ENSDF

Nuclear Data Sheets for A=123*

Jun Chen

National Superconducting Cyclotron Laboratory
Michigan State University, East Lansing, Michigan 48824, USA

Abstract: Experimental nuclear structure and decay data are evaluated for all of 15 known nuclides of mass 123 (Ru, Rh, Pd, Ag, Cd, In, Sn, Sb, Te, I, Xe, Cs, Ba, La, Ce). For each nuclide, detailed evaluated spectroscopic information is presented in each reaction and decay, and the best values combining all available data are recommended for level properties, γ and β radiations, and other spectroscopic properties. No excited states have been identified in ^{123}Ru, ^{123}Rh and ^{123}Pd. For ^{123}Ag, the long-predicted $1/2^-$ β-emitting isomer has been identified at 60-keV by 2019Ch24 recently, resolving unknown excitation energies in the level scheme that was previously available only from isomeric decays of two isomers (202 ns and 393 ns) with the position and spin-parity of the former remaining unknown. Significant discrepancies exist between data on high-spin sequences based on $11/2^{(-)}$ isomer in ^{123}Cd (2002Hw01 and 2016Re05), which needs to be resolved with further experimental investigation. In ^{123}Cs, the 114-ns isomer as the $\pi g_{9/2}$ bandhead proposed at 231.6+x by 2000Gi12 has been resolved by 2004Si26 and 2004Si27 to be the 328-keV level that is proposed by 2000Gi12 as a separate level. Excited states in ^{123}La and ^{123}Ce have only been studied via (HI,xnγ) reactions, with their base levels and thus excitation energies remaining unknown. The β^- decay schemes for daughter nuclide ^{123}Cd, ^{123}In and ^{123}Sn and the ε decay schemes for ^{123}Xe, ^{123}Cs and ^{123}Ba are considered incomplete due to large gaps between the highest observed excited levels and the Q-values. ^{123}Sn, ^{123}Sb, ^{123}Te and ^{123}I are the most extensively studied nuclides via various reactions and decays. This work supersedes earlier full evaluations of A=123 by 2004Oh11, 1993Oh12, 1980Ta02 and 1972Au10.

Cutoff Date: Literature available up to October 31, 2020 has been consulted. Main bibliographic source was the NSR database (2011Pr03) at Brookhaven laboratory webpage: www.nndc.bnl.gov/nsr/.

General Policies and Organization of Material: See the January issue of the *Nuclear Data Sheets* or http://www.nndc.bnl.gov/nds/NDSPolicies.pdf.

General Comments: The statistical analysis of γ-ray data and deduced level schemes is carried out through computer codes available at NNDC, BNL website: www.nndc.bnl.gov. The direct feedings to excited states in β^- and ε decays have generally been computed from I(γ+ce) intensity balances at each level; the associated log *ft* values are calculated using the log *ft* code. Theoretical total conversion coefficients are calculated using the BrIcc code (2008Ki07) for frozen-orbit option with an implicit uncertainty of 1.4% when not stated. Q values and particle-separation energies have been adopted from 2021Wa16 (AME-20). Static magnetic dipole moments are taken from 2014StZZ compilation and static electric quadrupole moments from 2016St14 evaluation, when available in these publications. Nuclear rms charge radii have been adopted from 2013An02 evaluation. In cases where weighted averaging procedures have been used, the assigned uncertainty in the result is generally not lower than the lowest uncertainty amongst the data points used in the procedure.

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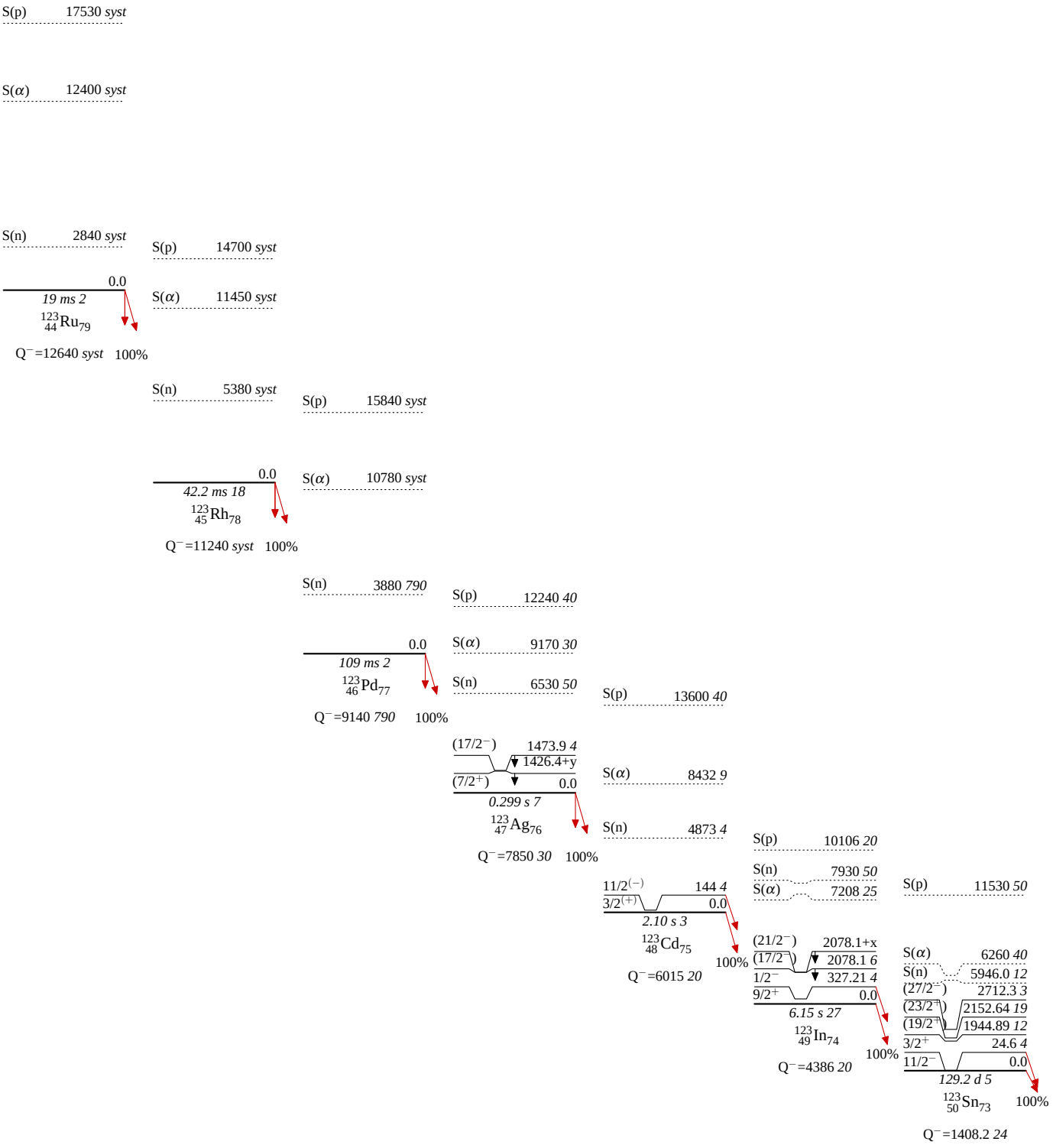
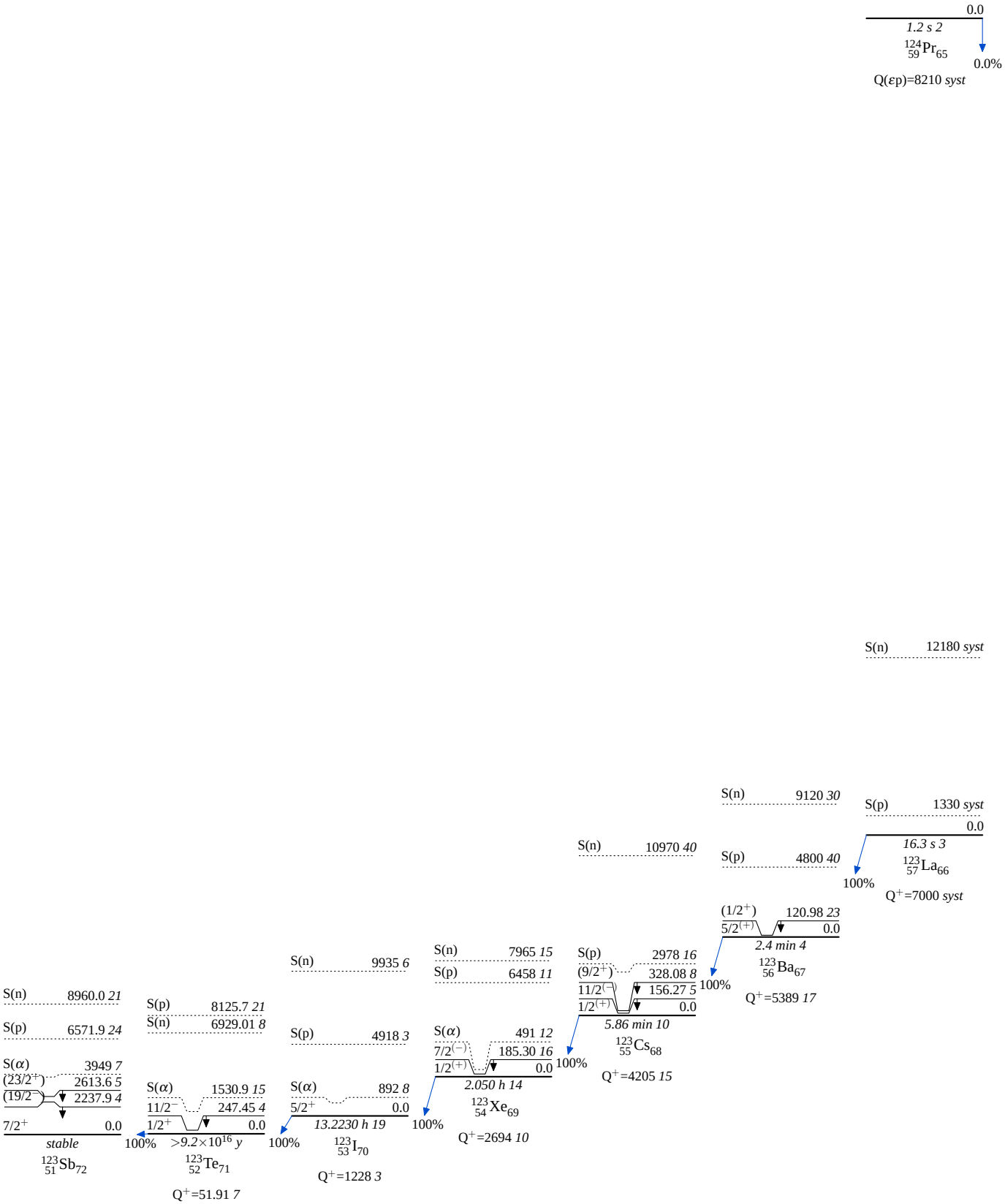
Index for A=123

Nuclide	Data Type	Page
	Skeleton Scheme for A=123	3
$^{123}_{44}Ru_{79}$		7
	Adopted Levels	7
$^{123}_{45}Rh_{78}$		8
	Adopted Levels	8
$^{123}_{46}Pd_{77}$		9
	Adopted Levels	9
$^{123}_{47}Ag_{76}$		11
	Adopted Levels, Gammas	11
	^{123}Pd β^- decay	15
	^{123}Ag IT decay (202 ns)	17
	^{123}Ag IT decay (393 ns)	19
$^{123}_{48}Cd_{75}$		23
	Adopted Levels, Gammas	23
	^{123}Ag β^- decay	28
	^{252}Cf SF decay	33
	^{9}Be(^{238}U,Xγ)	36
$^{123}_{49}In_{74}$		39
	Adopted Levels, Gammas	39
	^{123}Cd β^- decay (2.10 s)	48
	^{123}Cd β^- decay (1.80 s)	52
	^{123}In IT decay (1.4 μs)	59
	^{124}Sn(d,^{3}He)	61
	^{124}Sn(t,α)	62
	^{232}Th(^{6}Li,Fγ)	63
$^{123}_{50}Sn_{73}$		65
	Adopted Levels, Gammas	65
	^{123}In β^- decay (6.15 s)	78
	^{123}In β^- decay (47.4 s)	81
	^{122}Sn(n,γ) E=res	84
	^{122}Sn(n,γ):resonances	87
	^{122}Sn(n,γ) E=thermal	91
	^{122}Sn(d,p)	93
	^{122}Sn(d,pγ)	96
	^{122}Sn(α,^{3}He)	99
	^{124}Sn(p,d) IAR	100
	^{124}Sn(p,d)	101
	^{124}Sn(d,t)	102
	^{124}Sn(^{80}Se,Xγ)	103
	^{208}Pb(^{48}Ca,Xγ),^{238}U(^{48}Ca,Xγ)	105
	^{238}U(^{12}C,Fγ),^{208}Pb(^{18}O,Fγ)	110
$^{123}_{51}Sb_{72}$		114
	Adopted Levels, Gammas	114
	^{123}Sn β^- decay (129.2 d)	130
	^{123}Sn β^- decay (40.06 min)	133
	^{123}Te ε decay	137
	^{123}Sb IT decay (214 ns)	138
	^{123}Sb IT decay (61 μs)	141
	^{120}Sn(α,p)	146
	^{122}Sn(pol p,p) IAR	147
	^{122}Sn(^{3}He,d)	148
	^{122}Sn(α,t)	150
	^{122}Sn(^{7}Li,α2nγ)	151
	^{124}Sn(p,2nγ)	154
	^{123}Sb(γ,γ')	156
	^{123}Sb(n,n$'\gamma$)	164
	^{123}Sb(d,d$'$)	167
	^{124}Te(t,α)	168
	^{176}Yb(^{31}P,Xγ)	169
	Coulomb excitation	173
	^{9}Be(^{238}U,Fγ)	176
$^{123}_{52}Te_{71}$		179
	Adopted Levels, Gammas	179
	^{123}I ε decay (13.2230 h)	206
	^{123}Te IT decay (119.2 d)	214
	^{116}Cd(^{11}B,p3nγ)	218
	^{124}Sn(^{3}He,4nγ),^{123}Sb(d,2nγ)	223
	^{123}Sb(p,nγ)	226
	^{122}Te(n,γ) E=th	229
	^{122}Te(d,p)	241
	^{124}Te(p,d)	246
	^{124}Te(d,t)	247
	^{124}Te(^{3}He,α)	248
	^{125}Te(p,t)	249
	Coulomb excitation	250
$^{123}_{53}I_{70}$		253
	Adopted Levels, Gammas	253
	^{123}Xe ε decay	287
	^{80}Se(^{48}Ca,p4nγ)	298
	^{110}Pd(^{18}O,p4nγ)	310
	^{116}Cd(^{14}N,α3nγ)	314
	^{120}Sn(^{6}Li,3nγ)	323
	^{122}Sn(^{7}Li,6nγ)	327
	^{121}Sb(α,2nγ)	330
	^{122}Te(p,p$'$) IAR	343
	^{122}Te(^{3}He,d)	344
$^{123}_{54}Xe_{69}$		347
	Adopted Levels, Gammas	347
	^{123}Cs ε decay	388
	^{80}Se(^{48}Ca,5nγ):Nd	398
	^{80}Se(^{48}Ca,5nγ):SD	419
	^{110}Pd(^{18}O,5nγ)	427
	^{114}Cd(^{12}C,3nγ),(^{13}C,4nγ)	440
	^{123}Te(^{3}He,3nγ)	443
$^{123}_{55}Cs_{68}$		465
	Adopted Levels, Gammas	465
	^{123}Ba ε decay	488
	^{123}Cs IT decay	497
	^{64}Ni(^{64}Ni,p4nγ)	499
	^{96}Zr(^{32}S,p4nγ)	511
	^{92}Mo(^{34}S,3pγ)	514
	^{100}Mo(^{28}Si,p4nγ)	518
	^{108}Pd(^{19}F,4nγ),^{109}Ag(^{18}O,4nγ)	527
	^{116}Sn(^{10}B,3nγ),^{114}Sn(^{12}C,p2nγ)	534
$^{123}_{56}Ba_{67}$		539
	Adopted Levels, Gammas	539
	^{123}La ε decay	550
	^{94}Mo(^{32}S,2pnγ),^{74}Se(^{52}Cr,2pnγ)	554
	^{108}Cd(^{19}F,3npγ)	559
	^{114}Sn(^{12}C,3nγ)	565
$^{123}_{57}La_{66}$		567
	Adopted Levels, Gammas	567
	^{123}Ce ε decay (3.8 s)	579
	^{124}Pr εp decay (1.2 s)	580
	^{92}Mo(^{34}S,p2nγ),^{52}Cr(^{74}Se,p2nγ)	581
	^{92}Mo(^{40}Ca,2αpγ)	586
$^{123}_{58}Ce_{65}$		596
	Adopted Levels, Gammas	596
	^{64}Zn(^{64}Zn,αnγ)	600
References		604

Skeleton Scheme for A=123



Skeleton Scheme for A=123 (continued)



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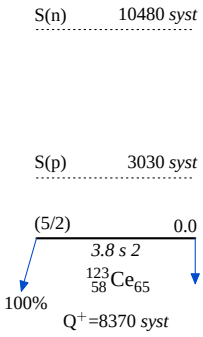

Ground-State and Isomeric-Level Properties

Nuclide	Level	Jπ	$T_{1/2}$	Decay Mode
^{123}Ru	0.0		19 ms *2*	%β^-=100; %β^-n=?; %β^-2n=?
^{123}Rh	0.0		42.2 ms *18*	%β^-=100; %β^-n=24.2 *14*; %β^-2n=?
^{123}Pd	0.0		109 ms *2*	%β^-=100; %β^-n=1.4 *3*
^{123}Ag	0.0	$(7/2^+)$	0.299 s *7*	%β^-=100; %β^-n=0.62 *9*
^{123}Ag	1426.4+y		202 ns *20*	%IT=100
^{123}Ag	1473.9	$(17/2^-)$	393 ns *16*	%IT=100
^{123}Cd	0.0	$3/2^{(+)}$	2.10 s *3*	%β^-=100
^{123}Cd	144	$11/2^{(-)}$	1.80 s *3*	%β^-=100
^{123}In	0.0	$9/2^+$	6.15 s *27*	%β^-=100
^{123}In	327.21	$1/2^-$	47.4 s *8*	%β^-=100
^{123}In	2078.1	$(17/2^-)$	1.4 μs *2*	%IT=100
^{123}In	2078.1+x	$(21/2^-)$	$\geq$100 μs	%IT=100
^{123}Sn	0.0	$11/2^-$	129.2 d *5*	%β^-=100
^{123}Sn	24.6	$3/2^+$	40.06 min *2*	%β^-=100
^{123}Sn	1944.89	$(19/2^+)$	7.4 μs *26*	
^{123}Sn	2152.64	$(23/2^+)$	6 μs	
^{123}Sn	2712.3	$(27/2^-)$	34 μs	
^{123}Sb	0.0	$7/2^+$	stable	
^{123}Sb	2237.9	$(19/2^-)$	214 ns *3*	%IT=100
^{123}Sb	2613.6	$(23/2^+)$	62 μs *4*	%IT=100
^{123}Te	0.0	$1/2^+$	$>9.2\times10^{16}$ y	%ε=100
^{123}Te	247.45	$11/2^-$	119.2 d *3*	%IT=100
^{123}I	0.0	$5/2^+$	13.2230 h *19*	%ε+%β^+=100
^{123}Xe	0.0	$1/2^{(+)}$	2.050 h *14*	%ε+%β^+=100
^{123}Xe	185.30	$7/2^{(-)}$	5.7 μs *3*	%IT=100
^{123}Cs	0.0	$1/2^{(+)}$	5.86 min *10*	%ε+%β^+=100
^{123}Cs	156.27	$11/2^{(-)}$	1.7 s *2*	%IT=100
^{123}Cs	328.08	$(9/2^+)$	114 ns *5*	%IT=100
^{123}Ba	0.0	$5/2^{(+)}$	2.4 min *4*	%ε+%β^+=100
^{123}Ba	120.98	$(1/2^+)$	0.83 μs *6*	%IT=100
^{123}La	0.0		16.3 s *3*	%ε+%β^+=100
^{123}Ce	0.0	(5/2)	3.8 s *2*	%ε+%β^+=100; %εp>0.
^{124}Pr	0.0		1.2 s *2*	%εp>0.0

Adopted Levels

Q(β^-)=12640 *syst*; S(n)=2840 *syst*; S(p)=17530 *syst*; Q(α)=−12400 *syst* 2021Wa16
ΔQ(β^-)=640, ΔS(n)=710, ΔS(p)=580, ΔQ(α)=580 (syst,2021Wa16).
S(2n)=8070 *640*, Q(β^-n)=7260 *580* (syst,2021Wa16).

2010Oh02: ^{123}Ru nuclide identified in Be(^{238}U,F) and Pb(^{238}U,F) reactions with a $^{238}U^{86+}$ beam energy of 345 MeV/nucleon produced by the cascade operation of the RIBF accelerator complex of the linear accelerator RILAC and four cyclotrons RRC, fRC, IRC and SRC. Identification of ^{123}Ru nuclei was made on the basis of magnetic rigidity, time-of-flight and energy loss of the fragments using BigRIPS fragment separator. Experiments performed at RIKEN facility. Based on A/Q spectrum and Z versus A/Q plot, three counts were assigned to ^{123}Ru isotope. (Q=charge state).

2015Lo04: ^{123}Ru nuclide produced at RIBF-RIKEN facility in ^{9}Be(^{238}U,F) reaction at E=345 MeV/nucleon with an average intensity of 6×10^{10} ions/s. Identification of ^{123}Ru was made by determining atomic Z and mass-to-charge ratio A/Q, where Q=charge state of the ions. The selectivity of ions was based on magnetic rigidity, time-of-flight and energy loss. The separated nuclei were implanted at a rate of 50 ions/s in a stack of eight double-sided silicon-strip detector (WAS3ABi), surrounded by EURICA array of 84 HPGe detectors. Correlations were recorded between the implanted ions and β rays. The half-life of ^{123}Ru isotope was measured from the correlated ion-β decay curves and maximum likelihood analysis technique as described in 2014Xu07. Comparison of measured half-lives with FRDM+QRPA, KTUY+GT2 and DF3+CQRPA theoretical calculations.

Structure calculations: 2019Mo01, 2017El01, 2017Ko24, 2016Ma12, 2015Sa14, 2013Fa08, 2003Mo09, 1997Bo24, 1997Mo25.

^{123}Ru Levels

E(level)	$T_{1/2}$	Comments
0	19 ms *2*	%β^-=100; %β^-n=?; %β^-2n=? E(level): measured half-life is assumed to correspond to the ground state of ^{123}Ru. J^π: $3/2^+$ from systematics (2021Ko07: NUBASE2020) and $1/2^-$ in theoretical calculations (2019Mo01). $T_{1/2}$: measured by 2015Lo04 from (implanted ions)β correlated curves in time and position using maximum likelihood method. See 2015Lo04 for comparison of their experimental value with theoretical values. Theoretical $T_{1/2}$=52.1 ms (2019Mo01), 33.4 ms (2016Ma12). Theoretical %β^-n=15, %β^-2n=0.0 (2019Mo01); %β^-n=2.5, %β^-2n=0.3 (2016Ma12). Measured σ=2 pb (2010Oh02), systematic uncertainty≈40%. Probability of misidentification of ^{123}Ru isotope<0.001% (2010Oh02).

Adopted Levels

Q(β^-)=11240 *syst*; S(n)=5380 *syst*; S(p)=14700 *syst*; Q(α)=−11450 *syst* 2021Wa16
ΔQ(β^-)=890, ΔS(n)=500, ΔS(p)=640, ΔQ(α)=640 (syst,2021Wa16).
S(2n)=9080 *740*, S(2p)=32230 *640*, Q(β^-n)=7360 *400* (syst,2021Wa16).

2010Oh02: ^{123}Rh nuclide identified in Be(^{238}U,F) and Pb(^{238}U,F) reactions with a $^{238}U^{86+}$ beam energy of 345 MeV/nucleon produced by the cascade operation of the RIBF accelerator complex of the linear accelerator RILAC and four cyclotrons RRC, fRC, IRC and SRC. Identification of ^{123}Rh nuclei was made on the basis of magnetic rigidity, time-of-flight and energy loss of the fragments using BigRIPS fragment separator. Experiments performed at RIKEN facility. Based on A/Q spectrum and Z versus A/Q plot, 920 counts in one setting and 11 counts in another setting were assigned to ^{123}Rh isotope. (Q=charge state).

2015Lo04: ^{123}Rh nuclide produced at RIBF-RIKEN facility in ^{9}Be(^{238}U,F) reaction at E=345 MeV/nucleon with an average intensity of 6×10^{10} ions/s. Identification of ^{123}Rh was made by determining atomic Z and mass-to-charge ratio A/Q, where Q=charge state of the ions. The selectivity of ions was based on magnetic rigidity, time-of-flight and energy loss. The separated nuclei were implanted at a rate of 50 ions/s in a stack of eight double-sided silicon-strip detector (WAS3ABi), surrounded by EURICA array of 84 HPGe detectors. Correlations were recorded between the implanted ions and β rays. The half-life of ^{123}Rh isotope was measured from the correlated ion-β decay curves and maximum likelihood analysis technique as described in 2014Xu07. Comparison of measured half-lives with FRDM+QRPA, KTUY+GT2 and DF3+CQRPA theoretical calculations.

2021Ha19: ^{123}Rh ions were produced by in-flight fission of E=345 MeV primary beam of ^{238}U on a ^{9}Be target. Fission products were analyzed and identified by the BigRIPS seperator and the ZeroDegree spectrometer, and implanted into the Advanced Implantation detector Array (AIDA) consisting of six 128x128 strips, 1-mm thick DSSDs. Neutrons were detected with the BRIKEN neutron counter array consisting of 140 ^{3}He proportional counters. Measured β-delayed neutrons, βn(t). Deduced $T_{1/2}$, β-delayed neutron emission probabilities.

Structure calculations: 2019Mo01, 2017Ko24, 2016Ma12, 2015Sa14, 2014Mi23, 2013Fa08, 2003Mo09, 1997Bo24, 1997Mo25.

^{123}Rh Levels

E(level)	$T_{1/2}$	Comments
0	42.2 ms *18*	%β^-=100; %β^-n=24.2 *14*; %β^-2n=? E(level): measured half-life is assumed to correspond to the ground state of ^{123}Rh. J^π: $7/2^+$ from systematic trends (2021Ko07); $1/2^-$ predicted in calculations of 2019Mo01. $T_{1/2}$: weighted average of 42.2 ms *18* (2021Ha19, β-delayed neutron counting) and 42 ms *4* (2015Lo04, (implanted ions)β correlated curves). %β^-n: from β-delayed neutron counting (2021Ha19). Theoretical $T_{1/2}$=162.3 ms (2019Mo01), 70.7 ms (2016Ma12). Theoretical %β^-n=70, %β^-2n=0.0 (2019Mo01); %β^-n=23.5 %β^-2n=0.1 (2016Ma12). Measured σ=1470 pb (2010Oh02), systematic uncertainty≈40%. Probability of misidentification of ^{123}Rh isotope<0.001% (2010Oh02).

Adopted Levels

Q(β^-)=9.14×10^3 *79*; S(n)=3.88×10^3 *79*; S(p)=15840 *syst*; Q(α)=−10780 *syst* 2021Wa16
ΔS(p)=850, ΔQ(α)=850 (syst,2021Wa16).
S(2n)=10390 *790*, S(2p)=30390 *890* (syst), Q(β^-n)=2610 *790* (2021Wa16).

1994Be24, 1998Do08: ^{123}Pd produced and identified in Pb(^{238}U,F), E=750 MeV/nucleon reaction followed by mass separation using FRS separator, and identification by time-of-flight. A total of 12 events were assigned by 1994Be24 to ^{123}Pd with production σ=4 μb.

2006Mo07: ^{123}Pd produced in ^{9}Be(^{136}Xe,X),E=121.8 MeV/nucleon reaction using A1900 fragment separator at NSCL-MSU facility to separate nuclei of interest. The secondary beam was implanted into β-decay detection apparatus consisting of Si(PIN) detectors and Si strip detectors (DSSD) and single-sided Si strip detectors (SSSD). Implantation and decay events were time stamped and correlated. Authors claim that new nuclide was identified, but it was already reported in 1994Be24 and 1998Do08. First measurement of half-life of ^{123}Pd decay reported by 2006Mo07 from ion-β correlated spectrum from 293 implants of ^{123}Pd nuclei.

2014SmZZ: neutron-rich nuclei were produced by fission reactions of E≈900 MeV/nucleon ^{238}U beam from the UNILAC linear accelerator and the SIS-18 synchrotron accelerated in two states impinging a 2.5 g/cm^2 lead target at GSI. Fragments were separated by the FRagment Separator (FRS) and implanted into the Silicon IMplantation Beta Absorber (SIMBA) with β-delayed neutrons detected by the surrounding Beta-delayed neutron (BELEN) detector. Measured implant-β correlations, β-neutron correlations. Deduced $T_{1/2}$, β-delayed neutron emission probabilities. Comparisons with available data and theoretical calculations. Discussed relevance to astrophysical r-process.

2015Lo04: ^{123}Pd nuclide produced at RIBF-RIKEN facility in ^{9}Be(^{238}U,F) reaction at E=345 MeV/nucleon with an average intensity of 6×10^{10} ions/s. Identification of ^{123}Pd was made by determining atomic Z and mass-to-charge ratio A/Q, where Q=charge state of the ions. The selectivity of ions was based on magnetic rigidity, time-of-flight and energy loss. The separated nuclei were implanted at a rate of 50 ions/s in a stack of eight double-sided silicon-strip detector (WAS3ABi), surrounded by EURICA array of 84 HPGe detectors. Correlations were recorded between the implanted ions and β rays. The half-life of ^{123}Pd isotope was measured from the correlated ion-β decay curves and maximum likelihood analysis technique as described in 2014Xu07. Comparison of measured half-lives with FRDM+QRPA, KTUY+GT2 and DF3+CQRPA theoretical calculations.

2016Kn03: neutron-rich exotic nuclei were produced by abrasion-fission reactions of E=410-415 MeV/nucleon ^{238}U beams from the synchrotron SIS-18 at GSI focused on a 1 g/cm^2 Be target. Fission fragments were separated using the FRagment Separator (FRS) and injected into the isochronous Experimental Storage Ring (ESR). Measured masses with the Isochronous Mass Spectrometry (IMS) method. Deduced mass excesses. Comparisons with theoretical models.

2021Ha19: ^{123}Pd ions were produced by in-flight fission of E=345 MeV primary beam of ^{238}U on a ^{9}Be target. Fission products were analyzed and identified by the BigRIPS seperator and the ZeroDegree spectrometer, and implanted into the Advanced Implantation detector Array (AIDA) consisting of six 128x128 strips, 1-mm thick DSSDs. Neutrons were detected with the BRIKEN neutron counter array consisting of 140 ^{3}He proportional counters. Measured β-delayed neutrons, βn(t). Deduced $T_{1/2}$, β-delayed neutron emission probabilities.

Structure calculations: 2019Mo01, 2018Ut01, 2017Ko24, 2016Ma12, 2015Sa14, 2013Fa08, 2003Bo06, 2003Mo09, 1997Bo24.

^{123}Pd Levels

E(level)	$T_{1/2}$	Comments
0	109 ms *2*	%β^-=100; %β^-n=1.4 *3* %β^-n: from β-delayed neutron counting (2021Ha19). Other: 10 *6* measured by 2014SmZZ. E(level): measured half-life is assumed to correspond to the ground state of ^{123}Pd. J$^\pi$: 3/2$^+$ from systematics (2021Ko07: NUBASE2020), 3/2$^-$ from theoretical considerations (2019Mo01). $T_{1/2}$: weighted average of 114 ms *2* (2021Ha19, β-delayed neutron counting), 108 ms *1* (2015Lo04, implanted ion-β correlation), 174 ms *+38−34* (2006Mo07, ion-β correlation), and 170 ms *+45−38*(stat)*18*(syst) (2014SmZZ, implant ion-β correlation). Measured mass-excess: −60430 *316*, with systematic uncertainty=315, statistical uncertainty=29 from 10 counts events (2016Kn03). Theoretical $T_{1/2}$=392.8 ms, %β^-n=1 (2019Mo01); $T_{1/2}$=172 ms, %β^-n=0.5 (2016Ma12).
0+x?		%β^-=100 E(level),J$^\pi$: a level with J^π=(11/2$^-$) is shown in the decay scheme in Fig.4 of 2019Ch24, with no further explanation and discussion. This level is proposed by 2019Ch24 probably as the parent level to feed the

Continued on next page (footnotes at end of table)

Adopted Levels (continued)

^{123}Pd Levels (continued)

E(level)	$T_{1/2}$	Comments
		high-spin levels in ^{123}Ag from ^{123}Pd β^- decay. No observation of this level has been made in any studies.

Adopted Levels, Gammas

Q(β^-)=7850 *30*; S(n)=6530 *50*; S(p)=12240 *40*; Q(α)=−9170 *30* 2021Wa16
S(2n)=11310 *30*, S(2p)=27900 *620*, Q(β^-n)=2970 *30* (2021Wa16).
Other measurements:
1976Lu02: ^{123}Ag produced and identified in ^{235}U(n,F) E=th reaction followed by on-line mass separation. Measured β-delayed neutrons, half-life of ^{123}Ag decay.
Precise mass measurements: 2010Br02, 2008Su19 (also 2010Li02).
Structure calculations: 2017Ko24, 2015Sa14, 2012Ji07, 2007Na28, 2003Bo06, 2003Bo48, 1997Bo24, 1996Bo11.
The level scheme is based on that of 2019Ch14 in ^{123}Pd β^- decay and 2013La11 in ^{123}Ag IT decay (393 ns).

^{123}Ag Levels

Cross Reference (XREF) Flags

A ^{123}Pd β^- decay
B ^{123}Ag IT decay (393 ns)
C ^{123}Ag IT decay (202 ns)

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	XREF	Comments
0.0	(7/2$^+$)	0.299 s *7*	AB	%β^-=100; %β^-n=0.62 *9* J$^\pi$: from systematics of lower mass odd-Ag isotopes J^π=1/2$^-$ or 7/2$^+$, but 1/2$^-$ is disfavored by the observed β feeding of three levels which feed an 11/2$^{(-)}$ isomer. $T_{1/2}$: weighted average of 0.272 s *24* (2006Mo07, implant-β correlations); 0.293 s *7* (1995Fe12, β and neutron counting using a laser-ionized source at ISOLDE-CERN facility); 0.35 s *4* (1989Hu10, γ-counting); 0.30 s *2* (1986Ma42, γ counting); 0.30 s *1* (1983Re05; neutron counting); 0.350 s *20* from neutron and γ-decay curves (2021Te02). Others: 0.396 s *15* (2014TeZY) from neutron and γ-decay curves; 0.39 s *3* (1976Lu02, neutron counting). %β^-n: weighted average of 0.55 *9* (1983Re05, uncertainty of 3.6% statistical and 15% systematic given in 1983Re05 combined in quadrature by the evaluator), 0.60 *25* (2014TeZY, neutron-β measurement), 1.0 *5* (2006Mo07, from implant-β decay curve analysis), and 1.01 *24* (2021Te02, neutron counting).
26.96 *24*	(9/2$^+$)		AB	
59.8 *8*	(1/2$^-$)		A C	E(level): the position of the 1/2$^-$ isomer is identified by 2019Ch24 in ^{123}Pd β^- decay based on $\gamma\gamma$-coin; 0+x in 2013La11. J$^\pi$: from shell-model predictions (2019Ch24).
385.0 *7*	(3/2$^-$,5/2$^-$)		A	
442.9 *7*	(3/2$^-$,5/2$^-$)		A C	
656.8 *4*	(11/2$^+$)	<25 ns	AB	J$^\pi$: (13/2$^+$) suggested by 2009St28. $T_{1/2}$: from γ(t) (2013La11).
740.9 *3*	(13/2$^+$)	<25 ns	AB	$T_{1/2}$: from γ(t) (2013La11).
968.9 *7*			A	
1036.2 *4*			A C	
1076.54 *24*	(9/2$^-$,11/2$^+$)		AB	J$^\pi$: (11/2$^+$) suggested by 2009St28.
1426.2 *3*	(13/2$^-$)		AB	J$^\pi$: (15/2$^+$,13/2$^-$) suggested by 2009St28.
1426.4 *8*			A C	
1426.4+y		202 ns *20*	C	%IT=100 E(level): this isomer feeds the 1426.4 level directly or indirectly (2013La11), but the feeding transition has not been observed. $T_{1/2}$: from γ(t) (2013La11).
1473.9 *4*	(17/2$^-$)	393 ns *16*	B	%IT=100 $T_{1/2}$: from γ(t), weighted average of 393 ns *16* (2013La11) and 396 ns *37* (2009St28).

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Adopted Levels, Gammas (continued)

^{123}Ag Levels (continued)

E(level)[†]	XREF
1647.2 *5*	A
1806.7 *5*	A
1852.4 *5*	A
2217.0 *6*	A

[†] From a least-squares fit to γ-ray energies, assuming $\Delta E\gamma$=0.3 keV where not given.
[‡] For excited states, tentative assignment are from 2013La11 based on systematics and observed decay pattern and also from 2019Ch24 based on shell-model predictions.

$\gamma(^{123}Ag)$

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.	α[‡]	Comments
26.96	(9/2$^+$)	(27)		0.0	(7/2$^+$)			E_γ: not observed experimentally in 2013La11 and 2019Ch24.
385.0	(3/2$^-$,5/2$^-$)	325.1		59.8	(1/2$^-$)			
442.9	(3/2$^-$,5/2$^-$)	57.9		385.0	(3/2$^-$,5/2$^-$)			
		383.1 *7*	100	59.8	(1/2$^-$)			E_γ: other: 383.1 from ^{123}Pd β^- decay (2019Ch24).
656.8	(11/2$^+$)	629.6 *5*	100	26.96	(9/2$^+$)			E_γ: other: 629.7 from ^{123}Pd β^- decay (2019Ch24).
740.9	(13/2$^+$)	84.1	10 *5*	656.8	(11/2$^+$)			E_γ: γ not seen in 2013La11.
		714.0 *2*	100	26.96	(9/2$^+$)			E_γ: other: 713.6 from ^{123}Pd β^- decay (2019Ch24).
968.9		526.0		442.9	(3/2$^-$,5/2$^-$)			
1036.2		593.3 *5*	100	442.9	(3/2$^-$,5/2$^-$)			E_γ: other: 594.0 from ^{123}Pd β^- decay (2019Ch24).
		1009.2		26.96	(9/2$^+$)			
1076.54	(9/2$^-$,11/2$^+$)	335.2 *5*	19 *4*	740.9	(13/2$^+$)			
		1049.3 *5*	51 *8*	26.96	(9/2$^+$)			E_γ: other: 1049.6 from ^{123}Pd β^- decay (2019Ch24).
		1076.5 *3*	100 *7*	0.0	(7/2$^+$)			E_γ: other: 1077.0 from ^{123}Pd β^- decay (2019Ch24).
1426.2	(13/2$^-$)	349.5 *2*	46.3 *25*	1076.54	(9/2$^-$,11/2$^+$)			E_γ: other: 349.1 from ^{123}Pd β^- decay (2019Ch24).
		685.6 *2*	100.0 *28*	740.9	(13/2$^+$)			E_γ: other: 685.3 from ^{123}Pd β^- decay (2019Ch24).
		769.3 *5*	34.2 *18*	656.8	(11/2$^+$)			E_γ: other: 770.0 from ^{123}Pd β^- decay (2019Ch24).
1426.4		390.2 *7*	100	1036.2				E_γ: other: 390.1 from ^{123}Pd β^- decay (2019Ch24).
1426.4+y		x[#]						E_γ: de-exciting transition directly from this isomer is not observed (2013La11). Such transition could feed directly the 1426.1 level or possible unobserved intermediate levels that feed the 1426.1 level.
1473.9	(17/2$^-$)	(48)	75 *2*	1426.2	(13/2$^-$)	[E2]	19.9	B(E2)(W.u.)=7.1 *8*
		732.7 *3*	100 *30*	740.9	(13/2$^+$)	[M2]	0.0068	B(M2)(W.u.)=9.0×10^{-4} *26*
1647.2		611.0		1036.2				
1806.7		770.5		1036.2				

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Adopted Levels, Gammas (continued)

$\gamma(^{123}Ag)$ (continued)

E_i(level)	E_γ [†]	E_f
1852.4	816.2	1036.2
2217.0	569.8	1647.2

[†] Values with uncertainties from 2013La11 in IT decays and those without uncertainties from 2019Ch24 in ^{123}Pd β^- decay. Eγ values are also available in 2009St28 but systematically higher by ≈ 2-4 keV than those in 2013La11 and 2019Ch24.

[‡] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

[#] Placement of transition in the level scheme is uncertain.

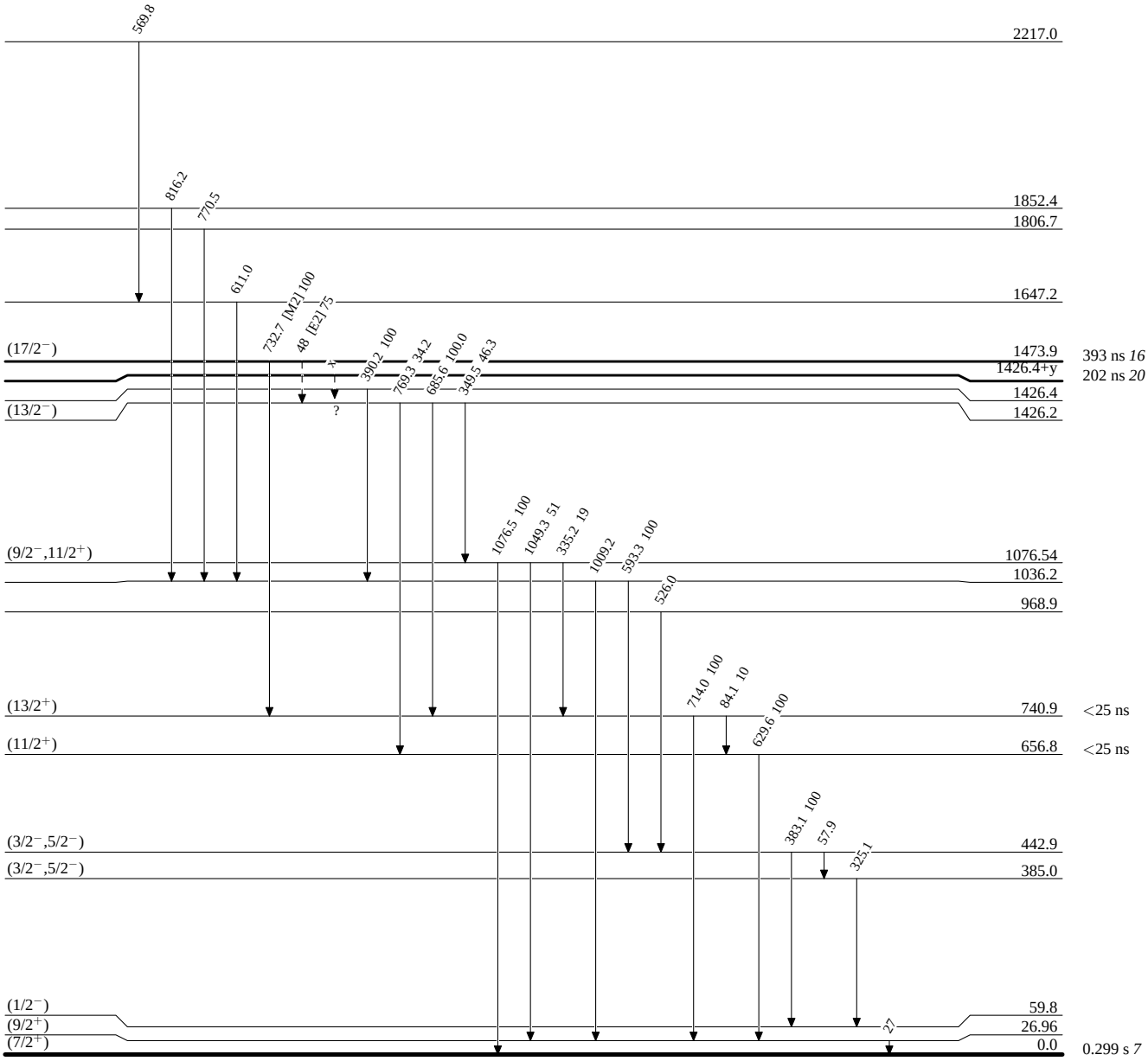
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

– – – – – – ► γ Decay (Uncertain)



$^{123}_{47}Ag_{76}$

^{123}Pd β^- decay 2019Ch24

Parent: ^{123}Pd: E=0; $T_{1/2}$=109 ms *2*; Q(β^-)=9.14×10^3 *79*; %β^- decay=100
Parent: ^{123}Pd: E=0+x; J^π=(11/2$^-$); Q(β^-)=9.14×10^3 *79*; %β^- decay=100
^{123}Pd(0)-J^π: (3/2$^+$) from systematics (2021Ko07: NUBASE2020).
^{123}Pd(0)-$T_{1/2}$: From Adopted Levels of ^{123}Pd.
^{123}Pd(0)-Q(β^-): From 2021Wa16.
^{123}Pd(0+x)-E,J^π: A level with J^π=(11/2$^-$) is shown in the decay scheme in Fig.4 of 2019Ch24, with no further explanation and discussion. This level is proposed by 2019Ch24 probably as the parent level to feed the high-spin levels in ^{123}Ag from ^{123}Pd β^- decay. No observation of this level has been made in any studies.
2019Ch24: ^{123}Pd source ions were produced via fragmentation of of a 345 MeV/nucleon ^{238}U beam provided from the RIBF facility at RIKEN impinging on a 3-mm-thick Be target. Fragments were separated and identified event by event by the BigRIPS and ZeroDegree spectrometers. Selected ions were implanted into the WAS3ABi active stopper consisting of 8 compactly-stacked double-sided silicon-strip detectors (DSSSDs). γ rays were detected with the EURICA spectrometer consisting of 84 HPGe crystals in 12 clusters. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\beta\gamma$-coin. Deduced levels. Identified the 1/2$^-$ isomer in ^{123,125}Ag. Systematics of neighboring Ag isotopes. Comparisons with shell-model calculations.
The level scheme is as proposed in 2019Ch24 based on $\gamma\gamma$-coin. A complete level scheme from this measurement will be presented in a following full paper according to an email reply of the author (Z.H. Li) to the evaluator in June 21, 2019.

^{123}Ag Levels

E(level)†	J^π‡	E(level)†	J^π‡	E(level)†	J^π‡	E(level)†
0.0	(7/2$^+$)	442.4 *6*	(3/2$^-$,5/2$^-$)	1036.4 *5*		1647.4 *6*
27.2 *4*	(9/2$^+$)	656.7 *5*	(11/2$^+$)	1077.0 *3*	(9/2$^-$,11/2$^+$)	1806.9 *6*
59.3 *7*	(1/2$^-$)	740.9 *5*	(13/2$^+$)	1426.3 *4*	(13/2$^-$)	1852.6 *6*
384.5 *7*	(3/2$^-$,5/2$^-$)	968.4 *7*		1426.5 *6*		2217.2 *7*

† From a least-squares fit to γ-ray energies, assuming $\Delta E\gamma$=0.3 keV.
‡ Proposed by 2019Ch24, based on γ-decay patterns and shell-model predictions. The evaluator has placed parity also in parenthesis if not by 2019Ch24.

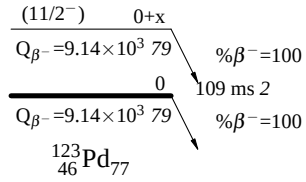
γ(^{123}Ag)

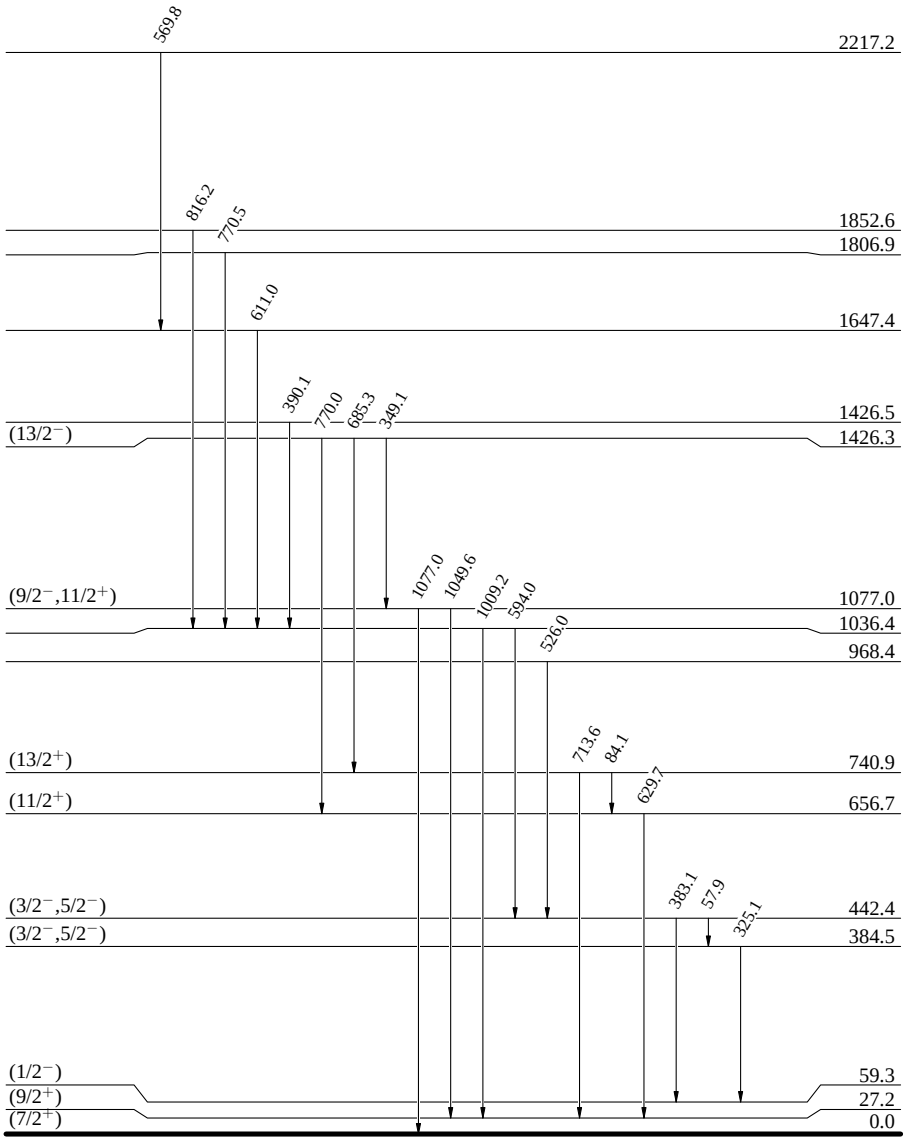
E$_\gamma$†	E$_i$(level)	J^π_i	E$_f$	J^π_f	E$_\gamma$†	E$_i$(level)	J^π_i	E$_f$	J^π_f
57.9	442.4	(3/2$^-$,5/2$^-$)	384.5	(3/2$^-$,5/2$^-$)	629.7	656.7	(11/2$^+$)	27.2	(9/2$^+$)
84.1	740.9	(13/2$^+$)	656.7	(11/2$^+$)	685.3	1426.3	(13/2$^-$)	740.9	(13/2$^+$)
x256.0					x699.8				
325.1	384.5	(3/2$^-$,5/2$^-$)	59.3	(1/2$^-$)	713.6	740.9	(13/2$^+$)	27.2	(9/2$^+$)
349.1	1426.3	(13/2$^-$)	1077.0	(9/2$^-$,11/2$^+$)	x742.8				
383.1	442.4	(3/2$^-$,5/2$^-$)	59.3	(1/2$^-$)	770.0‡	1426.3	(13/2$^-$)	656.7	(11/2$^+$)
390.1	1426.5		1036.4		770.5‡	1806.9		1036.4	
x471.9					816.2	1852.6		1036.4	
x500.2					x956.1				
526.0	968.4		442.4	(3/2$^-$,5/2$^-$)	1009.2	1036.4		27.2	(9/2$^+$)
569.8	2217.2		1647.4		1049.6	1077.0	(9/2$^-$,11/2$^+$)	27.2	(9/2$^+$)
594.0	1036.4		442.4	(3/2$^-$,5/2$^-$)	1077.0	1077.0	(9/2$^-$,11/2$^+$)	0.0	(7/2$^+$)
611.0	1647.4		1036.4						

† From 2019Ch24, with unplaced γ indicated in Fig.2 of 2019Ch24.
‡ Doublet peak (2019Ch24).
x γ ray not placed in level scheme.

^{123}Pd β^- decay 2019Ch24

Decay Scheme





$^{123}_{47}Ag_{76}$

^{123}Ag IT decay (202 ns) 2013La11,2009St28

Parent: ^{123}Ag: E=1426.1+y; $T_{1/2}$=202 ns *20*; %IT decay=100

2013La11: neutron-rich Ag nuclei were produced in two experiments performed at GSI, using the fragmentation of a ^{136}Xe beam and the fission of a ^{238}U beam, both with E=750 MeV/nucleon from the SIS-18 synchrotron, on Be targets of 1 and 4 g/cm^2 thickness, respectively. Fragments were analyzed and separated by the GSI Fragment Separator (FRS) and implanted into a copper or plastic stopper. Delayed γ rays were detected with the RISING array consisting of 105 HPGe detectors mounted as 15 clusters. Measured Eγ, Iγ, $\gamma\gamma$-coin, γ(t). Deduced levels, J, π, $T_{1/2}$. Comparisons with shell-model calculations.

2009St28 (also 2007To23, 2006ToZW, 2005WaZY): neutron-rich Ag nuclei were produced via fragmentation of E=120 MeV/nucleon ^{136}Xe beam from the cyclotron at NSCL on a 188 mg/cm^2 Be target. Fragments were separated by the A1900 separator and implanted into the NSCL Beta Counting System (BCS) consisting of three Si PIN detectors, a double- sided and six single-sided Si detectors for particle identification. γ rays were detected with 12 segmented Ge detectors from the NSCL SeGA array. Measured Eγ, Iγ, fragment-γ-coin, $\gamma\gamma$-coin, γ(t). Deduced levels, J, π, $T_{1/2}$. Systematics of neighboring Ag isotopes.

The placements of γ transitions (level scheme) follows that of 2019Ch24 in ^{123}Pd β^- decay, which is much more complete than that of 2013La11 and has identified the unknown level at E(level)=x fed by the 390γ-382γ-592γ sequence in 2013La11 to be the 1/2$^-$ isomer with E(level)=59.5. The order of 382γ-593γ cascade in 2013La11 is inverted in 2019Ch24.

Due to unobserved transition(s), the decay scheme is probably incomplete.

^{123}Ag Levels

E(level)†	J$^\pi$‡	$T_{1/2}$	Comments
59.5	(1/2$^-$)		E(level): 0+x in 2013La11.
442.6 *7*	(3/2$^-$,5/2$^-$)		
1035.9 *9*			
1426.1 *11*			
1426.1+y		202 ns *20*	E(level): this isomer feeds the 1426.1 level directly or indirectly (2013La11), but the feeding transition has not been observed. $T_{1/2}$: from γ(t) of 382γ+592γ+390γ (2013La11).

† From a least-squares fit to γ-ray energies.

‡ From Adopted Levels.

γ(^{123}Ag)

E$_\gamma$†	I$_\gamma$#	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Comments
x@		1426.1+y				E$_\gamma$: de-exciting transition directly from this isomer is not observed (2013La11). Such transition could feed directly the 1426.1 level or possible unobserved intermediate levels that feed the 1426.1 level.
383.1‡ *7*	5.5 *7*	442.6	(3/2$^-$,5/2$^-$)	59.5	(1/2$^-$)	E$_\gamma$: unweighted average of 382.4 *5* (2013La11) and 383.8 *3* (2006ToZW). Others: 385.3 *2* (unplaced in 2009St28), 383.1 (2019Ch24). I$_\gamma$: weighted average of 5.5 *7* (2013La11), 4 *1* (2009St28), and 6 *2* (2006ToZW).
390.2 *7*	5.3 *18*	1426.1		1035.9		E$_\gamma$: unweighted average of 389.5 *5* (2013La11) and 390.8 *3* (2006ToZW). Others: 391.2 *3* (unplaced in 2009St28), 390.1 (2019Ch24). I$_\gamma$: unweighted average of 8.8 *9* (2013La11), 4 *1* (2009St28), and 3 *3* (2006ToZW). In the level scheme of 2019Ch24, this γ is indicated much weaker than both 593γ and 383γ.
593.3‡ *5*	6.6 *8*	1035.9		442.6	(3/2$^-$,5/2$^-$)	E$_\gamma$: from 2013La11. Others: 597.6 *6* (unplaced in 2009St28), 594.0 (2019Ch24). This γ is not reported in 2006ToZW but an unlabelled peak around this energy is seen in the γ spectrum in Fig 4.33. I$_\gamma$: weighted average of 6.5 *8* (2013La11) and 7 *2* (2009St28).

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^{123}Ag IT decay (202 ns) 2013La11,2009St28 (continued)

$\gamma(^{123}Ag)$ (continued)

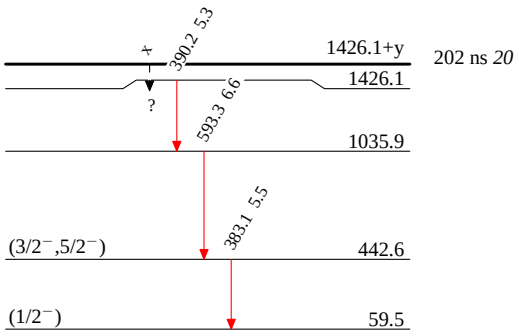
† Values in 2009St28 seem systematically higher than those in 2019Ch24, 2013La11 and 2006ToZW by ≈2-4 keV and are not considered in average.
‡ The order of 593γ-382γ is inverted in 2013La11.
# Relative to Iγ=100 for 713γ seen in ^{123}Ag IT decay (393 ns).
@ Placement of transition in the level scheme is uncertain.

^{123}Ag IT decay (202 ns) 2013La11,2009St28

Decay Scheme

Intensities: Relative I_γ
%IT=100

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)



$^{123}_{47}Ag_{76}$

^{123}Ag IT decay (393 ns) 2013La11,2009St28,2006ToZW

Parent: ^{123}Ag: E=1473.5 *5*; $J^{\pi}=(17/2^{-})$; $T_{1/2}$=393 ns *16*; %IT decay=100

2013La11: neutron-rich Ag nuclei were produced in two experiments performed at GSI, using the fragmentation of a ^{136}Xe beam and the fission of a ^{238}U beam, both with E=750 MeV/nucleon from the SIS-18 synchrotron, on Be targets of 1 and 4 g/cm^2 thickness, respectively. Fragments were analyzed and separated by the GSI Fragment Separator (FRS) and implanted into a copper or plastic stopper. Delayed γ rays were detected with the RISING array consisting of 105 HPGe detectors mounted as 15 clusters. Measured Eγ, Iγ, $\gamma\gamma$-coin, γ(t). Deduced levels, J, π, $T_{1/2}$. Comparisons with shell-model calculations.

2009St28 (also 2007To23, 2006ToZW, 2005WaZY): neutron-rich Ag nuclei were produced via fragmentation of E=120 MeV/nucleon ^{136}Xe beam from the cyclotron at NSCL on a 188 mg/cm^2 Be target. Fragments were separated by the A1900 separator and implanted into the NSCL Beta Counting System (BCS) consisting of three Si PIN detectors, a double- sided and six single-sided Si detectors for particle identification. γ rays were detected with 12 segmented Ge detectors from the NSCL SeGA array. Measured Eγ, Iγ, fragment-γ-coin, $\gamma\gamma$-coin, γ(t). Deduced levels, J, π, $T_{1/2}$. Systematics of neighboring Ag isotopes.

Level scheme, initially proposed by 2006ToZW was revised by 2009St28. Later work by 2013La11 is more in agreement with the results from 2006ToZW than from 2009St28. Data and level scheme in 2013La11 are adopted here.

^{123}Ag Levels

E(level)[†]	J^{π}[‡]	$T_{1/2}$[#]	Comments
0.0	$(7/2^{+})$		
26.9 *4*	$(9/2^{+})$		
656.7 *5*	$(11/2^{+})$	<25 ns	J^{π}: $(13/2^{+})$ suggested by 2009St28, $(11/2^{+})$ in 2006ToZW.
740.8 *4*	$(13/2^{+})$	<25 ns	
1076.5 *3*	$(9/2^{-},11/2^{+})$		J^{π}: $(11/2^{+})$ suggested by 2009St28 and 2006ToZW.
1426.2 *4*	$(13/2^{-})$		J^{π}: $(15/2^{+},13/2^{-})$ suggested by 2009St28; $(15/2^{+})$ in 2006ToZW.
1473.5 *5*	$(17/2^{-})$	393 ns *16*	$T_{1/2}$: from γ(t), weighted average of 393 ns *16* (2013La11) and 396 ns *37* (2009St28). Other: 0.32 μs *3* (2006ToZW).

[†] From a least-squares fit to γ-ray energies.

[‡] For excited states, tentative assignment are from 2013La11, based on systematics and observed decay pattern.

[#] From γ(t) (2013La11).

^{123}Ag IT decay (393 ns) 2013La11,2009St28,2006ToZW (continued)

$\gamma(^{123}Ag)$

Iγ normalization: From Iγ(all γ from 1426 level+732.7γ from 1474 level)=100.

E_γ [†]	I_γ [†#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α [@]	$I_{(\gamma+ce)}$ [#]	Comments
(27)		26.9	$(9/2^+)$	0.0	$(7/2^+)$				E_γ: not observed experimentally in 2013La11.
(48)	7.2 *2*	1473.5	$(17/2^-)$	1426.2	$(13/2^-)$	[E2]	19.9	151 *4*	B(E2)(W.u.)=6.8 *8* (2013La11) $I_{(\gamma+ce)}$: deduced by evaluator from γ+ce intensity balance at 1426 level, with negligible contributions from internal conversion of γ rays de-exciting 1426 level. I_γ: γ not observed experimentally, Iγ deduced from the intensity balance at the 1426-keV level, and conversion coefficient=19.9.
84[‡] *1*	10 *5*	740.8	$(13/2^+)$	656.7	$(11/2^+)$				
335.2[‡] *5*	3.6 *7*	1076.5	$(9/2^-,11/2^+)$	740.8	$(13/2^+)$				
349.5 *2*	38.6 *21*	1426.2	$(13/2^-)$	1076.5	$(9/2^-,11/2^+)$				E_γ: weighted average of 348.7 *5* (2013La11) and 349.5 *1* (2006ToZW). Other: 351.4 *1* (2009St28). I_γ: unweighted average of 42.8 *14* (2013La11), 36 *3* (2009St28), and 37 *2* (2006ToZW).
629.6 *5*	33.2 *15*	656.7	$(11/2^+)$	26.9	$(9/2^+)$				E_γ: unweighted average of 629.1 *5* (2013La11) and 630.1 *1* (2006ToZW). Other: 632.9 *1* (2009St28). I_γ: weighted average of 32.7 *15* (2013La11), 37 *4* (2009St28), and 33 *3* (2006ToZW).
685.6 *2*	83.4 *23*	1426.2	$(13/2^-)$	740.8	$(13/2^+)$				E_γ: weighted average of 684.7 *5* (2013La11) and 685.6 *1* (2006ToZW). Other: 687.3 *1* placed from 714 level (2009St28). I_γ: weighted average of 84.5 *23* (2013La11), 78 *6* (2009St28), and 80 *7* (2006ToZW).
714.0 *2*	100	740.8	$(13/2^+)$	26.9	$(9/2^+)$				E_γ: weighted average of 713.2 *5* (2013La11) and 714.0 *1* (2006ToZW). Other: 716.7 *2* and 714 with combined Iγ=100 *7* in 2009St28. Doublet at 713 keV was not confirmed by 2013La11, who place the 713γ above the 27 level, whereas 2009St28 placed a 714γ as a ground-state transition, and 717γ from a 1430 level. I_γ: other: 100 *4* in 2006ToZW.
732.7 *3*	10 *3*	1473.5	$(17/2^-)$	740.8	$(13/2^+)$	[M2]	0.0068		E_γ: weighted average of 732.1 *5* (2013La11) and 732.9 *3* (2006ToZW). Other: 735.1 *3* unplaced in 2009St28. I_γ: unweighted average of 15.4 *11* (2013La11), 8 *2* (2009St28), and 6 *3* (2006ToZW).
[x]741.2 *5*	4.3 *7*								Eγ=738.3 *4*, Iγ=7 *1*, unplaced in 2009St28.
769.3 *5*	28.5 *15*	1426.2	$(13/2^-)$	656.7	$(11/2^+)$				E_γ: unweighted average of 768.8 *5* (2013La11) and 769.8 *1* (2006ToZW). Other: 771.6 *4* (2009St28). I_γ: weighted average of 29.5 *15* (2013La11), 31 *4* (2009St28), and 26 *2* (2006ToZW).

^{123}Ag IT decay (393 ns) 2013La11,2009St28,2006ToZW (continued)

γ(^{123}Ag) (continued)

E_γ [†]	I_γ [†#]	E_i(level)	J_i^π	E_f	J_f^π	Comments
[x]1008.2[‡] *5*	1.7 *4*					
1049.3 *5*	9.8 *15*	1076.5	(9/2$^-$,11/2$^+$)	26.9	(9/2$^+$)	E_γ: others: 1049.3 *6* (2006ToZW), 1052.1 *5* (2009St28). I_γ: weighted average of 9.1 *9* (2013La11), 17 *3* (2009St28), and 11 *5* (2006ToZW).
1076.5 *3*	19.4 *13*	1076.5	(9/2$^-$,11/2$^+$)	0.0	(7/2$^+$)	E_γ: weighted average of 1076.3 *5* (2013La11) and 1076.6 *3* (2006ToZW). Other: 1079.4 *5* (2009St28). I_γ: weighted average of 19.5 *13* (2013La11), 22 *3* (2009St28), and 16 *3* (2006ToZW).
[x]1133.5 *2*	5 *1*					E_γ: γ from 2006ToZW, 2007To23 only.

[†] From 2013La11, unless otherwise noted. Some of the Eγ values given in 2006ToZW are more precise than in 2013La11, but these are in disagreement with the values in 2009St28 from the same lab. The energies of all the gamma rays in 2009St28 are systematically higher by ≈2-4 keV than those in 2013La11 and 2006ToZW (also 2007To23) and are not considered in average.

[‡] Weak γ from 2013La11 only.

[#] For absolute intensity per 100 decays, multiply by 0.62 *2*.

[@] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

[x] γ ray not placed in level scheme.

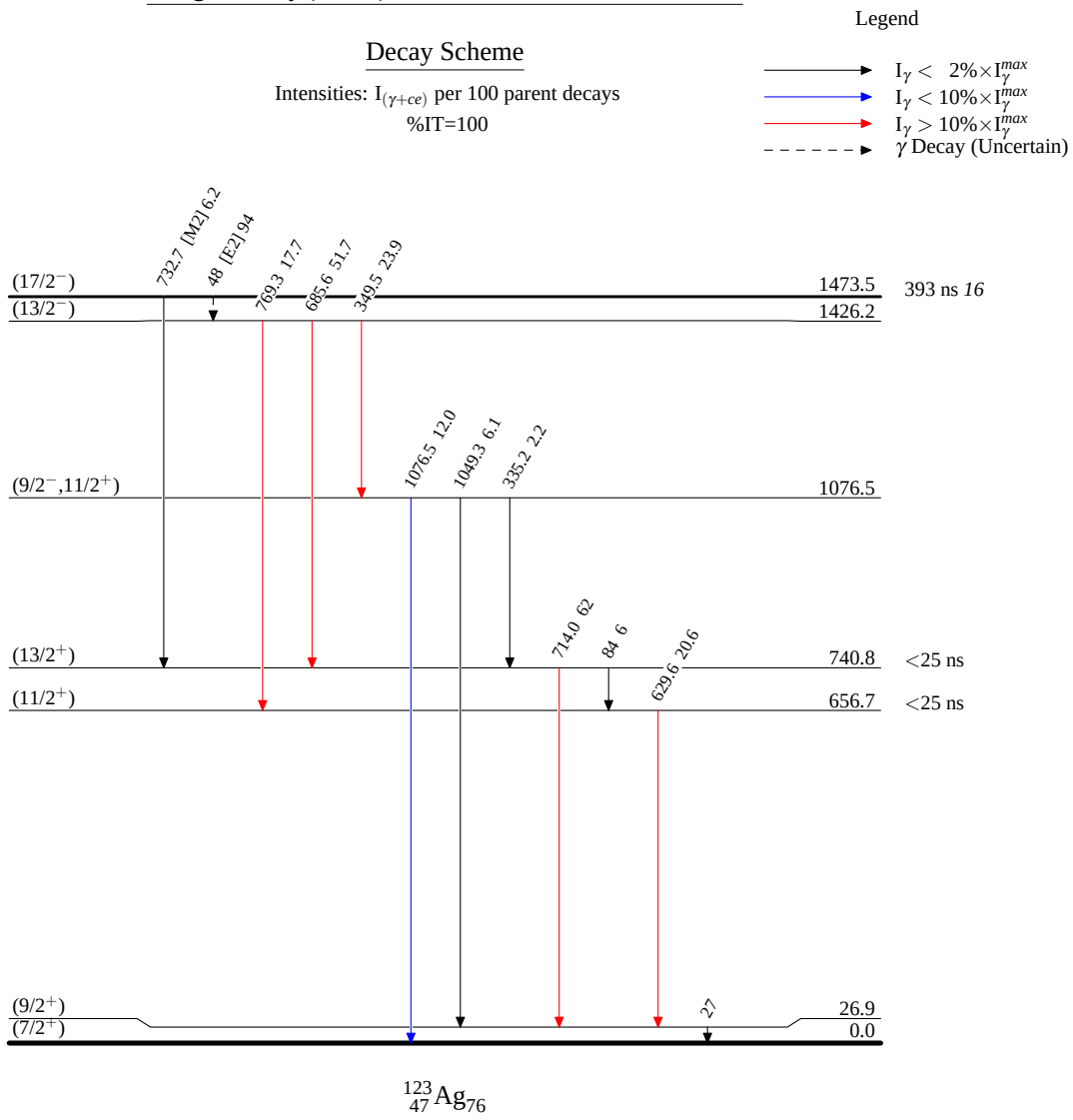
$^{123}_{47}Ag_{76}$-11

^{123}Ag IT decay (393 ns) 2013La11,2009St28,2006ToZW

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays

%IT=100



$^{123}_{47}Ag_{76}$

Adopted Levels, Gammas

Q(β^-)=6015 *20*; S(n)=4873 *4*; S(p)=13600 *40*; Q(α)=−8432 *9* 2021Wa16
S(2n)=12483 *3*, S(2p)=25810 *4* (2021Wa16).
Other measurements:
Mass measurements: 2013Ka08 (isomer, JYFLTRAP), 2012Ha25 (g.s., JYFLTRAP), 2010Br02 (g.s.+isomer unresolved, ISOLTRAP).
Hyperfine structure: 2018Ha30, 2017Ne04, 2016Yo01, 2013Yo02.
Structure calculations: 2015Le08, 2015Mi16, 2014Zh02, 2007Na28, 2003Bo06, 1981Al25.
^{124}Ag decays by delayed neutrons to ^{123}Cd (1983Re05).
The sequences of high-spin states based on the 11/2$^{(-)}$ isomer from 2002Hw01 via ^{252}Cf SF decay and from 2016Re05 via ^{9}Be(^{238}U,Xγ) are completely different in level and gamma energies. The evaluator has adopted the data from 2016Re05, which are more complete and have more convincing particle identification with γ rays tagged by both A and Z.

^{123}Cd Levels

Cross Reference (XREF) Flags

- A ^{123}Ag β^- decay
- B ^{252}Cf SF decay
- C ^{9}Be(^{238}U,Xγ)

E(level)[†]	J$^\pi$	T$_{1/2}$	XREF	Comments
0.0	3/2$^{(+)}$	2.10 s *3*	A	%β^-=100 μ=+0.7896 *6*; Q=+0.042 *5* (2013Yo02) J$^\pi$: spin=3/2 from collinear laser spectroscopy in 2013Yo02 and 2018Ha30; systematics of odd Cd isotopes indicates 1/2$^+$ or 3/2$^+$; parity also supported by possible allowed β feeding (log *ft*=5.5) to parity=(+) state at 1052 in ^{123}In. T$_{1/2}$: weighted average of 2.07 s *3* (1983Re05), 2.19 s *10* (1986Go10), 2.11 s *6* (1986Ma42) and 2.12 s *3* (1989Hu03). Other: 2.35 s *5* (2014TeZY) is in disagreement. μ,Q: from collinear laser spectroscopy in 2013Yo02. See also 2014StZZ and 2016St14 compilations. δ<r^2>=−0.028 mb *3*(stat) *2*(syst), or −0.042 mb *13*(stat) *3*(syst), for difference between the (11/2$^-$) state and the g.s. (2016Yo01). δ<r^2>=0.457 fm^2 *6*(uncorrelated) *67*(correlated), with respect to ^{114}Cd (2018Ha30).
116.40 *3*	(1/2$^+$)		A	J$^\pi$: systematics of odd-A Cd isotopes proposed by 1989Hu10 in ^{123}Ag β^- decay.
144[#] *4*	11/2$^{(-)}$[‡]	1.80 s *3*	ABC	%β^-=100 μ=−1.0015 *3*; Q=+0.135 *7* (2013Yo02) E(level): from the direct mass measurement by 2013Ka08. Other: an energy of 316 keV proposed by 1989Hu10 in ^{123}Ag β^- decay from γ-cascade relations. See detailed comments in that dataset for the position of this isomer. J$^\pi$: spin=11/2 from collinear laser spectroscopy in 2013Yo02; 11/2$^-$ from systematics of h$_{11/2}$ states in odd-A Cd isotopes. T$_{1/2}$: weighted average of 1.81 s *3* (1989Hu03) and 1.88 s *6* (1986Ma42), and 1.74 s *4* (2014TeZY). μ,Q: from collinear laser spectroscopy in 2013Yo02. See also the 2014StZZ and 2016St14 compilations.
263.867 *20*	(7/2$^+$)	80 ns *15*	A	J$^\pi$: possible allowed β feeding (log *ft*=5.1) from (7/2$^+$); 263.9γ to 3/2$^{(+)}$; possible 123.7γ to 11/2$^{(-)}$. T$_{1/2}$: from $\gamma\gamma$(t) (1989Hu10) in ^{123}Ag β^- decay.
409.76 *3*	(5/2$^+$,7/2$^+$)		A	J$^\pi$: possible allowed β feeding (log *ft*=5.6) from (7/2$^+$); 409.8γ to (3/2$^+$).
463.78 *7*	(5/2$^+$)		A	J$^\pi$: possible β feeding (log *ft*=6.0) from (7/2$^+$); 347.4γ to (1/2$^+$).
514.65 *5*	(9/2$^+$)		A	J$^\pi$: possible allowed β feeding (log *ft*=5.7) from (7/2$^+$); 374.0γ to 11/2$^{(-)}$.
553.72 *15*	(5/2$^+$)		A	J$^\pi$: possible β feeding (log *ft*=6.1) from (7/2$^+$); 437.5γ to (1/2$^+$).

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Adopted Levels, Gammas (continued)

^{123}Cd Levels (continued)

E(level)[†]	J^π	XREF	Comments
591.29 *5*	$(5/2^+,7/2^+)$	A	J^π: possible allowed β feeding (log *ft*=5.7) from $(7/2^+)$; 591.3γ to $3/2^{(+)}$.
672.44 *12*	$(5/2^+)$	A	J^π: possible β feeding (log *ft*=6.1) from $(7/2^+)$; 556.1γ to $(1/2^+)$.
704.92 *11*	(5/2,7/2,9/2)	A	J^π: possible β feeding (log *ft*=6.0) from $(7/2^+)$; 441.1γ to $(7/2^+)$.
743.73 *5*	$(5/2^+,7/2^+)$	A	J^π: possible allowed β feeding (log *ft*=5.7) from $(7/2^+)$; 743.4γ to $3/2^{(+)}$.
806.7[#] *10*	$(15/2^-)$[‡]	C	
829.75 *20*	$(9/2^+)$	A	J^π: possible allowed β feeding (log *ft*=5.8) from $(7/2^+)$; 689.1γ to $11/2^{(-)}$.
885.2 *3*	(5/2,7/2,9/2)	A	J^π: possible β feeding (log *ft*=6.0) from $(7/2^+)$; 621.3γ to $(7/2^+)$.
1010.08 *16*	(5/2,7/2,9/2)	A	J^π: possible β feeding (log *ft*=6.0) from $(7/2^+)$; 600.3γ to $(7/2^+)$.
1061.44 *9*	(5/2,7/2,9/2)	A	J^π: possible β feeding (log *ft*=6.3) from $(7/2^+)$.
1528.86 *14*	$(5/2^+,7/2^+)$	A	J^π: possible allowed β feeding (log *ft*=5.5) from $(7/2^+)$; 1528.2γ to $3/2^{(+)}$.
1607.7[#] *15*	$(19/2^-)$[‡]	C	
2239.88 *20*	$(5/2^+,7/2^+,9/2^+)$	A	J^π: possible allowed β feeding (log *ft*=5.4) from $(7/2^+)$.
2377.7[#] *18*	$(23/2^-)$[‡]	C	
2601.0 *3*	$(5/2^+,7/2^+,9/2^+)$	A	J^π: possible allowed β feeding (log *ft*=5.6) from $(7/2^+)$.
2615.7[#] *20*	$(25/2^-)$[‡]	C	
2787.37 *18*	$(5/2^+,7/2^+,9/2^+)$	A	J^π: possible allowed β feeding (log *ft*=5.4) from $(7/2^+)$.
2812.7[#] *23*	$(27/2^-)$[‡]	C	
2902.42 *22*	$(5/2^+,7/2^+)$	A	J^π: possible allowed β feeding (log *ft*=5.2) from $(7/2^+)$; 2902.7γ to $3/2^{(+)}$.
2910.22 *24*	$(5/2^+,7/2^+)$	A	J^π: possible allowed β feeding (log *ft*=5.5) from $(7/2^+)$; 2909.5γ to $3/2^{(+)}$.
2968.7[#] *25*	$(29/2^-)$[‡]	C	

[†] From a least-squares fit to γ-ray energies.
[‡] From γ-decay pattern and shell-model predictions.
[#] Seq.(A): Sequence based on $11/2^{(-)}$.

$\gamma(^{123}Cd)$

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.	α[#]	Comments
116.40	$(1/2^+)$	116.41 *3*	100	0.0	$3/2^{(+)}$	[M1,E2]	0.6 *3*	
263.867	$(7/2^+)$	123.67[@] *6*	16.0 *10*	144	$11/2^{(-)}$	[M2]	2.19	E_γ,Mult.: the placements of 123.67γ and 263.87γ from the same level are proposed by 2013Ka08, with the 123.67γ feeding the $11/2^-$ isomer at 144 keV *4* from their direct mass measurement. However, such placement of 123.67γ results in $J^\pi=(7/2^+)$, thus Mult=[M2], and consequently an unreasonably large B(M2)(W.u.)=56 $^{17-11}$ greatly exceeding RUL=1. This γ is placed from a 440, $(9/2^-)$ level to feed the $11/2^-$ isomer at E=316 keV proposed in 1989Hu10. It could also be implied that the 123.67γ could de-excite a different level with a very close energy. It is the evaluator's opinion that the further investigation is needed to firmly make the placement of the 123.67γ and the level scheme as well.
		263.87 *2*	100.0 *8*	0.0	$3/2^{(+)}$	[E2]	0.0498	B(E2)(W.u.)=0.098 *+26−18*

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Adopted Levels, Gammas (continued)

$\gamma(^{123}Cd)$ (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π
409.76	$(5/2^+,7/2^+)$	409.79 *3*	100	0.0	$3/2^{(+)}$
463.78	$(5/2^+)$	347.38 *6*	100	116.40	$(1/2^+)$
514.65	$(9/2^+)$	250.78 *5*	40 *3*	263.867	$(7/2^+)$
		374.00 *10*	100 *4*	144	$11/2^{(-)}$
553.72	$(5/2^+)$	437.54 *20*	100 *12*	116.40	$(1/2^+)$
		553.50 *20*	50 *11*	0.0	$3/2^{(+)}$
591.29	$(5/2^+,7/2^+)$	591.30 *5*	100	0.0	$3/2^{(+)}$
672.44	$(5/2^+)$	556.10 *20*	100 *17*	116.40	$(1/2^+)$
		672.40 *15*	50 *10*	0.0	$3/2^{(+)}$
704.92	(5/2,7/2,9/2)	441.05 *10*	100	263.867	$(7/2^+)$
743.73	$(5/2^+,7/2^+)$	334.05 *5*	29 *7*	409.76	$(5/2^+,7/2^+)$
		743.40 *10*	100 *8*	0.0	$3/2^{(+)}$
806.7	$(15/2^-)$	666‡ *1*	100	144	$11/2^{(-)}$
829.75	$(9/2^+)$	689.10 *15*	100	144	$11/2^{(-)}$
885.2	(5/2,7/2,9/2)	621.3 *3*	100	263.867	$(7/2^+)$
1010.08	(5/2,7/2,9/2)	600.31 *15*	100	409.76	$(5/2^+,7/2^+)$
1061.44	(5/2,7/2,9/2)	470.19 *10*	88 *28*	591.29	$(5/2^+,7/2^+)$
		651.58 *15*	100 *24*	409.76	$(5/2^+,7/2^+)$
1528.86	$(5/2^+,7/2^+)$	1265.15 *15*	100 *12*	263.867	$(7/2^+)$
		1528.2 *3*	85 *12*	0.0	$3/2^{(+)}$
1607.7	$(19/2^-)$	801‡ *1*	100	806.7	$(15/2^-)$
2239.88	$(5/2^+,7/2^+,9/2^+)$	1976.00 *20*	100	263.867	$(7/2^+)$
2377.7	$(23/2^-)$	770‡ *1*	100	1607.7	$(19/2^-)$
2601.0	$(5/2^+,7/2^+,9/2^+)$	2337.10 *25*	100	263.867	$(7/2^+)$
2615.7	$(25/2^-)$	238‡ *1*		2377.7	$(23/2^-)$
2787.37	$(5/2^+,7/2^+,9/2^+)$	1725.90 *20*	100 *22*	1061.44	(5/2,7/2,9/2)
		2523.5 *3*	83 *22*	263.867	$(7/2^+)$
2812.7	$(27/2^-)$	197‡ *1*		2615.7	$(25/2^-)$
2902.42	$(5/2^+,7/2^+)$	2638.40 *25*	100 *21*	263.867	$(7/2^+)$
		2902.7 *4*	44 *14*	0.0	$3/2^{(+)}$
2910.22	$(5/2^+,7/2^+)$	2646.7 *3*	100 *27*	263.867	$(7/2^+)$
		2909.5 *4*	57 *14*	0.0	$3/2^{(+)}$
2968.7	$(29/2^-)$	156‡ *1*		2812.7	$(27/2^-)$

† From ^{123}Ag β^- decay, unless noted otherwise.
‡ From ^{9}Be(^{238}U,Xγ).
# Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
@ Placement of transition in the level scheme is uncertain.

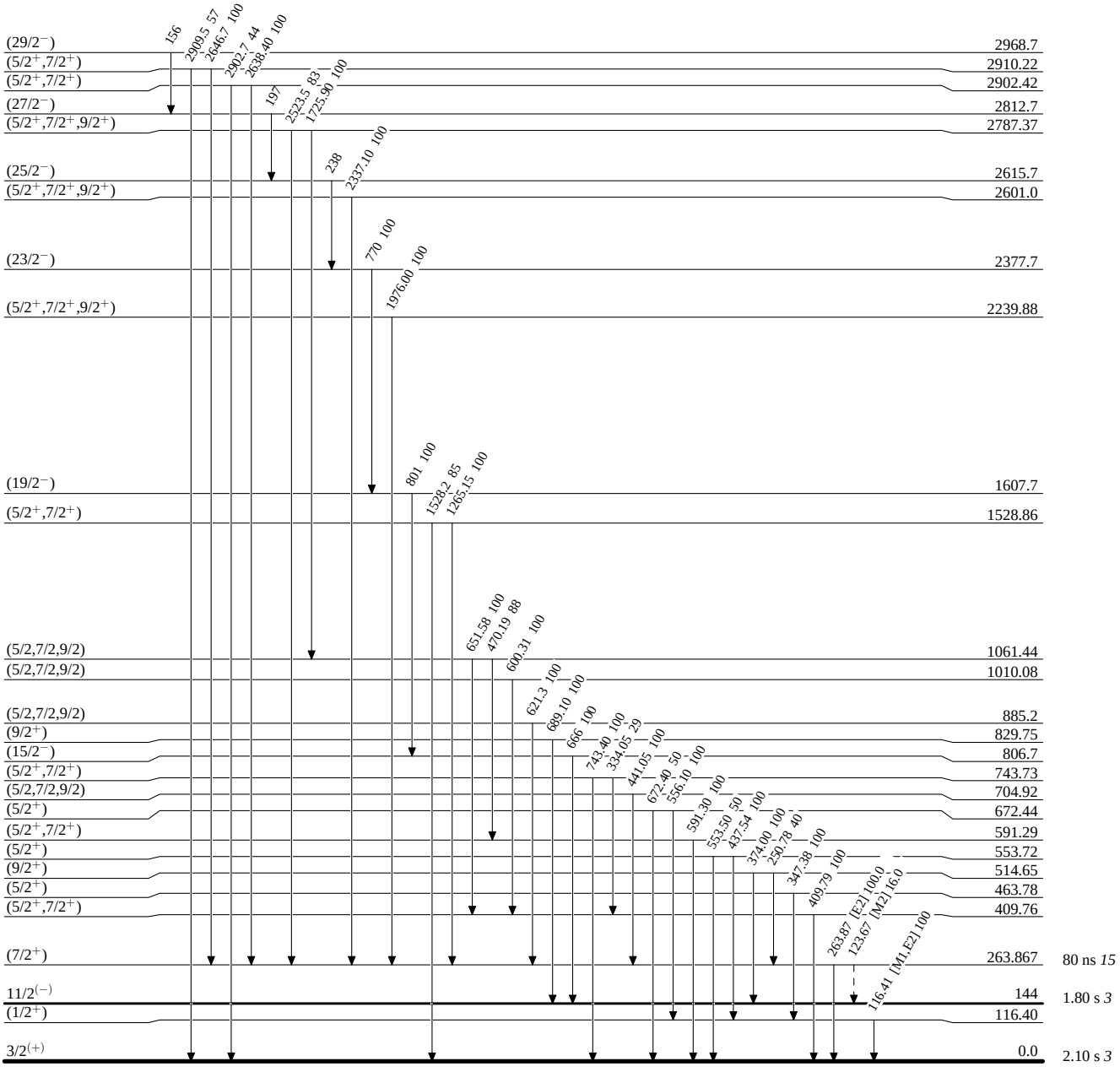
Adopted Levels, Gammas

Legend

Level Scheme

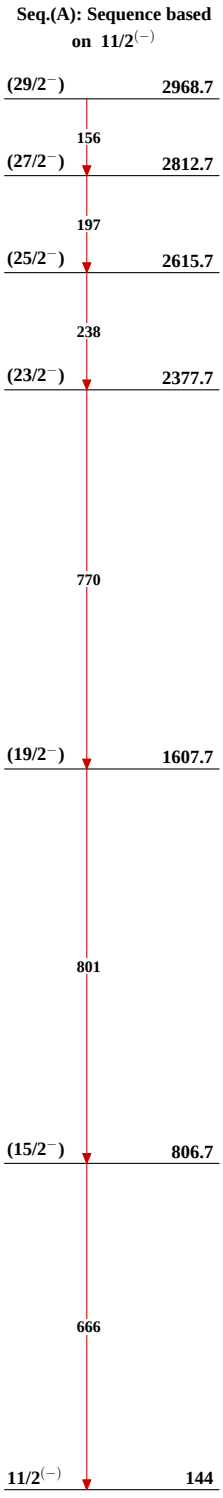
Intensities: Relative photon branching from each level

– – – – – – ► γ Decay (Uncertain)



$^{123}_{48}Cd_{75}$

Adopted Levels, Gammas



$^{123}_{48}Cd_{75}$

^{123}Ag β^- decay 1989Hu10

Parent: ^{123}Ag: E=0.0; $J^\pi=(7/2^+)$; $T_{1/2}=0.299$ s *7*; $Q(\beta^-)=7850$ *30*; $\%\beta^-$ decay=100

^{123}Ag-J^π,$T_{1/2}$: From Adopted Levels of ^{123}Ag.

^{123}Ag-$Q(\beta^-)$: From 2021Wa16.

1989Hu10: ^{123}Ag source was produced via U(n,F) with fast neutrons from the TANDAR accelerator. γ rays were detected with two HPGe detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma$(t), γ(t). Deduced levels, J, π, $T_{1/2}$, β-decay branching ratios, log *ft*. Systematics of neighboring odd-A Cd isotopes. Comparisons with theoretical calculations.

Other: 1989Hu03, 1986Ma42.

The decay scheme is from that proposed by 1989Hu10 with the energy of the $11/2^-$ isomer shifted from 316 keV to around 140 keV from a mass-excess measurement by 2013Ka08 and with upper levels shifted accordingly. Note that the energy, 316 keV, of the $11/2^-$ isomer proposed by 1989Hu10 is from a search to maximize the number of shared levels that de-exciting to both the isomer and the ground state, without a direct experimental evidence. 2013Ka08 claim that the isomer should be at an energy of 144 keV *4* from their direct mass measurement in which the g.s. and the isomer are resolved, with support also from the energy systematics of the $11/2^-$ states in neighboring odd-A Cd isotopes. 2013Ka08 further point out that many of the gating transitions used to deduced β-decay Q-value of ^{123}Cd g.s. by 1987Sp09 actually belong to the β decay of the isomer, based on a later study by 1989Hu03. With that being corrected, 2013Ka08 deduced Q-values for the g.s. and isomer β decays from the measured end-point energies in 1987Sp09, resulting in an energy of 135 keV *53* for the isomer that further supports their value of 144 keV *4*.

The decay scheme should be considered as incomplete due to a large gap between the highest observed level and the Q-value. Total decay energy deposit of 7835 keV *190* calculated by RADLIST code.

^{123}Cd Levels

E(level)[†]	J^π[‡]	$T_{1/2}$[‡]	Comments
0.0	$3/2^{(+)}$	2.10 s *3*	
116.40 *3*	$(1/2^+)$		
144 *4*	$11/2^{(-)}$	1.80 s *3*	E(level): from the mass measurement by 2013Ka08. Other: 316 keV in 1989Hu10. See detailed comments above on the position of this isomer.
263.866 *20*	$(7/2^+)$	80 ns *15*	$T_{1/2}$: adopted value from $\gamma\gamma$(t) in 1989Hu10.
409.76 *3*	$(5/2^+,7/2^+)$		
463.78 *7*	$(5/2^+)$		
514.65 *6*	$(9/2^+)$		E(level): it is the 691 level in 1989Hu10.
553.72 *15*	$(5/2^+)$		
591.29 *5*	$(5/2^+,7/2^+)$		
672.44 *12*	$(5/2^+)$		
704.92 *11*	(5/2,7/2,9/2)		
743.73 *5*	$(5/2^+,7/2^+)$		
829.75 *19*	$(9/2^+)$		E(level): it is the 1006 level in 1989Hu10.
885.2 *3*	(5/2,7/2,9/2)		
1010.08 *16*	(5/2,7/2,9/2)		
1061.44 *9*	(5/2,7/2,9/2)		
1528.86 *14*	$(5/2^+,7/2^+)$		
2239.88 *20*	$(5/2^+,7/2^+,9/2^+)$		
2601.0 *3*	$(5/2^+,7/2^+,9/2^+)$		
2787.37 *18*	$(5/2^+,7/2^+,9/2^+)$		
2902.42 *22*	$(5/2^+,7/2^+)$		
2910.22 *24*	$(5/2^+,7/2^+)$		

[†] From a least-squares fit to γ-ray energies.

[‡] From Adopted Levels. Adopted spin-parity assignments here are mostly from those proposed by 1989Hu10 based on systematics of neighboring odd-A Cd isotopes.

^{123}Ag β^- decay 1989Hu10 (continued)

β^- radiations

E(decay)	E(level)	Iβ^-[†‡]	Log *ft*[†]	Comments
(4.94×10^3 *3*)	2910.22	1.8 *4*	5.5 *1*	
(4.95×10^3 *3*)	2902.42	3.2 *6*	5.2 *1*	
(5.06×10^3 *3*)	2787.37	2.7 *5*	5.3 *1*	
(5.25×10^3 *3*)	2601.0	1.7 *5*	5.6 *1*	
(5.61×10^3 *3*)	2239.88	3.5 *5*	5.4 *1*	
(6.32×10^3 *3*)	1528.86	5.2 *5*	5.48 *5*	
(6.79×10^3 *3*)	1061.44	1.0 *7*	6.3 *3*	
(6.84×10^3 *3*)	1010.08	1.6 *3*	6.1 *1*	
(6.97×10^3 *3*)	885.2	2.1 *8*	6.1 *2*	
(7.02×10^3 *3*)	829.75	3.9 *4*	5.81 *5*	
(7.11×10^3 *3*)	743.73	5.1 *5*	5.71 *5*	
(7.15×10^3 *3*)	704.92	3.1 *3*	5.94 *5*	
(7.18×10^3 *3*)	672.44	2.2 *3*	6.1 *1*	
(7.26×10^3 *3*)	591.29	6.3 *6*	5.66 *5*	
(7.30×10^3 *3*)	553.72	2.7 *4*	6.0 *1*	
(7.34×10^3 *3*)	514.65	6.7 *3*	5.66 *3*	
(7.39×10^3 *3*)	463.78	3.6 *4*	5.94 *5*	
(7.44×10^3 *3*)	409.76	8.0 *7*	5.61 *4*	
(7.59×10^3 *3*)	263.866	30.8 *19*	5.06 *3*	
(7.73×10^3[#] *3*)	116.40	4.0 *22*	6.0 *3*	Iβ^-,Log *ft*: this branch is considered as questionable. The %Iβ^- value is from γ-intensity imbalance at the daughter level; the imbalance could be accounted for by unobserved/unplaced transitions. 1989Hu10 claim no β feeding to this level.

[†] Deduced by the evaluator from intensity balance at each level. These values should be considered as approximate since the level scheme seems incomplete in view of a large gap of ≈5 MeV between the highest (known) populated level at 2910 and Q(β^-)=7870, allowing the possibility of a significant amount of additional levels and associated unobserved transitions (pandemonium effect).

[‡] Absolute intensity per 100 decays.

[#] Existence of this branch is questionable.

^{123}Ag β^- decay 1989Hu10 (continued)

$\gamma(^{123}Cd)$

Iγ normalization: From ΣI(γ+ce to g.s.+141 isomer)=99.43 *9*, assuming no β feeding to g.s. and 141 isomer, and with adopted %β^-n=0.57 *9*.

E_γ [†]	I_γ [†#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α [@]	Comments
116.41 *3*	8.30 *10*	116.40	(1/2$^+$)	0.0	3/2$^{(+)}$	[M1,E2]	0.6[‡] *3*	%Iγ=6.85 *19*
123.67[&] *6*	6.3 *4*	263.866	(7/2$^+$)	144	11/2$^{(-)}$	[M2]	2.19	%Iγ=5.2 *3* E$_\gamma$: the placements of 123.67γ and 263.87γ from the same level are proposed by 2013Ka08, with the 123.67γ feeding the 11/2$^-$ isomer at 144 keV *4* from their direct mass measurement. However, such placement of 123.67γ results in J^π=(7/2$^+$), thus Mult=[M2] and consequently an unreasonably large B(M2)(W.u.)=56 $^{17-11}$ greatly exceeding RUL=1. This γ is placed from a 440, (9/2$^-$) level to feed the 11/2$^-$ isomer at E=316 keV proposed in 1989Hu10. It could also be implied that the 123.67γ could de-excite a different level with a very close energy. It is the evaluator's option that the further investigation is needed to firmly make the placement of the 123.67γ and the level scheme as well.
250.78 *5*	2.30 *16*	514.65	(9/2$^+$)	263.866	(7/2$^+$)			%Iγ=1.90 *14*
263.87 *2*	39.3 *3*	263.866	(7/2$^+$)	0.0	3/2$^{(+)}$	[E2]	0.0498	%Iγ=32.4 *9*
334.05 *5*	1.4 *4*	743.73	(5/2$^+$,7/2$^+$)	409.76	(5/2$^+$,7/2$^+$)	[M1,E2]	0.0205[‡] *24*	%Iγ=1.2 *4*
347.38 *6*	4.3 *4*	463.78	(5/2$^+$)	116.40	(1/2$^+$)	[E2]	0.0202	%Iγ=3.5 *4*
374.00 *10*	5.80 *23*	514.65	(9/2$^+$)	144	11/2$^{(-)}$	[E1]	0.00435	%Iγ=4.79 *22*
409.79 *3*	14.5 *5*	409.76	(5/2$^+$,7/2$^+$)	0.0	3/2$^{(+)}$	[M1,E2]	0.0114[‡] *7*	%Iγ=12.0 *5*
437.54 *20*	2.2 *3*	553.72	(5/2$^+$)	116.40	(1/2$^+$)			%Iγ=1.8 *25*
441.05 *10*	3.8 *3*	704.92	(5/2,7/2,9/2)	263.866	(7/2$^+$)			%Iγ=3.1 *3*
470.19 *10*	1.4 *5*	1061.44	(5/2,7/2,9/2)	591.29	(5/2$^+$,7/2$^+$)			%Iγ=1.2 *4*
[x]520.8 *4*	0.70 *20*							%Iγ=0.58 *17*
553.50 *20*	1.10 *25*	553.72	(5/2$^+$)	0.0	3/2$^{(+)}$			%Iγ=0.91 *21*
556.10 *20*	1.8 *3*	672.44	(5/2$^+$)	116.40	(1/2$^+$)			%Iγ=1.5 *25*
591.30 *5*	9.0 *5*	591.29	(5/2$^+$,7/2$^+$)	0.0	3/2$^{(+)}$			%Iγ=7.4 *5*
600.31 *15*	1.9 *3*	1010.08	(5/2,7/2,9/2)	409.76	(5/2$^+$,7/2$^+$)			%Iγ=1.6 *25*
621.3 *3*	2.5 *9*	885.2	(5/2,7/2,9/2)	263.866	(7/2$^+$)			%Iγ=2.1 *8* E$_\gamma$: placed from 1061 level to a 440 level in 1989Hu10.
651.58 *15*	1.6 *4*	1061.44	(5/2,7/2,9/2)	409.76	(5/2$^+$,7/2$^+$)			%Iγ=1.3 *4*
672.40 *15*	0.90 *17*	672.44	(5/2$^+$)	0.0	3/2$^{(+)}$			%Iγ=0.74 *14*
689.10 *15*	4.7 *4*	829.75	(9/2$^+$)	144	11/2$^{(-)}$			%Iγ=3.9 *4*
743.40 *10*	4.8 *4*	743.73	(5/2$^+$,7/2$^+$)	0.0	3/2$^{(+)}$			%Iγ=4.0 *4*
[x]1096.50 *20*	1.9 *4*							%Iγ=1.6 *4*
[x]1234.30 *20*	2.0 *4*							%Iγ=1.7 *4*

$\gamma(^{123}Cd)$ (continued)

E_γ [†]	I_γ [†#]	E_i(level)	J_i^π	E_f	J_f^π	Comments
						E_γ: this γ is placed from the 2240 level to a 1006 level in 1989Hu10, with the latter shifted to 830 in this dataset.
[x]1248.95 *20*	2.3 *5*					%Iγ=1.9 *4*
1265.15 *15*	3.4 *4*	1528.86	$(5/2^+,7/2^+)$	263.866	$(7/2^+)$	%Iγ=2.8 *4*
1528.2 *3*	2.9 *4*	1528.86	$(5/2^+,7/2^+)$	0.0	$3/2^{(+)}$	%Iγ=2.4 *4*
1725.90 *20*	1.8 *4*	2787.37	$(5/2^+,7/2^+,9/2^+)$	1061.44	(5/2,7/2,9/2)	%Iγ=1.5 *4*
1976.00 *20*	4.3 *6*	2239.88	$(5/2^+,7/2^+,9/2^+)$	263.866	$(7/2^+)$	%Iγ=3.5 *5*
2337.10 *25*	2.1 *5*	2601.0	$(5/2^+,7/2^+,9/2^+)$	263.866	$(7/2^+)$	%Iγ=1.7 *4*
2523.5 *3*	1.5 *4*	2787.37	$(5/2^+,7/2^+,9/2^+)$	263.866	$(7/2^+)$	%Iγ=1.2 *4*
2638.40 *25*	2.7 *6*	2902.42	$(5/2^+,7/2^+)$	263.866	$(7/2^+)$	%Iγ=2.2 *5*
2646.7 *3*	1.4 *4*	2910.22	$(5/2^+,7/2^+)$	263.866	$(7/2^+)$	%Iγ=1.2 *4*
2902.7 *4*	1.2 *4*	2902.42	$(5/2^+,7/2^+)$	0.0	$3/2^{(+)}$	%Iγ=1.0 *4*
2909.5 *4*	0.80 *19*	2910.22	$(5/2^+,7/2^+)$	0.0	$3/2^{(+)}$	%Iγ=0.66 *16*

[†] From 1989Hu10. Placements of some γ rays are adjusted due to the energy of the $11/2^-$ isomer being shifted from 316 keV proposed in 1989Hu10 to 140 keV proposed in 2013Ka08 from their direct mass mass measurement.
[‡] Calculated for δ=1.
[#] For absolute intensity per 100 decays, multiply by 0.825 *21*.
[@] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
[&] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

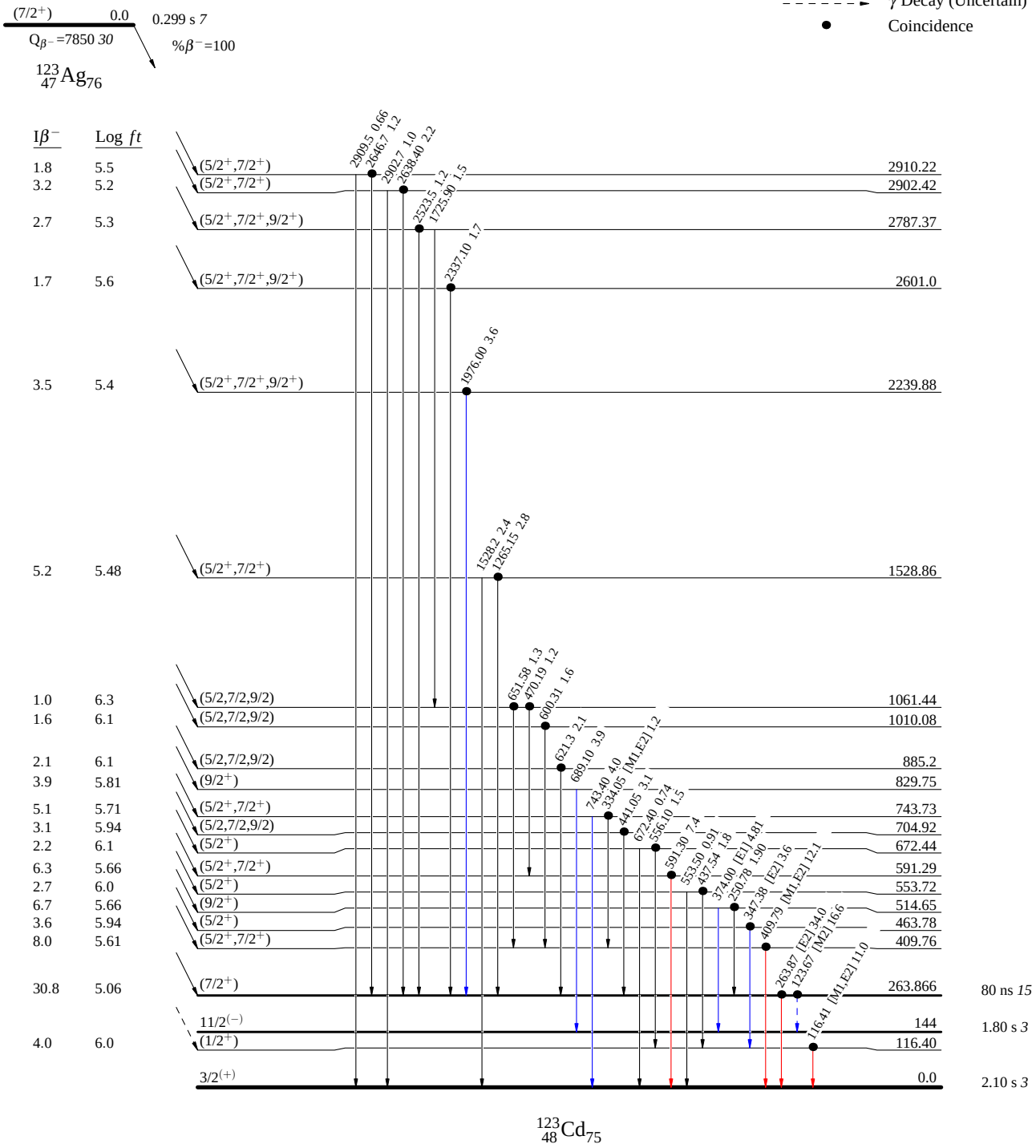
$^{123}_{48}Cd_{75}$-9

^{123}Ag β^- decay 1989Hu10

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)
- Coincidence



$^{123}_{48}Cd_{75}$

^{252}Cf SF decay 2002Hw01

Parent: ^{252}Cf: E=0.0; $J^{\pi}=0^{+}$; $T_{1/2}$=2.645 y *8*; %SF decay=?

2002Hw01: ^{252}Cf source was sandwiched between two Fe foils of thickness 10 mg/cm^2 at LBNL. γ rays were detected with the Gammasphere array of 102 Compton suppressed Ge detectors. Measured Eγ, $\gamma\gamma$-coin. Deduced levels.

The sequences of high-spin states based on the $11/2^{(-)}$ isomer from 2002Hw01 via ^{252}Cf SF decay and from 2016Re05 via ^{9}Be(^{238}U,Xγ) are completely different in level and gamma energies. The evaluator has adopted in the Adopted Levels, Gammas the data from 2016Re05, which are more complete and has more convincing particle identification with γ rays tagged by both A and Z.

^{123}Cd Levels

E(level)[†]	J^{π}[‡]	$T_{1/2}$[#]
140.65[#@]	$(11/2^{-})$	1.80 s *3*
863.5[@] *10*	$(15/2^{-})$	
1650.7[@] *15*	$(19/2^{-})$	
2580.5[@] *18*	$(23/2^{-})$	

† From a least-squares fit to γ-ray energies, assuming uncertainties of 0.3 keV for each γ-ray.
‡ Proposed by 2002Hw01 from systematics of neighboring odd Cd isotopes.
# From Adopted Levels.
@ Band(A): $h_{11/2}$ decoupled band (2002Hw01).

γ(^{123}Cd)

E_{γ}[†]	I_{γ}	E_i(level)	J_i^{π}	E_f	J_f^{π}
722.8		863.5	$(15/2^{-})$	140.65	$(11/2^{-})$
787.2	100	1650.7	$(19/2^{-})$	863.5	$(15/2^{-})$
929.8	15	2580.5	$(23/2^{-})$	1650.7	$(19/2^{-})$

† γ rays were assigned by 2002Hw01 from coincidence with γ rays from fission-fragment partner Sn isotopes. Note that none of these γ rays are seen in a more recent measurement of ^{9}Be(^{238}U,Xγ) by 2016Re05, with the γ rays from the latter adopted in Adopted Levels by the evaluator.

^{252}Cf SF decay 2002Hw01

Level Scheme

Intensities: Relative I_γ

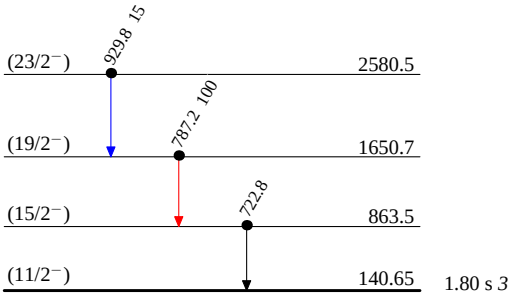
Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

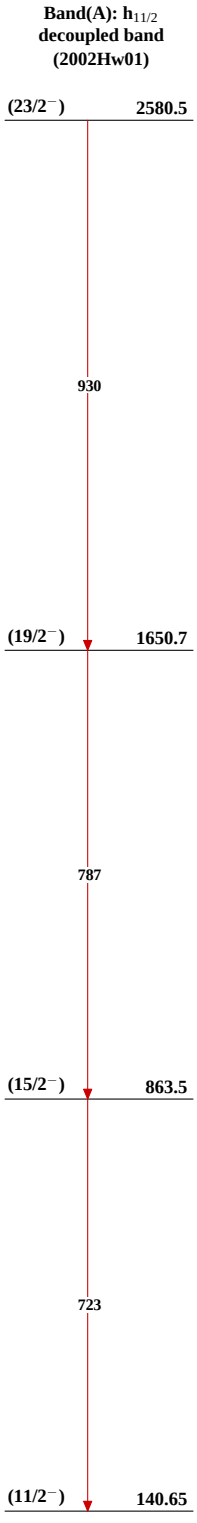
$I_\gamma > 10\% \times I_\gamma^{max}$

Coincidence



$^{123}_{48}Cd_{75}$

^{252}Cf SF decay 2002Hw01



$^{123}_{48}Cd_{75}$

^{9}Be(^{238}U,Xγ) 2016Re05

2016Re05: E=1.29 GeV ^{238}U beam was produced from the accelerator at GANIL. Target was 1.85 mg/cm^2 Be. Fission fragments were detected and identified using the VAMOS++ magnetic spectrometer and from correlation of the energy loss in the ionization chamber and the measured total energy in the Si detectors. γ rays were detected with the EXOGAM array. Measured Eγ, $\gamma\gamma$-coin. Deduced high-spin levels, J, π. Comparisons with shell-model calculations.

^{123}Cd Levels

E(level)[†]	J$^\pi$[#]
140.65[‡@]	(11/2$^-$)
806.7[@] *10*	(15/2$^-$)
1607.7[@] *15*	(19/2$^-$)
2113? *2*	
2377.7[@] *18*	(23/2$^-$)
2615.7[@] *20*	(25/2$^-$)
2812.7[@] *23*	(27/2$^-$)
2968.7[@] *25*	(29/2$^-$)

[†] From a least-squares fit to γ-ray energies, unless otherwise noted.
[‡] From Adopted Levels.
[#] Proposed by 2016Re05 from shell-model calculations.
[@] Seq.(A): Sequence based on (11/2$^-$).

γ(^{123}Cd)

E$_\gamma$[†]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Comments
[x]115					
156 *1*	2968.7	(29/2$^-$)	2812.7	(27/2$^-$)	
197 *1*	2812.7	(27/2$^-$)	2615.7	(25/2$^-$)	
238 *1*	2615.7	(25/2$^-$)	2377.7	(23/2$^-$)	
505[‡] *1*	2113?		1607.7	(19/2$^-$)	E$_\gamma$: Possibly located above the (19/2$^-$) state from analogy with ^{121}Cd and ^{124}Cd (2016Re05).
666 *1*	806.7	(15/2$^-$)	140.65	(11/2$^-$)	
770 *1*	2377.7	(23/2$^-$)	1607.7	(19/2$^-$)	
801 *1*	1607.7	(19/2$^-$)	806.7	(15/2$^-$)	

[†] From 2016Re05.
[‡] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

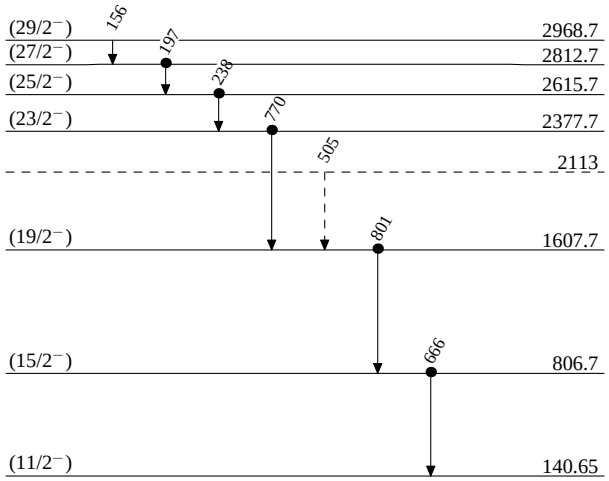
Legend

^{9}Be(^{238}U,Xγ) 2016Re05

Level Scheme

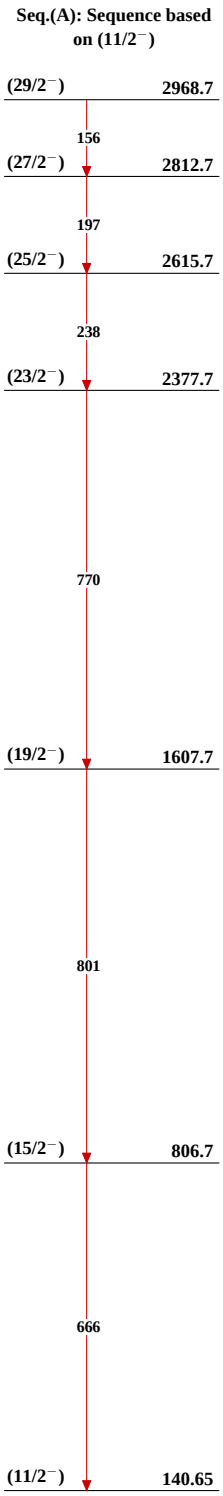
γ Decay (Uncertain)

Coincidence



$^{123}_{48}Cd_{75}$

^{9}Be(^{238}U,Xγ) 2016Re05



$^{123}_{48}Cd_{75}$

Adopted Levels, Gammas

Q(β^-)=4386 *20*; S(n)=7930 *50*; S(p)=10106 *20*; Q(α)=−7208 *25* 2021Wa16
S(2n)=13740 *30*, S(2p)=23604 *23* (2021Wa16).

^{123}In Levels

Cross Reference (XREF) Flags

A ^{123}Cd β^- decay (2.10 s) D ^{124}Sn(d,^{3}He)
B ^{123}Cd β^- decay (1.80 s) E ^{124}Sn(t,α)
C ^{123}In IT decay (1.4 μs) F ^{232}Th(^{6}Li,Fγ)

E(level)†	Jπ	$T_{1/2}$	XREF	Comments
0.0	9/2$^+$	6.15 s *27*	ABCDEF	%β^-=100 μ=+5.491 *7* (1987Eb02,2014StZZ) Q=+0.720 *9* (1987Eb02,2016St14) Configuration=(π 1g$_{9/2}$)$^{-1}$ Jπ: L(d,^{3}He)=L(t,α)=4 from 0$^+$; spin=9/2 from collinear laser spectroscopy (1987Eb02). $T_{1/2}$: unweighted average of 5.98 s *6* (1974Gr29), 6.68 s *20* (1986Go10), and 5.8 s *2* (2011Hi15). μ,Q: from collinear fast beam laser spectroscopy, relative to ^{115}In (1987Eb02). Quoted value of Q is from the original Q=+0.757 *9* relative to Q(^{115}In)=0.81 used in 1987Eb02, scaled using the adopted Q(^{115}In)=0.770 *8* (2008Py02). See also 2014StZZ and 2016St14 compilations. Nuclear rms charge radius=4.6594 fm *56* (2013An02).
327.21 *4*	1/2$^-$	47.4 s *8*	AB DE	%β^-=100 μ=−0.400 *4* (1987Eb02,2014StZZ) Configuration=(π 2p$_{1/2}$)$^{-1}$ Jπ: L(d,^{3}He)=L(t,α)=1 from 0$^+$; spin=1/2 from collinear laser spectroscopy (1987Eb02). $T_{1/2}$: weighted average of 47.8 s *5* (1974Gr29), 45.9 s *10* (1986Go10) using β counting. Other: 36 s *3* (1960Yu01) seems discrepant. μ: from collinear fast beam laser spectroscopy, relative to ^{115}In (1987Eb02). See also 2014StZZ compilation.
698.52 *5*	(3/2)$^-$		AB DE	Configuration=(π 2p$_{3/2}$)$^{-1}$ XREF: D(660)E(660). Jπ: L(d,^{3}He)=L(t,α)=1 from 0$^+$; spin=3/2 from systematics of neighboring odd-mass In isotopes; 371.3γ M1 to 1/2$^-$.
1027.542 *24*	(11/2$^+$)		BCD F	Jπ: 1027.5γ to 9/2$^+$; possible β-feeding (log *ft*=6.2) from 11/2$^{(-)}$ parent; 11/2$^+$ is favored from systematics of neighboring odd-mass In isotopes.
1052.294 *22*	(5/2$^+$)		AB	Jπ: 353.6γ to (3/2)$^-$, 1052.3γ to 9/2$^+$; possible allowed β-feeding (log *ft*=5.5) from 3/2$^{(+)}$.
1137.55 *5*	(3/2$^-$,5/2$^-$)		AB D	XREF: D(1100). Jπ: 438.7γ to (3/2)$^-$, 810.3γ to 1/2$^-$, 883.0γ from (7/2$^-$); possible β-feeding (log *ft*=6.0) from 3/2$^{(+)}$.
1165.855 *23*	(13/2$^+$)		BC F	Jπ: 1165.9γ to 9/2$^+$; possible β-feeding (log *ft*=6.2) from 11/2$^{(-)}$; 13/2$^+$ is favored from systematics of neighboring odd-mass In isotopes.
1473.79 *3*			B	
1512.11 *3*	7/2$^+$,9/2$^+$		AB D	XREF: D(1500). Jπ: L(d,^{3}He)=4 from 0$^+$.
1566.24 *4*	(9/2$^+$)		AB D	XREF: D(1550). Jπ: 1566.1γ to 9/2$^+$, 454.3γ from (7/2$^-$), 827.2γ from (5/2$^+$); possible β-feeding (log *ft*=6.4) from 11/2$^{(-)}$.
1615.72 *7*	(1/2,3/2,5/2$^-$)		A	Jπ: 1288.4γ to 1/2$^-$.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{123}In Levels (continued)

E(level)[†]	Jπ	$T_{1/2}$	XREF	Comments
1926.49 *6*	(1/2,3/2,5/2$^-$)		A	Jπ: 1599.2γ to 1/2$^-$.
2020.64 *3*	(7/2$^-$)		AB	Jπ: 2020.7γ to 9/2$^+$, 334.0γ from (11/2$^-$), 480.3γ from (9/2$^-$,11/2$^-$), possible β-feeding from 3/2$^{(+)}$ suggest (7/2$^-$). But log *ft*=6.2 from 3/2$^{(+)}$ would suggest (5/2$^+$), which cannot be completely ruled out. It could be that the β-feeding to this level is overestimated probably due to unobserved or unplaced γ feedings to this level.
2029.91 *7*	(1/2$^+$,3/2$^+$)		A	Jπ: 1702.4γ to 1/2$^-$; possible allowed β-feeding (log *ft*=5.5) from 3/2$^{(+)}$.
2046.55 *17*	(13/2$^-$)		C F	Jπ: proposed in ^{123}In IT decay based on γ-decay pattern.
2078.1 *6*	(17/2$^-$)	1.4 μs *2*	C F	%IT=100 Jπ: 31.5γ possible (E2) to (13/2$^-$). $T_{1/2}$: from 880.7γ(t)+1166.0γ(t) (2004Sc42) in ^{123}In IT decay.
2078.1+x	(21/2$^-$)	≥100 μs	F	%IT=100 E(level): this isomer is proposed by 2010Re01 based on their observation of delayed γ transitions seen in the decay of the 1.4−μs isomer in 2004Sc42, which however is less likely originated from the relatively short-lived 1.4−μs isomer due to the particle-γ correlation time from 5 to 175 μs in their setup, but is likely from a longer-lived isomer above the 1.4−μs isomer to further delay the decays as observed. Jπ,$T_{1/2}$: from 2010Re01 in (^{6}Li,Fγ), with the half-life limit suggested from intensity in time spectra. This isomer is suggested to arise from ν($h_{11/2}$⊗$d_{3/2}$)7$^-$ and ν($h_{11/2}$⊗$s_{1/2}$)5$^-$ neutron core excitation coupling with the valence proton (2010Re01).
2101.01 *4*	(11/2$^-$,13/2$^-$)		B	Jπ: 77.6γ M1 from (11/2$^-$), 935.1γ to (13/2$^+$).
2102.79 *5*	(9/2$^-$,11/2$^-$)		B	Jπ: 2102.8γ to 9/2$^+$; possible allowed β-feeding (log *ft*=5.4) from 11/2$^{(-)}$.
2136.63 *5*	(1/2$^+$,3/2$^+$)		AB	Jπ: 1809.5γ to 1/2$^-$; possible allowed β-feeding (log *ft*=5.0) from 3/2$^{(+)}$.
2158.59 *7*	(1/2$^+$,3/2$^+$,5/2$^+$)		A	Jπ: 1460.1γ (3/2)$^-$; possible allowed β-feeding (log *ft*=5.6) from 3/2$^{(+)}$.
2178.52 *6*	(11/2$^-$)		B	Jπ: 2178.98γ 9/2$^+$, 1012.9γ to (13/2$^+$); possible allowed β-feeding (log *ft*=5.1) from 11/2$^{(-)}$.
2185.7 *4*			B	
2268.05 *3*	(11/2$^-$)		B	Jπ: 2268.1γ to 9/2$^+$, 1102.2γ to (13/2$^+$); possible allowed β-feeding (log *ft*=5.0) from 11/2$^{(-)}$.
2309.74 *5*	(11/2$^-$,13/2$^-$)		B	Jπ: 1143.8γ to (13/2$^+$), 1282.2γ to (11/2$^+$); possible allowed β-feeding (log *ft*=5.3) from 11/2$^{(-)}$.
2354.69 *4*	(11/2$^-$)		B	Jπ: 2354.7γ to 9/2$^+$, 1188.8γ to (13/2$^+$); possible allowed β-feeding (log *ft*=5.2) from 11/2$^{(-)}$.
2377.32 *9*	(1/2$^+$,3/2$^+$,5/2$^+$)		A	Jπ: possible allowed β-feeding (log *ft*=5.4) from 3/2$^{(+)}$.
2393.31 *5*	(5/2$^+$)		AB	Jπ: 2393.5γ to 9/2$^+$, 1694.8γ to (3/2)$^-$, 256.7γ to (1/2$^+$,3/2$^+$); possible allowed β-feeding (log *ft*=4.7) from 3/2$^{(+)}$.
2429.49 *7*	(1/2$^+$,3/2$^+$,5/2$^+$)		A	Jπ: possible allowed β-feeding (log *ft*=5.3) from 3/2$^{(+)}$.
2461.49 *6*	(9/2$^-$,11/2$^-$)		B	Jπ: 2461.5γ to 9/2$^+$; possible allowed β-feeding (log *ft*=5.0) from 11/2$^{(-)}$.
2500.91 *4*	(9/2$^-$,11/2$^-$)		B	Jπ: 2500.4γ to 9/2$^+$; possible allowed β-feeding (log *ft*=4.8) from 11/2$^{(-)}$.
2529.26 *6*	(1/2$^+$,3/2$^+$)		A	Jπ: 2202.1γ 1/2$^-$; possible allowed β-feeding (log *ft*=5.0) from 3/2$^{(+)}$.
2529.47 *3*	(11/2$^-$,13/2$^-$)		B	Jπ: 1363.6γ to (13/2$^+$); possible allowed β-feeding (log *ft*=4.8) from 11/2$^{(-)}$.
2541.35 *6*	(1/2$^+$,3/2$^+$)		A	Jπ: 2214.3γ to 1/2$^-$; possible allowed β-feeding (log *ft*=4.8) from 3/2$^{(+)}$.

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Adopted Levels, Gammas (continued)

^{123}In Levels (continued)

E(level)[†]	J^{π}	XREF	Comments
2602.10 *8*	$(9/2^-,11/2^-)$	B	J^{π}: 2601.98γ to $9/2^+$; possible allowed β-feeding (log *ft*=4.8) from $11/2^{(-)}$.
2617.86 *6*	$(11/2^-,13/2^-)$	B	J^{π}: 1452.0γ to $(13/2^+)$; possible allowed β-feeding (log *ft*=5.7) from $11/2^{(-)}$.
2723.59 *6*	$(11/2^-,13/2^-)$	B	J^{π}: 1557.7γ to $(13/2^+)$; possible allowed β-feeding (log *ft*=5.6) from $11/2^{(-)}$.

[†] From a least-squares fit to γ-ray energies if levels are connected by γ rays, otherwise from transfer reactions.

Adopted Levels, Gammas (continued)

γ(^{123}In)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	α[@]	Comments
698.52	$(3/2)^-$	371.32 *3*	100	327.21	$1/2^-$	M1	0.01517	
1027.542	$(11/2^+)$	1027.50 *3*	100	0.0	$9/2^+$			E_γ: other: 1027.4 *3* from ^{123}In IT decay.
1052.294	$(5/2^+)$	353.63 *7*	14.5 *16*	698.52	$(3/2)^-$			I_γ: weighted average of 14.3 *16* from ^{123}Cd β^- decay (2.10 s) and 17 *7* from ^{123}Cd β^- decay (1.80 s).
		1052.28 *3*	100 *6*	0.0	$9/2^+$			I_γ: from ^{123}Cd β^- decay (2.10 s). Other: 100 *10* from ^{123}Cd β^- decay (1.80 s).
1137.55	$(3/2^-,5/2^-)$	438.68[‡] *5*	36 *4*	698.52	$(3/2)^-$			I_γ: weighted average of 37 *4* from ^{123}Cd β^- decay (2.10 s) and 34 *4* from ^{123}Cd β^- decay (1.80 s).
		810.29 *3*	100 *7*	327.21	$1/2^-$			I_γ: from ^{123}Cd β^- decay (1.80 s). Other: 100 *10* from ^{123}Cd β^- decay (2.10 s).
1165.855	$(13/2^+)$	138.38 *10*	3.5 *6*	1027.542	$(11/2^+)$			
		1165.86 *3*	100 *6*	0.0	$9/2^+$	[E2]	0.000872 *13*	E_γ: other: 1166.0 *3* from ^{123}In IT decay.
1473.79		1473.77[&] *3*	100	0.0	$9/2^+$			
1512.11	$7/2^+,9/2^+$	1512.09 *3*	100	0.0	$9/2^+$			
1566.24	$(9/2^+)$	1566.09 *5*	100	0.0	$9/2^+$			
1615.72	$(1/2,3/2,5/2^-)$	917.16 *6*	100 *11*	698.52	$(3/2)^-$			
		1288.35 *20*	8.6 *16*	327.21	$1/2^-$			
1926.49	$(1/2,3/2,5/2^-)$	1227.50[‡] *5*	100 *10*	698.52	$(3/2)^-$			
		1599.23 *12*	47 *8*	327.21	$1/2^-$			
2020.64	$(7/2^-)$	454.25 *5*	46 *11*	1566.24	$(9/2^+)$			I_γ: unweighted average of 35 *4* from ^{123}Cd β^- decay (2.10 s) and 56 *6* from ^{123}Cd β^- decay (1.80 s).
		883.0 *9*	43.4 *8*	1137.55	$(3/2^-,5/2^-)$			I_γ: weighted average of 35 *9* from ^{123}Cd β^- decay (2.10 s) and 43.5 *8* from ^{123}Cd β^- decay (1.80 s).
		2020.71 *4*	100 *7*	0.0	$9/2^+$			I_γ: from ^{123}Cd β^- decay (2.10 s). Other: 100 *8* from ^{123}Cd β^- decay (1.80 s).
2029.91	$(1/2^+,3/2^+)$	1331.44 *5*	100 *9*	698.52	$(3/2)^-$			
		1702.37[‡] *7*	33 *5*	327.21	$1/2^-$			
2046.55	$(13/2^-)$	880.7 *2*	100	1165.855	$(13/2^+)$			E_γ,I_γ: from ^{123}In IT decay.
		1019.0 *3*	37	1027.542	$(11/2^+)$			E_γ,I_γ: from ^{123}In IT decay.
2078.1	$(17/2^-)$	31.5 *5*	100	2046.55	$(13/2^-)$	(E2)	105 *7*	B(E2)(W.u.)=3.4 *+12−8* E_γ: from energy of conversion electron, observed in delayed ce spectrum in ^{123}In IT decay. Mult.: suggested by the absence of crossover transition between 2078 level and 1166 level in ^{123}In IT decay.
2078.1+x	$(21/2^-)$	x[a]		2078.1	$(17/2^-)$			E_γ: it is stated in 2010Re01 in (^{6}Li,Fγ) that by assuming a single transition between the two isomeric states, it is not possible to assign this transition in their experiment and mass separation or isomer decay tagging would be needed to determine the origin with confidence.
2101.01	$(11/2^-,13/2^-)$	935.10 *3*	100	1165.855	$(13/2^+)$			

$^{123}_{49}In_{74}$-4

Adopted Levels, Gammas (continued)

$\gamma(^{123}In)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	α[@]	Comments
2102.79	(9/2$^-$,11/2$^-$)	2102.81 *5*	100	0.0	9/2$^+$			
2136.63	(1/2$^+$,3/2$^+$)	999.12 *15*	17 *4*	1137.55	(3/2$^-$,5/2$^-$)			I_γ: weighted average of 17 *4* from ^{123}Cd β^- decay (2.10 s) and 18 *9* from ^{123}Cd β^- decay (1.80 s).
		1084.32 *3*	61 *5*	1052.294	(5/2$^+$)			I_γ: weighted average of 60 *5* from ^{123}Cd β^- decay (2.10 s) and 64 *9* from ^{123}Cd β^- decay (1.80 s).
		1438.13 *5*	100 *8*	698.52	(3/2)$^-$			I_γ: from ^{123}Cd β^- decay (2.10 s). Other: 100 *9* from ^{123}Cd β^- decay (1.80 s).
		1809.50 *9*	21 *2*	327.21	1/2$^-$			I_γ: weighted average of 21 *2* from ^{123}Cd β^- decay (2.10 s) and 27 *9* from ^{123}Cd β^- decay (1.80 s).
2158.59	(1/2$^+$,3/2$^+$,5/2$^+$)	1460.07 *5*	100	698.52	(3/2)$^-$			
2178.52	(11/2$^-$)	75.81	100 *10*	2102.79	(9/2$^-$,11/2$^-$)	M1	1.124	
		77.60	65 *7*	2101.01	(11/2$^-$,13/2$^-$)	M1	1.051	
		1012.91 *10*	81 *7*	1165.855	(13/2$^+$)			
		1150.81 *6*	17 *5*	1027.542	(11/2$^+$)			
		2178.98 *15*	12 *2*	0.0	9/2$^+$			
2185.7		84.7 *4*	100	2101.01	(11/2$^-$,13/2$^-$)			
2268.05	(11/2$^-$)	1102.20 *3*	38 *3*	1165.855	(13/2$^+$)			
		1240.48 *3*	100 *6*	1027.542	(11/2$^+$)			
		2268.09 *10*	6.7 *8*	0.0	9/2$^+$			
2309.74	(11/2$^-$,13/2$^-$)	207.12 *10*	41 *8*	2102.79	(9/2$^-$,11/2$^-$)			
		1143.84 *15*	33 *7*	1165.855	(13/2$^+$)			
		1282.19 *4*	100 *6*	1027.542	(11/2$^+$)			
2354.69	(11/2$^-$)	334.03 *5*	10.7 *11*	2020.64	(7/2$^-$)			
		1188.78 *9*	6.3 *8*	1165.855	(13/2$^+$)			
		2354.74 *6*	100 *6*	0.0	9/2$^+$			
2377.32	(1/2$^+$,3/2$^+$,5/2$^+$)	347.48 *8*	100 *17*	2029.91	(1/2$^+$,3/2$^+$)			
		1324.77 *15*	47 *10*	1052.294	(5/2$^+$)			
2393.31	(5/2$^+$)	256.69 *5*	41 *4*	2136.63	(1/2$^+$,3/2$^+$)			I_γ: weighted average of 39 *6* from ^{123}Cd β^- decay (2.10 s) and 42 *4* from ^{123}Cd β^- decay (1.80 s).
		363.7 *6*	3.5 *3*	2029.91	(1/2$^+$,3/2$^+$)			
		827.23 *25*	4.0 *18*	1566.24	(9/2$^+$)			I_γ: weighted average of 4.6 *21* from ^{123}Cd β^- decay (2.10 s) and 3.6 *18* from ^{123}Cd β^- decay (1.80 s).
		881.17 *5*	64 *13*	1512.11	7/2$^+$,9/2$^+$			I_γ: weighted average of 62 *13* from ^{123}Cd β^- decay (2.10 s) and 65 *13* from ^{123}Cd β^- decay (1.80 s).
		1255.65 *5*	39.2 *18*	1137.55	(3/2$^-$,5/2$^-$)			I_γ: weighted average of 37 *3* from ^{123}Cd β^- decay (2.10 s) and 40.0 *18* from ^{123}Cd β^- decay (1.80 s).
		1341.06 *5*	47 *4*	1052.294	(5/2$^+$)			I_γ: weighted average of 44 *4* from ^{123}Cd β^- decay (2.10 s) and 49 *4* from ^{123}Cd β^- decay (1.80 s).
		1694.81 *5*	100 *6*	698.52	(3/2)$^-$			I_γ: from ^{123}Cd β^- decay (2.10 s). Other: 100 *7* from ^{123}Cd β^- decay (1.80 s).
		2393.46 *15*	10.0 *3*	0.0	9/2$^+$			I_γ: weighted average of 10.0 *3* from ^{123}Cd β^- decay (2.10 s) and 10.9 *18* from ^{123}Cd β^- decay (1.80 s).

Adopted Levels, Gammas (continued)

$\gamma(^{123}In)$ (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π
2429.49	(1/2+,3/2+,5/2+)	813.63 *9*	95 *15*	1615.72	(1/2,3/2,5/2−)
		1377.36 *10*	70 *10*	1052.294	(5/2+)
		1730.95 *6*	100 *10*	698.52	(3/2)−
2461.49	(9/2−,11/2−)	107.1 *3*	1.8 *6*	2354.69	(11/2−)
		987.60 *10*	15 *4*	1473.79	
		2461.50 *7*	100 *6*	0.0	9/2+
2500.91	(9/2−,11/2−)	480.28 *3*	18.6 *14*	2020.64	(7/2−)
		988.73 *10*	65 *4*	1512.11	7/2+,9/2+
		1473.77&‡ *3*	100 *7*	1027.542	(11/2+)
		2500.44‡ *9*	8.6 *8*	0.0	9/2+
2529.26	(1/2+,3/2+)	602.73 *3*	20.0 *3*	1926.49	(1/2,3/2,5/2−)
		1830.78 *5*	100 *7*	698.52	(3/2)−
		2202.14 *7*	52 *5*	327.21	1/2−
2529.47	(11/2−,13/2−)	174.79 *6*	30 *4*	2354.69	(11/2−)
		261.5 *5*	12.7 *14*	2268.05	(11/2−)
		428.41 *3*	100 *6*	2101.01	(11/2−,13/2−)
		1363.64 *3*	63 *4*	1165.855	(13/2+)
		1502.13 *15*	4.2 *7*	1027.542	(11/2+)
2541.35	(1/2+,3/2+)	512.0 *5*	55.3 *10*	2029.91	(1/2+,3/2+)
		615.10 *9*	15 *6*	1926.49	(1/2,3/2,5/2−)
		1403.37 *15*	5.6 *14*	1137.55	(3/2−,5/2−)
		1488.91 *5*	33 *4*	1052.294	(5/2+)
		1842.86 *5*	100 *7*	698.52	(3/2)−
		2214.33 *10*	21 *3*	327.21	1/2−
2602.10	(9/2−,11/2−)	292.90‡ *10*	3.5 *3*	2309.74	(11/2−,13/2−)
		2601.98 *8*	100 *6*	0.0	9/2+
2617.86	(11/2−,13/2−)	515.0 *5*	57 *4*	2102.79	(9/2−,11/2−)
		1452.00 *5*	100 *9*	1165.855	(13/2+)
2723.59	(11/2−,13/2−)	193.4 *4*	37 *16*	2529.47	(11/2−,13/2−)
		1557.74 *5*	100 *8*	1165.855	(13/2+)

† From ^{123}Cd β^- decay (2.10 s) and/or ^{123}Cd β^- decay (1.80 s), unless otherwise noted. Averages are taken for intensities where different values are available in the two datasets.

‡ Poor fit. Uncertainty are increased to 0.2 keV in the fitting procedure.

From ^{123}Cd β^- decay (1.80 s) based on ce data (1986Ho24), unless otherwise noted.

@ Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

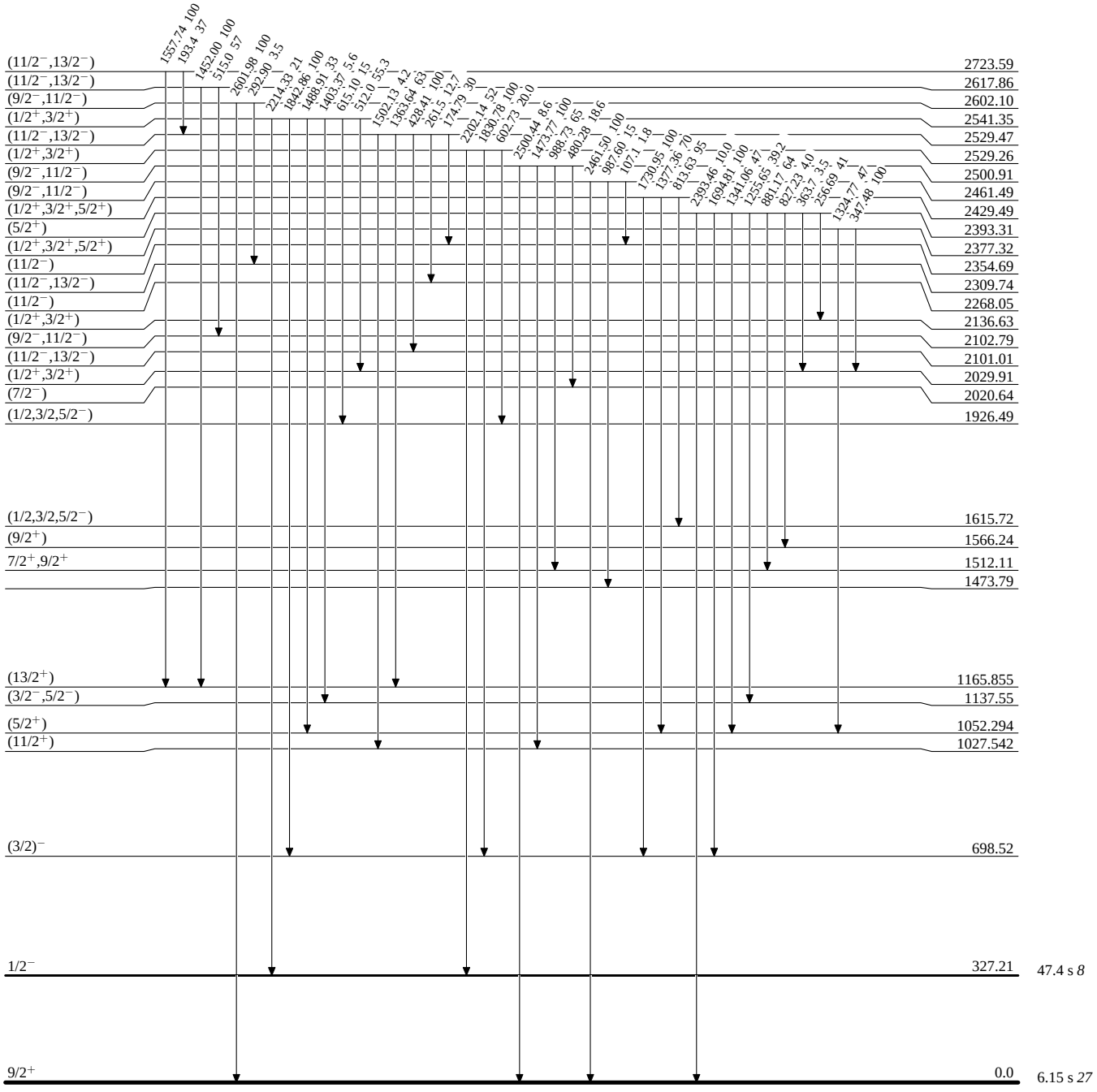
& Multiply placed.

a Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



$^{123}_{49}In_{74}$

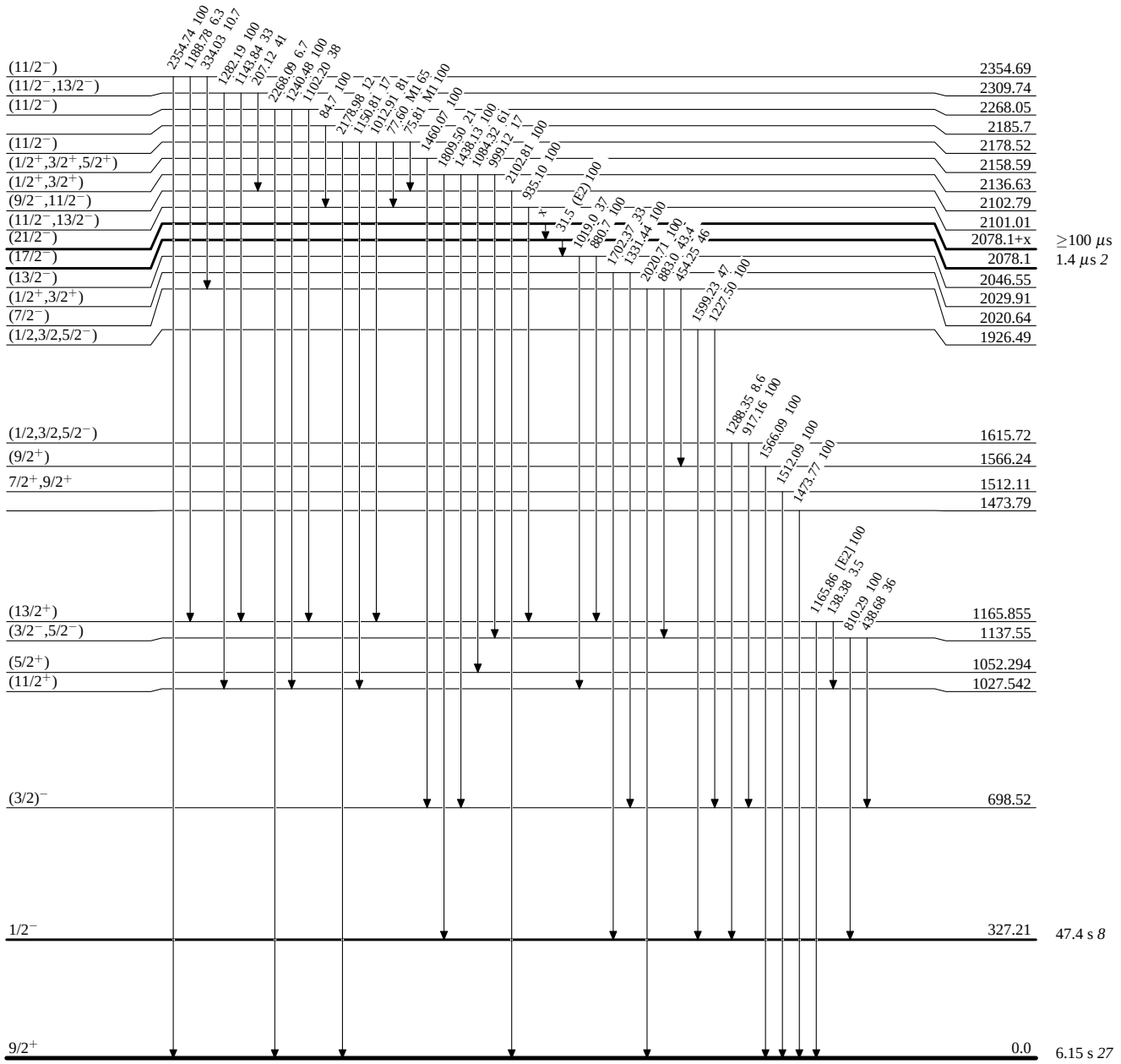
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

– – – – – – ► γ Decay (Uncertain)

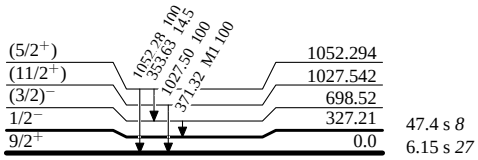


$^{123}_{49}In_{74}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{123}_{49}In_{74}$

^{123}Cd β^- decay (2.10 s) 1989Hu03,1986Ho24

Parent: ^{123}Cd: E=0.0; $J^\pi=3/2^{(+)}$; $T_{1/2}$=2.10 s *3*; Q(β^-)=6015 *20*; %β^- decay=100

^{123}Cd-J^π,$T_{1/2}$: From Adopted Levels of ^{123}Cd.

^{123}Cd-Q(β^-): From 2021Wa16.

1989Hu03: source of ^{123}Cd was produced via the U(n,F) reaction with fast neutrons produced from the Be(d,n) reaction at the TANDAR Laboratory. Fission products were separated by an electro-magnetic mass separator. γ rays were detected with two HPGe detectors (FWHM=1.95 keV at 1.33 MeV). Measured Eγ, Iγ, $\gamma\gamma$-coin, γ(t). Deduced levels, J, π, parent $T_{1/2}$, β-decay branching ratios, log *ft*. Systematics of neighboring odd-mass In isotopes. Comparisons with theoretical calculations.

1986Ho24: source of ^{123}Cd was produced via ^{235}U(n,F) with neutrons provided by the R2-0 reactor at Studvik. Fission products were separated by the mass separator OSIRIS. γ rays were detected with Ge detectors. Conversion electrons were detected with a small high-resolution Si detector. Measured Eγ, Iγ, $\gamma\gamma$-coin, γ(t). Deduced levels, J, π, parent $T_{1/2}$, β-decay branching ratios, log *ft*. Systematics of neighboring odd-mass In isotopes.

Others: 1973BaUR, 1981Ru07, 1983Re05, 1986Go10, 1986Ma42, 1987Sp09, 2014TeZY.

The decay scheme is that proposed by 1989Hu03. Fast-neutron fission favors high-spin isomer. γ-rays were distinguished by comparing the results from 1986Ho24. Decay scheme from 1986Ho24 is mixed from decays of g.s. and isomer. There are some discrepancies between the level scheme from 1989Hu03 and from 1986Ho24. The evaluator has adopted the g.s. decay scheme from 1989Hu03. However, there are many unplaced γ rays, as well as a large gap between the highest level and Q-value, therefore, the decay scheme is considered as incomplete and the deduced β-feedings and log *ft* as approximate.

^{123}In Levels

E(level)†	J^π‡	$T_{1/2}$‡	E(level)†	J^π‡
0.0	$9/2^+$	6.15 s *27*	2020.63 *4*	$(7/2^-)$
327.21 *5*	$1/2^-$	47.4 s *8*	2029.91 *6*	$(1/2^+,3/2^+)$
698.51 *4*	$(3/2)^-$		2136.63 *4*	$(1/2^+,3/2^+)$
1052.29 *3*	$(5/2^+)$		2158.59 *7*	$(1/2^+,3/2^+,5/2^+)$
1137.55 *5*	$(3/2^-,5/2^-)$		2377.32 *9*	$(1/2^+,3/2^+,5/2^+)$
1512.12 *4*	$7/2^+,9/2^+$		2393.31 *4*	$(5/2^+)$
1566.24 *4*	$(9/2^+)$		2429.48 *6*	$(1/2^+,3/2^+,5/2^+)$
1615.72 *7*	$(1/2,3/2,5/2^-)$		2529.30 *6*	$(1/2^+,3/2^+)$
1926.55 *6*	$(1/2,3/2,5/2^-)$		2541.31 *5*	$(1/2^+,3/2^+)$

† From a least-squares fit to γ-ray energies.

‡ From Adopted Levels.

β^- radiations

E(decay)	E(level)	Iβ^-†‡	Log *ft*	E(decay)	E(level)	Iβ^-†‡	Log *ft*
(3474 *20*)	2541.31	14.3 *7*	4.8 *1*	(3985 *20*)	2029.91	5.1 *9*	5.5 *1*
(3486 *20*)	2529.30	10.5 *5*	5.0 *1*	(3994 *20*)	2020.63	1.21 *11*	6.2 *1*
(3586 *20*)	2429.48	5.3 *4*	5.3 *1*	(4088 *20*)	1926.55	1.0 *4*	6.3 *2*
(3622 *20*)	2393.31	21.2 *12*	4.7 *1*	(4399 *20*)	1615.72	2.9 *6*	6.0 *1*
(3638 *20*)	2377.32	4.4 *6*	5.4 *1*	(4878 *20*)	1137.55	3.9 *8*	6.0 *1*
(3856 *20*)	2158.59	4.1 *3*	5.6 *1*	(4963 *20*)	1052.29	15.2 *18*	5.5 *1*
(3878 *20*)	2136.63	13.7 *10*	5.0 *1*	(5317 *20*)	698.51	≤2	≥6.5

† From γ+ce intensity imbalance at each level. Quoted values should be considered as approximate due to incomplete decay scheme.

‡ Absolute intensity per 100 decays.

^{123}Cd β^- decay (2.10 s) 1989Hu03,1986Ho24 (continued)

$\gamma(^{123}In)$

Iγ normalization: From ΣI(γ+ce to g.s.+327)=100. No β feeding is expected to g.s. (2nd forbidden) and feeding to 327 level is assumed to be negligible ($\leq$1 from log *ft*=6.9 for 1st forbidden in this mass region).

E_γ[†]	I_γ[†@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[&]	Comments
[x]244.0 *3*	0.37 *22*							
256.69 *5*	2.8 *4*	2393.31	(5/2$^+$)	2136.63	(1/2$^+$,3/2$^+$)			
347.48 *8*	3.0 *5*	2377.32	(1/2$^+$,3/2$^+$,5/2$^+$)	2029.91	(1/2$^+$,3/2$^+$)			
353.63 *7*	3.6 *4*	1052.29	(5/2$^+$)	698.51	(3/2)$^-$			
363.7 *6*	0.25 *2*	2393.31	(5/2$^+$)	2029.91	(1/2$^+$,3/2$^+$)			
371.32 *3*	52 *3*	698.51	(3/2)$^-$	327.21	1/2$^-$	M1[#]	0.0153	E_γ: other: 371.2 *2* (1981Ru07).
438.68[‡] *5*	2.32 *25*	1137.55	(3/2$^-$,5/2$^-$)	698.51	(3/2)$^-$			
454.25 *5*	0.25 *3*	2020.63	(7/2$^-$)	1566.24	(9/2$^+$)			
512.0 *5*	0.41 *8*	2541.31	(1/2$^+$,3/2$^+$)	2029.91	(1/2$^+$,3/2$^+$)			
[x]525.20 *20*	1.01 *14*							
[x]545.4 *3*	2.64 *22*							
602.73 *3*	1.22 *2*	2529.30	(1/2$^+$,3/2$^+$)	1926.55	(1/2,3/2,5/2$^-$)			
615.1 *9*	1.39 *13*	2541.31	(1/2$^+$,3/2$^+$)	1926.55	(1/2,3/2,5/2$^-$)			
[x]714.00 *25*	0.46 *14*							
810.29 *3*	6.3 *6*	1137.55	(3/2$^-$,5/2$^-$)	327.21	1/2$^-$			
813.63 *9*	1.9 *3*	2429.48	(1/2$^+$,3/2$^+$,5/2$^+$)	1615.72	(1/2,3/2,5/2$^-$)			
827.23 *25*	0.33 *15*	2393.31	(5/2$^+$)	1566.24	(9/2$^+$)			
881.17 *5*	4.4 *9*	2393.31	(5/2$^+$)	1512.12	7/2$^+$,9/2$^+$			
883.0 *9*	0.25 *6*	2020.63	(7/2$^-$)	1137.55	(3/2$^-$,5/2$^-$)			
[x]913.41 *15*	2.0 *4*							
917.16 *6*	4.4 *5*	1615.72	(1/2,3/2,5/2$^-$)	698.51	(3/2)$^-$			
999.12 *15*	1.4 *3*	2136.63	(1/2$^+$,3/2$^+$)	1137.55	(3/2$^-$,5/2$^-$)			
[x]1044.88 *12*	1.7 *3*							
1052.28 *3*	25.1 *16*	1052.29	(5/2$^+$)	0.0	9/2$^+$			E_γ: other: 1052.3 *2* (1981Ru07).
1084.32 *3*	5.0 *4*	2136.63	(1/2$^+$,3/2$^+$)	1052.29	(5/2$^+$)			
1227.50[‡] *5*	2.48 *24*	1926.55	(1/2,3/2,5/2$^-$)	698.51	(3/2)$^-$			
1255.65 *5*	2.62 *21*	2393.31	(5/2$^+$)	1137.55	(3/2$^-$,5/2$^-$)			
1288.35 *20*	0.38 *7*	1615.72	(1/2,3/2,5/2$^-$)	327.21	1/2$^-$			
1324.77 *15*	1.4 *3*	2377.32	(1/2$^+$,3/2$^+$,5/2$^+$)	1052.29	(5/2$^+$)			
1331.44 *5*	6.6 *6*	2029.91	(1/2$^+$,3/2$^+$)	698.51	(3/2)$^-$			
1341.06 *5*	3.1 *3*	2393.31	(5/2$^+$)	1052.29	(5/2$^+$)			
1377.36 *10*	1.39 *20*	2429.48	(1/2$^+$,3/2$^+$,5/2$^+$)	1052.29	(5/2$^+$)			
1403.37 *15*	0.44 *11*	2541.31	(1/2$^+$,3/2$^+$)	1137.55	(3/2$^-$,5/2$^-$)			
1438.13 *5*	8.4 *7*	2136.63	(1/2$^+$,3/2$^+$)	698.51	(3/2)$^-$			
1460.07 *5*	4.1 *3*	2158.59	(1/2$^+$,3/2$^+$,5/2$^+$)	698.51	(3/2)$^-$			
1488.91 *5*	2.6 *3*	2541.31	(1/2$^+$,3/2$^+$)	1052.29	(5/2$^+$)			
1512.09 *5*	4.28 *25*	1512.12	7/2$^+$,9/2$^+$	0.0	9/2$^+$			
[x]1519.48 *10*	1.09 *16*							
1566.09 *5*	0.33 *2*	1566.24	(9/2$^+$)	0.0	9/2$^+$			
[x]1594.8 *7*	0.63 *6*							
1599.23 *12*	1.17 *19*	1926.55	(1/2,3/2,5/2$^-$)	327.21	1/2$^-$			
[x]1641.86 *20*	0.63 *13*							
1694.81 *5*	7.1 *5*	2393.31	(5/2$^+$)	698.51	(3/2)$^-$			
1702.37[‡] *7*	2.2 *3*	2029.91	(1/2$^+$,3/2$^+$)	327.21	1/2$^-$			
1730.95 *6*	1.99 *19*	2429.48	(1/2$^+$,3/2$^+$,5/2$^+$)	698.51	(3/2)$^-$			
1809.50 *9*	1.72 *18*	2136.63	(1/2$^+$,3/2$^+$)	327.21	1/2$^-$			
1830.78 *5*	6.1 *4*	2529.30	(1/2$^+$,3/2$^+$)	698.51	(3/2)$^-$			
1842.86 *5*	7.8 *5*	2541.31	(1/2$^+$,3/2$^+$)	698.51	(3/2)$^-$			

Continued on next page (footnotes at end of table)

^{123}Cd β^- decay (2.10 s) 1989Hu03,1986Ho24 (continued)

$\gamma(^{123}In)$ (continued)

E_γ †	I_γ †@	E_i(level)	J_i^π	E_f	J_f^π
x1976.00 *10*	2.2 *3*				
2020.71 *4*	0.71 *5*	2020.63	$(7/2^-)$	0.0	$9/2^+$
2202.14 *7*	3.2 *3*	2529.30	$(1/2^+,3/2^+)$	327.21	$1/2^-$
2214.33 *10*	1.61 *21*	2541.31	$(1/2^+,3/2^+)$	327.21	$1/2^-$
2393.46 *15*	0.71 *2*	2393.31	$(5/2^+)$	0.0	$9/2^+$

† From 1989Hu03, unless otherwise noted. Values are also available in the decay schemes in 1986Ho24 but no tabulated data are given.

‡ Poor fit. Uncertainty are increased to 0.2 keV in the fitting procedure.

As given in the decay scheme in 1986Ho24 based on ce data. The same values are adopted in Adopted Gammas. No ce data is explicitly given by 1986Ho24.

@ Absolute intensity per 100 decays.

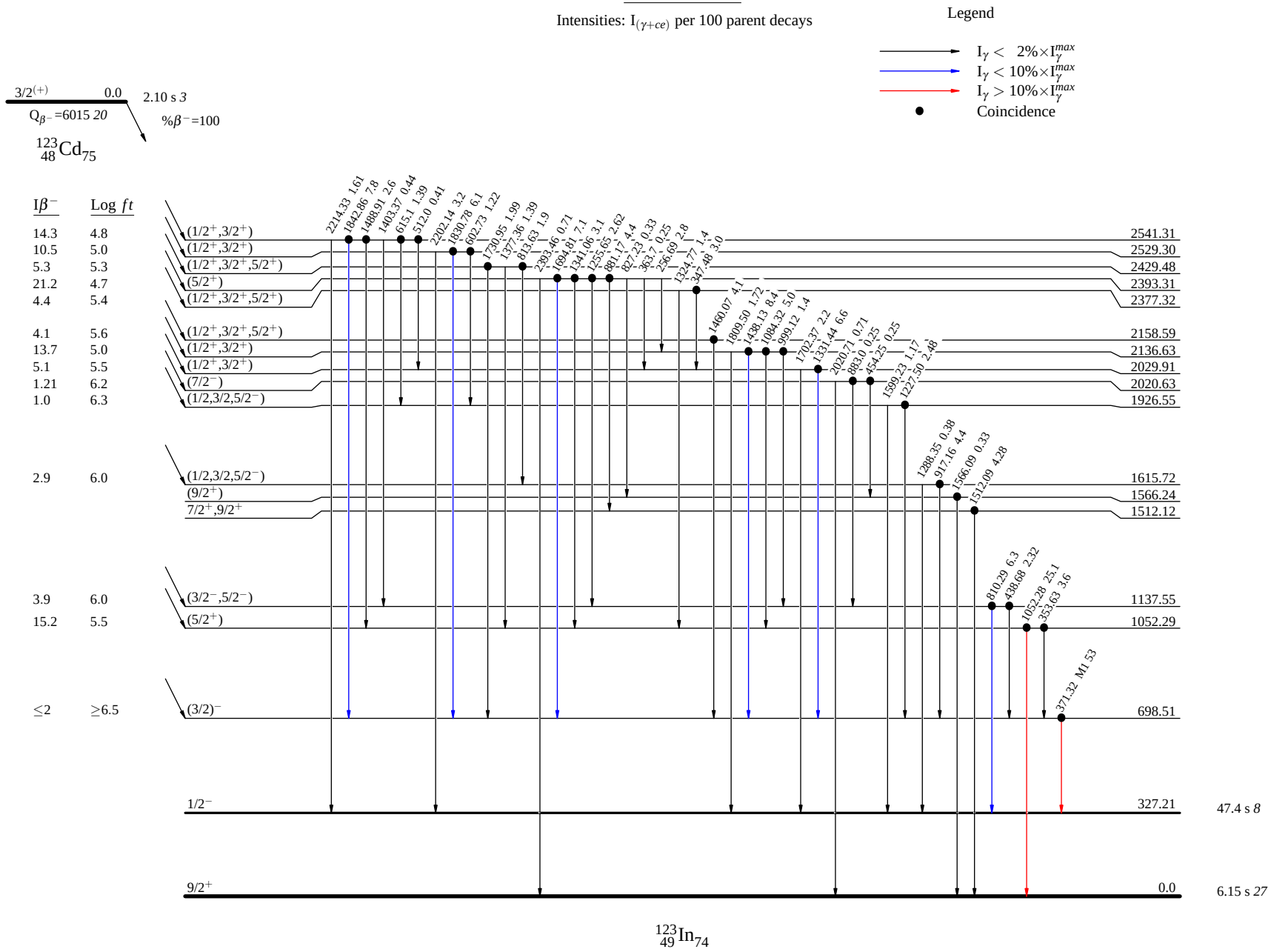
& Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

x γ ray not placed in level scheme.

^{123}Cd β^- decay (2.10 s) 1989Hu03,1986Ho24

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays



$^{123}_{49}In_{74}$

^{123}Cd β^- decay (1.80 s) 1989Hu03

Parent: ^{123}Cd: E=140.65 *12*; $J^\pi=11/2^{(-)}$; $T_{1/2}$=1.80 s *3*; Q(β^-)=6015 *20*; %β^- decay=100

^{123}Cd-J^π,$T_{1/2}$: From Adopted Levels of ^{123}Cd.

^{123}Cd-Q(β^-): From 2021Wa16.

1989Hu03: source of ^{123}Cd was produced via the U(n,F) reaction with fast neutrons produced from the Be(d,n) reaction at the TANDAR Laboratory. Fission products were separated by an electro-magnetic mass separator. γ rays were detected with two HPGe detectors (FWHM=1.95 keV at 1.33 MeV). Measured Eγ, Iγ, $\gamma\gamma$-coin, γ(t). Deduced levels, J, π, parent $T_{1/2}$, β-decay branching ratios, log *ft*. Systematics of neighboring odd-mass In isotopes. Comparisons with theoretical calculations.

1986Ho24: source of ^{123}Cd was produced via ^{235}U(n,F) with neutrons provided by the R2-0 reactor at Studvik. Fission products were separated by the mass separator OSIRIS. γ rays were detected with Ge detectors. Conversion electrons were detected with a small high-resolution Si detector. Measured Eγ, Iγ, $\gamma\gamma$-coin, γ(t). Deduced levels, J, π, parent $T_{1/2}$, β-decay branching ratios, log *ft*. Systematics of neighboring odd-mass In isotopes.

Others: 1973BaUR, 1981Ru07, 1986Ma42, 1987Sp09, 2014TeZY.

The decay scheme is that proposed by 1989Hu03. Fast-neutron fission favors high-spin isomer. γ-rays were distinguished by comparing the results from 1986Ho24. Decay scheme from 1986Ho24 is mixed from decays of g.s. and isomer. There are some discrepancies between the level scheme from 1989Hu03 and from 1986Ho24. The evaluator has adopted the g.s. decay scheme from 1989Hu03. However, there are many unplaced γ rays, as well as a large gap between the highest level and Q-value, therefore, the decay scheme is considered as incomplete and the deduced β-feedings and log *ft* as approximate.

^{123}In Levels

E(level)[†]	J^π[‡]	$T_{1/2}$[‡]	E(level)[†]	J^π[‡]
0.0	$9/2^+$	6.15 s *27*	2136.64 *4*	$(1/2^+,3/2^+)$
327.24 *5*	$1/2^-$	47.4 s *8*	2178.82 *9*	$(11/2^-)$
698.55 *4*	$(3/2)^-$		2185.7 *4*	
1027.511 *24*	$(11/2^+)$		2268.03 *3*	$(11/2^-)$
1052.28 *3*	$(5/2^+)$		2309.69 *4*	$(11/2^-,13/2^-)$
1137.56 *5*	$(3/2^-,5/2^-)$		2354.69 *4*	$(11/2^-)$
1165.858 *23*	$(13/2^+)$		2393.32 *4*	$(5/2^+)$
1473.89 *11*			2461.53 *7*	$(9/2^-,11/2^-)$
1512.12 *3*	$7/2^+,9/2^+$		2500.91 *4*	$(9/2^-,11/2^-)$
1566.24 *4*	$(9/2^+)$		2529.47 *3*	$(11/2^-,13/2^-)$
2020.64 *3*	$(7/2^-)$		2602.24 *7*	$(9/2^-,11/2^-)$
2101.01 *4*	$(11/2^-,13/2^-)$		2617.87 *6*	$(11/2^-,13/2^-)$
2102.78 *5*	$(9/2^-,11/2^-)$		2723.60 *6*	$(11/2^-,13/2^-)$

[†] From a least-squares fit to γ-ray energies. $\Delta E\gamma$=0.5 keV is assumed in the fitting procedure, if not given.

[‡] From Adopted Levels.

β^- radiations

The γ+ce intensity balances at 1137.6, 2020.6 and 2393.3 levels could indicate β feedings to these levels, which however is unlikely since $\Delta J\geq 2$. It is most likely that these levels are fed by undetected γ rays from observed or unobserved higher levels due to Pandemonium effect.

For γ+ce intensity from 2185.7 level, it is uncertain whether it is from β feeding or from undetected γ rays from higher levels.

E(decay)	E(level)	Iβ^-[†#]	Log *ft*[‡]
(3432 *20*)	2723.60	1.56 *21*	5.6 *1*
(3538 *20*)	2617.87	1.71 *11*	5.66 *3*
(3553 *20*)	2602.24	12.2 *7*	4.81 *3*
(3626 *20*)	2529.47	14.9 *7*	4.76 *3*
(3655 *20*)	2500.91	13.9 *6*	4.81 *3*

Continued on next page (footnotes at end of table)

^{123}Cd β^- decay (1.80 s) 1989Hu03 (continued)

β^- radiations (continued)

E(decay)	E(level)	Iβ^-[†#]	Log ft[‡]	E(decay)	E(level)	Iβ^-[†#]	Log ft[‡]
(3694 *20*)	2461.53	9.2 *6*	5.01 *3*	(4053 *20*)	2102.78	5.2 *9*	5.4 *1*
(3801 *20*)	2354.69	6.2 *6*	5.2 *1*	(4589 *20*)	1566.24	1.22 *13*	6.3 *1*
(3846 *20*)	2309.69	5.3 *4*	5.3 *1*	(4990 *20*)	1165.858	2.3 *17*	6.2 *4*
(3888 *20*)	2268.03	10.5 *6*	5.04 *3*	(5128 *20*)	1027.511	2.2 *17*	6.2 *4*
(3977 *20*)	2178.82	11.0 *7*	5.07 *3*				

† From γ+ce intensity imbalance at each level. Quoted values should be considered as approximate due to incomplete decay scheme.
‡ Quoted values should be considered as approximate due to incomplete decay scheme.
# Absolute intensity per 100 decays.

$\gamma(^{123}In)$

Iγ normalization: From $\Sigma I(\gamma+ce \text{ to g.s.}+327)=100$, assuming no β feeding to g.s. and 327 level.

E$_\gamma$[†]	I$_\gamma$[†&]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[@]	α[a]	Comments
75.81[‡]	2.40 *24*	2178.82	(11/2$^-$)	2102.78	(9/2$^-$,11/2$^-$)	M1	1.124	
77.60[‡]	1.56 *16*	2178.82	(11/2$^-$)	2101.01	(11/2$^-$,13/2$^-$)	M1	1.051	
84.7 *4*	0.20 *10*	2185.7		2101.01	(11/2$^-$,13/2$^-$)			
107.1 *3*	0.14 *5*	2461.53	(9/2$^-$,11/2$^-$)	2354.69	(11/2$^-$)			
138.38 *10*	0.87 *15*	1165.858	(13/2$^+$)	1027.511	(11/2$^+$)			
174.79 *6*	2.2 *3*	2529.47	(11/2$^-$,13/2$^-$)	2354.69	(11/2$^-$)			
193.4 *4*	0.42 *18*	2723.60	(11/2$^-$,13/2$^-$)	2529.47	(11/2$^-$,13/2$^-$)			
207.12 *10*	1.35 *25*	2309.69	(11/2$^-$,13/2$^-$)	2102.78	(9/2$^-$,11/2$^-$)			
x226.36 *9*	0.60 *7*							
256.69 *5*	0.23 *2*	2393.32	(5/2$^+$)	2136.64	(1/2$^+$,3/2$^+$)			
261.5 *5*	0.93 *10*	2529.47	(11/2$^-$,13/2$^-$)	2268.03	(11/2$^-$)			
292.90 *10*	0.41 *4*	2602.24	(9/2$^-$,11/2$^-$)	2309.69	(11/2$^-$,13/2$^-$)			
x299.90 *20*	0.18 *3*							
334.03 *5*	0.78 *8*	2354.69	(11/2$^-$)	2020.64	(7/2$^-$)			
353.63 *7*	0.05 *2*	1052.28	(5/2$^+$)	698.55	(3/2)$^-$			
371.32 *3*	0.89 *5*	698.55	(3/2)$^-$	327.24	1/2$^-$	M1	0.01517	E$_\gamma$: other: 371.2 *2* (1981Ru07).
428.41 *3*	7.3 *4*	2529.47	(11/2$^-$,13/2$^-$)	2101.01	(11/2$^-$,13/2$^-$)			
438.68[#] *5*	0.24 *3*	1137.56	(3/2$^-$,5/2$^-$)	698.55	(3/2)$^-$			
454.25 *5*	0.69 *7*	2020.64	(7/2$^-$)	1566.24	(9/2$^+$)			
x459.55 *6*	0.47 *6*							
480.28 *3*	1.34 *10*	2500.91	(9/2$^-$,11/2$^-$)	2020.64	(7/2$^-$)			
515.0 *5*	0.62 *4*	2617.87	(11/2$^-$,13/2$^-$)	2102.78	(9/2$^-$,11/2$^-$)			
x646.0 *3*	0.20 *4*							
x672.09 *15*	0.19 *5*							
x684.25 *20*	0.17 *5*							
810.29 *3*	0.71 *5*	1137.56	(3/2$^-$,5/2$^-$)	327.24	1/2$^-$			
827.23 *25*	0.02 *1*	2393.32	(5/2$^+$)	1566.24	(9/2$^+$)			
881.17 *5*	0.36 *7*	2393.32	(5/2$^+$)	1512.12	7/2$^+$,9/2$^+$			
883.0 *9*	0.54 *1*	2020.64	(7/2$^-$)	1137.56	(3/2$^-$,5/2$^-$)			
935.10 *3*	10.4 *6*	2101.01	(11/2$^-$,13/2$^-$)	1165.858	(13/2$^+$)			E$_\gamma$: other: 935.2 *2* (1981Ru07).
987.60 *10*	1.2 *3*	2461.53	(9/2$^-$,11/2$^-$)	1473.89				

Continued on next page (footnotes at end of table)

^{123}Cd β^- decay (1.80 s) 1989Hu03 (continued)

$\gamma(^{123}In)$ (continued)

E_γ [†]	I_γ [†&]	E_i(level)	J_i^π	E_f	J_f^π	Comments
988.73 *10*	4.7 *3*	2500.91	(9/2$^-$,11/2$^-$)	1512.12	7/2$^+$,9/2$^+$	
999.12 *15*	0.02 *1*	2136.64	(1/2$^+$,3/2$^+$)	1137.56	(3/2$^-$,5/2$^-$)	
1012.91 *10*	1.95 *25*	2178.82	(11/2$^-$)	1165.858	(13/2$^+$)	
1027.50 *3*	22.2 *15*	1027.511	(11/2$^+$)	0.0	9/2$^+$	E_γ: other: 1027.6 *2* (1981Ru07).
1052.28 *3*	0.30 *3*	1052.28	(5/2$^+$)	0.0	9/2$^+$	
1084.32 *3*	0.07 *1*	2136.64	(1/2$^+$,3/2$^+$)	1052.28	(5/2$^+$)	
1102.20 *3*	3.03 *21*	2268.03	(11/2$^-$)	1165.858	(13/2$^+$)	
1143.84 *15*	1.10 *23*	2309.69	(11/2$^-$,13/2$^-$)	1165.858	(13/2$^+$)	
1150.8 *6*	0.41 *21*	2178.82	(11/2$^-$)	1027.511	(11/2$^+$)	
1165.86 *3*	25.2 *15*	1165.858	(13/2$^+$)	0.0	9/2$^+$	E_γ: other: 1165.8 *3* (1981Ru07).
[x]1177.70 *20*	0.23 *2*					
1188.79 *9*	0.46 *6*	2354.69	(11/2$^-$)	1165.858	(13/2$^+$)	
1240.48 *3*	7.9 *5*	2268.03	(11/2$^-$)	1027.511	(11/2$^+$)	E_γ: other: 1240.5 *3* (1981Ru07).
1255.65 *5*	0.22 *1*	2393.32	(5/2$^+$)	1137.56	(3/2$^-$,5/2$^-$)	
[x]1275.7 *4*	0.88 *7*					
1282.19 *4*	3.30 *19*	2309.69	(11/2$^-$,13/2$^-$)	1027.511	(11/2$^+$)	
[x]1307.18 *5*	0.73 *7*					
1341.06 *5*	0.27 *2*	2393.32	(5/2$^+$)	1052.28	(5/2$^+$)	
1363.64 *3*	4.6 *3*	2529.47	(11/2$^-$,13/2$^-$)	1165.858	(13/2$^+$)	
1438.13 *5*	0.11 *1*	2136.64	(1/2$^+$,3/2$^+$)	698.55	(3/2)$^-$	
1452.00 *5*	1.09 *10*	2617.87	(11/2$^-$,13/2$^-$)	1165.858	(13/2$^+$)	
1473.77[b#] *3*	1.23[b] *8*	1473.89		0.0	9/2$^+$	
1473.77[b#] *3*	7.2[b] *5*	2500.91	(9/2$^-$,11/2$^-$)	1027.511	(11/2$^+$)	
1502.13 *15*	0.31 *5*	2529.47	(11/2$^-$,13/2$^-$)	1027.511	(11/2$^+$)	
1512.09 *3*	4.6 *3*	1512.12	7/2$^+$,9/2$^+$	0.0	9/2$^+$	
1557.74 *5*	1.14 *9*	2723.60	(11/2$^-$,13/2$^-$)	1165.858	(13/2$^+$)	
1566.09 *5*	1.93 *10*	1566.24	(9/2$^+$)	0.0	9/2$^+$	
1694.81 *5*	0.55 *3*	2393.32	(5/2$^+$)	698.55	(3/2)$^-$	
1809.50 *9*	0.03 *1*	2136.64	(1/2$^+$,3/2$^+$)	327.24	1/2$^-$	
[x]2009.08 *15*	0.26 *4*					
2020.71 *4*	1.24 *10*	2020.64	(7/2$^-$)	0.0	9/2$^+$	
2102.81 *5*	12.3 *7*	2102.78	(9/2$^-$,11/2$^-$)	0.0	9/2$^+$	
[x]2111.29 *6*	1.44 *12*					
[x]2151.52 *20*	0.14 *3*					
2178.98 *15*	0.28 *4*	2178.82	(11/2$^-$)	0.0	9/2$^+$	
2268.09 *10*	0.53 *6*	2268.03	(11/2$^-$)	0.0	9/2$^+$	
[x]2308.41 *15*	0.49 *7*					
2354.74 *6*	7.3 *4*	2354.69	(11/2$^-$)	0.0	9/2$^+$	
2393.46 *15*	0.06 *1*	2393.32	(5/2$^+$)	0.0	9/2$^+$	
[x]2408.16 *7*	1.9 *6*					
2461.50 *7*	7.9 *5*	2461.53	(9/2$^-$,11/2$^-$)	0.0	9/2$^+$	
2500.44[#] *9*	0.62 *6*	2500.91	(9/2$^-$,11/2$^-$)	0.0	9/2$^+$	
2601.98 *8*	11.8 *7*	2602.24	(9/2$^-$,11/2$^-$)	0.0	9/2$^+$	
[x]3077.7 *3*	0.15 *3*					

[†] From 1989Hu03, unless otherwise noted. Values are also available in the decay schemes in 1986Ho24 but no tabulated data are given.
[‡] From 1986Ho24.
[#] Poor fit. Uncertainty are increased to 0.2 keV in the fitting procedure.
[@] As given in the decay scheme in 1986Ho24 based on ce data. The same values are adopted in Adopted Gammas. No explicit ce data is given by 1986Ho24.

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^{123}Cd β^- decay (1.80 s) 1989Hu03 (continued)

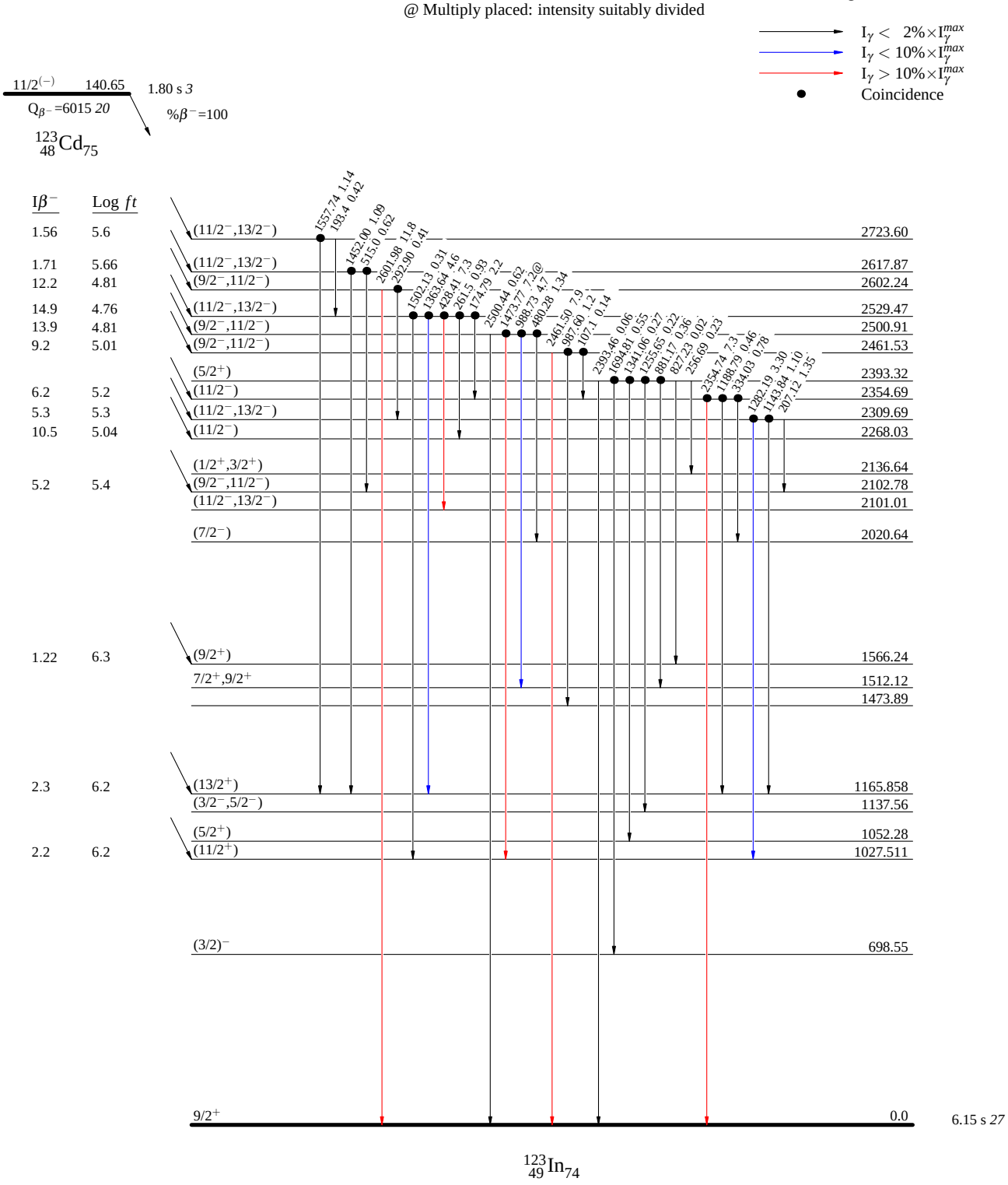
$\gamma(^{123}In)$ (continued)

[&] Absolute intensity per 100 decays.
[a] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
[b] Multiply placed with intensity suitably divided.
[x] γ ray not placed in level scheme.

^{123}Cd β^- decay (1.80 s) 1989Hu03

Decay Scheme

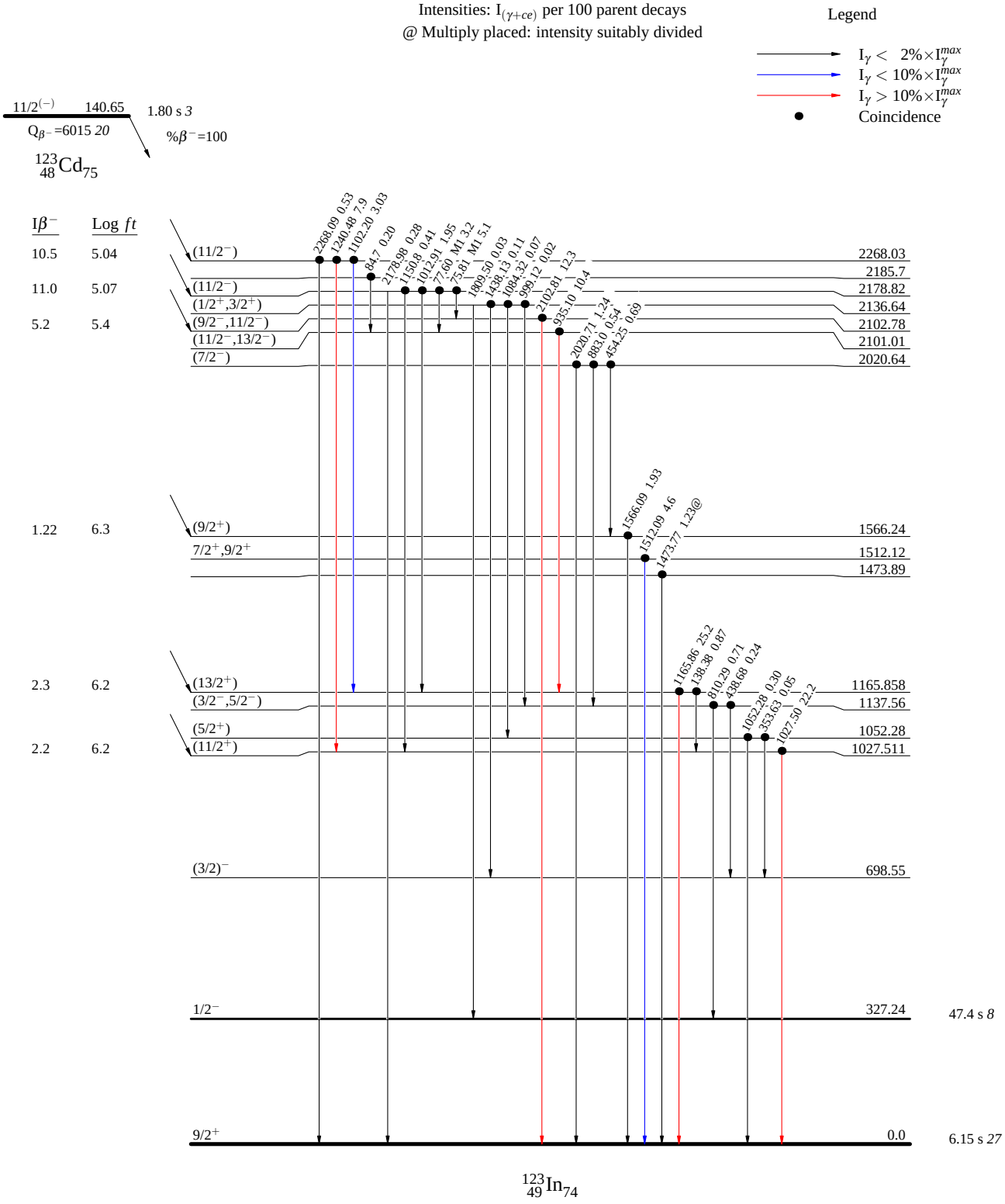
Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
@ Multiply placed: intensity suitably divided



^{123}Cd β^- decay (1.80 s) 1989Hu03

Decay Scheme (continued)

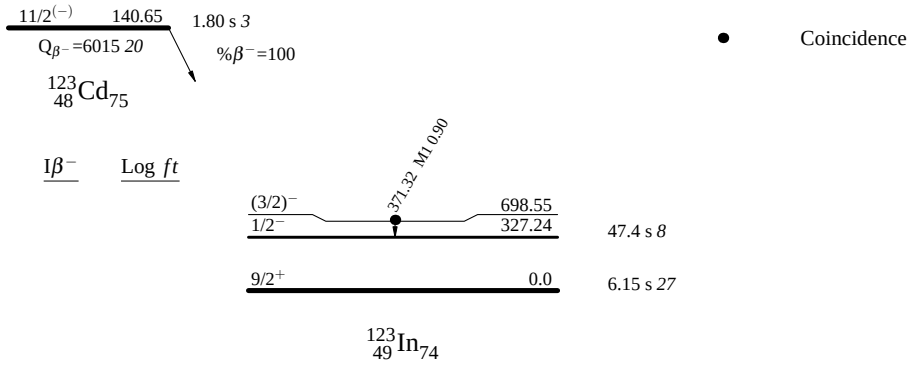
Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
@ Multiply placed: intensity suitably divided



^{123}Cd β^- decay (1.80 s) 1989Hu03

Decay Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
@ Multiply placed: intensity suitably divided



^{123}In IT decay (1.4 μs) 2004Sc42

Parent: ^{123}In: E=2078.1 *6*; J^{π}=(17/2$^-$); $T_{1/2}$=1.4 μs *2*; %IT decay=100

2004Sc42: ^{123}In isomer was produced via the thermal-neutron induced fission of ^{239}Pu and ^{241}Pu. Fission fragments were separated by the LOHENGRIN mass spectrometer according to their mass to ionic charge ratios and detected in a ΔE gas detector. γ rays were detected with two large-volume Ge detectors and x rays and conversion electrons were detected with two Si(Li) detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma$-coin, E(ce), γ(t). Deduced levels, J, π, $T_{1/2}$. Comparisons with shell-model calculations.

^{123}In Levels

E(level)[†]	J^{π}[‡]	$T_{1/2}$	Comments
0.0	9/2$^+$		
1027.5 *3*	(11/2$^+$)		
1165.9 *3*	(13/2$^+$)		
2046.6 *3*	(13/2$^-$)		J^{π}: the simultaneous feeding of the 11/2$^+$ and 13/2$^+$ levels at 1027.5 and 1165.9, respectively, (and no feeding to 9/2$^+$ g.s. and 11/2$^+$ level at 1027.5), suggests a spin and parity assignment 13/2$^-$ or 15/2$^+$ for this level. The negative parity assignment is preferred by analogy with the heavier In isotopes, but a positive parity cannot be completely ruled out (2004Sc42).
2078.1 *6*	(17/2$^-$)	1.4 μs *2*	J^{π}: proposed by 2004Sc42 based on 31.5γ probably (E2) to (13/2$^-$). $T_{1/2}$: from 880.7γ(t)+1166.0γ(t) (2004Sc42).

[†] From a least-squares fit to γ-ray energies.

[‡] From Adopted Levels. Assignments for excited states are adopted from this study as proposed by 2004Sc42, based on systematics of neighboring odd-mass In isotopes and γ decay pattern.

γ(^{123}In)

Iγ normalization: From I(880.7γ)+I(1019.0γ)=100.

E$_\gamma$	I$_\gamma$[†]	E$_i$(level)	J_i^{π}	E$_f$	J_f^{π}	Mult.	α[‡]	Comments
31.5 *5*	1.01	2078.1	(17/2$^-$)	2046.6	(13/2$^-$)	(E2)	105	E$_\gamma$: from energy of conversion electron, observed in delayed ce spectrum with electron energy of 27.5 *5* corresponding to ce(L) line of 31.5γ. I$_\gamma$: from I(γ+ce) intensity balance, I(889.7γ)=107, an di(1019.0γ)=40. Mult.: suggested by the absence of crossover transition between 2078 level and 1166 level.
(138.5)		1165.9	(13/2$^+$)	1027.5	(11/2$^+$)			E$_\gamma$: from level-energy difference. This γ-ray was not observed by 2004Sc42 due to its low expected relative intensity of ≈6.
880.7 *2*	107	2046.6	(13/2$^-$)	1165.9	(13/2$^+$)			
1019.0 *3*	40	2046.6	(13/2$^-$)	1027.5	(11/2$^+$)			
1027.4 *3*	42	1027.5	(11/2$^+$)	0.0	9/2$^+$			
1166.0 *3*	100	1165.9	(13/2$^+$)	0.0	9/2$^+$			

[†] For absolute intensity per 100 decays, multiply by 0.68.

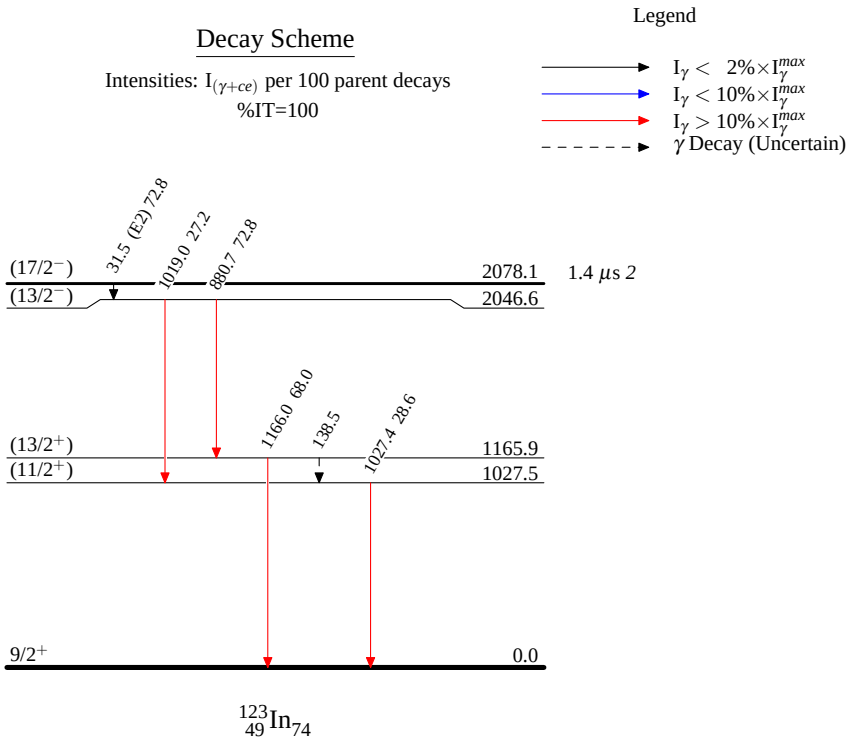
[‡] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

^{123}In IT decay (1.4 μs) 2004Sc42

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays

%IT=100



$^{123}_{49}In_{74}$

^{124}Sn(d,^{3}He) 1971We01

1971We01: E=28.9 MeV deuteron beam was produced from the University of Michigan 83-inch isochronous cyclotron. Targets were 94.7% enriched ^{124}Sn. Reaction products were momentum-analyzed with one of three available magnets in the high-resolution magnetic-analysis system (FWHM=40 keV). Measured $\sigma(\theta)$ from θ(c.m.)=0° to 60°. Deduced levels, J, π, L-transfers, spectroscopic factors from DWBA analysis. Uncertainty in absolute cross section is 15%.

Others:

2004Su04: E=503 MeV. Measured $\sigma(\theta)$. Deduced energies and widths for deeply-bound pionic states in ^{123}Sn.

1969Co03: E=22 MeV. Only Q-value is reported.

^{123}In Levels

Spectroscopic factor C^2S is obtained from $d\sigma/d\Omega(exp)=2.95\times C^2S\times d\sigma/d\Omega(DWBA)$ in 1971We01.

E(level)	J^π †	L ‡	C^2S ‡
0.0	$9/2^+$	4	7.2
320 *6*	$1/2^-$	1	1.4
660 *13*	$3/2^-$	1	1.7
1010 *20*			
1100 *20*			
1500 *30*	$9/2^+$	4	2.5
1550 *30*			

† Assumed spin-parities from L+1/2 or L-1/2 transfers for deduction of C^2S values (1971We01).

‡ From DWBA analysis (1971We01). Quoted values of C^2S are deduced for assumed spin-parities from L+1/2 or L-1/2 transfers (1971We01).

^{124}Sn(t,α) 1982Wa26

1982Wa26 (also 1979Wa17): E=4.75, 5.00, 5.25 MeV triton beams were produced from the University of Manchester 6-MV Van de Graaff. Targets were 200 μg/cm^2 isotopically enriched ^{124}Sn. Alpha particles were detected with an array of silicon surface-barrier detectors (FWHM≈70 keV). Measured $\sigma(\theta)$ from 60° to 160°. Deduced levels, L-transfers, spectroscopic factors from DWBA analysis. Uncertainty in absolute cross section is 5%.

^{123}In Levels

Spectroscopic factor C^2S is obtained from $d\sigma/d\Omega(exp)=N\times C^2S\times d\sigma/d\Omega(DWBA)$, where the normalization constant N=18.9 *15* used in 1982Wa26.

E(level)	L†	C^2S†
0.0	4	6.72 *22*
320	1	1.31 *4*
660	1	1.59 *5*

† From DWBA analysis (1982Wa26). C_2S are obtained assuming $1g_{9/2}$, $2p_{1/2}$, and $2p_{3/2}$ single-particle orbit for g.s. 320 and 660 levels, respectively.

^{232}Th(^{6}Li,Fγ) 2010Re01

2010Re01: E=45 MeV ^{6}Li beam was produced from the 88-Inch Cyclotron of the LBNL. Target was isotopically pure, 889 μg/cm^{2} ^{232}Th. Fission fragments and emitted particles were detected in the Silicon Telescope Array for Reaction Studies (STARS), consisting of a series of double-sided, annular Si detectors covering a range of 21° – 52° with respect to the incident beam. γ-rays were detected with the Livermore Berkeley Array consisting of six clover HPGe detectors and one LEPS detector. Measured Eγ, γγ-coin, (particle)-γ correlations, particle-γ(t). Deduced evidence for a new isomer and its half-life.

2010Re01 take level scheme below the 2079+x isomer from 2004Sc42 in ^{123}In IT decay, with γ transitions (except 32γ) confirmed in their measurement.

^{123}In Levels

E(level)	Jπ†	$T_{1/2}$	Comments
0	9/2^{+}		
1027	11/2^{+}		
1166	13/2^{+}		
2047	(13/2^{-})		
2079	(17/2^{-})	1.4 μs *2*	$T_{1/2}$: from 2004Sc42 in ^{123}In IT decay.
2079+x	(21/2^{-})	≥100 μs	E(level): this isomer is proposed by 2010Re01 based on their observation of delayed γ transitions seen in the decay of the 1.4–μs isomer in 2004Sc42, which however less likely originates from the relatively short-lived 1.4–μs isomer due to the particle-γ correlation time from 5 to 175 μs in their setup, but is likely from a longer-lived isomer above the 1.4–μs isomer to further delay the decays as observed. Jπ,$T_{1/2}$: from 2010Re01, with the half-life limit suggested from intensity in time spectra. This isomer is suggested to arise from ν($h_{11/2}$⊗$d_{3/2}$)7^{-} and ν($h_{11/2}$⊗$s_{1/2}$)5^{-} neutron core excitation coupling with the valence proton (2010Re01).

† Proposed in 2010Re01, based on systematics of neighboring nuclei and theoretical predictions.

γ(^{123}In)

Eγ	Ei(level)	J_i^π	E_f	J_f^π	Comments
x†	2079+x	(21/2^{-})	2079	(17/2^{-})	Eγ: it is stated in 2010Re01 that by assuming a single transition between the two isomeric states, it is not possible to assign this transition in their experiment and mass separation or isomer decay tagging would be needed to determine the origin with confidence.
32	2079	(17/2^{-})	2047	(13/2^{-})	Eγ: not seen in 2010Re01, taken from 2004Sc42.
881	2047	(13/2^{-})	1166	13/2^{+}	
1020	2047	(13/2^{-})	1027	11/2^{+}	
1027	1027	11/2^{+}	0	9/2^{+}	
1166	1166	13/2^{+}	0	9/2^{+}	

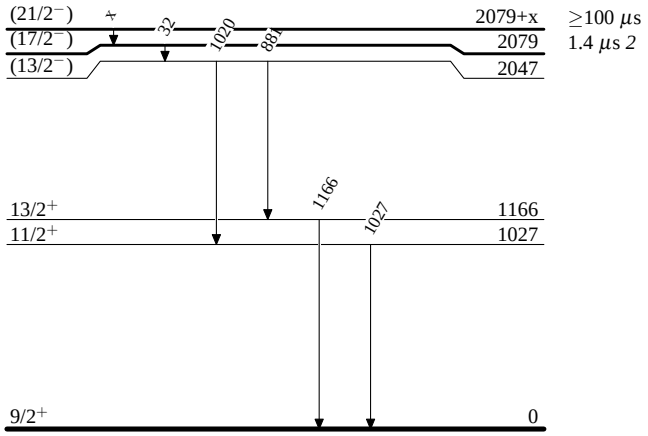
† Placement of transition in the level scheme is uncertain.

^{232}Th(^{6}Li,Fγ) 2010Re01

Legend

Level Scheme

γ Decay (Uncertain)



$^{123}_{49}In_{74}$

Adopted Levels, Gammas

Q(β^-)=1408.2 *24*; S(n)=5946.0 *12*; S(p)=11530 *50*; Q(α)=−6260 *40* 2021Wa16
S(2n)=14760.7 *24*, S(2p)=21319 *3* (2021Wa16).
See (n,γ):resonances for neutron resonance data of 199 resonances.

^{123}Sn Levels

Cross Reference (XREF) Flags

A	^{123}In β^- decay (6.15 s)	F	^{122}Sn(d,pγ)	K	^{124}Sn(^{80}Se,Xγ)
B	^{123}In β^- decay (47.4 s)	G	^{122}Sn(α,^{3}He)	L	^{208}Pb(^{48}Ca,Xγ),^{238}U(^{48}Ca,Xγ)
C	^{122}Sn(n,γ) E=res	H	^{124}Sn(p,d)	M	^{238}U(^{12}C,Fγ),^{208}Pb(^{18}O,Fγ)
D	^{122}Sn(n,γ) E=thermal	I	^{124}Sn(p,d) IAR		
E	^{122}Sn(d,p)	J	^{124}Sn(d,t)		

E(level)[†]	J$^\pi$	T$_{1/2}$	XREF	Comments
0.0[‡]	11/2$^-$	129.2 d *5*	ABCDEFGH JKLM	%β^-=100 μ=−1.3700 *9* (1986An24) Q=+0.03 *4* (1986An24) J$^\pi$: spin from atomic beam laser spectroscopy (1986An24); π=− from L(d,p)=L(d,t)=5 from 0$^+$. T$_{1/2}$: weighted average of 129.0 d *5* (1966La13) and 129.6 d *6* (1968Er03). Others: 130 d *5* (1949Le05), 126 d *5* (1950Ne52), 125 d *3* (1951Co34). μ,Q: from thermal atomic beam LASER spectroscopy (1986An24). See also 2014StZZ and 2016St14 compilations. Nuclear rms charge radius=4.6665 fm *23* (2013An02).
24.6 *4*	3/2$^+$	40.06 min *2*	ABCDEF J	%β^-=100 J$^\pi$: spin from atomic beam (1968Ch38); π=+ from L(d,p)=L(d,t)=2 from 0$^+$. T$_{1/2}$: weighted average of 40.06 m *1* (1990Ab06), 40.08 m *7* (1968Er03), 41.5 m *5* (1948Mo33), and 40 m *1* (1949Le05). Others: 41.8 m *5* (1977Ti03), 38.9 m *4* (1970OsZZ), 39.5 m (1949Du15).
150.4 *4*	1/2$^+$		BCDEF H J	XREF: H(139). J$^\pi$: L(d,p)=L(d,t)=L(p,d)=0 from 0$^+$.
618.88 *19*	(9/2)$^-$		A C EF J	XREF: J(?). J$^\pi$: 619.0γ M1,E2 to 11/2$^-$; 536.4γ from 7/2$^+$; possible β^- feeding from 9/2$^+$ parent; level systematics of 9/2$^-$ in odd Sn isotopes.
870.1 *5*	(5/2)$^+$		A C EF h	XREF: h(899). J$^\pi$: 719.5γ to 1/2$^+$, 284.7γ from 7/2$^+$, 1331γ from (9/2)$^+$. 1970Ca01 also suggest J=5/2 in (p,d) for a level at 899.
920.0 *5*	(3/2)$^+$		BCD F h J	XREF: h(899)J(930). J$^\pi$: 769.5γ M1 to 1/2$^+$; excitation function in (d,pγ) favors 3/2$^+$. Other: 1970Ca01 suggest J=5/2 in (p,d).
931.4 *5*	7/2$^-$		A C EF	J$^\pi$: L(d,p)=3 from 0$^+$;931.2γ E2 to 11/2$^-$.
1044.3 *5*	(7/2)$^+$	<0.1 ns	A EF H J	XREF: H(1028)J(1060). J$^\pi$: L(d,t)=4 and L(p,d)=(4) from 0$^+$; 1019.7γ to 3/2$^+$. T$_{1/2}$: from (β)(1019.7γ)(t) (1976Fo02) in ^{123}In β^- decay (6.15 s).
1072.0 *6*	(1/2,3/2)$^+$		C EF	J$^\pi$: 921.9γ M1+E2 to 1/2$^+$; primary 4873.9γ from 1/2 resonance state in (n,γ) E=res.
1107.04[&] *9*	(15/2$^-$)[@]		KLM	J$^\pi$: band assignment.
1109			E J	
1136.3 *8*	(1/2,3/2,5/2)$^+$		CDEF	J$^\pi$: 1112.0γ M1,E2 to 3/2$^+$; 985.5γ to 1/2$^+$.
1155.03 *14*	7/2$^+$	<0.1 ns	A E h J	XREF: h(1185).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{123}Sn Levels (continued)

E(level)[†]	Jπ	$T_{1/2}$	XREF	Comments
				E(level): L=4 component of 1185 level in (p,d) suggest excitation of 1155 level. Jπ: L(d,p)=L(d,t)=4 from 0+; 1130.5γ E2 to 3/2+. $T_{1/2}$: From (β)(1130.5γ)(t) (1976Fo02).
1194.6 *7*	(5/2)+		BC EF h J	XREF: h(1185). Jπ: L(d,p)=L(p,d)=L(d,t)=2 from 0+; IAR of 15434, 5/2+ level in ^{123}Sb in ^{122}Sn(pol p,p) IAR.
1217.07 *9*	(13/2−)		KL	Jπ: proposed in (^{48}Ca,Xγ) (2016Is03) and (^{80}Se,Xγ) (1994Ma48).
1301			E	
1440			E J	XREF: J(1451). E(level): from (d,p). 1451 level in (d,t) is tentative.
1466			E	
1488.8 *11*	(5/2)+		EF H J	XREF: F(?)J(1500). Jπ: L(d,p)=L(p,d)=L(d,t)=2 from 0+; IAR of 15734, 5/2+ level in ^{123}Sb in ^{122}Sn(pol p,p) IAR.
1714			E	
1729			E	
1780 *20*	3/2+,5/2+		E H J	E(level): from (d,t). Others: 1784 from (d,p), 1780 from (p,d). Jπ: L(p,d)=L(d,t)=2 from 0+; 1970Ca01 in (p,d) suggest J=5/2 from possible J-dependence of σ(θ).
1829	(1/2−,3/2−)		E	Jπ: L(d,p)=(1) from 0+.
1902	3/2+,5/2+		E H	Jπ: L(p,d)=2 and L(d,p)=(2) from 0+; 1970Ca01 in (p,d) suggest J=3/2 from possible J-dependence of σ(θ).
1926.09 *12*	(15/2+)		KL	Jπ: proposed in (^{48}Ca,Xγ). But (17/2−) proposed in (^{80}Se,Xγ).
1944.89[a] *12*	(19/2+)[@]	7.4 μs *26*	KLM	Jπ: band assignment. $T_{1/2}$: from delayed γ to pulsed beam in (^{80}Se,Xγ) (1992Ma27).
2001.2 *5*	(9/2)+		A E	Jπ: allowed β− feeding from 9/2+ parent gives 7/2+,9/2+,11/2+; 1131γ-719.5γ cascade to 1/2+ disfavors 11/2+; 2001.2γ to 11/2− disfavors 7/2+.
2026	3/2+,5/2+		E H J	XREF: J(2010). E(level): from (d,p). Others: 2020 from (p,d), 2010 *20* from (d,t). Jπ: L(p,d)=L(d,t)=2 from 0+; 1970Ca01 in (p,d) suggest J=3/2 from possible J-dependence of σ(θ).
2085	3/2+,5/2+		E H j	XREF: H(2080)j(2100). Jπ: L(p,d)=2 from 0+; 1970Ca01 in (p,d) suggest J=5/2 from possible J-dependence of σ(θ).
2098.97 *19*	(19/2−)[@]		L	
2114 *6*	(3/2+,5/2+)		E j	XREF: j(2100). Jπ: L(d,t)=2 from 0+ for a level at 2100 *20*.
2152.64[a] *19*	(23/2+)[@]	6 μs	KLM	Jπ: band assignment. $T_{1/2}$: from delayed γ versus beam pulse (1994Ma48,1995Da26) in (^{80}Se,Xγ). No $\Delta T_{1/2}$ value have been given.
2156.0 *8*	(1/2,3/2,5/2)		CD	Jπ: primary 3789.1γ from 3/2 resonance in (n,γ) E=res.
2157 *15*	(1/2,3/2,5/2)		E H J	XREF: H(2150)J(2167). Jπ: L(d,p)=(1+2) from 0+.
2260 *15*	1/2−,3/2−		E j	XREF: j(2271). Jπ: L(d,p)=1 from 0+.
2262.78[&] *20*	(19/2−)[@]		KLM	Jπ: band assignment.
2270	3/2+,5/2+		H j	XREF: j(2271). Jπ: L(p,d)=2 from 0+; 1970Ca01 in (p,d) suggest J=3/2+ from possible J-dependence of σ(θ).
2362 *15*	7/2+,9/2+		E H J	XREF: H(2350)J(2368). Jπ: L(p,d)=4 from 0+.
2395.29 *18*	(21/2+)[@]		KL	

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Adopted Levels, Gammas (continued)

^{123}Sn Levels (continued)

E(level)[†]	J^π	$T_{1/2}$	XREF	Comments
2425	$1/2^+$		E H J	XREF: H(2410)J(2420). J^π: L(p,d)=L(d,t)=0 from 0^+.
2446			E J	
2542.26[&] *19*	$(23/2^-)$[@]		KLM	J^π: band assignment.
2615.2 *11*	$(1/2^+)$		C E h	XREF: C(?)h(2620). E(level): from (d,p). Other: 2615 *3* from (n,γ) E=res is questionable; 2620 from (p,d). J^π: L(p,d)=0 for a level at 2620.
2621.0? *22*	$(1/2^+)$		BC h	XREF: C(?)h(2620). J^π: L(p,d)=0 for a level at 2620.
2676	$5/2^-,7/2^-$		E J	XREF: J(2680). J^π: L(d,p)=L(d,t)=3 from 0^+.
2712.3[&] *3*	$(27/2^-)$[@]	34 μs	KLM	J^π: band assignment. $T_{1/2}$: from delayed γ versus beam pulse (1994Ma48,1995Da26) in (^{80}Se,Xγ). No $\Delta T_{1/2}$ value have been given.
2716 *15*	$(7/2)^-$		E	J^π: L(d,p)=3 from 0^+; IAR of 16932, $7/2^-$ level in ^{123}Sb in ^{122}Sn(pol p,p) IAR.
2730	$7/2^+,9/2^+$		H	J^π: L(p,d)=4 from 0^+.
2746	$5/2^-,7/2^-$		E	J^π: L(d,p)=3 from 0^+.
2820 *15*	$5/2^-,7/2^-$		E	J^π: L(d,p)=3 from 0^+.
2850	$(3/2^+,5/2^+)$		H	J^π: L(p,d)=(2) from 0^+; 1970Ca01 in (p,d) suggest J=(3/2) from possible J-dependence of $\sigma(\theta)$.
2950 *20*	$7/2^+,9/2^+$		J	J^π: L(d,t)=4 from 0^+.
3040 *15*	$5/2^-,7/2^-$		E H	XREF: H(3020). J^π: L(d,p)=3 from 0^+.
3073	$(5/2^-,7/2^-)$		E	J^π: L(d,p)=(3) from 0^+.
3113	$5/2^-,7/2^-$		E	J^π: L(d,p)=3 from 0^+.
3151.6 *21*	$(7/2)^-$		B E h	XREF: B(?)h(3160). J^π: L(d,p)=3 from 0^+; IAR of 17376, $(7/2^-)$ level in ^{123}Sb in ^{122}Sn(pol p,p) IAR.
3188	$(1/2^-,3/2,5/2^+)$		E h	XREF: h(3160). J^π: L(d,p)=1,2 from 0^+.
3217	$5/2^-,7/2^-$		E	J^π: L(d,p)=3 from 0^+.
3240	$3/2^+,5/2^+$		e H	XREF: e(3252). J^π: L(p,d)=2 from 0^+; 1970Ca01 in (p,d) suggest J=3/2 from possible J-dependence of $\sigma(\theta)$.
3259 *3*			B e	XREF: e(3252).
3292.9[a] *3*	$(27/2^+)$[@]		LM	J^π: band assignment.
3306? *3*			B h	XREF: h(3300).
3320	$(3/2^-)$		E h	XREF: h(3300). J^π: IAR of 17563, $(3/2^-)$ level in ^{123}Sb in ^{122}Sn(pol p,p) IAR.
3345 *15*	$(1/2^-,3/2,5/2^+)$		E	J^π: L(d,p)=1,2 from 0^+.
3383 *15*	$(1/2^-,3/2,5/2^+)$		E	J^π: L(d,p)=1,2 from 0^+.
3435	$(1/2^-,3/2,5/2^+)$		E	J^π: L(d,p)=1,2 from 0^+.
3456	$(1/2^-,3/2,5/2^+)$		E	J^π: L(d,p)=1,2 from 0^+.
3514			E	
3534	$(1/2^-,3/2,5/2^+)$		E	J^π: L(d,p)=1,2 from 0^+.
3551	$(1/2^-,3/2,5/2^+)$		E	J^π: L(d,p)=1,2 from 0^+.
3632	$(1/2^-,3/2,5/2^+)$		E	J^π: L(d,p)=1,2 from 0^+.
3650	$(1/2^-,3/2,5/2^+)$		E	J^π: L(d,p)=1,2 from 0^+.
3677			E	
3694			E	
3720	$(1/2^-,3/2,5/2^+)$		E	J^π: L(d,p)=1,2 from 0^+.
3735			E	

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Adopted Levels, Gammas (continued)

^{123}Sn Levels (continued)

E(level)[†]	Jπ	$T_{1/2}$	XREF	Comments
3755.7[&] *4*	(31/2$^-$)[@]		LM	XREF: M(?). Jπ: band assignment.
3773	(1/2$^-$,3/2,5/2$^+$)		E	Jπ: L(d,p)=1,2 from 0$^+$.
3809	(1/2$^-$,3/2,5/2$^+$)		E	Jπ: L(d,p)=1,2 from 0$^+$.
3818.3? *5*	(31/2$^-$)		M	XREF: M(?). Jπ: proposed in (^{12}C,Fγ).
3827	(1/2$^-$,3/2,5/2$^+$)		E	Jπ: L(d,p)=1,2 from 0$^+$.
3849	(1/2$^-$,3/2,5/2$^+$)		E	Jπ: L(d,p)=1,2 from 0$^+$.
3868			E	
3910	5/2$^-$,7/2$^-$		E	Jπ: L(d,p)=3 from 0$^+$.
3966	5/2$^-$,7/2$^-$		E	Jπ: L(d,p)=3 from 0$^+$.
4008	(1/2$^-$)		E	Jπ: Possibly IAR of 18256, (1/2)$^-$ level in ^{123}Sb in ^{122}Sn(pol p,p).
4057	5/2$^-$,7/2$^-$		E	Jπ: L(d,p)=3 from 0$^+$.
4075	5/2$^-$,7/2$^-$		E	Jπ: L(d,p)=3 from 0$^+$.
4105			E	
4116.7[a] *4*	(31/2$^+$)[@]		LM	Jπ: band assignment.
4267	(1/2$^-$,3/2,5/2$^+$)		E	Jπ: L(d,p)=1,2 from 0$^+$.
4358	5/2$^-$,7/2$^-$		E	Jπ: L(d,p)=3 from 0$^+$.
4378.4[a] *4*	(35/2$^+$)[@]	4 ns *1*	LM	Jπ: band assignment. $T_{1/2}$: from $\gamma\gamma(\theta)$ in (^{48}Ca,Xγ).
4423	5/2$^-$,7/2$^-$		E	Jπ: L(d,p)=3 from 0$^+$.
4464			E	
4736			E	
4743.8[&] *5*	(35/2$^-$)[@]		LM	XREF: M(?). Jπ: band assignment.
4773 *15*			E	
4809.9? *6*	(35/2$^-$)		M	Jπ: proposed in (^{12}C,Fγ).
4845 *15*			E	
4875 *15*			E	
4923 *15*			E	
4964 *15*			E	
5019 *15*			E	
5127 *15*			E	
5478.8[&] *6*	(39/2$^-$)[@]		LM	XREF: M(?). Jπ: band assignment.
5520.4? *7*			M	
5640[#]			H	E(level): in energy region of 3830-7000, Γ=1.90 MeV in (p,d) (1986Ma37).
5644.5 *5*	(39/2$^+$)		LM	Jπ: proposed in (^{48}Ca,Xγ).
5945.9[‡]	3/2		C	Jπ: from $\gamma(\theta)$ in (n,γ) E=res (1975Bh01).
5946.1[‡]	1/2		C	Jπ: from $\gamma(\theta)$ in (n,γ) E=res (1975Bh01).
5947.5[‡]			C	
5947.9[‡]			C	
5948.9[‡]			C	
5949.2[‡]			C	
5950.6[‡]			C	
6231.1 *5*	(39/2$^+$)		LM	Jπ: proposed in (^{48}Ca,Xγ) and (^{12}C,Fγ).
6330[#]			H	E(level): in energy region of 3830-8200, Γ=2.60 MeV in (p,d) (1986Ma37).
6900[#]			H	E(level): in energy region of 3830-10020, Γ=3.89 MeV in (p,d) (1986Ma37).
7120[#]			H	E(level): in energy region of 3830-10020, Γ=3.68 MeV in (p,d)

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Adopted Levels, Gammas (continued)

^{123}Sn Levels (continued)

E(level)[†]	Jπ	$T_{1/2}$	XREF	Comments
				(1986Ma37).
7159.7 *5*	(43/2$^+$)		LM	
8520[#]			H	E(level): for energy region of 7000-10020, Γ=2.02 MeV in (p,d) (1986Ma37).
9040[#]			H	E(level): for energy region of 8200-10020, Γ=1.20 MeV in (p,d) (1986Ma37).
16943 *50*	9/2$^+$	39 keV *8*	I	Jπ: IAS ^{123}In g.s.
17306 *50*	1/2$^-$	45 keV *7*	I	Jπ: IAS ^{123}In 327-keV state.
17656 *50*	(3/2)$^-$	39 keV *15*	I	Jπ: IAS ^{123}In 698-keV state.

[†] From a least-squares fit to γ-ray energies where available, unless otherwise noted.
[‡] From (n,γ) E=res, obtained from S(n)+E_n(res).
[#] Quoted values are average excitation energies in 1986Ma37 in (p,d), calculated using strength functions in the indicated energy region in comments.
[@] Proposed by 2016Is03 in (^{40}Ca,Xγ), based on observed linking transitions, de-excitation paths, and systematics of level energies over the entire Sn isotopic chain.
[&] Band(A): Band based on 11/2$^-$. Band proposed in (^{12}C,Fγ) (2012As05) and (^{48}Ca,Xγ) (2016Is03).
[a] Band(B): Band based on (19/2$^+$) Band proposed in (^{12}C,Fγ) (2012As05).

Adopted Levels, Gammas (continued)

γ(^{123}Sn)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.@	α&	Comments
150.4	$1/2^+$	125.76 *4*	100	24.6	$3/2^+$	M1	0.295	E_γ: from ^{123}In β^- decay (47.4 s) (1976Fo02); also quoted in 2007Eg02 in (n,γ) E=th. Other: 125.9 *2* from (d,pγ). Mult.: from ce data in ^{123}In β^- decay (47.4 s) (1976Fo02).
618.88	$(9/2)^-$	619.0 *3*	100	0.0	$11/2^-$	M1,E2	0.0044 *4*	E_γ: weighted average of 618.8 *3* from ^{123}In β^- decay (6.15 s), 619.5 *5* from (n,γ) E=res, and 619.0 *3* from (d,pγ).
870.1	$(5/2)^+$	719.5 *8*	12.3 *28*	150.4	$1/2^+$			E_γ: weighted average of 719.0 *10* from (n,γ) E=res and 719.9 *8* from (d,pγ). I_γ: from (d,pγ). Other: 16.3 from (n,γ) E=res.
		845.5 *2*	100 *10*	24.6	$3/2^+$			E_γ: weighted average of 845.5 *2* from ^{123}In β^- decay (6.15 s), 845.0 *5* from (n,γ) E=res, and 845.9 *4* from (d,pγ). I_γ: from (d,pγ).
920.0	$(3/2)^+$	769.5 *2*	35 *4*	150.4	$1/2^+$	M1	0.00284	E_γ: weighted average of 769.3 *5* from (n,γ) E=res, 769.5 *2* from (n,γ) E=thermal, and 770.3 *9* from (d,pγ). I_γ: from (d,pγ). Other: 33 from (n,γ) E=res.
		896.2 *5*	100 *10*	24.6	$3/2^+$	M1,E2	0.00182 *18*	E_γ: weighted average of 896.5 *5* from ^{123}In β^- decay (47.4 s), 895.8 *10* from (n,γ) E=res, and 895.6 *8* from (d,pγ). I_γ: from (d,pγ).
931.4	$7/2^-$	931.2 *8*	100	0.0	$11/2^-$	E2	1.51×10^{-3}	E_γ: weighted average of 931.2 *8* from ^{123}In β^- decay (6.15 s), 930.9 *10* from (n,γ) E=res, and 931.3 *8* from (d,pγ).
1044.3	$(7/2)^+$	174.18 *6*	0.6 *1*	870.1	$(5/2)^+$	[M1,E2]	0.17 *6*	
		425.4 *7*	0.5 *3*	618.88	$(9/2)^-$	[E1]	0.00352	B(E1)(W.u.)>6.6×10^{-8}
		1019.7 *2*	100 *6*	24.6	$3/2^+$	(E2)	1.23×10^{-3}	B(E2)(W.u.)>0.14 E_γ: weighted average of 1019.7 *2* from ^{123}In β^- decay (6.15 s) and 1020.0 *10* from (d,pγ). Mult.: M1,E2 from ce data in (d,pγ) and ^{123}In β^- decay (6.15 s); E2 consistent with ΔJ^π.
1072.0	$(1/2,3/2)^+$	921.9 *5*	100 *9*	150.4	$1/2^+$	M1+E2	0.00171 *17*	E_γ: weighted average of 921.9 *5* from (n,γ) E=res and 920.9 *8* from (d,pγ). I_γ: from (d,pγ).
		1046.4 *10*	88 *22*	24.6	$3/2^+$			E_γ: weighted average of 1046.8 *10* from (n,γ) E=res and 1046 *1* from (d,pγ). I_γ: from (d,pγ). Other: 75 from (n,γ) E=res.
1107.04	$(15/2^-)$	1107.0 *1*	100	0.0	$11/2^-$			E_γ: weighted average of 1107.0 *1* from (^{48}Ca,Xγ) and 1106.8 *2* from (^{12}C,Fγ).
1136.3	$(1/2,3/2,5/2)^+$	985.5 *10*		150.4	$1/2^+$			E_γ: weighted average of 985.3 *10* from (n,γ) E=res and 985.6 *10* from (d,pγ). I_γ: this is the only γ seen from 1136 level in (n,γ) E=res and E=th; no Iγ given in (d,pγ).
		1112.0 *9*	100	24.6	$3/2^+$	M1,E2	0.00113 *11*	E_γ,I_γ: seen in (d,pγ) only (1976Ma09).
1155.03	$7/2^+$	223.5 *5*	0.19 *7*	931.4	$7/2^-$	[E1]	0.0189	B(E1)(W.u.)>2.7×10^{-7}
		284.7 *2*	0.27 *7*	870.1	$(5/2)^+$	[M1,E2]	0.037 *5*	
		536.4 *3*	1.4 *2*	618.88	$(9/2)^-$	[E1]	0.00202	B(E2)(W.u.)>2.0×10^{-7}

$^{123}_{50}Sn_{73}$-6

Adopted Levels, Gammas (continued)

γ(^{123}Sn) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[@]	α[&]	Comments
1155.03	7/2$^+$	1130.5 *2*	100 *6*	24.6	3/2$^+$	E2	0.000987 *14*	B(E2)(W.u.)>0.082 Mult.: from ce data in ^{123}In β^- decay (6.15 s).
		1155.2 *8*	0.06 *3*	0.0	11/2$^-$	[M2]	0.00264	B(M2)(W.u.)>0.0017
1194.6	(5/2)$^+$	1170.0 *5*	100	24.6	3/2$^+$	M1,E2	0.00101 *10*	E_γ: weighted average of 1170 *1* from ^{123}In β^- decay (47.4 s), 1169.8 *5* from (n,γ) E=res, and 1170.8 *10* from (d,pγ).
1217.07	(13/2$^-$)	1217.1 *1*	100	0.0	11/2$^-$			
1488.8	(5/2)$^+$	1464.2[a] *10*	100	24.6	3/2$^+$			E_γ: from (d,pγ).
1926.09	(15/2$^+$)	709.0 *1*	100 *13*	1217.07	(13/2$^-$)			E_γ,I_γ: from (^{40}Ca,Xγ).
		819.1 *2*	80 *13*	1107.04	(15/2$^-$)			E_γ,I_γ: from (^{40}Ca,Xγ).
1944.89	(19/2$^+$)	(18.7)		1926.09	(15/2$^+$)	[E2]	1250	E_γ: from level-energy difference.
		728.0 *2*	9.0 *15*	1217.07	(13/2$^-$)	[E3]	0.00642	B(E3)(W.u.)=0.14 *+8−4*
		837.8 *1*	100 *8*	1107.04	(15/2$^-$)	[M2]	0.00608	B(M2)(W.u.)=3.7×10^{-4} *+19−10*
2001.2	(9/2)$^+$	957.3 *5*	36 *9*	1044.3	(7/2)$^+$			
		1131 *2*	≈18	870.1	(5/2)$^+$			
		1382.3 *2*	100 *6*	618.88	(9/2)$^-$			
		2001.2 *4*	24 *6*	0.0	11/2$^-$			
2098.97	(19/2$^-$)	992.0 *2*	100	1107.04	(15/2$^-$)			E_γ: from (^{40}Ca,Xγ).
2152.64	(23/2$^+$)	207.6 *2*	100	1944.89	(19/2$^+$)	[E2]	0.1224	B(E2)(W.u.)=0.006
2156.0	(1/2,3/2,5/2)	1019.7 *1*	100	1136.3	(1/2,3/2,5/2)$^+$			E_γ: from (n,γ) E=thermal. Others: 1019.5 *10* from (n,γ) E=res.
2262.78	(19/2$^-$)	1155.7 *2*	100	1107.04	(15/2$^-$)			E_γ: weighted average of 1155.7 *2* from (^{48}Ca,Xγ) and 1155.6 *2* from (^{12}C,Fγ).
2395.29	(21/2$^+$)	242.6 *2*	88 *8*	2152.64	(23/2$^+$)			
		296.1 *5*	8 *3*	2098.97	(19/2$^-$)			
		450.5 *2*	100 *8*	1944.89	(19/2$^+$)			
2542.26	(23/2$^-$)	147.0 *2*	100 *11*	2395.29	(21/2$^+$)			
		279.4 *3*	34 *4*	2262.78	(19/2$^-$)			E_γ: weighted average of 279.6 *2* from (^{48}Ca,Xγ) and 279.1 *2* from (^{12}C,Fγ).
		443.4 *2*	11 *2*	2098.97	(19/2$^-$)			
2621.0?	(1/2$^+$)	2469 *3*	44 *27*	150.4	1/2$^+$			E_γ,I_γ: from ^{123}In β^- decay (47.4 s).
		2598 *3*	100 *39*	24.6	3/2$^+$			E_γ,I_γ: from ^{123}In β^- decay (47.4 s).
2712.3	(27/2$^-$)	170.1 *2*		2542.26	(23/2$^-$)			E_γ: weighted average of 170.2 *1* from (^{48}Ca,Xγ) and 169.8 *2* from (^{12}C,Fγ).
		559.5		2152.64	(23/2$^+$)			
3151.6	(7/2)$^-$	3127 *2*	100	24.6	3/2$^+$			E_γ: from ^{123}In β^- decay (47.4 s).
3259		3103[a] *3*	31 *10*	150.4	1/2$^+$			
		3234 *3*	100 *25*	24.6	3/2$^+$			
3292.9	(27/2$^+$)	1140.2 *2*	100	2152.64	(23/2$^+$)			E_γ: weighted average of 1140.3 *2* from (^{48}Ca,Xγ) and 1140.0 *3* from (^{12}C,Fγ).
3306?		3155[a] *3*	100	150.4	1/2$^+$			E_γ: from ^{123}In β^- decay (47.4 s).

$^{123}_{50}Sn_{73}$-7

Adopted Levels, Gammas (continued)

γ(^{123}Sn) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[@]	α[&]	Comments
3755.7	(31/2$^-$)	1043.7 *3*	100	2712.3	(27/2$^-$)			E_γ: weighted average of 1043.8 *3* from (^{48}Ca,Xγ) and 1043.5 *3* from (^{12}C,Fγ).
3818.3?	(31/2$^-$)	1107.0[a] *3*	100	2712.3	(27/2$^-$)			E_γ: from (^{12}C,Fγ).
4116.7	(31/2$^+$)	361.6 *5*	10 *5*	3755.7	(31/2$^-$)			E_γ,I_γ: from (^{48}Ca,Xγ).
		823.7 *2*	100 *9*	3292.9	(27/2$^+$)			E_γ: weighted average of 823.8 *2* from (^{48}Ca,Xγ) and 823.6 *3* from (^{12}C,Fγ). I_γ: from (^{48}Ca,Xγ).
4378.4	(35/2$^+$)	261.7 *2*	100	4116.7	(31/2$^+$)	[E2]	0.0557	B(E2)(W.u.)=3.0 *+10−6* E_γ: weighted average of 261.8 *2* from (^{48}Ca,Xγ) and 261.4 *3* from (^{12}C,Fγ).
4743.8	(35/2$^-$)	988.0 *3*	100	3755.7	(31/2$^-$)			E_γ: weighted average of 988.1 *3* from (^{48}Ca,Xγ) and 987.8 *3* from (^{12}C,Fγ).
4809.9?	(35/2$^-$)	991.6[a] *3*		3818.3?	(31/2$^-$)			E_γ: from (^{12}C,Fγ) only.
5478.8	(39/2$^-$)	735.0 *3*	100	4743.8	(35/2$^-$)			E_γ: weighted average of 734.9 *4* from (^{48}Ca,Xγ) and 735.0 *3* from (^{12}C,Fγ).
5520.4?		710.5[a] *3*		4809.9?	(35/2$^-$)			E_γ: from (^{12}C,Fγ) only.
5644.5	(39/2$^+$)	1266.0 *3*	100	4378.4	(35/2$^+$)			E_γ: weighted average of 1266.1 *3* from (^{48}Ca,Xγ) and 1265.8 *4* from (^{12}C,Fγ).
5945.9	3/2	3331[#] *3*	3.5[#] *7*	2615.2	(1/2$^+$)			
		3789.1[#] *25*	9.9[#] *14*	2156.0	(1/2,3/2,5/2)			
		4750.8[#] *25*		1194.6	(5/2)$^+$			
		4874.2[#] *25*		1072.0	(1/2,3/2)$^+$			
		5025.7[#] *25*	14.1[#] *14*	920.0	(3/2)$^+$			
		5076.2 *15*	14.1[#] *14*	870.1	(5/2)$^+$			
		5795.5 *15*	100[#] *3*	150.4	1/2$^+$			
		5921.0 *15*	34.5[#] *14*	24.6	3/2$^+$			
5946.1	1/2	3331[‡]		2615.2	(1/2$^+$)			
		4873.9[‡]	13[#] *2*	1072.0	(1/2,3/2)$^+$			
		5026.2[‡]	31[#] *3*	920.0	(3/2)$^+$			
		5076.4[‡]		870.1	(5/2)$^+$			
		5795.6[‡]	100[#] *4*	150.4	1/2$^+$			
5947.5		5077.8[‡]		870.1	(5/2)$^+$			
		5922.7[‡]		24.6	3/2$^+$			
5947.9		5923.1[‡]	100	24.6	3/2$^+$			
5948.9		5924.1[‡]	100	24.6	3/2$^+$			
5949.2		5079.5[‡]	90[#] *10*	870.1	(5/2)$^+$			
		5798.7[‡]	100[#] *5*	150.4	1/2$^+$			

$^{123}_{50}Sn_{73}$-8

Adopted Levels, Gammas (continued)

$\gamma(^{123}Sn)$ (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Comments
5949.2		5924.4‡		24.6	$3/2^+$	
5950.6		4756.1‡	36# *10*	1194.6	$(5/2)^+$	
		5925.8‡	100# *15*	24.6	$3/2^+$	
6231.1	$(39/2^+)$	1852.7 *3*	100	4378.4	$(35/2^+)$	E_γ: weighted average of 1852.6 *3* from (^{48}Ca,Xγ) and 1853.0 *5* from (^{12}C,Fγ).
7159.7	$(43/2^+)$	928.6 *3*	67 *17*	6231.1	$(39/2^+)$	E_γ: weighted average of 928.7 *3* from (^{48}Ca,Xγ) and 928.3 *4* from (^{12}C,Fγ). I_γ: weighted average of 83 *17* from (^{48}Ca,Xγ) and 50 *17* from (^{12}C,Fγ).
		1515.1 *3*	100 *17*	5644.5	$(39/2^+)$	E_γ: weighted average of 1515.0 *3* from (^{48}Ca,Xγ) and 1515.3 *5* from (^{12}C,Fγ). I_γ: from (^{48}Ca,Xγ). Other: 100 *33* from (^{12}C,Fγ).

† From ^{123}In β^- decays (6.15 s) for γ rays from levels with J<11/2 (up to 2001 level) and from (^{40}Ca,Xγ) for J>11/2 (up to 7160 level), unless otherwise noted.
‡ From level-energy differences, seen in (n,γ) E=res.
# From (n,γ) E=res.
@ From ce data in (d,pγ) (1976Ma09), unless otherwise noted.
& Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
a Placement of transition in the level scheme is uncertain.

$^{123}_{50}Sn_{73}$-9

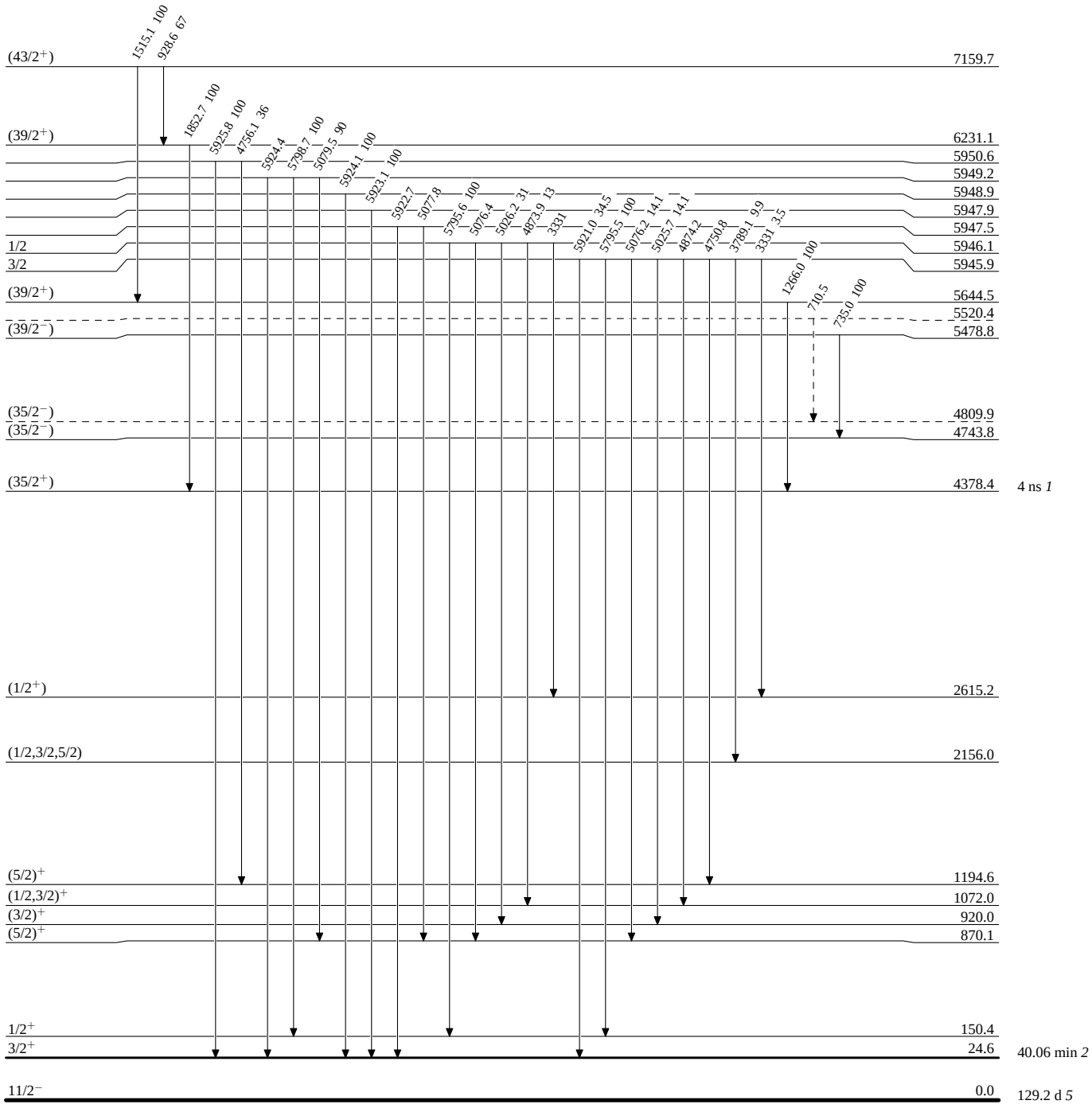
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{123}_{50}Sn_{73}$

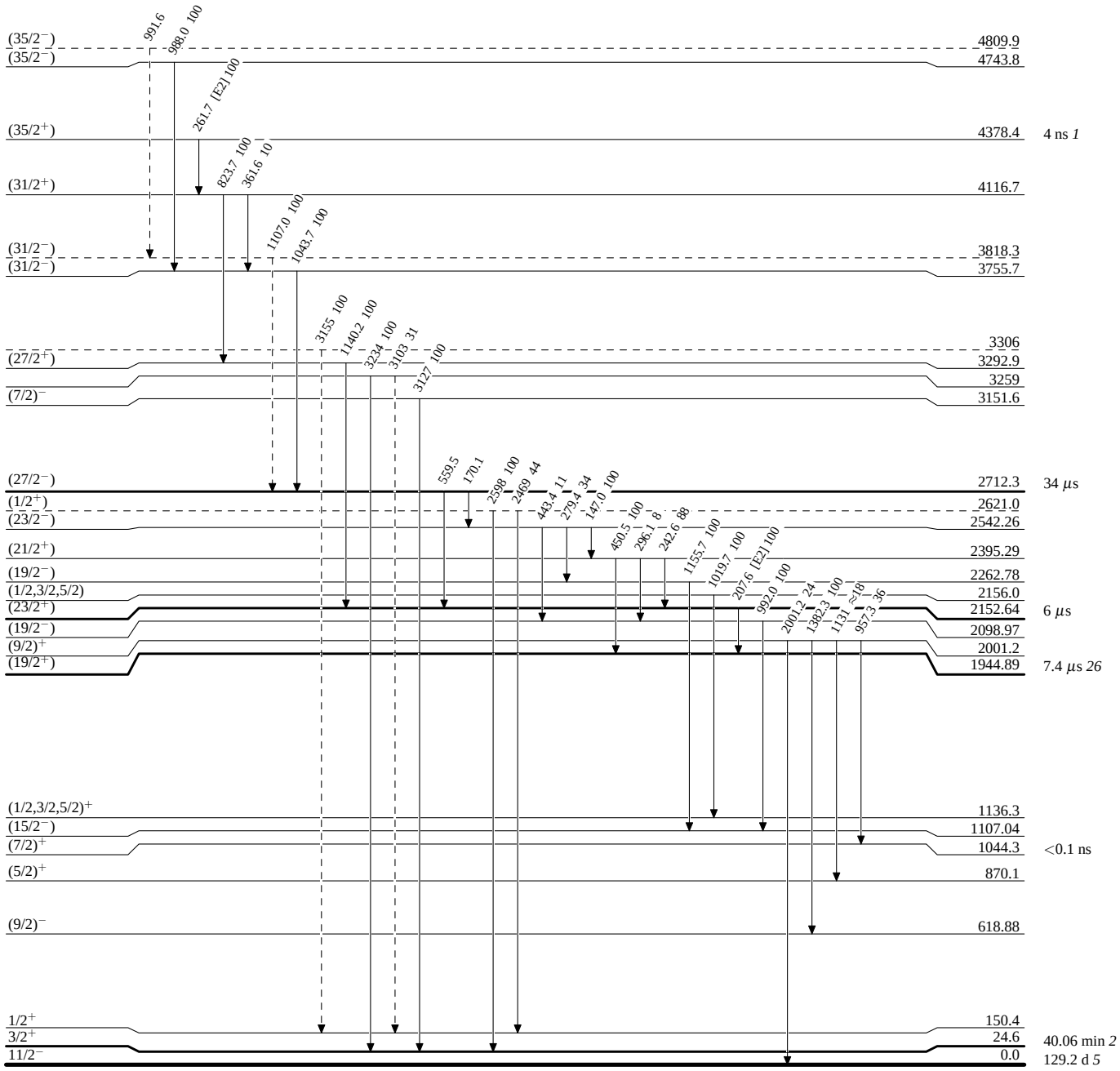
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{123}_{50}Sn_{73}$

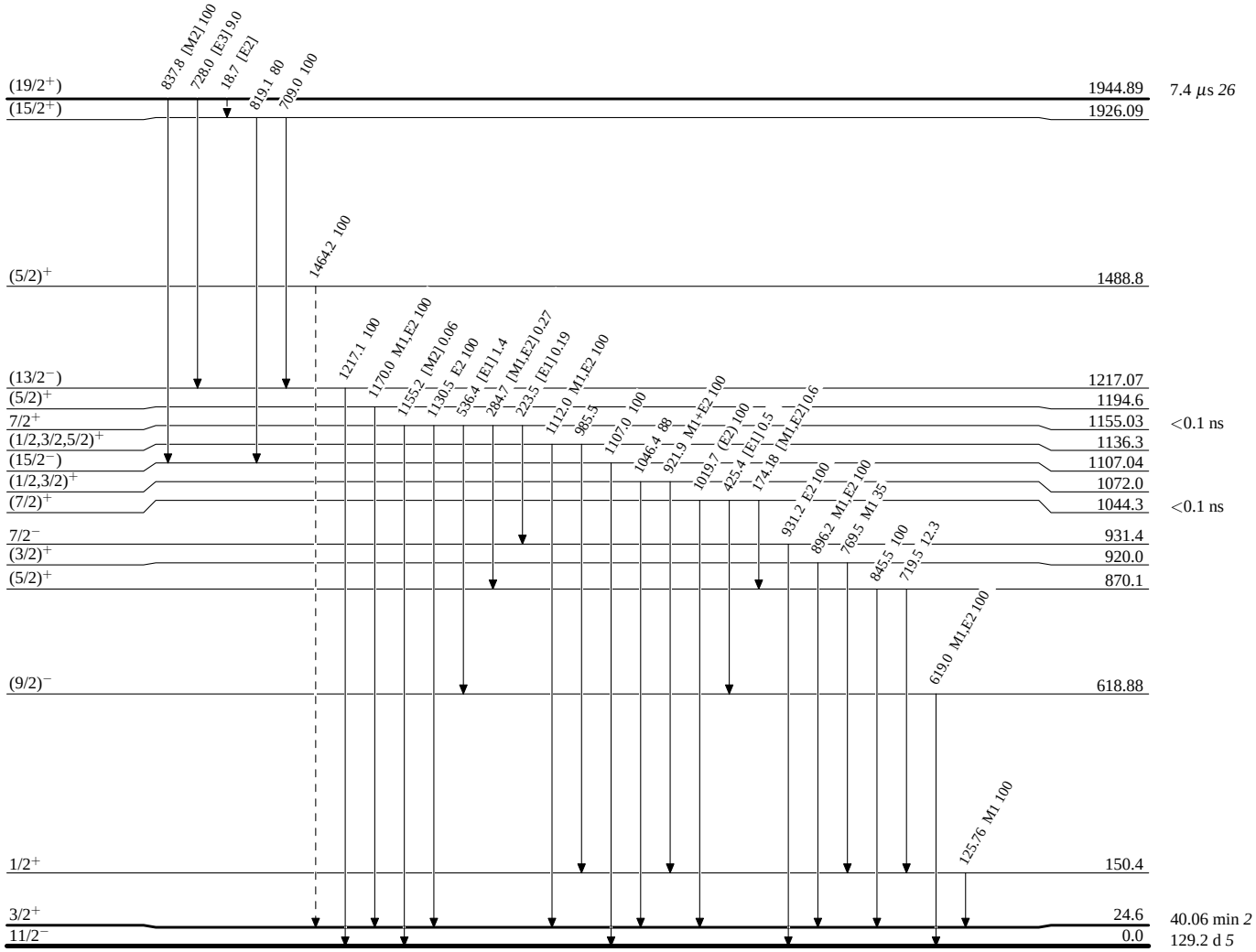
Adopted Levels, Gammas

Legend

Level Scheme (continued)

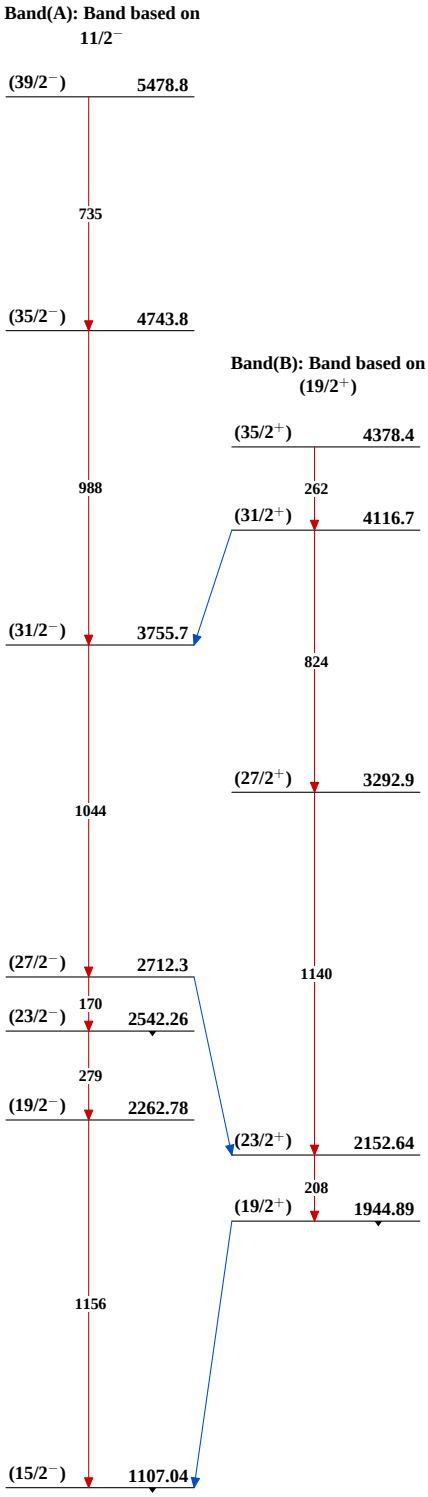
Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{123}_{50}Sn_{73}$

Adopted Levels, Gammas



$^{123}_{50}Sn_{73}$

^{123}In β^- decay (6.15 s) 1976Fo02

Parent: ^{123}In: E=0.0; $J^\pi=9/2^+$; $T_{1/2}$=6.15 s *27*; Q(β^-)=4386 *20*; %β^- decay=100

^{123}In-J^π,$T_{1/2}$: From Adopted Levels of ^{123}In. Adopted $T_{1/2}$ is unweighted average of 5.98 s *6* (1974Gr29), 6.68 s *20* (1986Go10), and 5.8 s *2* (2011Hi15), from this study.

^{123}In-Q(β^-): From 2021Wa16.

The decay scheme is that proposed by 1976Fo02.

1976Fo02: ^{123}In source was produced as isotope separated fission products from the OSIRIS and PINGIS facilities. γ rays were detected with Ge(Li) and NaI(Tl) detectors and electrons were detected with a cooled Si(Li) detector and a scintillator. Measured Eγ, Iγ, Eβ, Iβ, E(ce), I(ce), $\gamma\gamma$-coin, $\beta\gamma$(t). Deduced levels, J, π, $T_{1/2}$, β-decay branching ratios, log *ft*, conversion coefficients, γ-ray multipolarities. Systematics of neighboring tin isotopes.

1986Go10: ^{123}In source was produced as mass separated fission products at the OSIRIS ISOL facility at Studsvik. γ rays were detected with HPGe detectors and β particles were detected with a planar β detector. Measured Eγ, Iγ, Eβ, Iβ, $\beta\gamma$-coin, $\beta\gamma$(t). Deduced parent $T_{1/2}$, absolute γ emission probability for 619γ.

Others: 2011Hi15, 1987Sp09, 1986Go10, 1974Gr29, 1973Ja05, 1960Yu01.

The decay scheme could be incomplete due to a large gap between the highest excited level and the Q-value.

^{123}Sn Levels

E(level)[†]	J^π[‡]	$T_{1/2}$[‡]	Comments
0.0	$11/2^-$	129.2 d *5*	
24.6 *4*	$3/2^+$	40.06 min *2*	
618.81 *24*	$(9/2)^-$		
870.2 *4*	$(5/2)^+$		
931.4 *5*	$7/2^-$		
1044.3 *4*	$(7/2)^+$	<0.1 ns	$T_{1/2}$: from (β)(1019.7γ)(t) (1976Fo02).
1155.0 *3*	$7/2^+$	<0.1 ns	$T_{1/2}$: from (β)(1130.5γ)(t) (1976Fo02).
2001.2 *3*	$(9/2)^+$		

[†] From a least-squares fit to γ-ray energies.
[‡] From Adopted Levels, unless otherwise noted.

β^- radiations

E(decay)	E(level)	Iβ^-[†‡]	Log *ft*
(2385 *20*)	2001.2	1.89 *15*	5.45 *5*
(3231 *20*)	1155.0	64 *4*	4.47 *4*
(3342 *20*)	1044.3	32 *2*	4.83 *4*
(3455 *20*)	931.4	0.18 *11*	7.1 *3*
(3516[#] *20*)	870.2	0.80 *22*	6.5 *1*
(3767 *20*)	618.81	0.42 *24*	7.0 *3*

[†] From γ+ce intensity balance at each level.
[‡] Absolute intensity per 100 decays.
[#] Existence of this branch is questionable.

^{123}In β^- decay (6.15 s) 1976Fo02 (continued)

$\gamma(^{123}Sn)$

Iγ normalization: Intensities from 1976Fo02 are for per 100 parent decays, obtained from I(γ+ce to g.s.+24.6 level)=100, by assuming no I(β^-) to g.s. and 24.6 level.

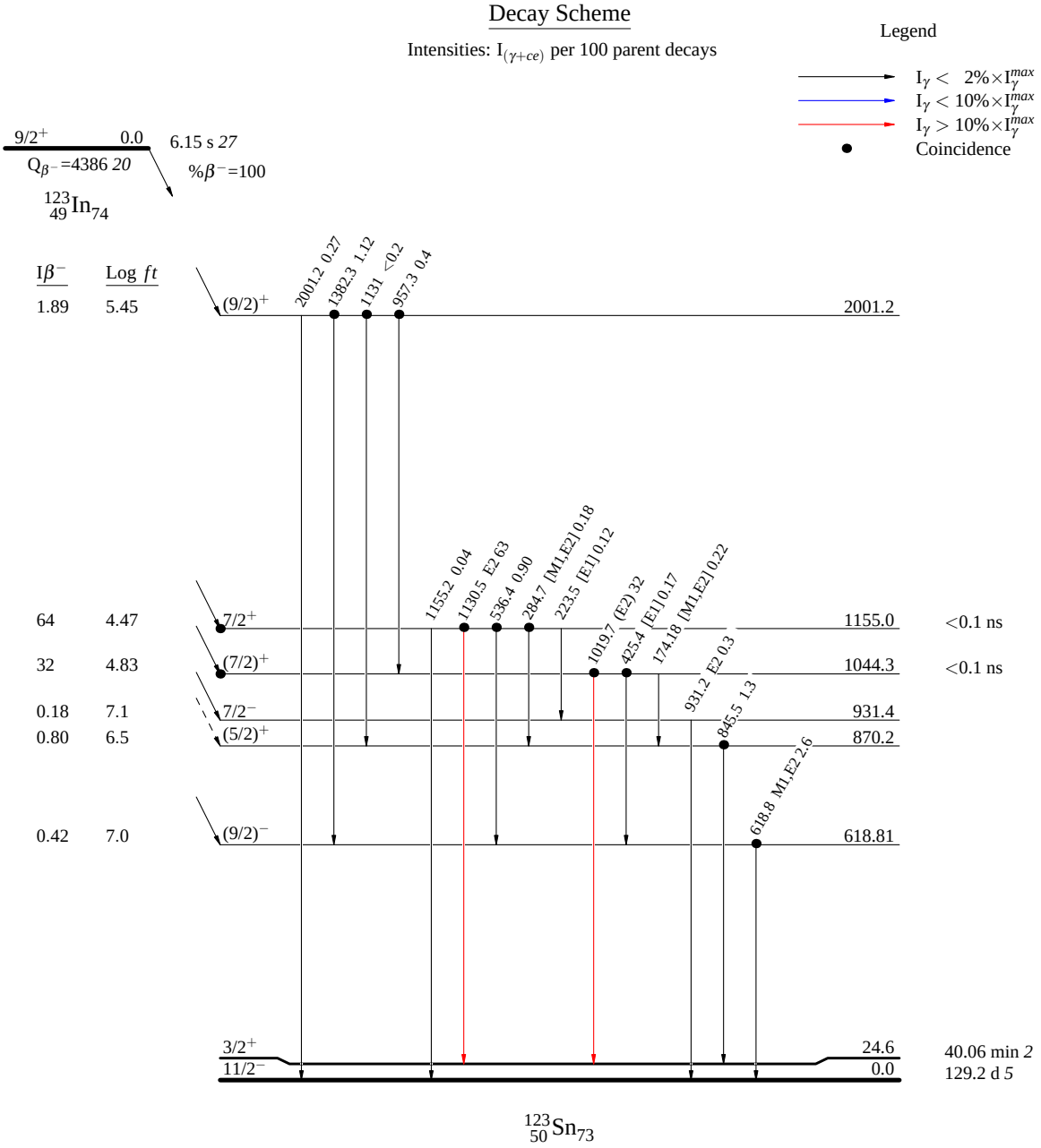
E_γ[†]	I_γ[†#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α[@]	Comments
174.18 *6*	0.19 *3*	1044.3	(7/2)$^+$	870.2	(5/2)$^+$	[M1,E2]	0.17 *6*	
[x]175.01 *8*	0.13 *3*							
223.5 *5*	0.12 *4*	1155.0	7/2$^+$	931.4	7/2$^-$	[E1]	0.0189	
284.7 *2*	0.17 *4*	1155.0	7/2$^+$	870.2	(5/2)$^+$	[M1,E2]	0.037 *5*	
425.4 *7*	0.17 *8*	1044.3	(7/2)$^+$	618.81	(9/2)$^-$	[E1]	0.00352	
536.4 *3*	0.90 *8*	1155.0	7/2$^+$	618.81	(9/2)$^-$			
618.8 *3*	2.6 *2*	618.81	(9/2)$^-$	0.0	11/2$^-$	M1,E2	0.00411	I_γ: other: 2.8 *3* (1986Go10).
845.5 *2*	1.3 *2*	870.2	(5/2)$^+$	24.6	3/2$^+$			
931.2 *8*	0.3 *1*	931.4	7/2$^-$	0.0	11/2$^-$	E2	1.51×10^{-3}	
957.3 *5*	0.4 *1*	2001.2	(9/2)$^+$	1044.3	(7/2)$^+$			
1019.7 *2*	32 *2*	1044.3	(7/2)$^+$	24.6	3/2$^+$	(E2)	1.23×10^{-3}	Mult.: M1,E2 from α(K)exp=0.0021 *11* (1976Fo02).
1130.5 *2*	63 *4*	1155.0	7/2$^+$	24.6	3/2$^+$	E2	0.000987 *14*	E_γ: other: 1130.5 *5* (1973Ja05). Mult.: M1,E2 from α(K)exp=0.0011 *4* (1976Fo02).
1131 *2*	≤0.2	2001.2	(9/2)$^+$	870.2	(5/2)$^+$			E_γ,I_γ: From $\gamma\gamma$-coincidence.
1155.2 *8*	0.04 *2*	1155.0	7/2$^+$	0.0	11/2$^-$			
1382.3 *2*	1.12 *7*	2001.2	(9/2)$^+$	618.81	(9/2)$^-$			
2001.2 *4*	0.27 *6*	2001.2	(9/2)$^+$	0.0	11/2$^-$			

[†] From 1976Fo02, unless otherwise noted. Intensity values from 1976Fo02 and 1986Go10 are absolute intensities per 100 decays.
[‡] From Adopted Gammas. Supporting evidence from this study is given under comments if available.
[#] Absolute intensity per 100 decays.
[@] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
[x] γ ray not placed in level scheme.

^{123}In β^- decay (6.15 s) 1976Fo02

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays



^{123}In β^- decay (47.4 s) 1973Ja05

Parent: ^{123}In: E=327.21 *4*; $J^\pi=1/2^-$; $T_{1/2}$=47.4 s *8*; Q(β^-)=4386 *20*; %β^- decay=100

^{123}In-E,J^π,Q(β^-): From Adopted Levels of ^{123}In. Adopted $T_{1/2}$ is weighted average of 47.8 s *5* (1974Gr29), 45.9 s *10* (1986Go10) from this study. Other: 36 s *3* (1960Yu01) seems discrepant.

1973Ja05: ^{123m}In source was produced via ^{124}Sn(γ,p) reaction with a 25-meV end-point bremsstrahlung photon beam provided by the linac of the University of Ghent, on samples of 100 mg SnO_2 powder (94.74% enriched in ^{124}Sn). γ rays were detected with Ge(Li) detectors. Measured Eγ, Iγ. Deduced levels, J, π, log *ft*.

The decay scheme is that proposed by 1973Ja05. It is considered incomplete due to a large gap between the highest excited level and the Q-value, and also due to the uncertain levels and placements of gammas as indicated by 1973Ja05.

1986Go10: ^{123m}In source was produced as mass separated fission products at the OSIRIS ISOL facility at Studsvik. γ rays were detected with HPGe detectors and β particles were detected with a planar β detector. Measured Eγ, Iγ, Eβ, Iβ, $\beta\gamma$-coin, $\beta\gamma$(t). Deduced parent $T_{1/2}$, absolute γ emission probability for 125γ.

Others: 1987Sp09, 1986Go10, 1976Fo02, 1974Gr29, 1960Yu01.

No β-decay branching ratios and log *ft* values are deduced by the evaluator due to incomplete and uncertain decay scheme.

^{123}Sn Levels

E(level)[†]	J^π[‡]	$T_{1/2}$[‡]	Comments
0.0	$11/2^-$	129.2 d *5*	
24.6	$3/2^+$	40.06 min *2*	E(level): from Adopted Levels.
150.4 *4*	$1/2^+$		
921.1 *7*	$(3/2)^+$		
1194.6 *11*	$(5/2)^+$		
2621? *3*	$(1/2^+)$		
3151.6? *21*	$(7/2)^-$		
3259 *3*			
3306? *3*			

[†] From a least-squares fit to γ-ray energies, unless otherwise noted.
[‡] From Adopted Levels.

γ(^{123}Sn)

Iγ normalization: From %I(125.8γ)=45 *5* from $\beta\gamma$-coin measurement in 1986Go10.

E$_\gamma$[†]	I$_\gamma$[†‡]	E$_i$(level)	J_i^π	E$_f$	J_f^π	Mult.	α[#]	Comments
125.76 *4*	≈40000	150.4	$1/2^+$	24.6	$3/2^+$	M1	0.298	E$_\gamma$: from 1976Fo02. Other: 126.9 *5* (1973Ja05). I$_\gamma$: other: 45 *5* per 100 parent decays (1986Go10). Mult.: from α(K)exp=0.250 *30* (1976Fo02).
896.5 *5*	78 *25*	921.1	$(3/2)^+$	24.6	$3/2^+$			
1170 *1*	100	1194.6	$(5/2)^+$	24.6	$3/2^+$			
2469[@] *3*	18 *11*	2621?	$(1/2^+)$	150.4	$1/2^+$			
2598[@] *3*	41 *16*	2621?	$(1/2^+)$	24.6	$3/2^+$			
[x]2695 *3*	52 *19*							
[x]3064 *2*	58 *18*							
3103[@] *3*	38 *13*	3259		150.4	$1/2^+$			
3127 *2*	93 *26*	3151.6?	$(7/2)^-$	24.6	$3/2^+$			
3155[@] *3*	34 *12*	3306?		150.4	$1/2^+$			
3234 *3*	122 *31*	3259		24.6	$3/2^+$			

[†] From 1973Ja05, unless otherwise noted.

Continued on next page (footnotes at end of table)

^{123}In β^- decay (47.4 s) 1973Ja05 (continued)

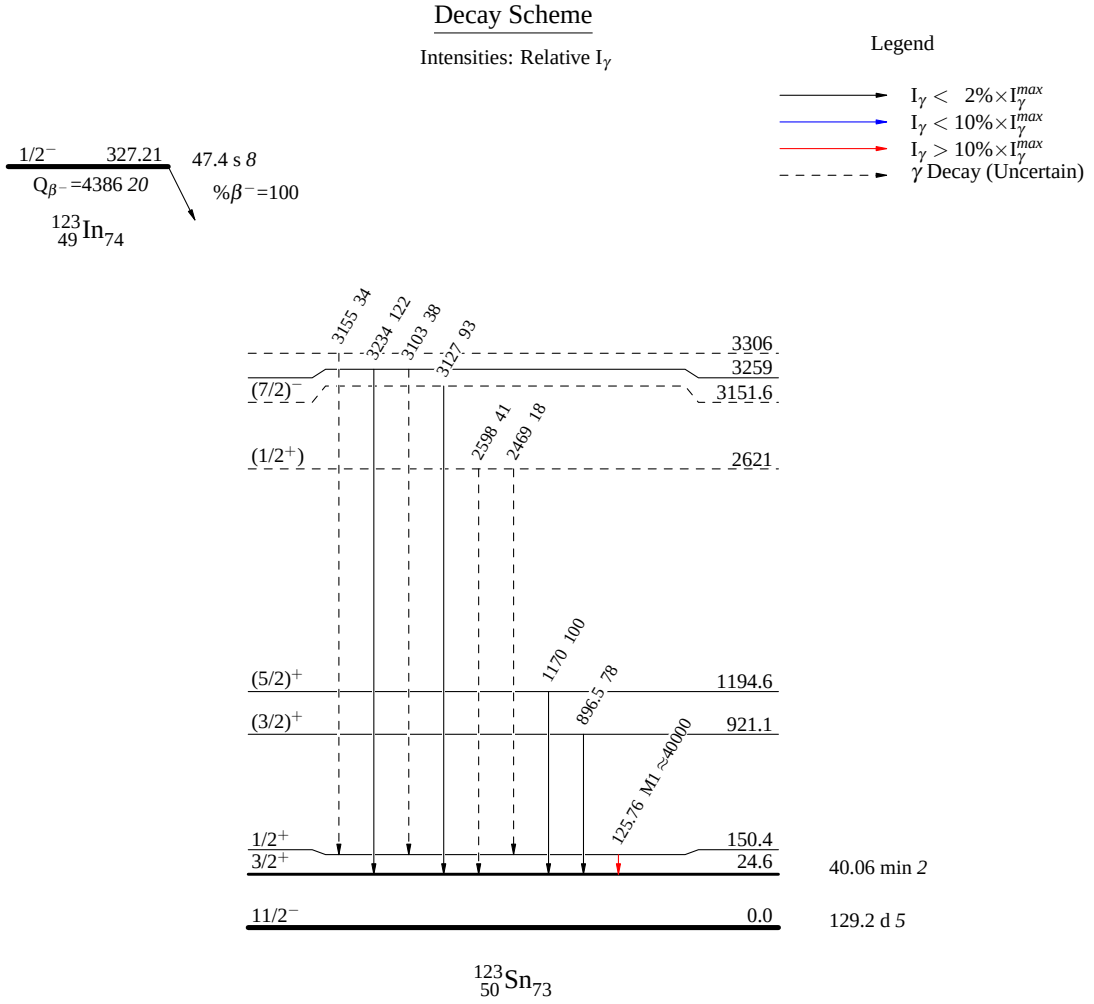
$\gamma(^{123}Sn)$ (continued)

‡ For absolute intensity per 100 decays, multiply by ≈0.001125.
# Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
@ Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

^{123}In β^- decay (47.4 s) 1973Ja05

Decay Scheme

Intensities: Relative I_γ



^{122}Sn(n,γ) E=res 1977Ca09

1977Ca09: E=0.1-20 keV neutron beams were produced from the Oak Ridge Electron Linear Accelerator (ORELA) facility. Target was 90.80% enriched ^{122}Sn. γ rays were detected with a Ge(Li) detector. Measured Eγ, Iγ. Deduced levels.
Others: 1975Bh01 (E=7.724 MeV), 1974TiZT (E=14.7 MeV), 1972BhZZ (E=res), 1971ChYQ (E=res).

^{123}Sn Levels

E(level)[†]	J$^\pi$[#]	Comments
0.0	11/2$^-$	
24.6	3/2$^+$	E(level): from Adopted Levels.
150.4[‡] *6*	1/2$^+$	
619.5 *5*	(9/2)$^-$	
869.6 *5*	(5/2)$^+$	
919.8[‡] *6*	(3/2)$^+$	
930.9 *10*	7/2$^-$	
1072.1[‡] *6*	(1/2,3/2)$^+$	
1135.9 *11*	(1/2,3/2,5/2)$^+$	
1194.4 *5*	(5/2)$^+$	
2155.5 *14*	(1/2,3/2,5/2)	
2615? *3*	(1/2$^+$)	
5945.9	3/2[@]	E$_n$(res)=0.106 keV. J$^\pi$: From 1995Ca25; neutron capture state.
5946.1	1/2[@]	E$_n$(res)=0.258 keV.
5947.5		E$_n$(res)=1.737 keV.
5947.9		E$_n$(res)=2.073 keV.
5948.9		E$_n$(res)=3.138 keV.
5949.2		E$_n$(res)=3.425 keV.
5950.6		E$_n$(res)=4.799 keV.

[†] From a least-squares fit to γ-ray energies, except for resonant levels where E(level)=S(n)+E$_n$(res), with S(n)=5945.8 *15* from 1977Ca09. Adopted S(n)=5946.0 *12* in 2021Wa16.
[‡] Fed by primary γ from 258-eV resonance.
[#] From Adopted Levels, unless noted otherwise.
[@] From angular distribution measurements in 1975Bh01.

γ(^{123}Sn)

E$_i$(level)	J$_i^\pi$	E$_\gamma$[†]	I$_\gamma$[#]	E$_f$	J$_f^\pi$	Comments
150.4	1/2$^+$	125.76		24.6	3/2$^+$	E$_\gamma$: from Adopted Gammas, not seen in 1977Ca09.
619.5	(9/2)$^-$	619.5 *5*	100	0.0	11/2$^-$	
869.6	(5/2)$^+$	719.0 *10*	14	150.4	1/2$^+$	
		845.0 *5*	86	24.6	3/2$^+$	
919.8	(3/2)$^+$	769.3 *5*	25	150.4	1/2$^+$	
		895.8 *10*	75	24.6	3/2$^+$	
930.9	7/2$^-$	930.9 *10*	100	0.0	11/2$^-$	
1072.1	(1/2,3/2)$^+$	921.9 *5*	57	150.4	1/2$^+$	
		1046.8 *10*	43	24.6	3/2$^+$	
1135.9	(1/2,3/2,5/2)$^+$	985.3 *10*	100	150.4	1/2$^+$	
1194.4	(5/2)$^+$	1169.8 *5*	100	24.6	3/2$^+$	
2155.5	(1/2,3/2,5/2)	1019.5 *10*	100	1135.9	(1/2,3/2,5/2)$^+$	
5945.9	3/2	3331[‡] *3*	0.05[@] *1*	2615?	(1/2$^+$)	
		3789.1[‡] *25*	0.14[@] *2*	2155.5	(1/2,3/2,5/2)	
		4750.8[‡] *25*		1194.4	(5/2)$^+$	E$_\gamma$: not seen from this resonance.

Continued on next page (footnotes at end of table)

^{122}Sn(n,γ) E=res 1977Ca09 (continued)

$\gamma(^{123}Sn)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[#]	E_f	J_f^π
5945.9	3/2	4874.2[‡] *25*		1072.1	$(1/2,3/2)^+$
		5025.7[‡] *25*	0.20[@] *2*	919.8	$(3/2)^+$
		5076.2[‡] *15*	0.20[@] *2*	869.6	$(5/2)^+$
		5795.5[‡] *15*	1.42[@] *4*	150.4	$1/2^+$
		5921.0[‡] *15*	0.49[@] *2*	24.6	$3/2^+$
5946.1	1/2	3331		2615?	$(1/2^+)$
		4873.9	0.14[@] *2*	1072.1	$(1/2,3/2)^+$
		5026.2	0.34[@] *3*	919.8	$(3/2)^+$
		5076.4		869.6	$(5/2)^+$
		5795.6	1.10[@] *4*	150.4	$1/2^+$
5947.5		5077.8		869.6	$(5/2)^+$
		5922.7		24.6	$3/2^+$
5947.9		5923.1	0.87[@] *1*	24.6	$3/2^+$
5948.9		5924.1	0.84[@] *6*	24.6	$3/2^+$
5949.2		5079.5	0.37[@] *4*	869.6	$(5/2)^+$
		5798.7	0.41[@] *2*	150.4	$1/2^+$
		5924.4		24.6	$3/2^+$
5950.6		4756.1	0.22[@] *6*	1194.4	$(5/2)^+$
		5925.8	0.61[@] *9*	24.6	$3/2^+$

[†] From 1977Ca09, unless otherwise noted. Values without uncertainties are from level-energy differences. Note that no energies are explicitly given for primary γ rays from each resonance state by the authors, instead, γ-ray energies corresponding to thermal neutron separation are quoted for primary γ from each resonance state.

[‡] γ-ray energies corresponding to thermal neutron separation (1977Ca09).

[#] Quoted values are %photon branching from each level from 1977Ca09, unless otherwise noted.

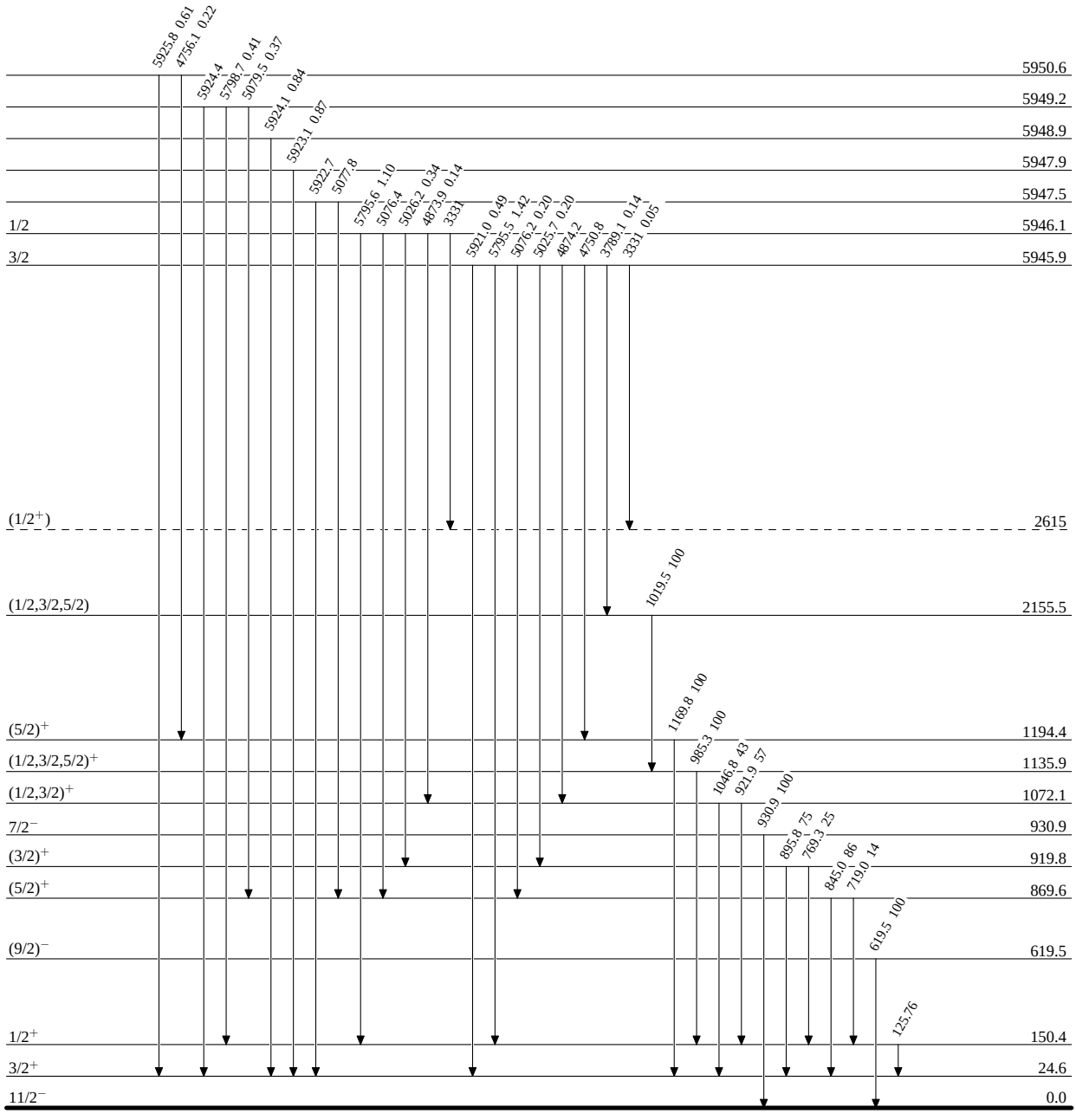
[@] Relative intensities at 90°, normalized to 100 for the sum of Ge(Li) detector counts between 2.5 to 2.5 MeV from 1977Ca09 at each resonance energy.

[x] γ ray not placed in level scheme.

^{122}Sn(n,γ) E=res 1977Ca09

Level Scheme

Intensities: Relative photon branching from each level



$^{123}_{50}Sn_{73}$

^{122}Sn(n,γ):resonances 1995Ca25,2018MuZY

See also 2018MuZY: Compilation of thermal neutron induced σ and resonance parameter data for nuclei of Z=1-60.
1995Ca25: E=13-310 keV neutrons were produced from the Oak Ridge Electron Linear Accelerator (ORELA). Target was 29.9 g 90.8% enriched ^{122}Sn. Neutron energies were measured by time-of-flight with a flight path of 200 m, with neutrons detected by a plastic scintillator. Measured $\sigma(E_n)$. Deduced neutron resonance energies, J, π, widths from R-Matrix analysis, for 346 resonances.
Other: 1963Fu08.
All data are from 1995Ca25, unless otherwise noted.

^{123}Sn Levels

E(level)[†]	Jπ	gΓn (eV)[‡]	En(lab) (keV)	E(level)[†]	Jπ	gΓn (eV)[‡]	En(lab) (keV)
5946.31			0.1069[#]	5991.42	1/2+	23	45.594
5946.46			0.2599[#]	5991.97	(3/2−)	3	46.151
5947.94			1.75[#]	5993.28	1/2+	2	47.471
5949.62			3.45[#]	5993.32	1/2−	8	47.510
5952.99			6.85[#]	5994.95	(3/2−)	10	49.154
5959.32	(3/2−)	5	13.231	5995.36	(3/2−)	4	49.567
5959.90	(3/2−)	5	13.818	5995.46	1/2+	10	49.666
5961.14	(3/2−)	3	15.061	5995.68	(3/2−)	12	49.885
5961.16	(3/2−)	4	15.079	5996.55	1/2+	11	50.765
5961.94	(3/2−)	4	15.866	5997.41	1/2+	2	51.629
5963.21	(3/2−)	3	17.150	5998.04	(3/2−)	23	52.265
5964.16	(1/2−)	4	18.104	5998.19	(1/2−)	4	52.424
5965.01	1/2+	9	18.962	5999.09	3/2−	37	53.332
5965.46	(1/2−)	3	19.418	6001.37	(1/2−)	3	55.628
5966.66	1/2+	4	20.634	6001.53	(3/2−)	23	55.783
5968.15	(3/2−)	4	22.136	6001.68	(3/2−)	8	55.934
5968.92	(1/2−)	11	22.907	6002.33	1/2+	5	56.591
5970.13	(1/2−)	6	24.125	6003.26	1/2+	6	57.534
5970.51	(3/2−)	6	24.510	6004.75	1/2−	41	59.038
5972.26	(1/2−)	4	26.278	6004.84	(3/2−)	9	59.122
5973.08	1/2+	36	27.102	6004.95	1/2+	26	59.238
5973.10	(1/2−)	4	27.118	6005.24	(3/2−)	28	59.524
5974.25	3/2−	17	28.281	6008.31	(1/2−)	8	62.626
5974.39	1/2−	12	28.423	6008.39	(3/2−)	6	62.705
5974.85	(1/2−)	3	28.889	6008.98	3/2−	39	63.299
5977.53	1/2+	13	31.591	6009.81	(3/2−)	9	64.140
5977.81	1/2−	11	31.869	6010.52	(3/2−)	9	64.851
5978.27	1/2−	26	32.337	6010.69	1/2−	29	65.021
5979.22	1/2+	2	33.288	6011.73	(3/2−)	8	66.073
5980.37	(3/2−)	7	34.453	6012.39	3/2−	88	66.735
5980.91	(1/2−)	8	34.994	6014.37	(3/2−)	16	68.730
5981.17	(1/2−)	2	35.256	6016.20	(3/2−)	8	70.576
5981.30	1/2+	1	35.393	6016.60	1/2+	13	70.987
5981.35	1/2−	27	35.440	6016.80	3/2−	70	71.182
5981.48	1/2+	8	35.568	6017.38	1/2+	9	71.765
5982.76	(1/2−)	5	36.863	6018.67	3/2−	33	73.065
5983.28	(3/2−)	9	37.387	6019.66	1/2−	75	74.072
5984.08	(1/2−)	1	38.193	6020.68	(3/2−)	10	75.093
5984.47	1/2−	50	38.584	6021.23	(3/2−)	8	75.651
5988.12	1/2+	4	42.265	6021.52	1/2+	87	75.942
5988.17	3/2−	12	42.318	6023.00	3/2−	72	77.436
5988.45	(1/2−)	13	42.603	6023.98	1/2−	151	78.426
5989.04	(3/2−)	7	43.197	6024.48	(3/2−)	18	78.925
5989.36	(3/2−)	12	43.520	6025.29	(1/2−)	19	79.739
5990.33	3/2−	50	44.497	6025.29	1/2+	5	79.747

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^{122}Sn(n,γ):resonances 1995Ca25,2018MuZY (continued)

^{123}Sn Levels (continued)

E(level)[†]	Jπ	gΓn (eV)[‡]	En(lab) (keV)	E(level)[†]	Jπ	gΓn (eV)[‡]	En(lab) (keV)
6025.46	1/2−	27	79.919	6077.56	1/2−	121	132.445
6025.93	3/2−	59	80.390	6078.39	(3/2−)	28	133.280
6027.50	1/2+	5	81.973	6079.95	(1/2−)	60	134.853
6027.61	3/2−	39	82.088	6080.57	(1/2−)	8	135.480
6027.85	3/2−	19	82.327	6081.24	(1/2−)	16	136.158
6029.26	(3/2−)	3	83.743	6082.70	(1/2−)	37	137.624
6030.59	(3/2−)	13	85.091	6083.02	3/2−	254	137.948
6031.55	3/2−	122	86.054	6085.23	(1/2−)	21	140.181
6032.11	(3/2−)	27	86.621	6086.39	(1/2−)	20	141.351
6032.44	1/2+	14	86.950	6086.81	1/2+	3	141.776
6034.36	(3/2−)	14	88.892	6086.92	(1/2−)	53	141.882
6034.79	1/2+	8	89.319	6088.83	(1/2−)	37	143.809
6035.66	(3/2−)	20	90.198	6089.46	(3/2−)	17	144.443
6037.79	(3/2−)	30	92.348	6090.39	1/2+	27	145.387
6037.93	(3/2−)	25	92.488	6090.42	(1/2−)	103	145.412
6039.39	(1/2−)	19	93.964	6091.17	(1/2−)	48	146.166
6039.53	(1/2−)	14	94.098	6092.50	(1/2−)	75	147.506
6039.67	1/2+	16	94.243	6094.12	(3/2−)	46	149.138
6042.04	(3/2−)	8	96.629	6095.29	1/2+	5	150.323
6042.95	1/2+	61	97.545	6095.42	(1/2−)	60	150.458
6043.21	1/2+	14	97.816	6096.19	(1/2−)	57	151.228
6047.22	1/2−	183	101.854	6096.52	1/2+	4	151.566
6048.08	3/2−	33	102.719	6097.78	(3/2−)	43	152.834
6049.55	(1/2−)	22	104.200	6098.04	1/2+	8	153.100
6049.82	1/2+	10	104.475	6099.00	(3/2−)	29	154.060
6050.49	(1/2−)	12	105.156	6099.22	(3/2−)	10	154.285
6052.22	1/2+	23	106.892	6100.07	(3/2−)	49	155.139
6052.35	(1/2−)	25	107.026	6100.96	1/2+	46	156.040
6053.57	(3/2−)	56	108.262	6101.00	(3/2−)	50	156.077
6053.78	1/2+	4	108.471	6101.69	(1/2−)	28	156.774
6053.93	(1/2−)	77	108.624	6101.88	(1/2−)	59	156.966
6054.29	(1/2−)	43	108.982	6103.68	(1/2−)	55	158.777
6056.08	(1/2−)	41	110.786	6105.66	(3/2−)	34	160.778
6058.82	(3/2−)	97	113.549	6106.03	(3/2−)	39	161.148
6059.32	(3/2−)	39	114.058	6106.05	1/2+	9	161.176
6059.71	3/2−	60	114.444	6106.29	(3/2−)	24	161.416
6060.22	3/2−	144	114.961	6106.69	1/2+	7	161.818
6060.75	1/2+	13	115.498	6107.80	(3/2−)	85	162.931
6061.95	(3/2−)	19	116.707	6108.08	(3/2−)	5	163.222
6062.61	(3/2−)	74	117.372	6108.29	1/2+	20	163.434
6063.74	(3/2−)	19	118.507	6108.55	(1/2−)	7	163.697
6063.74	1/2+	2	118.509	6109.05	1/2+	13	164.193
6064.00	(3/2−)	45	118.778	6109.16	(3/2−)	90	164.310
6065.60	(3/2−)	44	120.389	6110.00	1/2+	15	165.150
6066.77	(3/2−)	18	121.567	6110.02	(3/2−)	28	165.178
6067.11	3/2	71	121.911	6110.59	(1/2−)	21	165.753
6067.77	3/2−	119	122.575	6111.49	(3/2−)	110	166.652
6068.75	(3/2−)	57	123.561	6111.56	1/2+	31	166.726
6069.24	1/2+	25	124.058	6111.86	(3/2−)	107	167.025
6070.86	(1/2−)	52	125.687	6112.25	(3/2−)	70	167.426
6071.28	(1/2−)	11	126.111	6112.92	1/2+	12	168.100
6071.89	(1/2−)	24	126.730	6114.22	3/2−	60	169.405
6072.64	3/2−	210	127.488	6114.84	1/2+	6	170.035
6072.68	1/2+	7	127.530	6114.92	3/2−	40	170.110
6074.65	(3/2−)	59	129.509	6115.08	(1/2−)	9	170.281
6075.73	(3/2−)	53	130.596	6116.53	(3/2−)	17	171.739

Continued on next page (footnotes at end of table)

^{122}Sn(n,γ):resonances 1995Ca25,2018MuZY (continued)

^{123}Sn Levels (continued)

E(level)[†]	Jπ	gΓn (eV)[‡]	En(lab) (keV)	E(level)[†]	Jπ	gΓn (eV)[‡]	En(lab) (keV)
6118.00	1/2+	16	173.224	6160.02	3/2−	207	215.588
6118.14	(1/2−)	16	173.366	6160.84	(1/2−)	17	216.415
6119.24	(1/2−)	40	174.472	6162.06	1/2+	28	217.646
6119.45	(3/2−)	5	174.687	6162.36	3/2−	99	217.947
6120.92	(3/2−)	58	176.164	6163.20	3/2−	133	218.795
6121.19	1/2+	53	176.435	6163.29	1/2+	33	218.882
6121.46	(1/2−)	26	176.707	6163.82	(3/2−)	17	219.415
6123.21	(1/2−)	20	178.471	6165.18	3/2−	242	220.787
6123.81	(1/2−)	116	179.076	6165.81	3/2−	91	221.422
6124.43	1/2+	23	179.704	6165.88	1/2+	26	221.498
6124.60	(1/2−)	15	179.875	6166.76	(1/2−)	25	222.382
6125.06	1/2−	76	180.337	6167.59	(3/2−)	81	223.224
6125.43	3/2−	98	180.713	6168.77	(1/2−)	47	224.413
6125.84	1/2+	4	181.122	6170.85	(1/2−)	21	226.508
6125.95	3/2−	188	181.233	6171.31	(1/2−)	48	226.976
6126.95	3/2−	104	182.240	6173.52	1/2−	110	229.202
6128.12	1/2−	249	183.420	6175.28	1/2−	75	230.978
6128.52	(1/2−)	17	183.830	6175.76	(1/2−)	45	231.461
6129.98	(1/2−)	34	185.302	6176.14	(3/2−)	60	231.842
6130.48	(3/2−)	9	185.806	6176.75	(3/2−)	12	232.460
6131.02	3/2−	41	186.343	6177.15	(1/2−)	38	232.861
6131.42	1/2−	160	186.748	6177.74	(3/2−)	41	233.454
6131.99	(3/2−)	41	187.329	6177.98	1/2+	15	233.700
6132.58	(1/2−)	8	187.921	6178.72	(1/2−)	65	234.447
6132.83	1/2+	23	188.177	6180.05	3/2−	200	235.783
6134.75	1/2−	53	190.112	6181.79	(1/2−)	42	237.539
6135.93	3/2−	220	191.300	6183.99	(3/2−)	77	239.753
6136.51	1/2+	12	191.886	6184.45	(1/2−)	22	240.218
6137.13	(3/2−)	9	192.505	6185.05	(1/2−)	28	240.821
6137.82	(1/2−)	17	193.207	6185.33	1/2+	9	241.106
6138.59	(1/2−)	17	193.976	6185.56	1/2−	268	241.334
6140.43	(3/2−)	76	195.836	6186.21	1/2+	14	241.991
6140.69	(1/2−)	21	196.099	6187.17	(1/2−)	31	242.960
6141.93	(3/2−)	35	197.349	6187.99	(1/2−)	37	243.788
6142.66	(1/2−)	9	198.087	6188.40	(3/2−)	62	244.207
6143.15	3/2−	455	198.575	6189.49	(1/2−)	125	245.304
6144.01	(1/2−)	20	199.449	6189.94	(3/2−)	86	245.756
6144.92	3/2−	185	200.364	6190.26	(1/2−)	160	246.079
6146.17	3/2−	151	201.623	6194.01	1/2−	702	249.857
6146.41	(1/2−)	40	201.864	6194.74	3/2−	124	250.594
6147.00	1/2+	20	202.463	6196.63	3/2−	186	252.499
6147.75	(1/2−)	70	203.219	6196.94	(3/2−)	70	252.816
6149.71	(1/2−)	71	205.197	6197.44	(3/2−)	82	253.315
6150.13	(3/2−)	61	205.615	6198.23	(1/2−)	124	254.118
6150.50	(3/2−)	15	205.989	6199.32	(3/2−)	82	255.212
6152.26	1/2+	37	207.761	6199.82	(3/2−)	91	255.717
6152.52	1/2−	125	208.022	6200.26	3/2−	177	256.158
6153.46	(3/2−)	59	208.976	6201.52	(3/2−)	113	257.426
6153.95	(1/2−)	24	209.468	6202.00	(3/2−)	43	257.919
6155.11	3/2−	36	210.638	6204.13	(3/2−)	50	260.065
6156.25	1/2−	287	211.789	6204.70	3/2−	221	260.638
6156.73	(3/2−)	14	212.273	6205.70	(3/2−)	25	261.642
6157.58	(3/2−)	57	213.129	6206.83	3/2−	260	262.787
6157.94	(1/2−)	26	213.489	6207.98	(1/2−)	167	263.942
6158.37	(1/2−)	23	213.929	6208.27	(3/2−)	78	264.240
6158.65	3/2−	172	214.203	6209.18	1/2+	16	265.150

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^{122}Sn(n,γ):resonances 1995Ca25,2018MuZY (continued)

^{123}Sn Levels (continued)

E(level)[†]	Jπ	gΓn (eV)[‡]	En(lab) (keV)	E(level)[†]	Jπ	gΓn (eV)[‡]	En(lab) (keV)
6209.43	(3/2−)	187	265.409	6230.44	3/2−	340	286.590
6209.72	(1/2−)	40	265.700	6230.91	(3/2−)	81	287.061
6210.61	(3/2−)	85	266.592	6231.64	1/2+	35	287.800
6212.15	(3/2−)	107	268.144	6231.83	(3/2−)	88	287.996
6212.36	(1/2−)	48	268.365	6232.86	(3/2−)	61	289.026
6215.94	1/2−	225	271.975	6233.45	(3/2−)	140	289.620
6216.84	1/2−	77	272.873	6234.16	(3/2−)	82	290.338
6218.49	(1/2−)	33	274.544	6236.06	(3/2−)	51	292.261
6219.25	1/2+	37	275.307	6237.43	(3/2−)	115	293.641
6219.97	(1/2)	153	276.031	6239.51	(3/2−)	53	295.730
6220.77	(3/2−)	87	276.839	6239.88	(1/2−)	37	296.106
6221.51	(3/2−)	70	277.591	6242.02	(1/2−)	146	298.264
6222.85	(1/2−)	21	278.933	6242.37	(3/2−)	118	298.620
6224.10	(1/2−)	105	280.195	6242.73	(1/2−)	97	298.977
6224.92	(1/2−)	172	281.026	6245.49	(3/2−)	192	301.763
6225.86	(1/2−)	76	281.967	6249.30	(1/2−)	350	305.601
6226.03	1/2+	27	282.139	6252.45	(1/2−)	81	308.781
6228.54	3/2−	190	284.670	6252.74	(1/2−)	206	309.073
6230.03	(1/2−)	58	286.174				

[†] From S(n)+En(res), with S(n)=5946.0 *12* in 2021Wa16 and En(res) deduced from En(lab) in 1995Ca25.
[‡] Statistical factor g=(2J+1).
[#] From 1963Fu08.

^{122}Sn(n,γ) E=thermal 1979BaYJ,2007Eg02

1979BaYJ: measured Eγ, Iγ. γ rays are not placed by the authors.
2007Eg02: E=th neutrons were produced from the WWR-M reactor of Petersburg Nuclear Physics Institute (PNPI). Measured Eγ, Iγ, σ(Eγ). Deduced absolute intensities.
Others: 1975SlZW, 1968HaZW, 1966HaZY.

^{123}Sn Levels

E(level)†	J$^\pi$†
0.0	11/2$^-$
24.6	3/2$^+$
150.4	1/2$^+$
920.0	(3/2)$^+$
1136.3	(1/2,3/2,5/2)$^+$
2156.0	(1/2,3/2,5/2)

† From Adopted Levels. Energies are rounded values.

γ(^{123}Sn)

γ rays are placed by the evaluator based on Adopted Levels, Gammas. γ rays from 1979BaYJ are not placed by the authors.

E$_\gamma$†	I$_\gamma$†	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Comments
125.76‡ *4*	28.4‡ *11*	150.4	1/2$^+$	24.6	3/2$^+$	
769.5‡ *2*	6.2‡ *16*	920.0	(3/2)$^+$	150.4	1/2$^+$	
985.3		1136.3	(1/2,3/2,5/2)$^+$	150.4	1/2$^+$	E$_\gamma$: rounded value from Adopted Gammas.
1019.7‡ *1*	24.7‡ *37*	2156.0	(1/2,3/2,5/2)	1136.3	(1/2,3/2,5/2)$^+$	
x1138.4 *4*	0.8 *5*					
x1466.0 *8*	1.4 *2*					
x1953 *1*	1.3 *3*					
x2131.3 *6*	2.4 *2*					
x2149.8 *4*	1.8 *3*					
x2500.9 *5*	1.6 *2*					
x2521.3 *8*	0.6 *1*					
x2561.4 *4*	4.0 *2*					
x2598.1 *4*	2.4 *2*					
x2717.4 *8*	0.9 *2*					
x3197.4 *3*	2.1 *1*					
x3233.7 *2*	2.4 *1*					
x3294.4 *3*	0.93 *7*					
x3360.1 *3*	1.3 *1*					
x3555.0 *6*	0.2 *1*					
x3571.5 *4*	0.56 *4*					
x3643.9 *2*	1.4 *1*					
x3681.2 *5*	0.56 *6*					
x3891 *1*	0.4 *1*					
x3967.5 *6*	0.59 *8*					
x4005 *1*	0.18 *3*					
x4016.0 *3*	0.82 *5*					
x4064.1 *6*	0.21 *4*					
x4098.0 *3*	0.74 *1*					
x4687.8 *8*	0.25 *4*					
x4735 *3*	0.2 *1*					
x5793.4 *7*	0.24 *3*					

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^{122}Sn(n,γ) E=thermal 1979BaYJ,2007Eg02 (continued)

$\gamma(^{123}Sn)$ (continued)

† From 1979BaYJ for all unplaced γ rays, unless otherwise noted. Intensities are relative values.
‡ From 2007Eg02. Intensities are absolute γ emission probabilities.
^{x} γ ray not placed in level scheme.

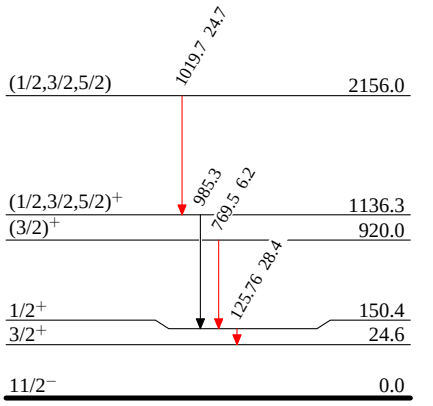
^{122}Sn(n,γ) E=thermal 1979BaYJ,2007Eg02

Level Scheme

Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



$^{123}_{50}Sn_{73}$

^{122}Sn(d,p) 1971Di11,1972Ca33

1971Di11,1972Bo76: E=12 MeV deuteron beam was produced at ORNL. Enriched target. Reaction products were momentum analyzed with a magnetic spectrograph. Measured $\sigma(E_p,\theta)$. Deduced levels, J, π, L-transfers, spectroscopic factors from DWBA analysis. Comparisons with available data.

1972Ca33: E=5.55, 5.15, 4.75, 4.55 MeV deuteron beams were produced from the University of Arizona model CN Van de Graaff. Targets were 180-450 $\mu g/cm^2$ 92.3% enriched ^{122}Sn. Reaction products were momentum-analyzed with a movable cooled silicon surface-barrier detectors fitted with electron magnets (FWHM=25 keV). Measured $\sigma(E_p,\theta)$. Deduced levels. Comparisons with available data.

1967Sc12: E=15 MeV deuteron beam was produced from the University of Pittsburgh 47-in. fixed-frequency cyclotron. Reaction products were momentum analyzed with a 60° wedge magnetic spectrograph (FWHM=40-60 keV). Measured $\sigma(E_p,\theta)$, θ=9° to 50°. Deduced levels, J, π, L-transfers, spectroscopic factors from DWBA analysis.

1964Ne10: E=12 MeV deuteron beam was produced from the FSU tandem Van de Graaff accelerator. Target was 88.9% enriched ^{122}Sn. Reaction products were momentum analyzed with a broad-range magnetic spectrograph. Measured $\sigma(E_p)$. Deduced levels.

Others: 1975Be09, 1961Co03.

^{123}Sn Levels

E(level)[†]	J$^\pi$[@]	L[‡]	C^{2}S[‡]	Comments
0.0	11/2$^-$	5	0.38	
24	3/2$^+$	2	0.39	E(level): other: 25 (1972Ca33). C^{2}S: other: 0.43 (1967Sc12).
150 *15*	1/2$^+$	0	0.19	C^{2}S: other: 0.36 (1967Sc12).
621				
870				
926 *15*	7/2$^-$	3	0.020	E(level): other: 932 (1971Di11, 1964Ne10).
1043				
1076				
1109				
1140				
1158	7/2$^+$	4	0.043	
1191 *15*	5/2$^+$	2	0.086	E(level): other: 1197 (1971Di11), 1199 (1964Ne10). C^{2}S: other: 0.062 (1967Sc12).
1301				
1440				
1466				
1485 *15*	5/2$^+$	2	0.029	E(level): other: 1492 (1971Di11), 1494 (1964Ne10). C^{2}S: other: 0.024 (1967Sc12).
1714				
1729				
1784				
1829	(3/2$^-$)	(1)[#]	0.003[#]	
1902	(5/2$^+$)	(2)[#]	0.002[#]	
2007				
2026				
2085?				
2114				
2157 *15*		(1+2)[#]	[#]	E(level): other: 2162 (1971Di11).
2260 *15*	(3/2$^-$)	1	0.004	E(level): other: 2271 (1971Di11), 2274 (1964Ne10). C^{2}S: other: 0.005 for a level at 2290 (1967Sc12).
2362 *15*				E(level): other: 2365 (1971Di11).
2425	(1/2$^+$)	(0)[#]	0.012[#]	L,C^{2}S: for a level at 2400 (1967Sc12).
2446				
2612 *15*				E(level): other: 2601 (1971Di11).
2667 *15*	7/2$^-$	3	0.056	E(level): other: 2676 (1971Di11).
2716 *15*	7/2$^-$	3	0.224	E(level): other: 2726 (1971Di11).
2746	7/2$^-$	3	0.054	E(level): other: 2757 (1971Di11), 2758 (1964Ne10).

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^{122}Sn(d,p) 1971Di11,1972Ca33 (continued)

^{123}Sn Levels (continued)

E(level)[†]	J^{π}[@]	L[‡]	C^2S[‡]	Comments
2820 *15*	7/2$^-$	3	0.017	E(level): other: 2828 (1971Di11), 2826 (1964Ne10). C^2S: other: 0.023 (1967Sc12).
3040 *15*		3	0.021	E(level): other: 3049 (1971Di11), 3050 (1964Ne10).
3073	(7/2$^-$)	(3)[#]	0.12[#]	E(level): other: 3071 (1964Ne10).
3113	7/2$^-$	3	0.027	E(level): other: 3112 (1964Ne10).
3151	7/2$^-$	3	0.048	E(level): other: 3130 from 1972Ca33 could correspond to 3113+3151; 3150 (1964Ne10). C^2S: other: 0.12 for a level at 3140 (1967Sc12).
3188	3/2$^-$,5/2$^+$	1,2	0.049,0.065	E(level): other: 3196 from 1972Ca33 could correspond to 3188+3217; 3182 (1964Ne10).
3217	7/2$^-$	3	0.026	E(level): other: 3215 (1964Ne10).
3252 *15*	3/2$^-$,5/2$^+$	1,2	0.021,0.028	E(level): other: 3265 (1971Di11), 3263 (1964Ne10).
3320	3/2$^-$,5/2$^+$	1,2	0.011,0.016	E(level): other: 3316 (1964Ne10).
3345 *15*	3/2$^-$,5/2$^+$	1,2	0.052,0.062	E(level): other: 3358 (1971Di11), 3354 (1964Ne10).
3383 *15*	3/2$^-$,5/2$^+$	1,2	0.088,0.099	E(level): other: 3395 (1971Di11, 1964Ne10). C^2S: other: 0.23 for a level at 3400 with L=(1) (1967Sc12).
3435	3/2$^-$,5/2$^+$	1,2	0.015,0.017	E(level): other: 3443 from 1972Ca33 could correspond to 3435+3456; 3432 (1964Ne10).
3456	3/2$^-$,5/2$^+$	1,2	0.039,0.043	E(level): other: 3454 (1964Ne10).
3514				E(level): other: 3522 from 1972Ca33 could correspond to 3514+3534; 3526 (1964Ne10).
3534	3/2$^-$,5/2$^+$	1,2	0.014,0.016	C^2S: other: 0.043 for a level at 3530 with L=(1) (1967Sc12).
3551	3/2$^-$,5/2$^+$	1,2	0.007,0.008	E(level): other: 3549 (1964Ne10).
3632	3/2$^-$,5/2$^+$	1,2	0.004,0.004	E(level): other: 3627 (1964Ne10).
3650	3/2$^-$,5/2$^+$	1,2	0.002,0.002	E(level): other: 3640 (1964Ne10).
3677				E(level): other: 3666 (1964Ne10).
3694				
3720	3/2$^-$,5/2$^+$	1,2	0.023,0.024	E(level): other: 3713 (1964Ne10).
3735				E(level): other: 3727 (1964Ne10).
3773	3/2$^-$,5/2$^+$	1,2	0.015,0.016	E(level): other: 3761 (1964Ne10).
3809	3/2$^-$,5/2$^+$	1,2	0.052,0.058	C^2S: other: 0.14 for a level at 3810 with L=(1) (1967Sc12).
3827	3/2$^-$,5/2$^+$	1,2	0.011,0.013	E(level): other: 3805 (1964Ne10).
3849	3/2$^-$,5/2$^+$	1,2	0.031,0.033	E(level): other: 3842 (1964Ne10).
3868				
3910	7/2$^-$	3	0.007	E(level): other: 3903 (1964Ne10).
3966	7/2$^-$	3	0.019	E(level): other: 3952 (1964Ne10).
4008				E(level): other: 3999 (1964Ne10).
4057	7/2$^-$	3	0.059	E(level): other: 4033 *15* in 1972Ca33 could correspond to this level; 4043 (1964Ne10). C^2S: other: 0.11 for a level at 4050 with L=(1) (1967Sc12).
4087 *15*	7/2$^-$	3	0.017	E(level): other: 4075 (1971Di11), 4097 (1964Ne10).
4105				
4267	3/2$^-$,5/2$^+$	1,2	0.036,0.042	E(level): other: 4242 *15* in 1972Ca33 could correspond to this level.
4358	7/2$^-$	3	0.007	
4423	7/2$^-$	3	0.009	E(level): other: 4436 from 1972Ca33 could correspond to 4423+4464.
4464				
4736				E(level): other: 4702 *15* in 1972Ca33 could correspond to this level.
4773 *15*				
4845 *15*				
4875 *15*				
4923 *15*				
4964 *15*				
5019 *15*				
5127 *15*				

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^{122}Sn(d,p) 1971Di11,1972Ca33 (continued)

^{123}Sn Levels (continued)

† Values with uncertainties are from 1972Ca33 and those without uncertainties are from 1971Di11, unless otherwise noted.
‡ From 1971Di11, extracted from DWBA analysis of measured differential cross sections.
# From 1967Sc12.
@ Assumed for C^2S.

^{122}Sn(d,pγ) 1976Ma09

1976Ma09: E=5-10 MeV deuteron beams were produced from the tandem of Institute of Physics at University of Uppsala. Targets were 2.5-3.5 mg/cm^3 ^{122}Sn (92% to 98.5% enriched). γ rays were detected with two Ge(Li) detectors and a LEPS; protons were detected with an annular Si detector; conversion electrons were detected with a Lithium-drifted Si detector (FWHM≈2 keV at 975 keV). Measured Eγ, Iγ, E(ce), I(ce), excitation functions, $\gamma\gamma$-coin, pγ-coin. Deduced levels, J, π, conversion coefficients, γ-ray multipolarities. Systematics of neighboring Sn isotopes.

The level scheme is that proposed by 1976Ma09. The evaluator added tentatively the levels at 619.0 and 1044.6 based on ^{123}In β^-decay, to place 619.0γ and 1020.0γ, respectively.

^{123}Sn Levels

E(level)[†]	J$^\pi$[‡]	Comments
0.0	11/2$^-$	
24.6	3/2$^+$	E(level): from Adopted Levels.
150.48 *19*	1/2$^+$	
619.0 *3*	(9/2)$^-$	
870.5 *4*	(5/2)$^+$	
920.5 *6*	(3/2)$^+$	
931.3 *8*	7/2$^-$	
1044.6 *10*	(7/2)$^+$	
1071.1 *7*	(1/2,3/2)$^+$	
1136.4 *7*	(1/2,3/2,5/2)$^+$	
1195.4 *10*	(5/2)$^+$	
1488.8? *10*	(5/2)$^+$	

[†] From a least-squares fit to γ-ray energies, unless otherwise noted.
[‡] From Adopted Levels.

γ(^{123}Sn)

Experimental K-shell coefficients in 1976Ma09 are normalized to theoretical α(K) for 845.9γ assuming Mult=E2.

E$_\gamma$	I$_\gamma$	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[†]	α[‡]	Comments
125.9 *2*	100	150.48	1/2$^+$	24.6	3/2$^+$			
619.0 *3*	17 *3*	619.0	(9/2)$^-$	0.0	11/2$^-$	M1,E2	0.00416	Mult.: from α(K)exp=0.0028 *5*, mostly E2.
[x]626.2 *8*	2.2 *5*							
[x]676.0 *4*	6.1 *6*							
719.9 *8*	2.2 *5*	870.5	(5/2)$^+$	150.48	1/2$^+$			
770.3 *9*	4.1 *5*	920.5	(3/2)$^+$	150.48	1/2$^+$	M1	0.00288	Mult.: from α(K)exp=0.0027 *5*.
845.9 *4*	17.8 *18*	870.5	(5/2)$^+$	24.6	3/2$^+$	[E2]		
895.6 *8*	11.7 *11*	920.5	(3/2)$^+$	24.6	3/2$^+$	M1,E2		Mult.: from α(K)exp=0.0015 *2*, mostly E2.
920.9 *8*	5.6 *5*	1071.1	(1/2,3/2)$^+$	150.48	1/2$^+$	M1+E2		Mult.: from α(K)exp=0.0016 *3*.
931.3 *8*	14 *3*	931.3	7/2$^-$	0.0	11/2$^-$	E2		Mult.: from α(K)exp=0.00130 *23*.
985.6 *10*		1136.4	(1/2,3/2,5/2)$^+$	150.48	1/2$^+$			
1020.0 *10*	13 *3*	1044.6	(7/2)$^+$	24.6	3/2$^+$	(E2)		Mult.: M1,E2 from α(K)exp=0.00123 *22*; E2 consistent with ΔJ^π.
1046 *1*	4.9 *12*	1071.1	(1/2,3/2)$^+$	24.6	3/2$^+$			
1112.0 *9*	9.5 *14*	1136.4	(1/2,3/2,5/2)$^+$	24.6	3/2$^+$	M1,E2		Mult.: from α(K)exp=0.00097 *16*.
[x]1130.8 *13*	2.2 *7*							
1170.8 *10*	11.9 *12*	1195.4	(5/2)$^+$	24.6	3/2$^+$	M1,E2		Mult.: from α(K)exp=0.00095 *16*.
1464.2[#] *10*	4.3 *4*	1488.8?	(5/2)$^+$	24.6	3/2$^+$			

Continued on next page (footnotes at end of table)

^{122}Sn(d,pγ) 1976Ma09 (continued)

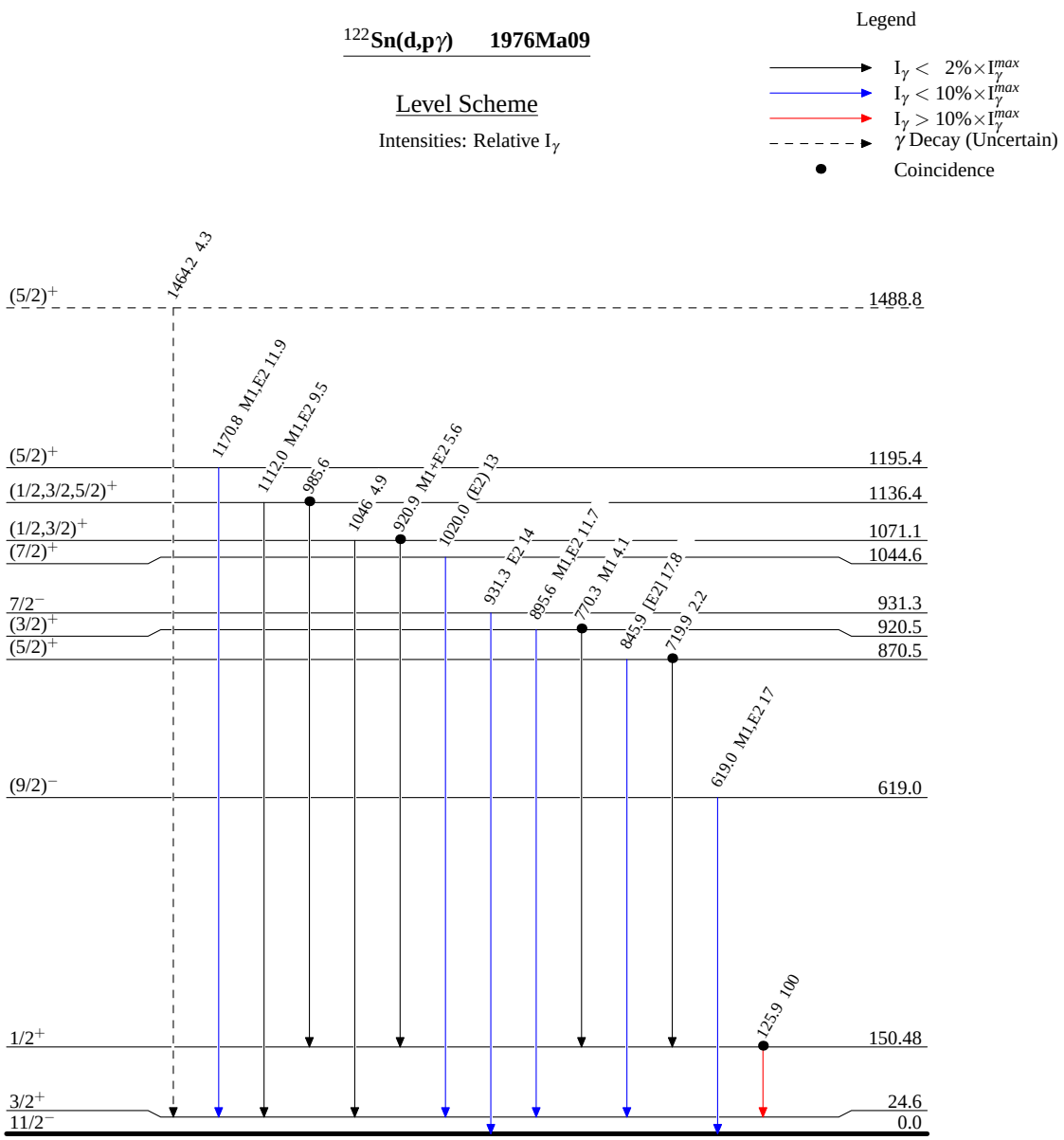
$\gamma(^{123}Sn)$ (continued)

† From α(K)exp in 1976Ma09.
‡ Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
# Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

^{122}Sn(d,pγ) 1976Ma09

Level Scheme

Intensities: Relative I_γ



$^{123}_{50}Sn_{73}$

^{122}Sn(α,^{3}He) 1991Ma06

1991Ma06: E=183 MeV α beam was produced from the K220 Orsay synchrocyclotron. Target was isotopically enriched self-supporting metallic tin foils. Reaction products were momentum-analyzed with a magnetic spectrometer (FWHM=100-200 keV). Measured $\sigma(\theta=4°, 8°)$. Deduced C^2S for $h_{11/2}$ single-particle state from DWBA analysis.

^{123}Sn Levels

E(level)	J^{π} †	C^2S
0.0	$11/2^-$	0.37

† From Adopted Levels.

^{124}Sn(p,d) IAR 1980Ta04,1977Se01

1980Ta04: E=55 MeV proton beam was produced from the RCNP AVF cyclotron. Target was ≈1mg/cm^2 isotopically enriched Sn foil. Reaction products were momentum-analyzed with the QDMDQ-type spectrograph RAIDEN (FWHM≈10 keV) and detected with a position sensitive resistive-wire proportional counter. Measured $\sigma(E_d)$. Deduced deep-hole states, widths, IAR.

1977Se01: E=52 MeV proton was produced the INS synchrocyclotron. Target was self-supporting metallic foil of 8.2 mg/cm^2 97% enriched ^{124}Sn. Reaction products were momentum-analyzed with a broad-range magnetic spectrograph (FWHM≈100 keV). Measured $\sigma(E_d)$. Deduced deep-hole states, spectroscopic factors from DWBA analysis.

^{123}Sn Levels

E(level)[†]	J^{π}[#]	Γ[‡]	C^2S[@]	Comments
16943 *50*	$9/2^+$	39 keV *8*	0.19	Configuration=$(\nu\ 1g_{9/2})^{-1}$ E(level): IAS of $9/2^+$ g.s. of ^{123}In.
17306 *50*	$1/2^-$	45 keV *7*	0.062	Configuration=$(\nu\ 2p_{1/2})^{-1}$ E(level): IAS of 320-keV, $1/2^-$ state in ^{123}In.
17656 *50*	$(3/2)^-$	39 keV *15*		Configuration=$(\nu\ 2p_{3/2})^{-1}$ E(level): IAS of 698-keV, $(3/2)^-$ state in ^{123}In.

† From 1980Ta04. Relative uncertainty is 5keV. They are also reported in 1977Se01.
‡ From 1980Ta04.
# From Adopted Levels.
@ DWBA calculation for ^{123}In IAS from 1977Se01.

^{124}Sn(p,d) 1970Ca01,1982Fl02

1970Ca01: E=30 MeV proton beam was produced from the RHEL LINAC. Reaction products were momentum analyzed with a magnetic spectrograph (FWHM=55-70 keV). Measured $\sigma(E_d,\theta)$, $\theta\leq60°$. Deduced levels, J, π, L-transfers from DWBA analysis. J-dependence of $\sigma(\theta)$ for L=2 is discussed to deduce $J^\pi=5/2^+$ or $3/2^+$ (1970Ca01).

1982Fl02: analysis of data obtained at Institut de Physique Nucleaire, Orsay in 1969 with E=20 MeV proton beam. Reaction products were momentum analyzed with a magnetic spectrometer (FWHM=25 keV). Measured $\sigma(E_d,\theta)$, θ=10° to 50°. Deduced levels, J, π, spectroscopic factors, L-transfers from DWBA analysis.

1986Ma37: E=50 MeV proton beam was produced at RCNP. Target was 0.75 mg/cm^2 96.96% enriched metallic ^{124}Sn. Reaction products were momentum analyzed with the multi-range spectrograph RAIDEN (FWHM=15-20 keV). Measured $\sigma(\theta)$ of deeply-bound hole states. Deduced average excitation energies, strength functions, spreading widths from DWBA analysis.

Others: 2020Ga03, 1982HyZZ, 1980Is01, 1979CrZY, 1973Is09.

^{123}Sn Levels

E(level)[†]	J$^\pi$[‡]	L[#]	C^{2}S[@]	Comments
0.0		5+2	4.5+3.0	E(level): Unresolved doublet (1982Fl02). C^{2}S: 4.5 *15* for L=5, 3.0 *4* for L=2 obtained by 1982Fl02 from peak angle systematics.
139		0	1.9 *2*	
899	5/2$^+$	2		
1028		(4)	2.8 *14*	
1185		2	3.2 *5*	E(level),L: from 1982Fl02. 1970Ca01 report L=2+4, suggesting a possible contribution from 7/2$^+$ level at 1155.
1484	5/2$^+$	2	2.8 *4*	
1780	5/2$^+$	2		
1900	3/2$^+$	2		
2020	3/2$^+$	2		
2080	5/2$^+$	2		
2150				
2270	3/2$^+$	2		
2350		4		
2410		0		
2620		0		
2730		4		
2850	(3/2$^+$)	(2)		
3020				
3160				
3240	3/2$^+$	2		
3300				
5640[&]		4	4.17[&]	E(level): in energy region of 3830-7000, Γ=1.90 MeV (1986Ma37).
6330[&]		1	1.55[&]	E(level): in energy region of 3830-8200, Γ=2.60 MeV (1986Ma37).
6900[&]		4	7.44[&]	E(level): in energy region of 3830-10020, Γ=3.89 MeV (1986Ma37).
7120[&]		1	2.19[&]	E(level): in energy region of 3830-10020, Γ=3.68 MeV (1986Ma37).
8520[&]		4	3.27[&]	E(level): for energy region of 7000-10020, Γ=2.02 MeV (1986Ma37).
9040[&]		1	0.63[&]	E(level): for energy region of 8200-10020, Γ=1.20 MeV (1986Ma37).

[†] From 1970Ca01, unless otherwise noted.
[‡] From J-dependence of $\sigma(\theta)$ for L=2 transfer (1970Ca01).
[#] From angular distribution analyses by 1970Ca01, unless noted otherwise.
[@] From DWBA analysis (1982Fl02), unless otherwise noted.
[&] From 1986Ma37. Quoted energy values are average excitation energies, calculated using strength functions in the indicated energy region in comments.

^{124}Sn(d,t) 1990Bo25,1971Di11

1990Bo25: E=50 MeV deuteron beam was produced at KVI. Reaction products were momentum analyzed with the QMG/2 spectrograph (FWHM=50 keV). Measured $\sigma(E_t,\theta)$. Deduced levels, L-transfers, spectroscopic factors from DWBA analysis. Comparisons with available data.

1971Di11,1972Bo76: E=17 MeV deuteron beam was produced at ORNL. Enriched target. Reaction products were momentum analyzed with a magnetic spectrograph. Measured $\sigma(E_t)$. Deduced levels. Comparisons with available data.

Others: 1977Va15, 1975Be09, 1974Va17, 1967Sc12, 1961Co03.

^{123}Sn Levels

E(level)[†]	J^{π}[#]	L[†]	C^2S[†]	Comments
0.0	$11/2^-$	5	9.3 *15*	
24	$3/2^+$	2	2.8 *5*	E(level): from 1971Di11.
150 *20*	$1/2^+$	0	1.6 *2*	
620?				E(level): possible contaminant of ^{119}Sn.
930 *20*	$5/2^+$	2	0.07 *3*	
1060 *20*	$7/2^+$	4	1.4 *2*	E(level): other: 1044 (1971Di11).
1109[‡]				
1160 *20*	$7/2^+$	4	9.0 *31*	E(level): other: 1157 (1971Di11).
1190 *20*	$5/2^+$	2	2.9 *5*	E(level): other: 1196 (1971Di11).
1451?[‡]				
1500 *20*	$5/2^+$	2	2.8 *2*	E(level): other: 1492 (1971Di11).
1780 *20*	$5/2^+$	2	0.08 *4*	E(level): other: 1781 (1971Di11).
2010 *20*	$3/2^+$	2	0.22 *10*	E(level): other: 2026 (1971Di11).
2100 *20*	$5/2^+$	2	0.20 *10*	E(level): other: 2093 (1971Di11).
2167[‡]				
2271[‡]				
2368[‡]				
2420 *20*	$1/2^+$	0	0.25 *10*	E(level): other: 2423 (1971Di11).
2446[‡]				
2680 *20*	$5/2^-$	3	0.45 *20*	
2950 *20*	$9/2^+$	4	0.90 *20*	

[†] From 1990Bo25. L and C^2S values are from DWBA analysis of measured differential cross sections.
[‡] from 1971Di11 only.
[#] Assumed for C^2S.

^{124}Sn(^{80}Se,Xγ) 1994Ma48,1992Ma27

1994Ma48, 1992Ma27, 1995Da26: E=344 MeV ^{80}Se beam was produced from the ATLAS accelerator at ANL. Target was 1 mg/cm^2 >95% enriched ^{124}Sn. γ rays were detected with 12 Compton-suppressed Ge detectors of the Argonne-Notre Dame BGO γ-ray facility. Measured Eγ, $\gamma\gamma$-coin, $\gamma\gamma$(t). Deduced levels, J, π, $T_{1/2}$.

^{123}Sn Levels

E(level)†	J^π‡	$T_{1/2}$	Comments
0.0	$11/2^-$#		
1107.0 *9*	$(15/2^-)$		
1217.0 *9*	$(13/2^-)$		
1926.0 *10*	$(17/2^-)$		
1945.0 *10*	$(19/2^+)$	7.4 μs *26*	$T_{1/2}$: from delayed γ versus beam pulse (1992Ma27).
2153.0 *12*	$(23/2^+)$	6 μs	$T_{1/2}$: from delayed γ versus beam pulse (1994Ma48,1995Da26). No $\Delta T_{1/2}$ value have been given.
2263.0 *12*	$(19/2^-)$		
2396.0 *14*	$(21/2^+)$		
2543.0 *13*	$(23/2^-)$		
2713.0 *14*	$(27/2^-)$	34 μs	$T_{1/2}$: from delayed γ versus beam pulse (1994Ma48,1995Da26). No $\Delta T_{1/2}$ value have been given.

† From a least-squares fit to γ-ray energies, assuming $\Delta E\gamma$=1 keV.

‡ Given by authors based on systematics and calculation of seniority scheme of $h_{11/2}$ level energies, except as noted. However the parentheses have been added by the evaluator.

From Adopted Levels.

γ(^{123}Sn)

E_γ†	E_i(level)	J_i^π	E_f	J_f^π	Comments
(19)	1945.0	$(19/2^+)$	1926.0	$(17/2^-)$	E_γ: Eγ from difference of level energies.
147	2543.0	$(23/2^-)$	2396.0	$(21/2^+)$	
170	2713.0	$(27/2^-)$	2543.0	$(23/2^-)$	
208	2153.0	$(23/2^+)$	1945.0	$(19/2^+)$	
243	2396.0	$(21/2^+)$	2153.0	$(23/2^+)$	
280	2543.0	$(23/2^-)$	2263.0	$(19/2^-)$	
560	2713.0	$(27/2^-)$	2153.0	$(23/2^+)$	
709	1926.0	$(17/2^-)$	1217.0	$(13/2^-)$	
728	1945.0	$(19/2^+)$	1217.0	$(13/2^-)$	
819	1926.0	$(17/2^-)$	1107.0	$(15/2^-)$	
838	1945.0	$(19/2^+)$	1107.0	$(15/2^-)$	
1107	1107.0	$(15/2^-)$	0.0	$11/2^-$	
1156	2263.0	$(19/2^-)$	1107.0	$(15/2^-)$	
1217	1217.0	$(13/2^-)$	0.0	$11/2^-$	

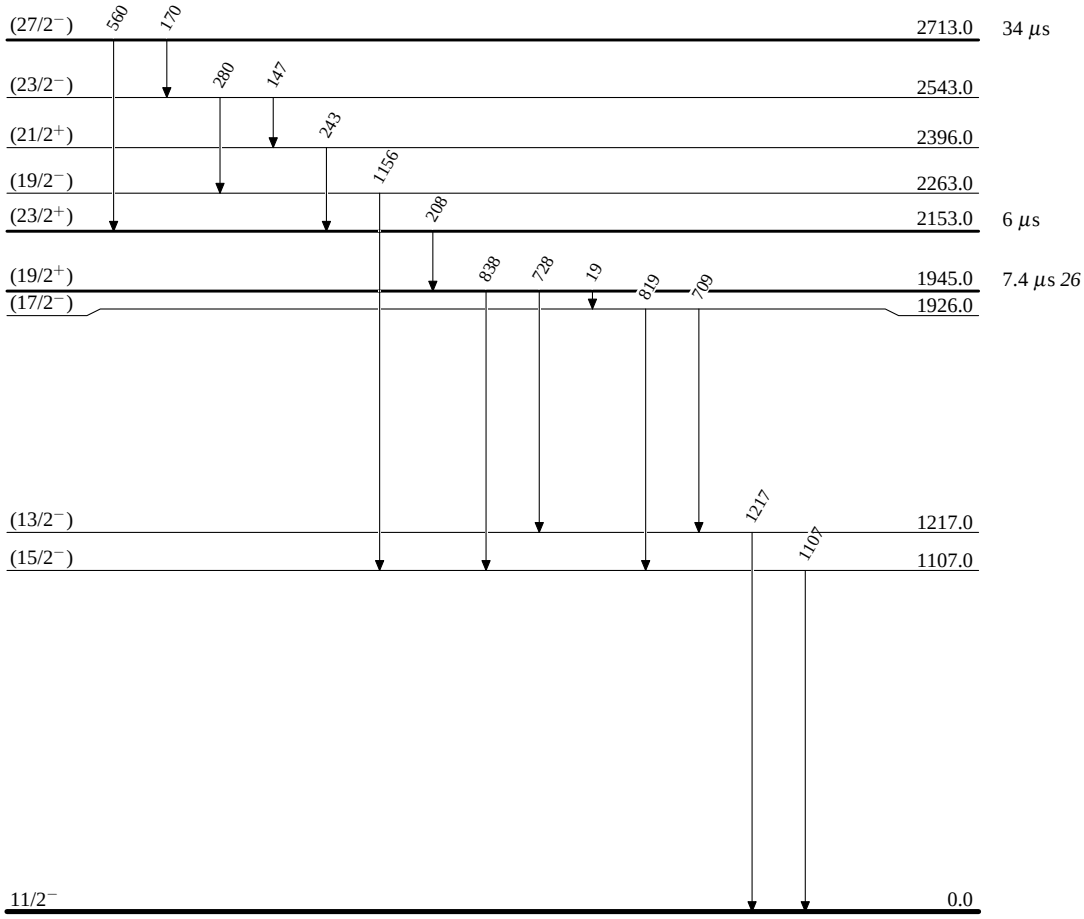
† From 1994Ma48.

Legend

^{124}Sn(^{80}Se,Xγ) 1994Ma48,1992Ma27

Level Scheme

γ Decay (Uncertain)



$^{123}_{50}Sn_{73}$

^{208}Pb(^{48}Ca,Xγ),^{238}U(^{48}Ca,Xγ) 2016Is03

Also includes ^{238}U(^{64}Ni,Fγ) in 2016Is03.

2016Is03: Three experiments were performed with beams provided from the ATLAS linear accelerator at ANL and target thickness of ≈50 mg/cm^2. In the first and second, E=330 MeV ^{48}Ca beam was used and targets were ^{208}Pb and ^{238}U, respectively; in the third, E=430 MeV ^{64}Ni beam was produced on a ^{238}U target. γ rays were detected with the Gammasphere array consisting of 101 Compton suppressed HPGe detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma\gamma$-coin, $\gamma\gamma$(t). Deduced levels, J, π, $T_{1/2}$, band structures, γ-ray transition strengths, branching ratios. Comparisons with shell-model calculations.

All data are from 2016Is03.

^{123}Sn Levels

E(level)[†]	J$^\pi$[‡]	E(level)[†]	J$^\pi$[‡]	E(level)[†]	J$^\pi$[‡]	$T_{1/2}$[#]
0.0	11/2$^-$	2262.72 *19*	19/2$^-$	4378.8[@] *4*	(35/2$^+$)	4 ns *1*
1107.04 *9*	15/2$^-$	2395.31 *18*	21/2$^+$	4744.1[&] *5*	(35/2$^-$)	
1217.08 *9*	13/2$^-$	2542.30 *18*	23/2$^-$	5479.0[&] *6*	(39/2$^-$)	
1926.09 *12*	(15/2$^+$)	2712.47[&] *21*	27/2$^-$	5644.9 *5*	(39/2$^+$)	
1944.90 *12*	19/2$^+$	3293.1[@] *3*	(27/2$^+$)	6231.3 *5*	(39/2$^+$)	
2098.99 *18*	19/2$^-$	3756.0[&] *4*	(31/2$^-$)	7160.0 *5*	(43/2$^+$)	
2152.66[@] *19*	23/2$^+$	4117.0[@] *3*	(31/2$^+$)			

[†] From a least-squares fit to γ-ray energies.

[‡] Proposed by 2016Is03, based on observed linking transitions, de-excitation paths, band assignments, and systematics of level energies over the entire Sn isotopic chain. When considered in Adopted Levels, those firm assignments here will be placed inside parenthesis by the evaluator if there is no other experimental evidence.

[#] From decay curves obtained as time distribution between transitions feeding the isomer and those associated directly with the decay (2016Is03).

[@] Band(A): Positive-parity yrast states.

[&] Band(B): Negative-parity yrast states.

γ(^{123}Sn)

E$_\gamma$	I$_\gamma$	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.	Comments
(18.7)	0.02[†]	1944.90	19/2$^+$	1926.09	(15/2$^+$)	[E2]	E$_\gamma$: From differences of level energies (2016Is03). I$_\gamma$: Calculated from summed intensities of 709 and 819 keV γ-rays with electron-conversion coefficient for an E2 transition (2016Is03).
147.0 *2*	47[†] *5*	2542.30	23/2$^-$	2395.31	21/2$^+$		
170.2 *1*	68[†] *6*	2712.47	27/2$^-$	2542.30	23/2$^-$		
207.6 *2*	75[†] *7*	2152.66	23/2$^+$	1944.90	19/2$^+$	[E2]	
242.6 *2*	22[†] *2*	2395.31	21/2$^+$	2152.66	23/2$^+$		
261.8 *2*	44[‡] *5*	4378.8	(35/2$^+$)	4117.0	(31/2$^+$)	[E2]	
279.6 *2*	16[†] *2*	2542.30	23/2$^-$	2262.72	19/2$^-$		
296.1 *5*	2.0[†] *8*	2395.31	21/2$^+$	2098.99	19/2$^-$		
361.6 *5*	9[‡] *4*	4117.0	(31/2$^+$)	3756.0	(31/2$^-$)		
443.4 *2*	5[†] *1*	2542.30	23/2$^-$	2098.99	19/2$^-$		
450.5 *2*	25[†] *2*	2395.31	21/2$^+$	1944.90	19/2$^+$		
(559.5)	47[†]	2712.47	27/2$^-$	2152.66	23/2$^+$		I$_\gamma$: deduced by 2016Is03 from B(E2) value for 170 keV isomeric transition in the 27/2$^-$ decay study in 1994Ma48.
709.0 *1*	15[†] *2*	1926.09	(15/2$^+$)	1217.08	13/2$^-$		
728.0 *2*	6[†] *1*	1944.90	19/2$^+$	1217.08	13/2$^-$	[E3]	

Continued on next page (footnotes at end of table)

^{208}Pb(^{48}Ca,Xγ),^{238}U(^{48}Ca,Xγ) 2016Is03 (continued)

$\gamma(^{123}Sn)$ (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.
734.9 *4*	20‡ *2*	5479.0	(39/2$^-$)	4744.1	(35/2$^-$)	
819.1 *2*	12† *2*	1926.09	(15/2$^+$)	1107.04	15/2$^-$	
823.8 *2*	90‡ *8*	4117.0	(31/2$^+$)	3293.1	(27/2$^+$)	
837.8 *1*	67† *5*	1944.90	19/2$^+$	1107.04	15/2$^-$	[M2]
928.7 *3*	5‡ *1*	7160.0	(43/2$^+$)	6231.3	(39/2$^+$)	
988.1 *3*	75‡ *7*	4744.1	(35/2$^-$)	3756.0	(31/2$^-$)	
992.0 *2*	5† *1*	2098.99	19/2$^-$	1107.04	15/2$^-$	
1043.8 *3*	81‡ *7*	3756.0	(31/2$^-$)	2712.47	27/2$^-$	
1107.0 *1*	100†	1107.04	15/2$^-$	0.0	11/2$^-$	
1140.3 *2*	100‡	3293.1	(27/2$^+$)	2152.66	23/2$^+$	
1155.7 *2*	16† *2*	2262.72	19/2$^-$	1107.04	15/2$^-$	
1217.1 *1*	21† *2*	1217.08	13/2$^-$	0.0	11/2$^-$	
1266.1 *3*	16‡ *2*	5644.9	(39/2$^+$)	4378.8	(35/2$^+$)	
1515.0 *3*	6‡ *1*	7160.0	(43/2$^+$)	5644.9	(39/2$^+$)	
1852.6 *3*	8‡ *2*	6231.3	(39/2$^+$)	4378.8	(35/2$^+$)	

† Intensities of delayed transitions normalized to 100 for the 1107 γ transition.
‡ Intensities of prompt transitions normalized to 100 for the 1140 γ transition.

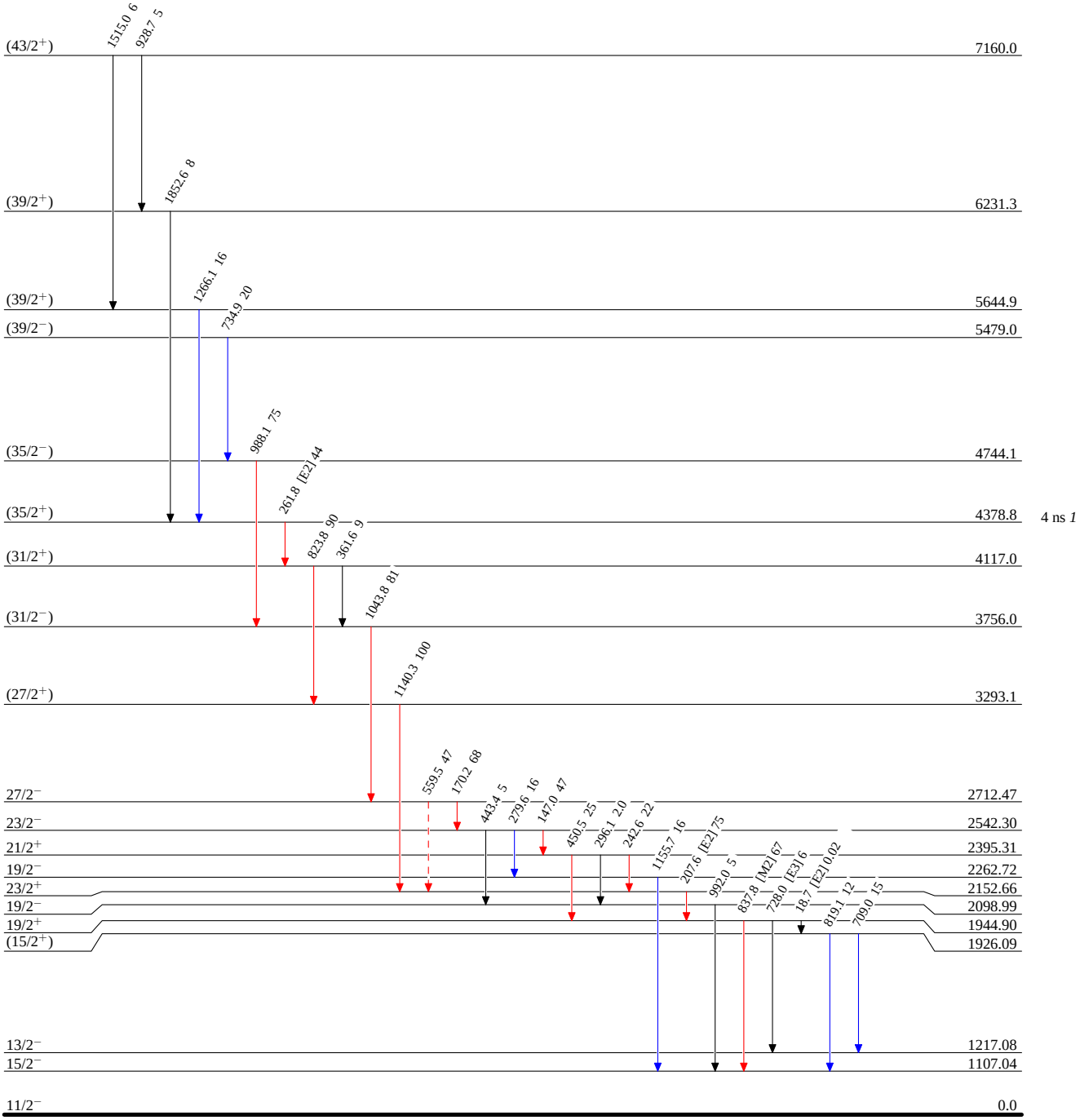
^{208}Pb(^{48}Ca,Xγ),^{238}U(^{48}Ca,Xγ) 2016Is03

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)

Level Scheme

Intensities: Relative I_γ

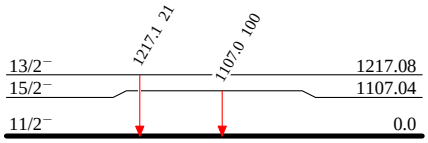


$^{123}_{50}Sn_{73}$

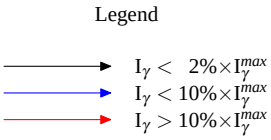
^{208}Pb(^{48}Ca,Xγ),^{238}U(^{48}Ca,Xγ) 2016Is03

Level Scheme (continued)

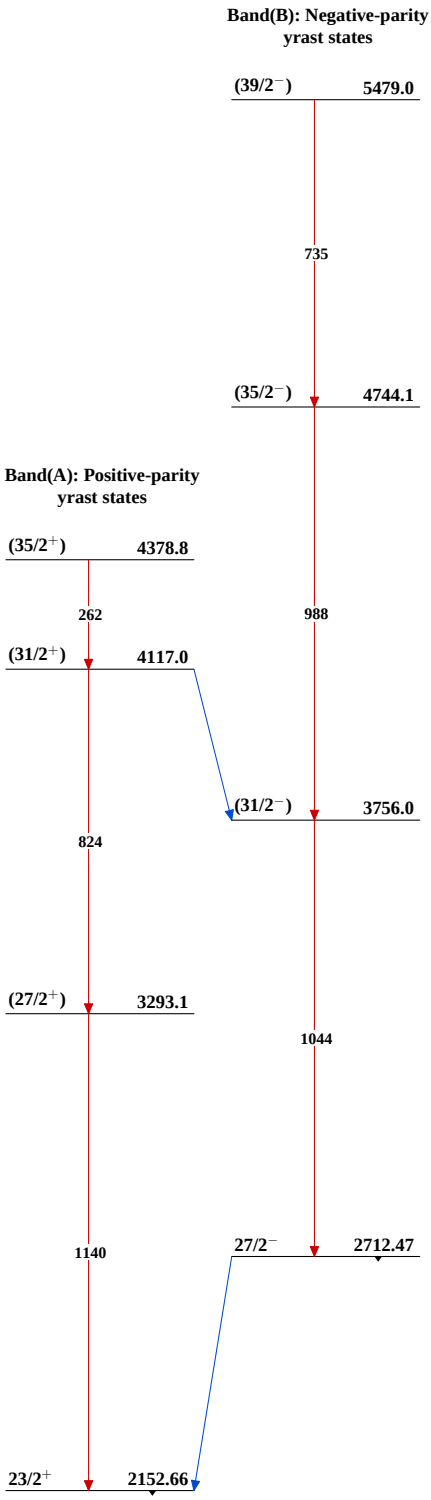
Intensities: Relative I_γ



$^{123}_{50}Sn_{73}$



^{208}Pb(^{48}Ca,Xγ),^{238}U(^{48}Ca,Xγ) 2016Is03



$^{123}_{50}Sn_{73}$

^{238}U(^{12}C,Fγ),^{208}Pb(^{18}O,Fγ) 2012As05

2012As05: two experiments: in the first, E=90 MeV ^{12}C beam was produced from the Legnaro XTU tandem and target was 47 mg/cm^2 ^{238}U. In the second, E=85 MeV beam was produced from the Vivitron accelerator of IReS (Strasbourg) and target was 100 mg/cm^2 ^{208}Pb. In both experiments, γ rays were detected with the Euroball array consisting of 71 Compton-suppressed Ge detectors (15 clusters, 26 clovers, 30 tapered single-crystal Ge detectors). Measured Eγ, Iγ, $\gamma\gamma$-coin. Deduced levels, J, π, band structures, configurations. Comparisons with shell-model calculations.

^{123}Sn Levels

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$	Comments
0.0[#]	11/2$^-$		
1106.81[#] *20*	15/2$^-$		
1944.8[@] *11*	19/2$^+$		
2152.8[@] *15*	23/2$^+$		
2262.4[#] *3*	19/2$^-$		
2541.5[#] *4*	23/2$^-$		
2711.3[#] *4*	27/2$^-$		
3292.8[@] *15*	(27/2$^+$)		
3754.8? *5*	(31/2$^-$)		
3818.3? *5*	(31/2$^-$)		
4116.4[@] *15*	(31/2$^+$)		
4377.8[@] *16*	(35/2$^+$)	<30 ns	T$_{1/2}$: estimated by 2012As05.
4742.6? *6*	(35/2$^-$)		
4809.9? *6*	(35/2$^-$)		
5477.6? *7*			
5520.4? *7*			
5643.7 *16*			
6230.8 *16*	(39/2$^+$)		
7159.0 *16*			

[†] From a least-squares fit to γ-ray energies.
[‡] Proposed by 2012As05, based on band assignments, known assignments of low-lying states and analogy with neighboring isotopes.
[#] Band(A): Band based on 11/2$^-$.
[@] Band(B): Band based on 19/2$^+$.

γ(^{123}Sn)

E$_\gamma$	I$_\gamma$	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	E$_\gamma$	I$_\gamma$	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$
169.8 *2*	[‡]	2711.3	27/2$^-$	2541.5	23/2$^-$	991.6[#] *3*		4809.9?	(35/2$^-$)	3818.3?	(31/2$^-$)
208[†]		2152.8	23/2$^+$	1944.8	19/2$^+$	1043.5[#] *3*		3754.8?	(31/2$^-$)	2711.3	27/2$^-$
261.4 *3*	43 *9*	4377.8	(35/2$^+$)	4116.4	(31/2$^+$)	1106.8 *2*	[‡]	1106.81	15/2$^-$	0.0	11/2$^-$
279.1 *2*	[‡]	2541.5	23/2$^-$	2262.4	19/2$^-$	1107.0[#] *3*		3818.3?	(31/2$^-$)	2711.3	27/2$^-$
710.5[#] *3*		5520.4?		4809.9?	(35/2$^-$)	1140.0 *3*	100	3292.8	(27/2$^+$)	2152.8	23/2$^+$
735.0[#] *3*		5477.6?		4742.6?	(35/2$^-$)	1155.6 *2*	[‡]	2262.4	19/2$^-$	1106.81	15/2$^-$
823.6 *3*	100	4116.4	(31/2$^+$)	3292.8	(27/2$^+$)	1265.8 *4*	12 *4*	5643.7		4377.8	(35/2$^+$)
838[†]		1944.8	19/2$^+$	1106.81	15/2$^-$	1515.3 *5*	6 *2*	7159.0		5643.7	
928.3 *4*	3 *1*	7159.0		6230.8	(39/2$^+$)	1853.0 *5*	5 *2*	6230.8	(39/2$^+$)	4377.8	(35/2$^+$)
987.8[#] *3*		4742.6?	(35/2$^-$)	3754.8?	(31/2$^-$)						

[†] γ not seen in 2012As05 and Eγ taken from Adopted Gammas.

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^{238}U(^{12}C,Fγ),^{208}Pb(^{18}O,Fγ) 2012As05 (continued)

$\gamma(^{123}Sn)$ (continued)

‡ Intensity could not be determined in the present experiment due to decay from a 34−μs isomer at 2711.
# Placement of transition in the level scheme is uncertain.

$^{238}U(^{12}C,F\gamma),^{208}Pb(^{18}O,F\gamma)$ 2012As05

Level Scheme

Intensities: Relative I_γ

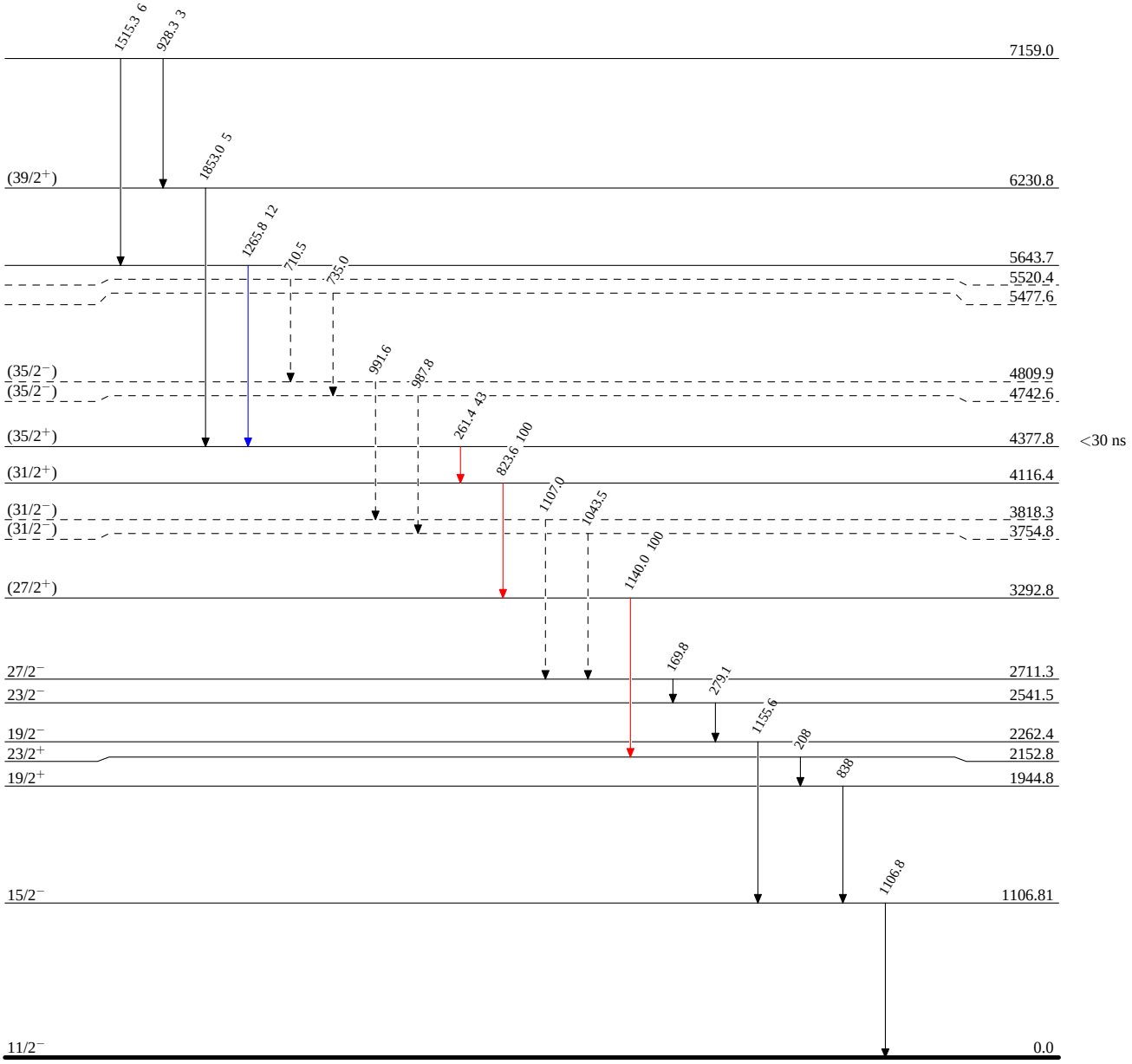
Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

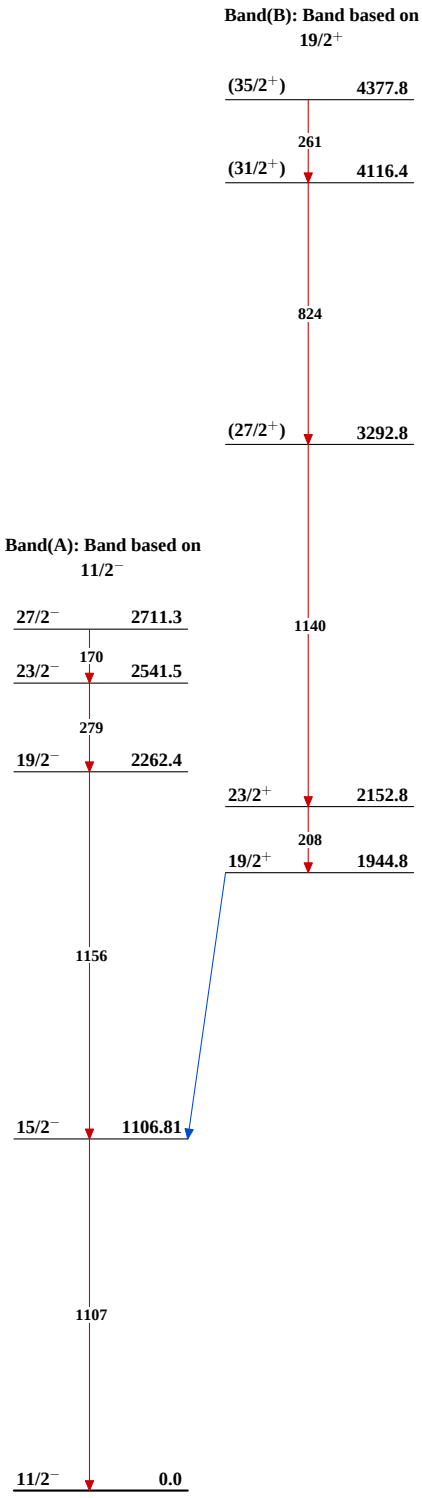
$I_\gamma > 10\% \times I_\gamma^{max}$

γ Decay (Uncertain)



$^{123}_{50}Sn_{73}$

^{238}U(^{12}C,Fγ),^{208}Pb(^{18}O,Fγ) 2012As05



$^{123}_{50}Sn_{73}$

Adopted Levels, Gammas

Q(β^-)=−51.91 *7*; S(n)=8960.0 *21*; S(p)=6571.9 *24*; Q(α)=−3949 *7* 2021Wa16
S(2n)=15766.4 *21*, S(2p)=17966 *27* (2021Wa16).
Mass measurement: 2016Fi07: measured ^{123}Te and ^{123}Sb mass difference.

^{123}Sb Levels

Cross Reference (XREF) Flags

A	^{123}Sn β^- decay (129.2 d)	G	^{122}Sn(pol p,p) IAR	M	^{123}Sb(d,d′)
B	^{123}Sn β^- decay (40.06 min)	H	^{122}Sn(^{3}He,d)	N	^{124}Sn(p,2nγ)
C	^{123}Te ε decay	I	^{122}Sn(α,t)	O	^{124}Te(t,α)
D	^{123}Sb IT decay (214 ns)	J	^{122}Sn(^{7}Li,α2nγ)	P	^{176}Yb(^{31}P,Xγ)
E	^{123}Sb IT decay (61 μs)	K	^{123}Sb(γ,γ')	Q	Coulomb excitation
F	^{120}Sn(α,p)	L	^{123}Sb(n,n′γ)	R	^{9}Be(^{238}U,Fγ)

E(level)†	Jπ‡	$T_{1/2}$	XREF	Comments
0.0	7/2$^+$	stable	ABCDEF HIJKLMNOPQR	μ=+2.5498 *2*; Q=−0.49 *5* Configuration=(π 1g$_{7/2}$) Jπ: spin=7/2 from optical spectroscopy J=7/2 (1932Ba01, 1934Cr03, 1978Bu24); parity from L(t,α)=L(α,t)L(^{3}He,d)=4 from 0$^+$. μ: from 2014StZZ, deduced from ν(^{123}Sb)/ν(^{2}H)=0.84423 *8* measured by NMR (1951Pr02). See also 2014StZZ compilation. Q: from optical spectroscopy (1978Bu24). The 2016St14 compilation quotes a value of −0.692 *14*, from a calculation by R.L.A. Haiduke et al.: Jour Chem Phys 125, 064301 (2006). Nuclear rms charge radius=4.6879 fm *25* (2013An02).
160.33 *3*	5/2$^+$	0.61 ns *4*	AB DEF HIJKLMNOPQR	Configuration=(π 2d$_{5/2}$) XREF: O(144). Jπ: L(t,α)=L(^{3}He,d)=2 from 0$^+$; 160.3γ M1+E2 to 7/2$^+$. $T_{1/2}$: from ^{123}Sn β^- decay (40.06 min), as weighted average of 0.60 ns *8* (1970Si21), 0.64 ns *5* (1963Sc12), 0.57 ns *7* (1969Sh12), 0.60 ns *4* (1973Be18) and 0.62 ns *21* (1964Sh23).
542.04 *5*	(3/2)$^+$	5.3 ps *+12−10*	B F HI LMNO Q	XREF: O(528). Jπ: L(t,α)=L(^{3}He,d)=2 from 0$^+$; spin=3/2 proposed in (α,p) based on J-dependence. $T_{1/2}$: from B(E2)=0.033 *3* in Coulomb excitation, adopted branching=29% *3* for 541.9γ, if J=3/2.
712.58 *23*	1/2$^+$		B F HI L NO	XREF: O(705). Jπ: L(t,α)=L(^{3}He,α)=0 from 0$^+$.
1017 *1*	9/2$^-$,11/2$^-$		I	Jπ: L(α,t)=5 from 0$^+$.
1030.28 *10*	9/2$^+$	0.190 ps *+16−14*	A DE JKLM PQR	Jπ: 1030.3γ M1+E2 to 7/2$^+$; J=9/2 (favored) or 11/2 (0.13% confidence) from $\gamma(\theta)$ in (n,n′γ) (1979Ho28). $T_{1/2}$: From Γ=0.0030 eV *2* in (γ,γ'). Others: 90 fs *35* DSAM (1975An16), 0.19 ps *3* (1978Ca25). 1978Ca25 superseded by 1981Ca10 whose width is already included in the average in (γ,γ').
1088.64 *10*	11/2$^+$	0.52 ps *+5−4*	A DE JKLM PQR	Jπ: 1088.6γ E2, ΔJ=2 to 7/2$^+$; spin=(9/2,11/2) from $\gamma(\theta)$ in (n,n′γ) (1979Ho28) and 11/2 from $\gamma(\theta)$ in Coulomb excitation (1989Ja13). But spin=9/2 from $\gamma(\theta)$ of 1977Ku23 in Coulomb excitation and 1978Be45 in (γ,γ') is inconsistent. $T_{1/2}$: weighted average of 0.53 ps *+5−4* from width in

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Adopted Levels, Gammas (continued)

^{123}Sb Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$	XREF	Comments
				(γ,γ') and 0.45 ps *11* from DSAM in Coulomb excitation (1975An16).
1181.38 *16*	(5/2,7/2)		A H KLM Q	Jπ: from $\gamma(\theta)$ in Coulomb excitation (1977Ku23). Other: 11/2 from $\gamma(\theta)$ in (γ,γ') is inconsistent with 1021.2γ to 5/2$^+$ and 1181.1γ D+Q to 7/2$^+$.
1260.90 *20*	(9/2$^+$)		A DE HIJKLM OP R	XREF: H(1253)M(1258). Jπ: (5/2,7/2,9/2) from dipole excitation in (γ,γ'); 395.3γ from 11/2$^-$; 1100.6γ to 5/2$^+$; 9/2$^+$ proposed in (^{7}Li,α2nγ) (2009Wa02) and (^{31}P,Xγ) (2005Po03). But L(α,t)=5 from 0$^+$ gives 9/2$^-$,11/2$^-$ for a level at 1262 *1*.
1337.43 *15*	7/2$^+$,9/2$^+$		A JKL O Q	XREF: O(1324)Q(1334.2). Jπ: L(t,α)=4 from 0$^+$.
1424.8 *4*			K	
1509.3 *4*	(5/2)$^+$		f HI KLm	XREF: f(1511)m(1510). Jπ: L(^{3}He,d)=2 from 0$^+$; spin=(5/2,7/2,9/2) from dipole excitation from 7/2$^+$ g.s. in (γ,γ') (2002Br05).
1513.56 *24*	7/2		f KLm	XREF: f(1511)m(1510). Jπ: from $\gamma(\theta)$ of 5651γ from 7163 level with J=7/2.
1575.5 *6*	3/2$^+$,5/2$^+$		HI L	Jπ: L(^{3}He,d)=2 from 0$^+$.
1643 *3*	(5/2$^+$)		h K m o	XREF: m(1653)o(1649). Jπ: L(^{3}He,d)=2+5 for a level at 1644 *1*, most likely the L=2 component; spin=(5/2,7/2,9/2) from dipole excitation from 7/2$^+$ in (γ,γ').
1656.18 *19*	11/2$^-$		DEF hIJ m oP R	XREF: F(1643)h(1644)I(1644)m(1653)o(1649). Jπ: L(α,t)=5 from 0$^+$ for a level at 1644 *1*; L(^{3}He,d)=2+5 from 0$^+$ for a level at 1644 *1*, most likely the L=5 component; J=11/2 from J-dependence of $\sigma(\theta)$ in (α,p) for a level at 1643; 11/2$^-$ proposed in (^{7}Li,α2nγ) (2009Wa02) and (^{31}P,Xγ) (2005Po03).
1729 *10*	1/2$^-$,3/2$^-$		m O	XREF: m(1750). E(level): from (t,α). Jπ: L(t,α)=1 from 0$^+$.
1732 *1*	3/2$^+$,5/2$^+$		HI m	XREF: m(1750). E(level): from (^{3}He,d) and L(α,t) (2014MiZZ). Jπ: L(^{3}He,d)=2 and L(α,t)=(2) from 0$^+$.
1764.3 *3*	(7/2)$^+$		F I K m	XREF: F(1754)m(1750). Jπ: L(α,t)=4 from 0$^+$; J=(7/2) from J-dependence of $\sigma(\theta)$ in (α,p).
1773.4 *11*	(11/2)		J m	XREF: m(1750). E(level),Jπ: this level is only proposed by 1985Pi02 in (^{7}Li,α2nγ).
1777.7 *4*			K m	XREF: m(1750).
1810 *30*			M	
1884 *10*	1/2$^-$,3/2$^-$		O	Jπ: L(t,α)=1 from 0$^+$.
1896.4 *3*			K	
2011.6 *4*			K	
2026 *3*			K	
2033 *3*			K	
2036.4 *4*			K	
2037.4 *3*	(15/2)$^-$	37.3 ns *8*	DE J P R	Jπ: 381.1γ E2, ΔJ=2 to 11/2$^-$. $T_{1/2}$: from $\gamma\gamma$(t) in (^{7}Li,α2nγ) (2009Wa02). Other: 37 ns *4* from from $\gamma\gamma$(t) in 2008Jo03 in ^{123}Sb IT decay (214 ns).
2044.2 *3*	(15/2)$^+$		E J P R	Jπ: 955.6γ E2, ΔJ=2 to 11/2$^+$.
2047.6 *3*			K m	XREF: m(2070).
2059.0 *6*			K m	XREF: m(2070).
2105 *4*	3/2$^+$,5/2$^+$		H m o	XREF: m(2070)o(2105). Jπ: L(^{3}He,d)=2 from 0$^+$.
2115 *3*			K o	XREF: o(2105).

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Adopted Levels, Gammas (continued)

^{123}Sb Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$	XREF	Comments
2137.9 *8*			K	
2170.0 *6*			K m o	XREF: m(2200)o(2184).
2230.3 *4*			K m	XREF: m(2200).
2235 *10*	$1/2^-,3/2^-$		m O	XREF: m(2200). Jπ: L(t,α)=1 from 0^+.
2235.0 *6*			K	
2237.9 *4*	$(19/2^-)$	214 ns *3*	DE J P	%IT=100 Jπ: 200.5γ to $(15/2)^-$; 375.7γ from $(23/2^+)$ isomer (61 μs). $T_{1/2}$: from γγ(t) in (^{7}Li,α2nγ) (2009Wa02). Others: 190 ns *30* from γ(t) in ^{123}Sb IT decay (214 ns) (2008Jo03), 222 ns *23* from γ(t) in ^{9}Be(^{238}U,Fγ) (2019Bi04); 110 ns *10* from γ(t) in (^{31}P,Xγ) (2005Po03) is discrepant.
2238.6 *6*			K	
2252.0 *6*	$(5/2^+)$		H K	XREF: H(2250). Jπ: L(^{3}He,d)=(2) from 0^+; spin=(5/2,7/2,9/2) from dipole excitation from $7/2^+$ in (γ,γ′).
2270.0 *7*			K m	XREF: m(2270).
2273.7 *5*			K m	XREF: m(2270).
2278.7 *5*			K m	XREF: m(2270).
2283.3 *7*			K m	XREF: m(2270).
2292.1 *8*	$(9/2)^-$		I K m o	XREF: I(2289)m(2270)o(2296). Jπ: L(α,t)=5 from 0^+; spin=(5/2,7/2,9/2) from dipole excitation from $7/2^+$ in (γ,γ′).
2296.6 *4*			K m o	XREF: m(2270)o(2296).
2300.8 *5*			K o	XREF: o(2296).
2306.4 *3*			K	
2322.3 *3*			K	
2329.5 *3*			K	
2338.4 *8*	$(15/2^+)$		E J	Jπ: proposed by 2009Wa02 in (^{7}Li,α2nγ) based on 1249.7γ to $11/2^+$.
2371.3 *3*			K m o	XREF: m(2380)o(2378).
2377 *4*	$^+$		HI m o	XREF: m(2380)o(2378). Jπ: L(^{3}He,d)=0 and L(α,t)=4 components for a peak at 2377 in 2012MiZY.
2385.5 *7*	$(17/2,19/2)^-$		E J	Jπ: 147.5γ D to $(19/2^-)$, 347.9γ to $(15/2)^-$; 100.4γ E1 from $(19/2)^+$.
2423.0 *4*			K	
2429.3 *3*			K	
2447.3 *6*			K o	XREF: o(2441).
2455.4 *6*			I K o	XREF: I(2452)o(2441).
2459.1 *4*			K	
2472 *3*			K	
2486.0 *4*	$(19/2)^+$	0.7 ns *2*	E J P R	Jπ: 441.8γ E2 to $(15/2)^+$; band assignment. $T_{1/2}$: from centroid-shift analysis in (^{7}Li,α2nγ) (2009Wa02).
2507.3 *6*			K o	XREF: o(2506).
2521.8 *3*			K o	XREF: o(2506). E(level): since spin of this level in (γ,γ′) is expected to be (5/2,7/2,9/2) from dipole excitation from $7/2^+$ g.s., it could be a different level from the 2522, $1/2^+$ level in (^{3}He,d).
2522 *4*	$1/2^+$		HI o	XREF: o(2506). Jπ: L(^{3}He,d)=0 from 0^+.
2584 *5*	$3/2^+,5/2^+$		HI m	XREF: m(2580). Jπ: L(^{3}He,d)=2 from 0^+.
2597.7 *4*			K m	XREF: m(2580).
2605.9 *8*			K m	XREF: m(2580).

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Adopted Levels, Gammas (continued)

^{123}Sb Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$	XREF	Comments
2613.6 *5*	(23/2+)	62 μs *4*	E J P R	%IT=100 Jπ: 127.8γ (E2), ΔJ=(2) to (19/2)+; band assignment. (21/2+) proposed by 2005Po03 in (^{31}P,Xγ). $T_{1/2}$: unweighted average of 66 μs *4* from ^{9}Be(^{238}U,Fγ) (2019Bi04), 65 μs *1* (2009Wa02), 52 μs *3* (2008Jo03) and 66 μs *4* (2007Ju06), in ^{123}Sb IT decay (61 μs).
2620.1 *4*			K	
2633 *5*	7/2+,9/2+		I O	Jπ: L(^{3}He,d)=L(t,α)=4 from 0+.
2647.4 *3*			K o	XREF: o(2636).
2687 *9*	(3/2+,5/2+)		H M	XREF: M(?). Jπ: L(^{3}He,d)=(2) from 0+.
2701.6 *5*			K M	XREF: M(?).
2732 *6*	9/2−,11/2−		I M	XREF: M(?). Jπ: L(α,t)=5 from 0+.
2735.2[#] *5*	(21/2−)[#]		P	
2756.7 *4*	(5/2+)		H K M	XREF: H(2757)M(?). Jπ: L(^{3}He,d)=(2) from 0+; (5/2,7/2,9/2) from dipole excitation from 7/2+ in (γ,γ′).
2807 *7*	+		HI O	XREF: O(2799). E(level): weighted average of 2811 *7* in (^{3}He,d) (2014MiZZ) and 2799 *10* in (t,α) (1973Co33). Jπ: L(^{3}He,d)=0 and L(α,t)=4 components for a peak at 2811 in 2012MiZY.
2843.1 *10*			K m	XREF: m(2860).
2860.6 *9*			K m	XREF: m(2860).
2883.1 *5*			K m	XREF: m(2860).
2891 *8*	3/2+,5/2+		H m	XREF: m(2860). Jπ: L(^{3}He,d)=2 from 0+.
2904.9 *5*			K	
2917 *8*	7/2+,9/2+		I O	E(level): from (α,t). Other: 2915 *10* in (t,α). Jπ: L(α,t)=L(t,α)=4 from 0+.
2919.0 *6*			K	
2934.6 *7*			K	
2968.0[#] *7*	(23/2+)[#]		P	
2977 *10*	9/2−,11/2−		I m O	XREF: m(3000). E(level): weighted average of 2972 *10* in (α,t) and 2982 *10* in (t,α). Jπ: L(α,t)=5 from 0+.
2989.0 *6*			K m	XREF: m(3000).
3000.8 *5*			K m	XREF: m(3000).
3017.3 *3*	(9/2−)		I K m	XREF: I(3016)m(3000). Jπ: L(α,t)=(5) from 0+; (5/2,7/2,9/2) from dipole excitation from 7/2+ in (γ,γ′).
3052.8 *11*	(25/2+)		R	Jπ: proposed by 2019Bi04 in ^{9}Be(^{238}U,Fγ).
3056.8 *3*			K	
3062.6 *4*			K	
3098.1 *7*			K	
3147.9 *5*			K	
3152.4 *6*			K	
3158.5 *10*	(9/2)−		I K	XREF: I(3156). Jπ: L(α,t)=5 from 0+; (5/2,7/2,9/2) from dipole excitation from 7/2+ in (γ,γ′).
3184.5 *4*	7/2+,9/2+		K O	XREF: O(3178). Jπ: L(t,α)=4 from 0+.
3190.6 *3*			K	
3198.2 *5*			K	

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Adopted Levels, Gammas (continued)

^{123}Sb Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$	XREF	Comments
3209.8 *8*			K	
3228.4 *9*	$(9/2)^-$		I K	XREF: I(3225). Jπ: L(α,t)=5 from 0^+; (5/2,7/2,9/2) from dipole excitation from $7/2^+$ in (γ,γ′).
3277.6 *10*			K	
3281.1 *6*			K	
3294.2 *3*			K	
3296.9 *15*	$(27/2^+)$		R	Jπ: proposed by 2019Bi04 in ^{9}Be(^{238}U,Fγ).
3327 *10*	$1/2^-,3/2^-$		O	Jπ: L(t,α)=1 from 0^+.
3331.9 *5*			K	
3348.6[#] *5*	$(23/2^-)$[#]		P	
3351.7 *6*			K	
3385.7 *7*	$(9/2^-)$		i K	XREF: i(3391). Jπ: L(α,t)=5 for a probable doublet at 3391 *13*.
3399.7 *9*	$(9/2^-)$		i K	XREF: i(3391). Jπ: L(α,t)=5 for a probable doublet at 3391 *13*.
3412.3 *10*			K	
3418.3 *10*			K	
3427.6 *9*			K	
3476.2 *6*	$7/2^+,9/2^+$		I K	XREF: I(3464). Jπ: L(α,t)=4 from 0^+.
3544 *15*	$9/2^-,11/2^-$		I	Jπ: L(α,t)=5 from 0^+.
3738 *16*	$9/2^-,11/2^-$		I	Jπ: L(α,t)=5 from 0^+.
3786.8?[#] *6*	$(25/2^-)$[#]		P	
4025.3[#] *6*	$(27/2^-)$[#]		P	
4392.7?[#] *8*			P	
4773.0[#] *9*			P	
6417.5 *15*	9/2		K	Jπ: from 6418γ(θ) in (γ,γ′) (1978Be45).
6760.0 *14*	7/2		K	Jπ: from 6760γ(θ) in (γ,γ′) (1978Be45).
6874.4 *15*	7/2		K	Jπ: from 6874γ(θ) in (γ,γ′) (1978Be45).
7163.4 *15*	7/2		K	Jπ: from 7163γ(θ) in (γ,γ′) (1978Be45).
7309.7 *14*	9/2		K	Jπ: from 7310γ(θ) in (γ,γ′) (1978Be45).
14261	$3/2^+$	48 keV	G	Jπ: L(pol p,p)=2 from 0^+, J=3/2 from analyzing power.
14390	$1/2^+$	48 keV	G	Jπ: L(pol p,p)=0 from 0^+.
15429	$5/2^+$	74 keV	G	Jπ: L(pol p,p)=2 from 0^+, J=5/2 from analyzing power.
15729	$5/2^+$	93 keV	G	Jπ: L(pol p,p)=2 from 0^+, J=5/2 from analyzing power.
16927	$7/2^-$	94 keV	G	Jπ: L(pol p,p)=3 from 0^+, J=7/2 from analyzing power.
17371	$(7/2^-)$	140 keV	G	Jπ: L(pol p,p)=(3) from 0^+, J=(7/2) from analyzing power.
17558	$(3/2^-)$	202 keV	G	Jπ: L(pol p,p)=(1) from 0^+, J=(3/2) from analyzing power.
18251	$(1/2)^-$	130 keV	G	Jπ: L(pol p,p)=(1) from 0^+, J=(1/2) from analyzing power.

[†] From a least-squares fit to γ-ray energies for levels connected by γ transitions.
[‡] Spin of excited levels by dipole excitations from $7/2^+$ g.s. in (γ,γ′) are expected to be (5/2,7/2,9/2).
[#] Proposed in (^{31}P,Xγ) (2005Po03).

Adopted Levels, Gammas (continued)

$\gamma(^{123}Sb)$

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.	δ	α #	Comments
160.33	$5/2^+$	160.34 *3*	100	0.0	$7/2^+$	M1+E2	0.078 *10*	0.1668	B(M1)(W.u.)=0.0075 *5*; B(E2)(W.u.)=1.25 *+36−31* E_γ: from ^{123}Sn β^- decay (40.06 min). Others: 160.3 *5* from ^{123}Sb IT decay (214 ns), 160.9 *10* from (n,n′γ), 159.8 *10* from ^{9}Be(^{238}U,Fγ). Mult.: from ce data in ^{123}Sn β^- decay (40.06 min) and (p,2nγ), $\gamma(\theta)$ in Coulomb excitation. δ: deduced from $T_{1/2}$=0.61 ns *4* and B(E2)↑=0.0034 *6* from Coulomb excitation. Others: −0.10 *6* (1964Al28) and +0.86 *7* (1977Ku23) from $\gamma(\theta)$ in Coulomb excitation; 0.22 *+18−22* from α(K)exp=0.15 *2* in (p,2nγ), α(K)exp=0.15 *1* and K/L=7.6 *6* in ^{123}Sn β^- decay (40.06 min), using the BrIccMixing program.
542.04	$(3/2)^+$	381.73 *5*	100.0 *13*	160.33	$5/2^+$	M1(+E2)		0.0171 *3*	B(M1)(W.u.)<0.07 E_γ: weighted average of 381.75 *5* from ^{123}Sn β^- decay (40.06 min), 381.79 *15* from (n,n′γ), and 381.6 *1* from Coulomb excitation. I_γ: from Coulomb excitation. Other: 100 *6* from ^{123}Sn β^- decay (40.06 min), 100 *7* from (n,n′γ). Mult.: mainly M1 from ce data in (p,2nγ).
		541.94 *10*	41 *5*	0.0	$7/2^+$	[E2]		0.00620	B(E2)(W.u.)=18.0 *+45−37* E_γ: weighted average of 541.95 *10* from ^{123}Sn β^- decay (40.06 min), 542.1 *2* from (n,n′γ), and 541.9 *1* from Coulomb excitation. I_γ: unweighted average of 45 *6* from ^{123}Sn β^- decay (40.06 min), 47 *5* from (n,n′γ), and 31.6 *13* from Coulomb excitation.
712.58	$1/2^+$	170.9 *7* 552.21 *24*	44 *33* 100 *22*	542.04 160.33	$(3/2)^+$ $5/2^+$				E_γ,I_γ: from ^{123}Sn β^- decay (40.06 min). E_γ: weighted average of 552.37 *24* from ^{123}Sn β^- decay (40.06 min) and 552.1 *2* from (n,n′γ). I_γ: from ^{123}Sn β^- decay (40.06 min).
1030.28	$9/2^+$	1030.27 *10*	100	0.0	$7/2^+$	M1+E2	−0.54 *5*	1.51×10^{-3} *2*	B(M1)(W.u.)=0.082 *7*; B(E2)(W.u.)=15.9 *27* E_γ: weighted average of 1030.23 *10* from ^{123}Sn β^- decay (129.2 d), 1030.3 *4* from ^{123}Sb IT decay (214 ns), 1030.5 *3* from (γ,γ'), 1030.3 *3* from (n,n′γ), 1030.1 *3* from (^{31}P,Xγ), and 1030.4 *2* from Coulomb excitation. Other: 1030.5 *10* from ^{9}Be(^{238}U,Fγ). Mult.: D+Q from $\gamma(\theta)$ in Coulomb excitation and (n,n′γ); M2 ruled out by RUL. δ: deduced from B(E2)=0.073 *4* in Coulomb excitation, adopted $T_{1/2}$=0.190 ps *+16−14*, with sign from δ=−1.6 *15* from $\gamma(\theta)$ in (n,n′γ) (1979Ho28).
1088.64	$11/2^+$	1088.63 *10*	100	0.0	$7/2^+$	E2		1.13×10^{-3}	B(E2)(W.u.)=19.5 *17*

$^{123}_{51}Sb_{72}$-6

Adopted Levels, Gammas (continued)

γ(^{123}Sb) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.	Comments
							E_γ: weighted average of 1088.64 *10* from ^{123}Sn β^- decay (129.2 d), 1088.6 *3* from ^{123}Sb IT decay (214 ns), 1088.6 *3* from ^{123}Sb IT decay (61 μs), 1088.8 *5* from (γ,γ'), 1088.7 *4* from (n,n′γ), 1088.6 *3* from (^{31}P,Xγ), and 1088.6 *2* from Coulomb excitation. Other: 1089.0 *10* from ^{9}Be(^{238}U,Fγ). Mult.: Q from $\gamma\gamma(\theta)$ in ^{123}Sb IT decay (61 μs) (2009Wa02, 2008Jo03); M2 ruled out by RUL. Other: Q,D from $\gamma(\theta)$ in Coulomb excitation.
1181.38	(5/2,7/2)	1021.24 *24*	100 *5*	160.33	5/2$^+$		E_γ: weighted average of 1021.00 *20* from ^{123}Sn β^- decay (129.2 d), 1021.2 *4* from (n,n′γ), and 1021.8 *3* from Coulomb excitation. I_γ: from ^{123}Sn β^- decay (129.2 d).
		1181.23 *20*	15 *2*	0.0	7/2$^+$	D+Q	E_γ,I_γ: from ^{123}Sn β^- decay (129.2 d). Mult.,δ: from $\gamma(\theta)$ in Coulomb excitation (1977Ku23), with δ=+0.39 *4* for J=5/2 and −0.039 *4* for J=7/2.
1260.90	(9/2$^+$)	1100.6 *3*	100 *22*	160.33	5/2$^+$		E_γ: weighted average of 1100.5 *4* from ^{123}Sn β^- decay (129.2 d), 1100.9 *5* from ^{123}Sb IT decay (214 ns), 1101.0 *3* from (n,n′γ), and 1100.2 *3* from (^{31}P,Xγ). Other: 1101.0 *10* from ^{9}Be(^{238}U,Fγ). I_γ: from ^{123}Sb IT decay (214 ns). Others: 100 *50* from ^{123}Sn β^- decay (129.2 d) and 100 *27* from (^{31}P,Xγ).
		1260.8 *4*	43 *11*	0.0	7/2$^+$		E_γ: weighted average of 1260.9 *4* from ^{123}Sn β^- decay (129.2 d), 1260.9 *7* from ^{123}Sb IT decay (214 ns), 1261.0 *5* from (n,n′γ), and 1260.5 *4* from (^{31}P,Xγ). I_γ: weighted average of 64 *36* from ^{123}Sn β^- decay (129.2 d), 39 *11* from ^{123}Sb IT decay (214 ns), and 47 *13* from (^{31}P,Xγ).
1337.43	7/2$^+$,9/2$^+$	1177.03 *20*	30 *3*	160.33	5/2$^+$		E_γ: weighted average of 1177.06 *20* from ^{123}Sn β^- decay (129.2 d) and 1176.8 *6* from (n,n′γ). I_γ: from ^{123}Sn β^- decay (129.2 d). Other: <45 from (n,n′γ).
		1337.49 *20*	100 *6*	0.0	7/2$^+$		E_γ: weighted average of 1337.44 *20* from ^{123}Sn β^- decay (129.2 d) and 1337.6 *3* from (n,n′γ). I_γ: from ^{123}Sn β^- decay (129.2 d). Other: 100 *9* from (n,n′γ).
1424.8		1424.8 *4*		0.0	7/2$^+$		
1509.3	(5/2)$^+$	1350.0 *20*	<119	160.33	5/2$^+$		E_γ,I_γ: from (n,n′γ).
		1509.2 *4*	100 *19*	0.0	7/2$^+$		E_γ: weighted average of 1509.0 *4* from (γ,γ') and 1509.6 *6* from (n,n′γ). I_γ: from (n,n′γ).
1513.56	7/2	1353.4 *4*	56 *11*	160.33	5/2$^+$		
		1513.5 *3*	100	0.0	7/2$^+$		E_γ: weighted average of 1513.4 *3* from (γ,γ') and 1514.6 *12* from (n,n′γ).
1575.5	3/2$^+$,5/2$^+$	1575.5 *6*	100	0.0	7/2$^+$		E_γ: from (n,n′γ).
1643	(5/2$^+$)	1643 *3*	100	0.0	7/2$^+$		
1656.18	11/2$^-$	395.3 *3*	32 *3*	1260.90	(9/2$^+$)		E_γ: weighted average of 396.0 *5* from ^{123}Sb IT decay (214 ns), 395.2 *2* from (^{31}P,Xγ), and 395.4 *10* from ^{9}Be(^{238}U,Fγ). I_γ: weighted average of 30.9 *32* from ^{123}Sb IT decay (214 ns), 34.9 *79* from (^{31}P,Xγ), and 35 *19* from ^{9}Be(^{238}U,Fγ).
		567.5 *3*	16 *3*	1088.64	11/2$^+$		E_γ: weighted average of 567.7 *4* from ^{123}Sb IT decay (214 ns), 567.3 *3* from (^{31}P,Xγ), and 568.2 *10* from ^{9}Be(^{238}U,Fγ).

Adopted Levels, Gammas (continued)

γ(^{123}Sb) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.	α #	Comments
								I_γ: weighted average of 14.9 *32* from ^{123}Sb IT decay (214 ns) and 19.0 *48* from (^{31}P,Xγ). Other: 28 *14* from ^{9}Be(^{238}U,Fγ).
1656.18	11/2$^-$	625.9 *3*	100 *8*	1030.28	9/2$^+$	(E1)	1.51×10^{-3}	E_γ: weighted average of 626.1 *4* from ^{123}Sb IT decay (214 ns), 625.7 *3* from (^{31}P,Xγ), and 626.0 *10* from ^{9}Be(^{238}U,Fγ). I_γ: from ^{123}Sb IT decay (214 ns). Other: 100 *19* from (^{31}P,Xγ), 100 *45* from ^{9}Be(^{238}U,Fγ). Mult.: D from γγ(θ) in ^{123}Sb IT decay; E1 required by level scheme.
		1655.9		0.0	7/2$^+$	[M2]	1.25×10^{-3}	E_γ: from ^{123}Sb IT decay (2009Wa02).
1764.3	(7/2)$^+$	1764.3 *3*		0.0	7/2$^+$			
1773.4	(11/2)	436		1337.43	7/2$^+$,9/2$^+$	(D)		Mult.: from γ(θ) in (^{7}Li,α2nγ).
1777.7		1777.7 *4*		0.0	7/2$^+$			
1896.4		1896.4 *3*		0.0	7/2$^+$			
2011.6		2011.6 *4*		0.0	7/2$^+$			
2026		2026 *3*		0.0	7/2$^+$			
2033		2033 *3*		0.0	7/2$^+$			
2036.4		2036.4 *4*		0.0	7/2$^+$			
2037.4	(15/2)$^-$	381.2 *3*	100.0 *25*	1656.18	11/2$^-$	E2	0.01734	B(E2)(W.u.)=0.0490 *11* E_γ: weighted average of 381.7 *4* from ^{123}Sb IT decay (214 ns), 381.0 *2* from (^{31}P,Xγ), and 382.0 *10* from ^{9}Be(^{238}U,Fγ). I_γ: from (^{7}Li,α2nγ) (2009Wa02). Mult.: from γγ(θ) in (^{7}Li,α2nγ) (2009Wa02) and RUL.
		949.0	1.6 *4*	1088.64	11/2$^+$	[M2]	0.00475	B(M2)(W.u.)=6.5×10^{-4} *17* E_γ,I_γ: from (^{7}Li,α2nγ) (2009Wa02).
		1007.3	2.6 *4*	1030.28	9/2$^+$	[E3]	0.00281	B(E3)(W.u.)=0.85 *13* E_γ,I_γ: from (^{7}Li,α2nγ) (2009Wa02).
2044.2	(15/2)$^+$	955.6 *3*	100	1088.64	11/2$^+$	E2	1.51×10^{-3}	E_γ: weighted average of 955.8 *3* from ^{123}Sb IT decay (61 μs), 955.4 *3* from (^{31}P,Xγ), and 955.6 *10* from ^{9}Be(^{238}U,Fγ). Mult.: Q from γγ(θ) in ^{123}Sb IT decay (61 μs); M2 ruled out by RUL, since it would require an isomeric halflife.
2047.6		2047.6 *3*		0.0	7/2$^+$			
2059.0		2059.0 *6*		0.0	7/2$^+$			
2115		2115 *3*		0.0	7/2$^+$			
2137.9		2137.9 *8*		0.0	7/2$^+$			
2170.0		2170.0 *6*		0.0	7/2$^+$			
2230.3		2230.3 *4*		0.0	7/2$^+$			
2235.0		2235.0 *6*		0.0	7/2$^+$			
2237.9	(19/2$^-$)	200.5 *3*	100	2037.4	(15/2)$^-$	[E2]	0.1433	B(E2)(W.u.)=0.1964 *32* E_γ: weighted average of 201.0 *4* from ^{123}Sb IT decay (214 ns), 200.4 *2* from (^{31}P,Xγ), and 200.4 *10* from ^{9}Be(^{238}U,Fγ).
2238.6		2238.6 *6*		0.0	7/2$^+$			
2252.0	(5/2$^+$)	2252.0 *6*		0.0	7/2$^+$			
2270.0		2270.0 *7*		0.0	7/2$^+$			

$^{123}_{51}Sb_{72}$-8

Adopted Levels, Gammas (continued)

γ(^{123}Sb) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.	α #	Comments
2273.7		2112.9 *9*	27 *13*	160.33	$5/2^+$			
		2273.8 *5*	100	0.0	$7/2^+$			
2278.7		2118.3 *6*	80 *24*	160.33	$5/2^+$			
		2278.7 *6*	100	0.0	$7/2^+$			
2283.3		2283.3 *7*		0.0	$7/2^+$			
2292.1	$(9/2)^-$	2292.1 *8*		0.0	$7/2^+$			
2296.6		2296.6 *4*		0.0	$7/2^+$			
2300.8		2300.8 *5*		0.0	$7/2^+$			
2306.4		2306.4 *3*		0.0	$7/2^+$			
2322.3		2322.3 *3*		0.0	$7/2^+$			
2329.5		2329.5 *3*		0.0	$7/2^+$			
2338.4	$(15/2^+)$	1249.7		1088.64	$11/2^+$			
2371.3		2371.3 *3*		0.0	$7/2^+$			
2385.5	$(17/2,19/2)^-$	147.5		2237.9	$(19/2^-)$	D		E_γ,Mult.: from (^{7}Li,α2nγ) (2009Wa02), with Mult=M1 or E1 from ce data.
		347.9		2037.4	$(15/2)^-$			E_γ: from (^{7}Li,α2nγ) (2009Wa02).
2423.0		2262.2 *6*	51 *12*	160.33	$5/2^+$			
		2423.2 *4*	100	0.0	$7/2^+$			
2429.3		2429.3 *3*		0.0	$7/2^+$			
2447.3		2287.3 *10*	50 *17*	160.33	$5/2^+$			
		2447.2 *6*	100	0.0	$7/2^+$			
2455.4		2455.4 *6*		0.0	$7/2^+$			
2459.1		2459.1 *4*		0.0	$7/2^+$			
2472		2472 *3*		0.0	$7/2^+$			
2486.0	$(19/2)^+$	100.4	1.44 *10*	2385.5	$(17/2,19/2)^-$	E1	0.187	B(E1)(W.u.)=5.3×10^{-6} *+21−13* E_γ,I_γ,Mult.: from (^{7}Li,α2nγ), with Mult from ce data in 2009Wa02.
		147.6	1.65 *21*	2338.4	$(15/2^+)$	[E2]	0.416	B(E2)(W.u.)=5.0 *+21−13* E_γ,I_γ: from (^{7}Li,α2nγ).
		441.8 *3*	100 *3*	2044.2	$(15/2)^+$	E2	0.01111	B(E2)(W.u.)=1.26 *+49−28* E_γ: weighted average of 441.9 *3* from ^{123}Sb IT decay (61 μs) and 441.7 *4* from (^{31}P,Xγ), and 441.6 *10* from ^{9}Be(^{238}U,Fγ). I_γ,Mult.: from (^{7}Li,α2nγ), with Mult from γγ(θ) and RUL.
2507.3		2507.3 *6*		0.0	$7/2^+$			
2521.8		2521.8 *3*		0.0	$7/2^+$			
2597.7		2597.7 *4*		0.0	$7/2^+$			
2605.9		2605.9 *8*		0.0	$7/2^+$			
2613.6	$(23/2^+)$	127.6 *3*	100.0 *11*	2486.0	$(19/2)^+$	(E2)	0.691 *12*	B(E2)(W.u.)=0.00435 *+40−34* E_γ: weighted average of 127.8 *3* from ^{123}Sb IT decay (61 μs) (2008Jo03), 127.0 *5* from (^{31}P,Xγ) (2005Po03), and 128.2 *10* from ^{9}Be(^{238}U,Fγ). I_γ: from (^{7}Li,α2nγ) (2009Wa02). Mult.: O+Q from γγ(θ) in (^{7}Li,α2nγ); M3 ruled out and E2 preferred by RUL.

$^{123}_{51}Sb_{72}$-9

Adopted Levels, Gammas (continued)

γ(^{123}Sb) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.	α #	Comments
2613.6	(23/2$^+$)	375.7	2.7 *6*	2237.9	(19/2$^-$)	[M2]	0.0671	B(M2)(W.u.)=4.4×10^{-5} *10* E_γ,I_γ: from (^{7}Li,α2nγ).
2620.1		2620.1 *4*		0.0	7/2$^+$			
2647.4		2487.0 *4*	100	160.33	5/2$^+$			
		2647.4 *4*	51 *16*	0.0	7/2$^+$			
2701.6		2701.6 *5*		0.0	7/2$^+$			
2735.2	(21/2$^-$)	497.2‡ *3*	100	2237.9	(19/2$^-$)			
2756.7	(5/2$^+$)	2756.7 *4*		0.0	7/2$^+$			
2843.1		2843.1 *10*		0.0	7/2$^+$			
2860.6		2860.6 *9*		0.0	7/2$^+$			
2883.1		2883.1 *5*		0.0	7/2$^+$			
2904.9		2904.9 *5*		0.0	7/2$^+$			
2919.0		2919.0 *6*		0.0	7/2$^+$			
2934.6		2934.6 *7*		0.0	7/2$^+$			
2968.0	(23/2$^+$)	482.0‡ *5*	100	2486.0	(19/2)$^+$			
2989.0		2989.0 *6*		0.0	7/2$^+$			
3000.8		3000.8 *5*		0.0	7/2$^+$			
3017.3	(9/2$^-$)	3017.3 *3*		0.0	7/2$^+$			
3052.8	(25/2$^+$)	439.2 *10*	100	2613.6	(23/2$^+$)			E_γ: from ^{9}Be(^{238}U,Fγ) only.
3056.8		3056.8 *3*		0.0	7/2$^+$			
3062.6		3062.6 *4*		0.0	7/2$^+$			
3098.1		3098.1 *7*		0.0	7/2$^+$			
3147.9		3147.9 *5*		0.0	7/2$^+$			
3152.4		3152.4 *6*		0.0	7/2$^+$			
3158.5	(9/2)$^-$	3158.5 *10*		0.0	7/2$^+$			
3184.5	7/2$^+$,9/2$^+$	3184.5 *4*		0.0	7/2$^+$			
3190.6		3190.6 *3*		0.0	7/2$^+$			
3198.2		3198.2 *5*		0.0	7/2$^+$			
3209.8		3209.8 *8*		0.0	7/2$^+$			
3228.4	(9/2)$^-$	3228.4 *9*		0.0	7/2$^+$			
3277.6		3277.6 *10*		0.0	7/2$^+$			
3281.1		3120.3 *8*	35 *16*	160.33	5/2$^+$			
		3281.4 *8*	100	0.0	7/2$^+$			
3294.2		3134.5 *8*	19 *6*	160.33	5/2$^+$			
		3294.1 *3*	100	0.0	7/2$^+$			
3296.9	(27/2$^+$)	244.1 *10*	100	3052.8	(25/2$^+$)			E_γ: from ^{9}Be(^{238}U,Fγ) only.
3331.9		3331.9 *5*		0.0	7/2$^+$			
3348.6	(23/2$^-$)	613.4‡ *3*	92‡ *23*	2735.2	(21/2$^-$)			
		1110.8‡ *4*	100‡ *31*	2237.9	(19/2$^-$)			
3351.7		3351.7 *6*		0.0	7/2$^+$			
3385.7	(9/2$^-$)	3385.6 *7*		0.0	7/2$^+$			
3399.7	(9/2$^-$)	3399.6 *9*		0.0	7/2$^+$			

$^{123}_{51}Sb_{72}$-10

Adopted Levels, Gammas (continued)

$\gamma(^{123}Sb)$ (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π
3412.3		3412.2 *10*		0.0	$7/2^+$
3418.3		3418.2 *10*		0.0	$7/2^+$
3427.6		3427.5 *9*		0.0	$7/2^+$
3476.2	$7/2^+,9/2^+$	3476.1 *6*		0.0	$7/2^+$
3786.8?	$(25/2^-)$	438.1‡ *3*	100	3348.6	$(23/2^-)$
4025.3	$(27/2^-)$	238.5‡ *3*	100‡ *33*	3786.8?	$(25/2^-)$
		676.8‡ *5*	50‡ *25*	3348.6	$(23/2^-)$
4392.7?		367.4‡ *4*	100	4025.3	$(27/2^-)$
4773.0		380.3‡ *4*	100	4392.7?	
6417.5	9/2	5236 *3*	3.6 *15*	1181.38	(5/2,7/2)
		5329 *3*	2.9 *22*	1088.64	$11/2^+$
		5386 *3*	18.8 *22*	1030.28	$9/2^+$
		6418 *3*	100.0 *15*	0.0	$7/2^+$
6760.0	7/2	5248 *3*	4 *3*	1513.56	7/2
		5498 *3*	9 *2*	1260.90	$(9/2^+)$
		5728 *3*	22 *4*	1030.28	$9/2^+$
6760.0	7/2	6600 *3*	69 *3*	160.33	$5/2^+$
		6760 *3*	100	0.0	$7/2^+$
6874.4	7/2	5362 *3*	6 *9*	1513.56	7/2
		5612 *3*	25 *9*	1260.90	$(9/2^+)$
		6714 *3*	9 *6*	160.33	$5/2^+$
		6874 *3*	100 *9*	0.0	$7/2^+$
7163.4	7/2	5651 *3*	24 *4*	1513.56	7/2
		5901 *3*	8 *3*	1260.90	$(9/2^+)$
		7003 *3*	100 *4*	160.33	$5/2^+$
		7163 *3*	81 *3*	0.0	$7/2^+$
7309.7	9/2	5973 *3*	15 *3*	1337.43	$7/2^+,9/2^+$
		6128 *3*	65 *3*	1181.38	(5/2,7/2)
		6221 *3*	14 *3*	1088.64	$11/2^+$
		6278 *3*	27 *3*	1030.28	$9/2^+$
		7310 *3*	100	0.0	$7/2^+$

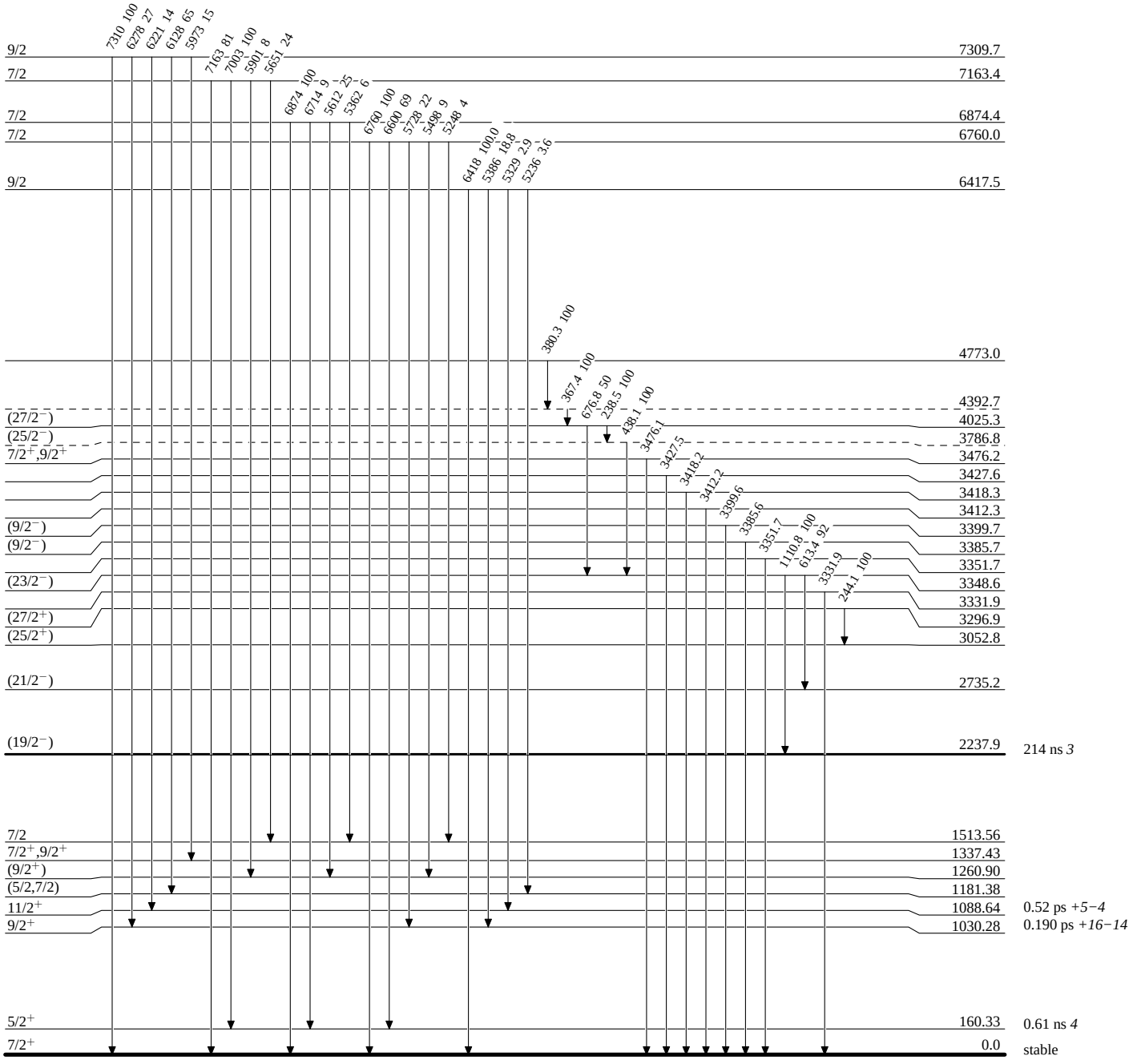
† From (γ,γ'), unless otherwise noted.
‡ From (^{31}P,Xγ) (2005Po03).
# Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

$^{123}_{51}Sb_{72}$-11

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level

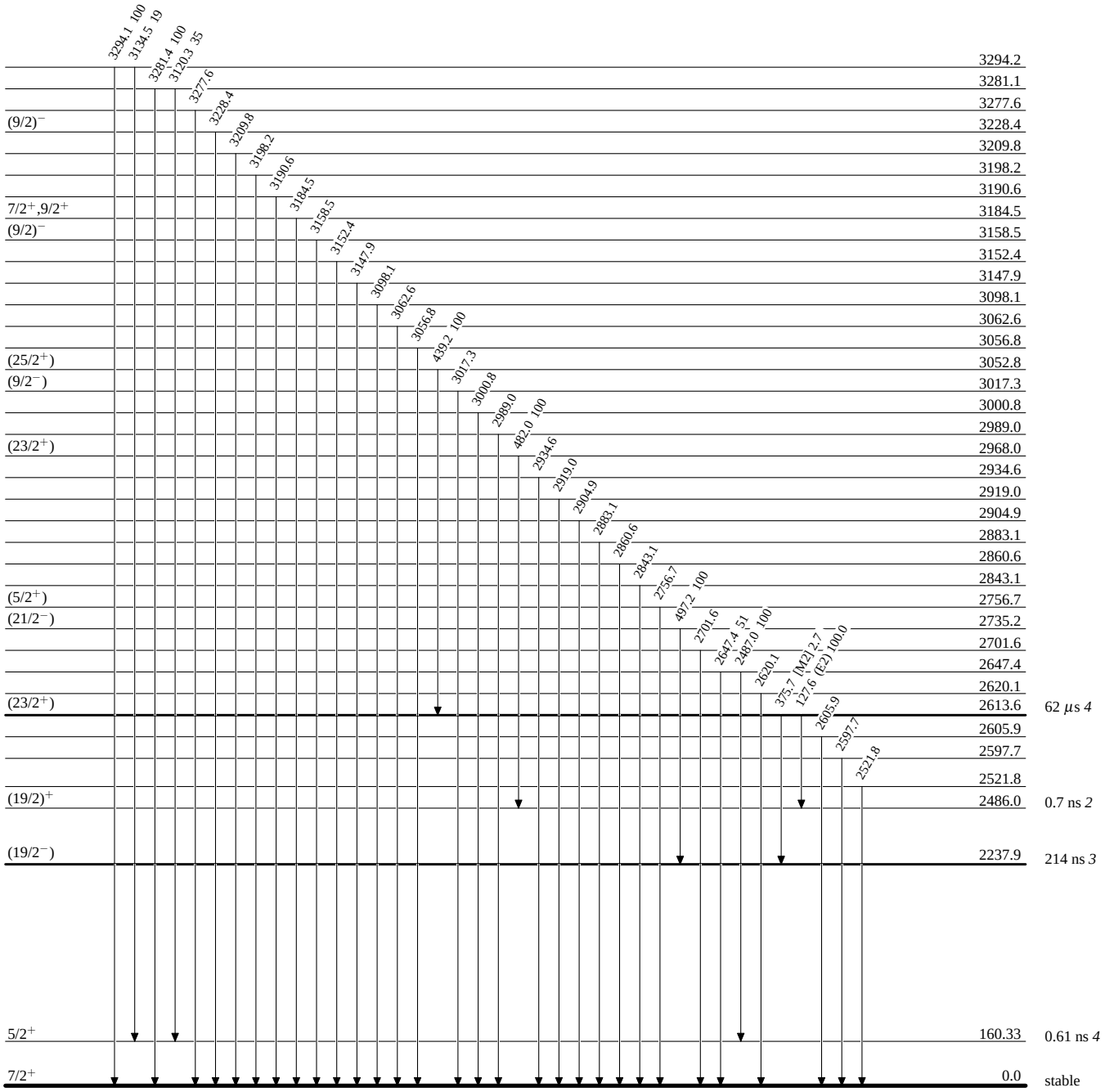


$^{123}_{51}Sb_{72}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

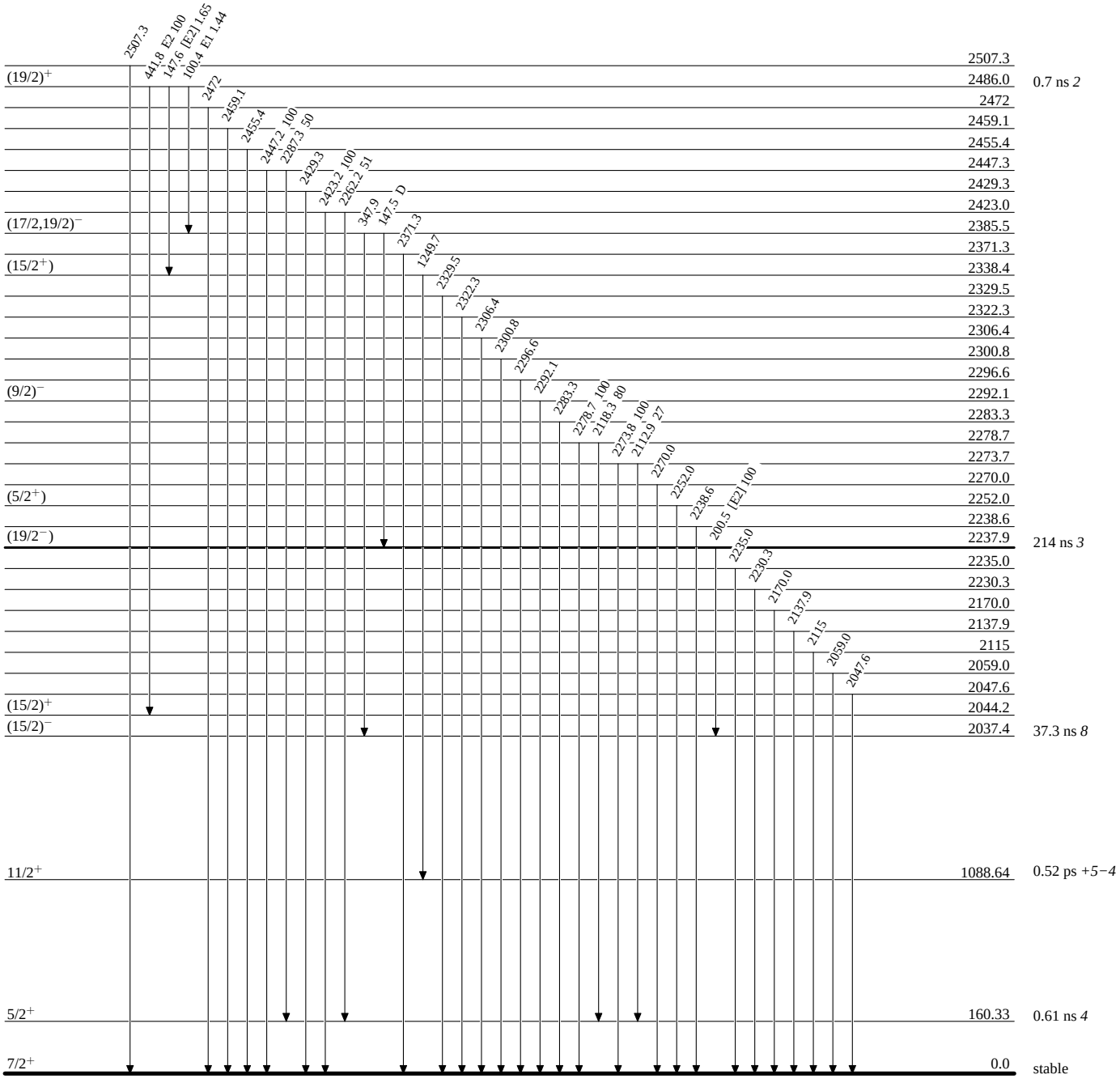


$^{123}_{51}Sb_{72}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

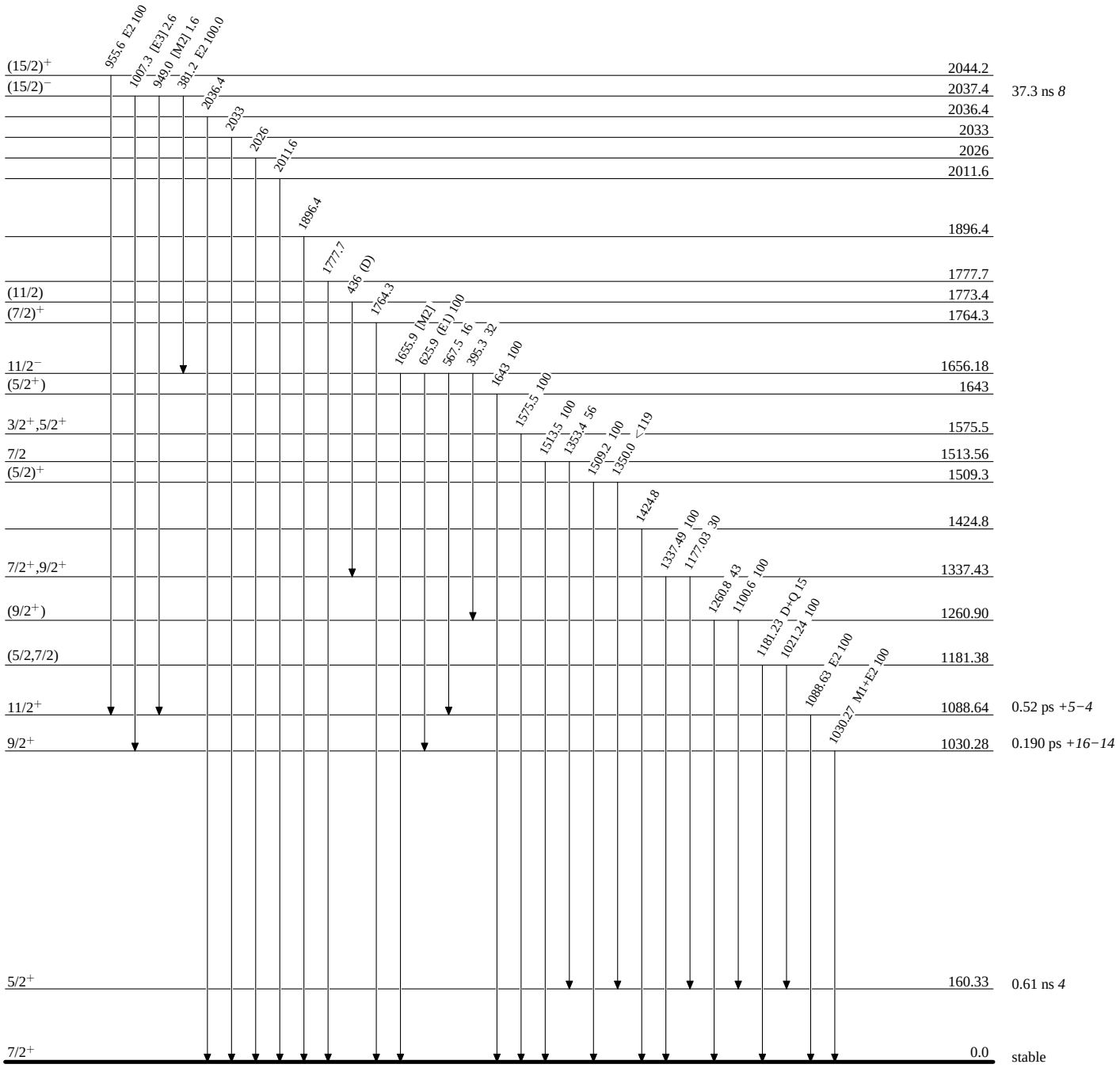


$^{123}_{51}Sb_{72}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

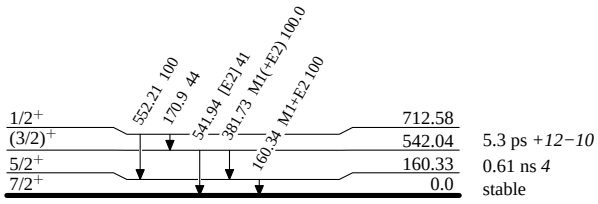


$^{123}_{51}Sb_{72}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{123}_{51}Sb_{72}$

^{123}Sn β^- decay (129.2 d) 1974Ra03,1966Au04

Parent: ^{123}Sn: E=0.0; $J^\pi=11/2^-$; $T_{1/2}$=129.2 d *5*; Q(β^-)=1408.2 *24*; %β^- decay=100

^{123}Sn-J^π,$T_{1/2}$: From Adopted Levels of ^{123}Sn.

^{123}Sn-Q(β^-): From 2021Wa16.

1974Ra03: ^{123}Sn activity was produced by irradiation of 95% enriched ^{122}Sn with thermal neutrons at ORNL. γ rays were detected with a 50-cm^3 Ge(Li) detector. Measured Eγ, Iγ. Deduced levels, J, π, β-decay branching ratios, log *ft*. Comparisons with available data.

1966Au04: ^{123}Sn activity was produced by irradiating 10 mg of enriched ^{122}Sn metal in the ORR reactor at ORNL. γ rays were detected with NaI(Tl) and Ge(Li) detectors; β particles were detected with a 4π electron detector. Measured Eγ, Iγ, Eβ, Iβ, $\gamma\gamma$-coin, $\beta\gamma$-coin. Deduced levels, J, π, β-decay branching ratios.

Others (measured parent $T_{1/2}$): 1949Le05, 1950Ne52, 1951Co34, 1966La13, 1968Er03, 1973Be18, 2004AdZX.

^{123}Sb Levels

E(level)[†]	J^π[‡]	$T_{1/2}$[‡]
0.0	$7/2^+$	stable
160.33 *5*	$5/2^+$	0.61 ns *4*
1030.23 *10*	$9/2^+$	0.190 ps *+16−14*
1088.65 *10*	$11/2^+$	0.52 ps *+5−4*
1181.28 *15*	(5/2,7/2)	
1260.9 *3*	($9/2^+$)	
1337.42 *15*	$7/2^+$,$9/2^+$	

[†] From a least-squares fit to γ-ray energies.
[‡] From Adopted Levels.

β^- radiations

E(decay)	E(level)	Iβ^-[†‡]	Log *ft*	Comments
(70.8 *24*)	1337.42	0.00098 *21*	9.8 *1*	
(147.3 *24*)	1260.9	0.00014 *6*	11.6 *2*	
(226.9 *24*)	1181.28	0.0022 *5*	11.0 *1*	
(319.6 *24*)	1088.65	0.60 *12*	9.0 *1*	E(decay): 310 *10* (1966Au04). Iβ^-: from 1966Au04, determined from their measured intensities of β transition to g.s. and 1089γ. A %20 uncertainty is assumed by the evaluator.
(378.0 *24*)	1030.23	0.031 *7*	10.6 *1*	
(1408.2 *24*)	0.0	99.37 *13*	9.88[1u] *1*	E(β)=1.42 MeV *1*, ΔJ=2 yes shape (magnetic spectrometer 1950Ke11).

[†] From γ+ce intensity balance at each level, assuming a 20% uncertainty in normalizing I(γ+ce) to %Iγ(1088γ)=0.60 measured by 1966Au04.
[‡] Absolute intensity per 100 decays.

$\gamma(^{123}Sb)$

Iγ normalization, I(γ+ce) normalization: From Iβ=0.6% to 1089-keV level, determined from $\beta\gamma$-coin by 1966Au04. A 20% uncertainty has been assumed by the evaluator.

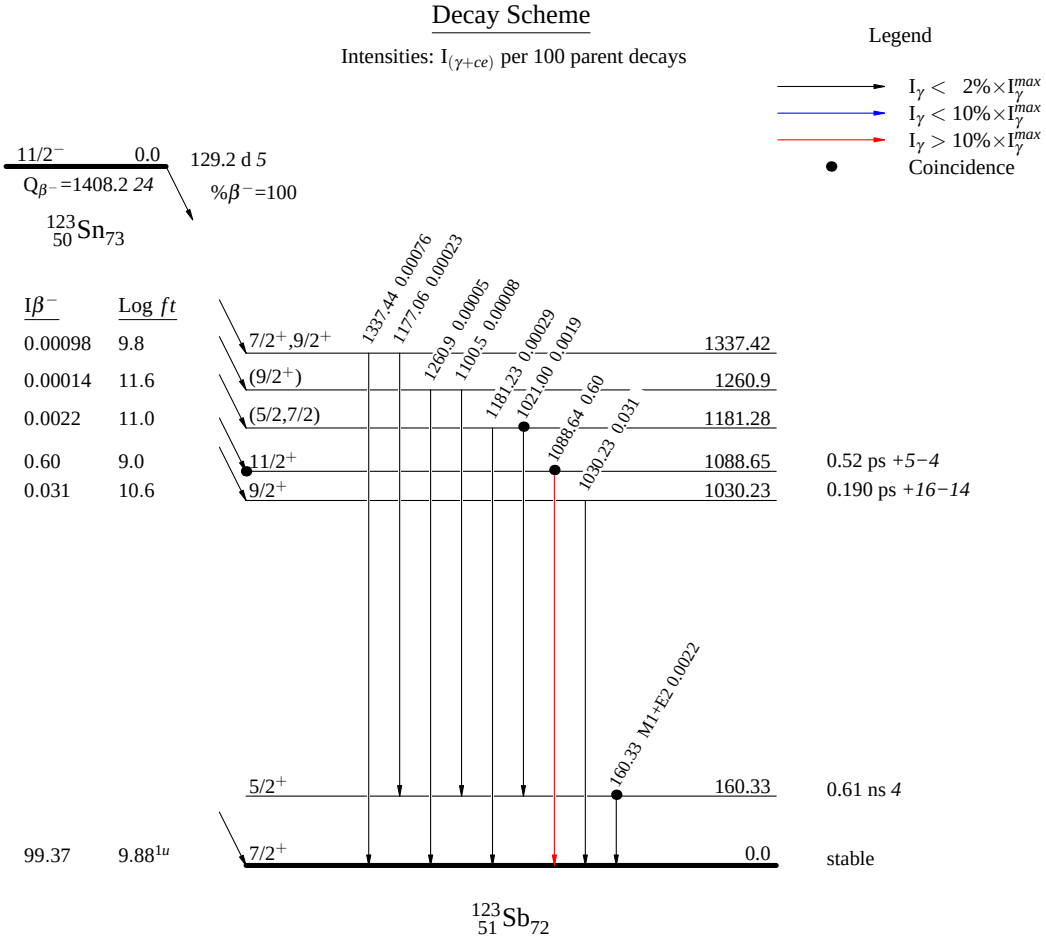
E_γ[†]	I_γ[†‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	δ	α[#]	$I_{(\gamma+ce)}$[‡]	Comments
160.33 *5*	0.320 *16*	160.33	5/2$^+$	0.0	7/2$^+$	M1+E2	0.078 *10*	0.1668	0.373 *18*	E_γ: from 40.06-min isomer decay in 1974Ra03. Other: a very weak peak of 155 *10* seen in coincidence with 1030γ in 1966Au04, with about 4% of the intensity of 1030γ, making a level at 1187; but this placement and the 1187 level were not confirmed in other studies and instead, the 155γ could correspond to 160γ here. $I_{(\gamma+ce)}$: from intensity balance at 160 level. I_γ: from I(γ+ce) and α. Mult.,δ: from Adopted Gammas.
1021.00 *20*	0.321 *16*	1181.28	(5/2,7/2)	160.33	5/2$^+$					
1030.23 *10*	5.17 *20*	1030.23	9/2$^+$	0.0	7/2$^+$					E_γ: other: 1030 *1* (1966Au04), I(1032/1088)=0.056 *6*.
1088.64 *10*	100	1088.65	11/2$^+$	0.0	7/2$^+$					E_γ: other: 1089 *1* (1966Au04).
1100.5 *4*	0.014 *7*	1260.9	(9/2$^+$)	160.33	5/2$^+$					
1177.06 *20*	0.038 *4*	1337.42	7/2$^+$,9/2$^+$	160.33	5/2$^+$					
1181.23 *20*	0.049 *5*	1181.28	(5/2,7/2)	0.0	7/2$^+$					
1260.9 *4*	0.009 *5*	1260.9	(9/2$^+$)	0.0	7/2$^+$					
1337.44 *20*	0.126 *7*	1337.42	7/2$^+$,9/2$^+$	0.0	7/2$^+$					

[†] From 1974Ra03.
[‡] For absolute intensity per 100 decays, multiply by 0.0060 *12*.
[#] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

^{123}Sn β^- decay (129.2 d) 1974Ra03,1966Au04

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays



^{123}Sn β^- decay (40.06 min) 1977Ti03,2006Kr04,1974Ra03

Parent: ^{123}Sn: E=24.6 *4*; $J^\pi=3/2^+$; $T_{1/2}$=40.06 min *2*; Q(β^-)=1408.2 *24*; %β^- decay=100

^{123}Sn-E,J^π,$T_{1/2}$: From Adopted Levels of ^{123}Sn.

^{123}Sn-Q(β^-): From 2021Wa16.

1977Ti03: ^{123m}Sn activity was produced by irradiation of 97.8% enriched ^{122}Sn with thermal neutrons and 96% enriched ^{124}Sn with fast neutrons at Saha Institute of Nuclear Physics. X and γ rays were detected with Ge(Li) detectors and conversion electrons were detected with a six-gap β-ray spectrometer. Measured Eγ, Iγ, E(X ray), I(X ray), E(ce), I(ce). Deduced levels, J, π, β-decay branching ratios, log *ft*, conversion coefficients, γ-ray multipolarities. Comparisons with available data.

2006Kr04: ^{123m}Sn activity was produced in thermal neutron capture on ^{122}Sn with neutrons from the Oregon State TRIGA reactor (OSTR). γ rays were detected with a HPGe detector. Measured Eγ, Iγ. Deduced levels, β-decay branching ratios.

1974Ra03: ^{123m}Sn activity was produced by irradiation of 95% enriched ^{122}Sn with thermal neutrons at ORNL. γ rays were detected with a 50-cm^3 Ge(Li) detector. Measured Eγ, Iγ. Deduced levels, J, π, β-decay branching ratios, log *ft*. Comparisons with available data.

1968Ba04: ^{123m}Sn activity was produced by irradiation of 92.3% enriched ^{122}Sn with thermal neutrons from the MIT reactor. γ rays were detected with a 1.2 cm^3 Ge(Li) detector. Measured Eγ, Iγ. Deduced levels, J, π, β-decay branching ratios, log *ft*.

1968Je02: ^{123m}Sn activity was produced by irradiation of enriched ^{122}Sn with neutrons from the I.E.A de Sao Paulo reactor. γ rays were detected with a NaI(Tl) and a Ge(Li) detector. Measured Eγ, Iγ. Deduced levels, J, π, β-decay branching ratio, log *ft*.

Others:

1949Du15: measured ce-β-coin, ce(t). Deduced parent $T_{1/2}$.

1949Le05: measured β(t). Deduced parent $T_{1/2}$.

1963Sc12: measured ce-γ(t). Deduced $T_{1/2}$ of 160 level.

1968Er03: measured γ(t). Deduced parent $T_{1/2}$.

1969PrZY: measured Eγ, Iγ. Also report data on ^{124}Sn(p,2nγ).

1970OsZZ: parent $T_{1/2}$.

1970Si21: measured $\beta\gamma$(t). Deduced $T_{1/2}$ of 160 level.

1973Be18: measured $\gamma\gamma$(t). Deduced $T_{1/2}$ of 160 level.

1990Ab06: measured γ(t). Deduced parent $T_{1/2}$.

^{123}Sb Levels

E(level)[†]	J^π[‡]	$T_{1/2}$[‡]	Comments
0.0	$7/2^+$	stable	
160.33 *3*	$5/2^+$	0.61 ns *4*	$T_{1/2}$: adopted value is weighted average of 0.60 ns *8* (1970Si21), 0.64 ns *5* (1963Sc12), 0.57 ns *7* (1969Sh12), 0.60 ns *4* (1973Be18) and 0.62 ns *21* (1964Sh23).
542.06 *5*	$(3/2)^+$	5.3 ps *+12−10*	
712.56 *21*	$1/2^+$		

[†] From a least-squares fit to γ-ray energies.
[‡] From Adopted Levels.

β^- radiations

E(decay)	E(level)	Iβ^-[†‡]	Log *ft*
(720.2 *25*)	712.56	0.011 *3*	8.3 *1*
(890.7 *24*)	542.06	0.055 *5*	7.93 *4*
(1272.5 *24*)	160.33	99.9 *3*	5.248 *4*

[†] From γ+ce intensity balance at each level.
[‡] Absolute intensity per 100 decays.

^{123}Sn β^- decay (40.06 min) 1977Ti03,2006Kr04,1974Ra03 (continued)

$\gamma(^{123}Sb)$

Iγ normalization: From ΣI(γ+ce to g.s.)=100.

E_γ	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	δ[†]	α[#]	Comments
160.34 *3*	100	160.33	$5/2^+$	0.0	$7/2^+$	M1+E2	0.078 *10*	0.1668	B(M1)(W.u.)=0.0075 *5*; B(E2)(W.u.)=1.25 *+36−31* %Iγ=85.69 *18* E_γ: weighted average of 160.35 *3* (2006Kr04), 160.0 *3* (1977Ti03), 160.33 *5* (1974Ra03), 159.7 *5* (1968Ba04), and 160.6 *6* (1968Je02). Other: 153 *5* from E(ce) (1949Du15). Mult.,δ: α(K)exp=0.15 *1* and K/L=7.6 *6* (1977Ti03) gives δ(E2/M1)=0.21 *+14−21*, using BrIccMixing.
170.15 *38*	0.004 *3*	712.56	$1/2^+$	542.06	$(3/2)^+$				%Iγ=0.003 *3* E_γ: weighted average of 171.22 *38* (2006Kr04) and 170.9 *7* (1977Ti03). I_γ: weighted average of 0.003 *3* (2006Kr04) and 0.008 *5* (1977Ti03).
381.75 *5*	0.047 *3*	542.06	$(3/2)^+$	160.33	$5/2^+$	M1(+E2)			%Iγ=0.040 *3* E_γ: weighted average of 381.77 *5* (2006Kr04), 381.1 *4* (1977Ti03), 381.7 *4* (1974Ra03), 381.3 *7* (1968Je02), and 381 *1* (1968Ba04). I_γ: weighted average of 0.050 *3* (2006Kr04), 0.049 *5* (1977Ti03), 0.05 *1* (1974Ra03), and 0.040 *4* (1968Ba04). Other: 0.027 *3*) (1968Je02) is discrepant.
541.95 *10*	0.021 *3*	542.06	$(3/2)^+$	0.0	$7/2^+$				%Iγ=0.018 *3* E_γ: weighted average of 541.95 *10* (2006Kr04), 541.4 *4* (1977Ti03), 542.2 *4* (1974Ra03), 542.2 *9* (1968Je02), and 542 *1* (1968Ba04). I_γ: weighted average of 0.028 *5* (2006Kr04), 0.021 *3* (1977Ti03), 0.030 *6* (1974Ra03), 0.016 *3* (1968Je02), and 0.020 *4* (1968Ba04).
552.37 *24*	0.009 *2*	712.56	$1/2^+$	160.33	$5/2^+$				%Iγ=0.0077 *18* E_γ: weighted average of 552.29 *24* (2006Kr04), 552.8 *4* (1977Ti03), 552.2 *4* (1974Ra03), and 552 *1* (1968Ba04).

Continued on next page (footnotes at end of table)

^{123}Sn β^- decay (40.06 min) 1977Ti03,2006Kr04,1974Ra03 (continued)

$\gamma(^{123}Sb)$ (continued)

E_γ	E_i(level)	Comments
		I_γ: weighted average of 0.010 *3* (2006Kr04), 0.010 *3* (1977Ti03), 0.014 *3* (1974Ra03), and 0.007 *2* (1968Ba04).

† From Adopted Gammas. Values and arguments from this study are given in comments.

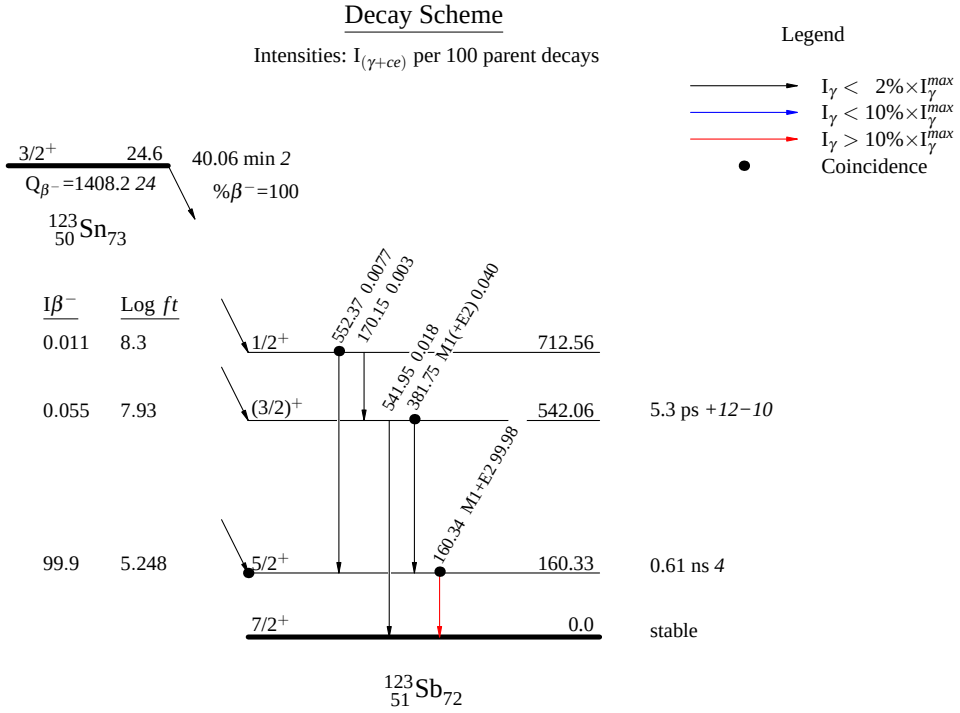
‡ For absolute intensity per 100 decays, multiply by 0.8569 *18*.

Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

^{123}Sn β^- decay (40.06 min) 1977Ti03,2006Kr04,1974Ra03

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays



^{123}Te ε decay 2003Al02,2003Mu02

Parent: ^{123}Te: E=0.0; $J^{\pi}=1/2^{+}$; $T_{1/2}>9.2\times10^{16}$ y; Q(ε)=51.91 *7*; %ε decay=100
^{123}Te-J^{π},$T_{1/2}$: From Adopted Levels of ^{123}Te.
^{123}Te-Q(ε): From 2021Wa16.
The half-life of this decay is not well determined. see ^{123}Te Adopted Levels.

^{123}Sb Levels

E(level)	J^{π}[†]	$T_{1/2}$
0.0	$7/2^{+}$	stable

[†] From Adopted Levels.

ε radiations

E(decay)	E(level)	Iε[†]	Log *ft*
(51.91 *7*)	0.0	100	14.8^{2u}

[†] Absolute intensity per 100 decays.

^{123}Sb IT decay (214 ns) 2009Wa02,2008Jo03

Parent: ^{123}Sb: E=2238.6 *5*; $J^{\pi}=(19/2^{-})$; $T_{1/2}$=214 ns *3*; %IT decay=100

^{123}Sb-J^{π},$T_{1/2}$: From Adopted Levels. Adopted $T_{1/2}$ is from γ(t) in 2008Jo03.

2009Wa02: ^{123}Sb isomers were produced in two experiments: ^{122}Sn(^{7}Li,α2nγ) E=54 MeV ^{7}Li beam from the 14UD Pelletron at the Australian National University on a target of 3.5 mg/cm^{2} enriched ^{122}Sn. γ rays were detected with the CAESAR array of six Ge detectors with BGO anti-Compton shields and two LEPS detectors; conversion electrons were detected with a cooled Si(Li) detector. Measured Eγ, Iγ, E(ce), I(ce), $\gamma\gamma$-coin, $\gamma\gamma(\theta)$, γ(t), $\gamma\gamma$(t). The second experiment Yb,Lu,W,Os(^{136}Xe,X) with E=6.0-6.2 MeV/nucleon ^{136}Xe beam from ATLAS facility at Argonne. γ rays were detected with the GAMMASPHERE array of 100 Compton-suppressed Ge detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin. Deduced levels, J, π, isomer $T_{1/2}$, conversion coefficients, γ-ray multipolarities, mixing ratios, branching ratios, transition strengths. Comparisons with theoretical calculations. Systematics of neighboring Sb isotopes.

2008Jo03: ^{123}Sb isomers were produced by ^{27}Al(^{178}Hf,X) with E=1150 MeV beam provided by ATLAS facility at Argonne on a ^{27}Al frame supporting a ^{208}Pb target for other experiments. γ rays were detected with the GAMMASPHERE array of 101 Compton-suppressed HPGe detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma(\theta)$, γ(t), $\gamma\gamma$(t). Deduced levels, J, π, isomer halflives, γ-ray multipolarities, mixing ratios. Pulsed beam with short pulses of ≈0.5 ns width and separated by 82.5 ns.

^{123}Sb Levels

E(level)[†]	J^{π}[‡]	$T_{1/2}$[#]	Comments
0.0	$7/2^{+}$		
160.0 *4*	$5/2^{+}$		
1030.2 *3*	$9/2^{+}$		
1088.58 *23*	$11/2^{+}$	0.52 ps *+5−4*	
1260.6 *4*	$(9/2^{+})$		
1656.14 *22*	$11/2^{-}$		
2037.6 *3*	$(15/2)^{-}$	37.3 ns *8*	$T_{1/2}$: from $\gamma\gamma$(t) (2009Wa02). Other: 37 ns *4* from $\gamma\gamma$(t) in 2008Jo03.
2238.6 *5*	$(19/2^{-})$	214 ns *3*	$T_{1/2}$: from $\gamma\gamma$(t) (2009Wa02). Other: 190 ns *30* from γ(t) in 2008Jo03.

[†] From a least-squares fit to γ-ray energies, assuming $\Delta E\gamma$=0.3 keV where not given.

[‡] From Adopted Levels. The same assignments are proposed by 2008Jo03 and/or 2009Wa02 based on $\gamma\gamma(\theta)$, γ-ray intensity balance, analog states in ^{121}Sb, and known assignments for low-lying states, except that these assignments are placed inside parenthesis by the evaluator if there is no firm evidence from other studies.

[#] From Adopted Levels. Values from this study are indicated in comments.

^{123}Sb IT decay (214 ns) 2009Wa02,2008Jo03 (continued)

$\gamma(^{123}Sb)$

Iγ normalization: From ΣI(γ+ce to g.s.)=100. I(γ+ce) intensity is not balanced at some levels, probably due to unobserved transitions. The decay scheme is thus considered incomplete by the evaluator and the normalization factor is taken as estimated.

E_γ[†]	I_γ[†@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[#]	α[&]	Comments
160.3 *5*	25 *3*	160.0	$5/2^+$	0.0	$7/2^+$	M1+E2	0.078 *10*	0.167 *3*	E_γ: other: 160.3 (2009Wa02).
201.0 *4*	104 *18*	2238.6	$(19/2^-)$	2037.6	$(15/2)^-$	[E2]		0.1420 *23*	B(E2)(W.u.)=0.1943 *34* E_γ: others: 200.4 (2009Wa02), 201.0 (2007Ju06).
381.7 *4*	114 *15*	2037.6	$(15/2)^-$	1656.14	$11/2^-$	E2		0.01725	B(E2)(W.u.)=0.0486 *12* E_γ: others: 381.6 (2009Wa02), 381.7 (2007Ju06). Mult.: (382γ)(626γ)(θ): A_2=−0.045 *7*, A_4=−0.003 *10* gives δ(O/Q)=−0.07 *2* in 2009Wa02; but M2 and M3 ruled out by RUL.
396.0 *5*	29 *3*	1656.14	$11/2^-$	1260.6	$(9/2^+)$				E_γ: other: 395.6 (2009Wa02).
567.7 *4*	14 *3*	1656.14	$11/2^-$	1088.58	$11/2^+$				E_γ: other: 567.4 (2009Wa02).
626.1 *4*	94 *7*	1656.14	$11/2^-$	1030.2	$9/2^+$	(E1)		1.51×10^{-3}	E_γ: other: 625.7 (2009Wa02). Mult.: D from $\gamma\gamma(\theta)$ in 2009Wa02.
949.0[‡]	1.8 *5*	2037.6	$(15/2)^-$	1088.58	$11/2^+$	[M2]		0.00475	B(M2)(W.u.)=6.5×10^{-4} *+22−19* I_γ: from I(381.7γ)=114 *15* (2008Jo03) and I(949.0γ/381.6γ)=1.5 *4*/95.9 *24* (2009Wa02).
1007.3[‡]	3.0 *6*	2037.6	$(15/2)^-$	1030.2	$9/2^+$	[E3]		0.00281	I_γ: from I(381.7γ)=114 *15* (2008Jo03) and I(1007.3γ/381.6γ)=2.5 *4*/95.9 *24* (2009Wa02).
1030.3 *4*	100 *8*	1030.2	$9/2^+$	0.0	$7/2^+$	M1+E2	−0.54 *5*	1.51×10^{-3} *2*	E_γ: other: 1030.2 (2009Wa02).
1088.6 *3*	14 *3*	1088.58	$11/2^+$	0.0	$7/2^+$	E2		1.13×10^{-3}	B(E2)(W.u.)=19.6 *11* E_γ: other: 1088.5 (2009Wa02). I_γ: estimated by the evaluator from intensity balance. Mult.: Q from $\gamma\gamma(\theta)$ in 2009Wa02.
1100.9 *5*	18 *4*	1260.6	$(9/2^+)$	160.0	$5/2^+$				E_γ: other: 1100.1 (2009Wa02).
1260.9 *7*	7 *2*	1260.6	$(9/2^+)$	0.0	$7/2^+$				E_γ: other: 1260.3 (2009Wa02).
1655.9[‡]		1656.14	$11/2^-$	0.0	$7/2^+$	[M2]		1.25×10^{-3}	

[†] From 2008Jo03, unless otherwise noted. Intensities are relative within the band from 2008Jo03.
[‡] From 2009Wa02.
[#] From Adopted Gammas. Assignments and arguments from this study are given in comments, where available.
[@] For absolute intensity per 100 decays, multiply by ≈0.7.
[&] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

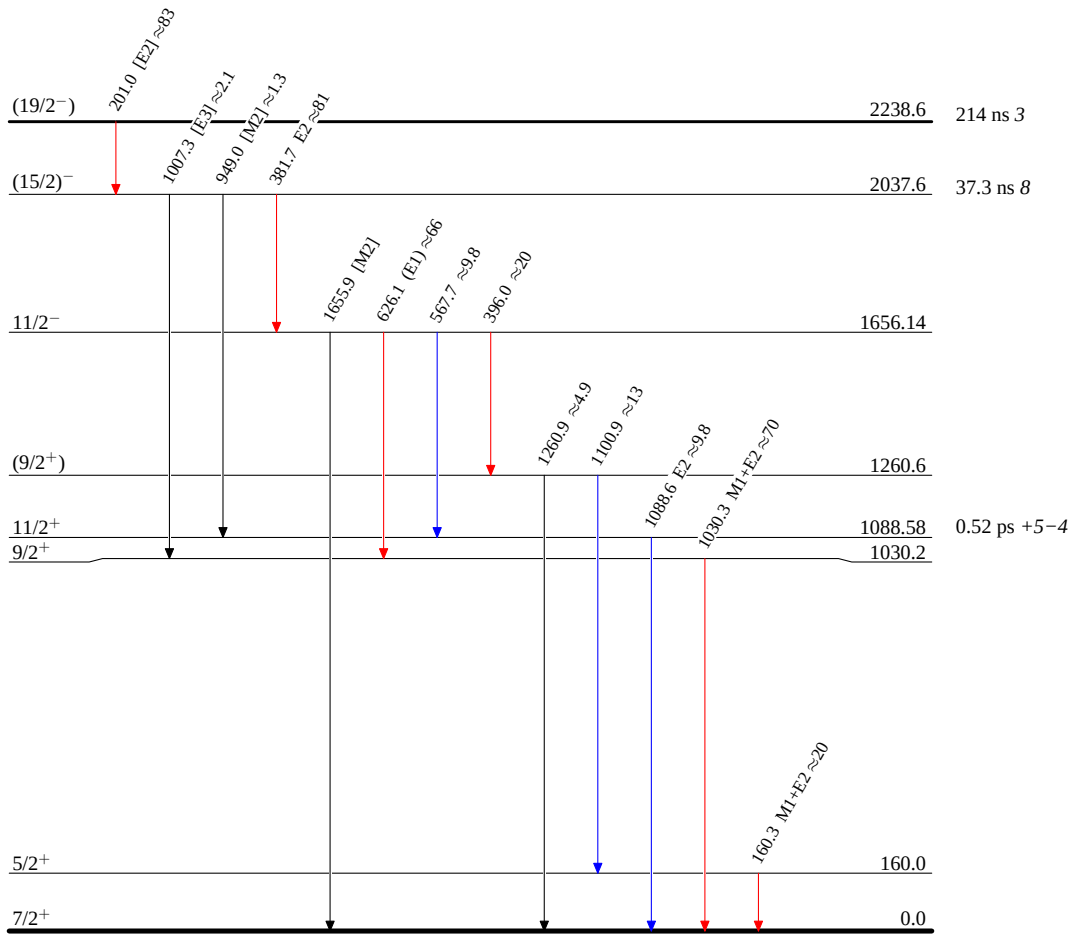
$^{123}_{51}Sb_{72}$-26

^{123}Sb IT decay (214 ns) 2009Wa02,2008Jo03

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
%IT=100

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



$^{123}_{51}Sb_{72}$

^{123}Sb IT decay (61 μs) 2009Wa02,2008Jo03

Parent: ^{123}Sb: E=2613.7 *4*; J^{π}=(23/2$^+$); $T_{1/2}$=61 μs *5*; %IT decay=100

^{123}Sb-J^{π},$T_{1/2}$: From Adopted Levels. Adopted $T_{1/2}$ from this study.

A complete level scheme from 2009Wa02 is presented in the ^{122}Sn(^{7}Li,α2nγ) dataset, where multiple isomers are populated in that reaction.

2009Wa02: ^{123}Sb isomers were produced in two experiments: ^{122}Sn(^{7}Li,α2nγ) E=54 MeV ^{7}Li beam from the 14UD Pelletron at the Australian National University on a target of 3.5 mg/cm^2 enriched ^{122}Sn. γ rays were detected with the CAESAR array of six Ge detectors with BGO anti-Compton shields and two LEPS detectors; conversion electrons were detected with a cooled Si(Li) detector. Measured Eγ, Iγ, E(ce), I(ce), $\gamma\gamma$-coin, $\gamma\gamma(\theta)$, γ(t), $\gamma\gamma$(t). The second experiment Yb,Lu,W,Os(^{136}Xe,X) with E=6.0-6.2 MeV/nucleon ^{136}Xe beam from ATLAS facility at Argonne. γ rays were detected with the GAMMASPHERE array of 100 Compton-suppressed Ge detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin. Deduced levels, J, π, isomer $T_{1/2}$, conversion coefficients, γ-ray multipolarities, mixing ratios, branching ratios, transition strengths. Comparisons with theoretical calculations. Systematics of neighboring Sb isotopes.

2008Jo03: ^{123}Sb isomers were produced by ^{27}Al(^{178}Hf,X) with E=1150 MeV beam provided by ATLAS facility at Argonne on a ^{27}Al frame supporting a ^{208}Pb target for other experiments. γ rays were detected with the GAMMASPHERE array of 101 Compton-suppressed HPGe detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma(\theta)$, γ(t), $\gamma\gamma$(t). Deduced levels, J, π, isomer halflives, γ-ray multipolarities, mixing ratios. Pulsed beam with short pulses of ≈0.5 ns width and separated by 82.5 ns.

^{123}Sb Levels

E(level)[†]	J^{π}[‡]	$T_{1/2}$[#]	Comments
0.0[@]	7/2$^+$		
160.21 *24*	5/2$^+$		
1030.23 *21*	9/2$^+$		
1088.54[@] *21*	11/2$^+$	0.52 ps *+5−4*	
1260.32 *21*	(9/2$^+$)		
1655.93 *18*	11/2$^-$		
2037.57 *23*	(15/2)$^-$	37.3 ns *8*	$T_{1/2}$: from $\gamma\gamma$(t) (2009Wa02).
2044.2[@] *3*	(15/2)$^+$		
2238.0 *3*	(19/2$^-$)	214 ns *3*	$T_{1/2}$: from $\gamma\gamma$(t) (2009Wa02).
2338.3 *3*	(15/2$^+$)		
2385.5 *3*	(17/2,19/2)$^-$		
2486.0[@] *3*	(19/2)$^+$	0.7 ns *2*	$T_{1/2}$: from centroid-shift analysis (2009Wa02). Other: 7.9 ns *4* from 2006JoZY is discrepant; no $T_{1/2}$ is reported for this level by 2008Jo03, which supersedes 2006JoZY.
2613.7[@] *4*	(23/2$^+$)	61 μs *5*	$T_{1/2}$: unweighted average of 65 μs *1* (2009Wa02), 52 μs *3* (2008Jo03) and 66 μs *4* (2007Ju06).

[†] From a least-squares fit to γ-ray energies, assuming $\Delta E\gamma$=0.3 keV where not given.

[‡] From Adopted Levels. The same assignments are proposed by 2008Jo03 and/or 2009Wa02 based on $\gamma\gamma(\theta)$, γ-ray intensity balance, analog states in ^{121}Sb, and known assignments for low-lying states, except that these assignments are placed inside parenthesis by the evaluator if there is no firm evidence from other studies.

[#] From Adopted Levels. Values from this study are indicated in comments.

[@] Band(A): g.s. band.

$\gamma(^{123}Sb)$

E_γ[†]	I_γ[#&]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	δ[@]	α[a]	Comments
100.4		2486.0	$(19/2)^+$	2385.5	$(17/2,19/2)^-$	E1		0.187	E_γ: from figure 1 of 2009Wa02, 100.5 in table II. I_γ: I(100.4γ)/I(441.9γ)=1.4 *1*/97 *3* (2009Wa02). Mult.: from α(exp)=0.1 *2* in 2009Wa02.
127.8[‡] *3*	60 *5*	2613.7	$(23/2^+)$	2486.0	$(19/2)^+$	(E2)		0.691 *12*	B(E2)(W.u.)=0.0044 *4* E_γ: others: 127.4 (2009Wa02), 127.6 (2007Ju06). Mult.: O+Q from $\gamma\gamma(\theta)$ and α(exp)=0.76 *13* (weighted average of 0.85 *15*, 0.75 *14* and 0.69 *13* from different γ gates) in 2008Jo03; and also from $\gamma\gamma(\theta)$ in 2009Wa02. δ(O/Q)=−0.06 *+18−21* from (128γ)(1089γ)(θ): A_2=+0.14 *5*, A_4=0.00 *6* in 2008Jo03; δ=+0.01 *6* from (127γ)(442γ)(θ)+(127γ)(956γ)(θ)+(127γ)(1089γ)(θ): A_2=+0.106 *25*, A_4=+0.006 *36* in 2009Wa02.
147.5		2385.5	$(17/2,19/2)^-$	2238.0	$(19/2^-)$	D			Mult.: M1 or E1 from α(exp)=0.2 *2* (2009Wa02).
147.6	1.8 *3*	2486.0	$(19/2)^+$	2338.3	$(15/2^+)$	[E2]		0.416	B(E2)(W.u.)=5.1 *+24−14* I_γ: from I(441.9γ)=109 *11* (2008Jo03) and I(147.6γ)/I(441.9γ)=1.6 *2*/97 *3* (2009Wa02).
160.2		160.21	$5/2^+$	0.0	$7/2^+$	M1+E2	0.078 *10*	0.1672	
200.4	100	2238.0	$(19/2^-)$	2037.57	$(15/2)^-$	[E2]		0.1435	B(E2)(W.u.)=0.197 *4* E_γ: other: 201.0 (2007Ju06).
347.9		2385.5	$(17/2,19/2)^-$	2037.57	$(15/2)^-$				
375.7	1.6 *4*	2613.7	$(23/2^+)$	2238.0	$(19/2^-)$	[M2]		0.0671	B(M2)(W.u.)=4.3×10^{-5} *+13−11* I_γ: from I(127.8γ)=60 *5* (2008Jo03) and I(375.7γ/127.8γ)=2.6 *6*/97.4 *11* (2009Wa02).
381.6		2037.57	$(15/2)^-$	1655.93	$11/2^-$	E2		0.01727	E_γ: other: 381.7 (2007Ju06). Mult.,δ: (382γ)(626γ)(θ): A_2=−0.045 *7*, A_4=−0.003 *10* gives δ(O/Q)=−0.07 *2* in 2009Wa02; but M2 and M3 ruled out by RUL.
395.6		1655.93	$11/2^-$	1260.32	$(9/2^+)$				
441.9[‡] *3*	109 *11*	2486.0	$(19/2)^+$	2044.2	$(15/2)^+$	E2		0.01110	B(E2)(W.u.)=1.3 *+5−3* E_γ: others: 441.7 (2009Wa02), 441.9 (2007Ju06). Mult.: δ(O/Q)=−0.08 *+14−18* from (442γ)(1089γ)(θ): A_2=+0.13 *4*, A_4=−0.07 *6* in 2008Jo03; Q from $\gamma\gamma(\theta)$ in 2009Wa02; M2, M3 ruled out by RUL.
567.4		1655.93	$11/2^-$	1088.54	$11/2^+$				
625.7		1655.93	$11/2^-$	1030.23	$9/2^+$	(E1)		1.51×10^{-3}	Mult.: D from $\gamma\gamma(\theta)$ in 2009Wa02.
949.0		2037.57	$(15/2)^-$	1088.54	$11/2^+$	[M2]		0.00475	I_γ: I(949.0γ/381.6γ)=1.5 *4*/95.9 *24* (2009Wa02).
955.8[‡] *3*	112 *9*	2044.2	$(15/2)^+$	1088.54	$11/2^+$	E2		1.51×10^{-3}	E_γ: other: 955.6 (2009Wa02). Mult.: δ(O/Q)=−0.10 *+17−25* from (956γ)(1089γ)(θ): A_2=+0.15 *4*, A_4=0.00 *6*

^{123}Sb IT decay (61 μs) 2009Wa02,2008Jo03 (continued)

$\gamma(^{123}Sb)$ (continued)

E_γ[†]	I_γ[#&]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	δ[@]	α[a]	Comments
									(2008Jo03); Q from $\gamma\gamma(\theta)$ in 2009Wa02; M2 and M3 ruled out by RUL, since they would require an isomeric halflife.
1007.3		2037.57	$(15/2)^-$	1030.23	$9/2^+$	[E3]		0.00281	I_γ: I(1007.3γ/381.6γ)=2.5 *4*/95.9 *24* (2009Wa02).
1030.2		1030.23	$9/2^+$	0.0	$7/2^+$	M1+E2	−0.54 *5*	1.51×10^{-3} *2*	
1088.6[‡] *3*	100	1088.54	$11/2^+$	0.0	$7/2^+$	E2		1.13×10^{-3}	B(E2)(W.u.)=19.6 *11* E_γ: other: 1088.6 (2009Wa02). Mult.: Q from $\gamma\gamma(\theta)$ in 2009Wa02 and 2008Jo03.
1100.1		1260.32	$(9/2^+)$	160.21	$5/2^+$				
1249.7		2338.3	$(15/2^+)$	1088.54	$11/2^+$				
1260.3		1260.32	$(9/2^+)$	0.0	$7/2^+$				
1655.9		1655.93	$11/2^-$	0.0	$7/2^+$	[M2]		1.25×10^{-3}	

[†] From 2009Wa02, unless otherwise noted.
[‡] From 2008Jo03.
[#] Relative intensities within the band from 2008Jo03.
[@] From Adopted Gammas. Assignments and arguments from this study are given in comments, where available.
[&] Absolute intensity per 100 decays.
[a] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

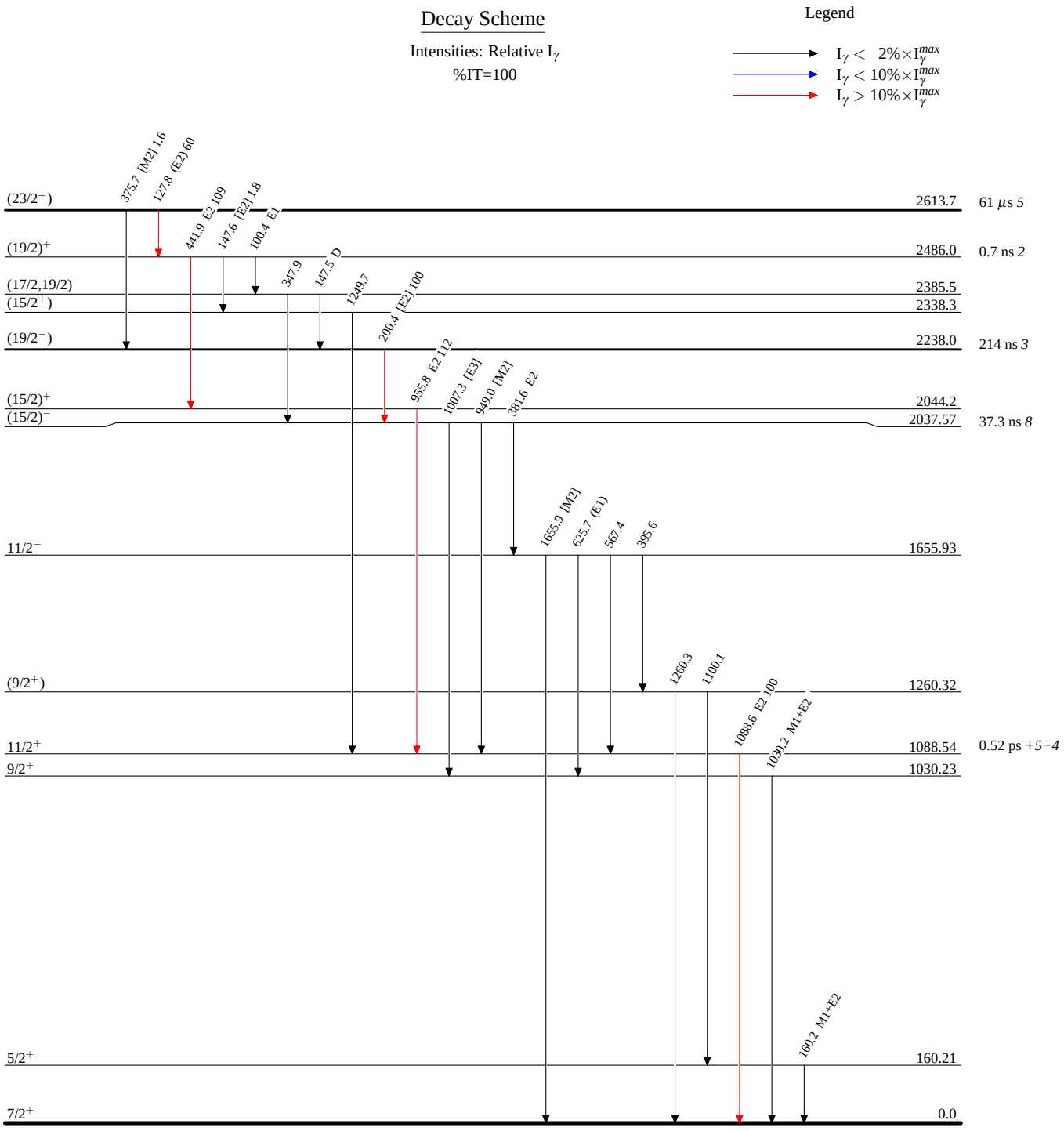
$^{123}_{51}Sb_{72}$-30

^{123}Sb IT decay (61 μs) 2009Wa02,2008Jo03

Decay Scheme

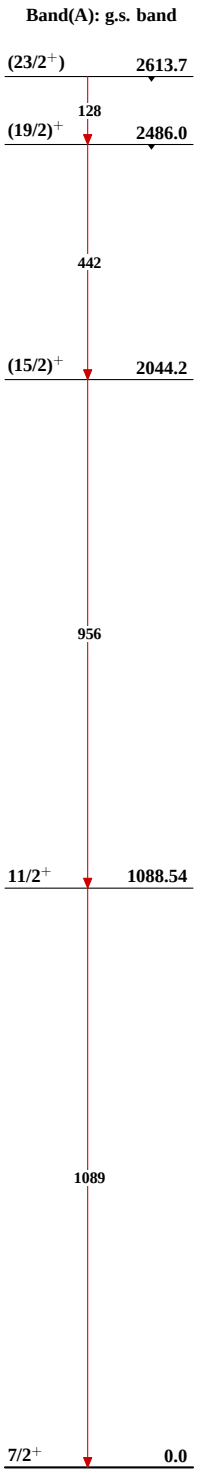
Intensities: Relative I_γ

%IT=100



$^{123}_{51}Sb_{72}$

^{123}Sb IT decay (61 μs) 2009Wa02,2008Jo03



$^{123}_{51}Sb_{72}$

^{120}Sn(α,p) 1977Ka04

1977Ka04: E=30 MeV alpha beam was produced from the AVF cyclotron of the KVI. Targets were 150 μg/cm^2 98% enriched ^{120}Sn foils. Reaction products were detected with two E-ΔE telescopes (FWHM=45 keV). Measured $\sigma(E_p,\theta)$. Deduced levels, J, π from DWBA analysis.

^{123}Sb Levels

E(level)	J^π †
0.0	$7/2^+$
160	$5/2^+$
542	$3/2^+$
713	$1/2^+$
1511	$3/2^+,5/2^+$
1643	$11/2^-$
1754	$(7/2)^+$

† Proposed by 1977Ka04 on the basis of J-dependence in (α,p).

^{122}Sn(pol p,p) IAR 1975Ar04

1975Ar04: E=7.2-12.0 MeV polarized proton beams were produced from the FN tandem Van de Graaff accelerator at Rutgers University. Target was 1000 μg/cm^2 92%−98% enriched ^{122}Sn. Reaction products were detected with Si(Li) detectors. Measured $\sigma(\theta)$, analyzing powers (E,θ). Deduced resonance energies, J, π, widths, L-transfers. Comparisons with available data.

^{123}Sb Levels

Γ: From analysis of experimental cross sections and analyzing powers compared with theoretical calculations.

E(level)†	J$^\pi$‡	L‡	E(p)(c.m.)	Comments
14261	3/2$^+$	2	7689	Γ=48 keV; Γ_p=7.4 keV E(level): IAR of 24.6-keV, 3/2$^+$ state in ^{123}Sn.
14395	1/2$^+$	0	7823	Γ=48 keV; Γ_p=14.3 keV E(level): IAR of 150.4-keV, 1/2$^+$ state in ^{123}Sn.
15434	5/2$^+$	2	8862	Γ=74 keV; Γ_p=3.4 keV E(level): IAR of 1194.4-keV, 5/2$^+$ level in ^{123}Sn; L=2 in ^{122}Sn(d,p).
15734	5/2$^+$	2	9162	Γ=93 keV; Γ_p=2.7 keV E(level): IAR of 1488.8-keV, 5/2$^+$ level in ^{123}Sn; L=2 in ^{122}Sn(d,p).
16932	7/2$^-$	3	10360	Γ=94 keV; Γ_p=19.6 keV E(level): IAR of 2726-keV, 7/2$^-$ level in ^{123}Sn; L=2 in ^{122}Sn(d,p).
17376	(7/2$^-$)	(3)	10840	Γ=140 keV; Γ_p=8.0 keV E(level): IAR of 3151-keV, (7/2$^-$) level in ^{123}Sn; L=3 in ^{122}Sn(d,p).
17563	(3/2$^-$)	(1)	10911	Γ=202 keV; Γ_p=30.0 keV E(level): IAR of 3320-keV, (3/2$^-$) level in ^{123}Sn; L=1,2 in ^{122}Sn(d,p).
18256	(1/2)$^-$	1	11684	Γ=130 keV; Γ_p=27.0 keV E(level): Possibly IAR of 4008-keV level in ^{122}Sn(d,p).

† From E(p)(c.m.)+S(p), where S(p)=6571.9 keV *24* (2021Wa16). Uncertainties of E(p) are 5-20 keV.
‡ From analysis of experimental cross sections and analyzing powers compared with theoretical calculations.

^{122}Sn(^{3}He,d) 2014MiZZ,2012MiZY,1968Co22

2014MiZZ, 2012MiZY: E=25.0 MeV ^{3}He beam was produced from tandem van de Graaff accelerator at A.W. Wright Nuclear Structure Laboratory of Yale University. Target was 100 μg/cm^2 thick, 92.19% enriched ^{122}Sn. Reaction products were momentum analyzed with an Enge split-pole magnetic spectrograph (FWHM≈45-60 keV) and detected by a gas-filled ionization chamber and scintillator. Measured σ(E$_d$,θ), at 6° and 15°. Deduced levels, J, π, L-transfers, spectroscopic factors from DWBA analysis.

1968Co22: E=18 MeV ^{3}He beam was produced from the Saclay tandem Van de Graaff accelerator. Target was 500-800 μg/cm^2 90.80% enriched ^{122}Sn. Reaction products were detected with two ΔE-E telescopes of surface-barrier detectors (FWHM=70-110 keV). Measured σ(E$_d$,θ), θ(c.m.)=10° to 80°. Deduced levels, J, π, L-transfers, spectroscopic factors from DWBA analysis.

1966Ba45: E=19 MeV ^{3}He beam was produced from the tandem accelerator at the Niels Bohr Institute. Target was 200 μg/cm^2 90% enriched self-supporting ^{122}Sn. Reaction products were momentum-analyzed with a magnetic spectrograph. Measured σ(E$_d$,θ), at θ=40°. Deduced levels.

Others: 1977VaZB, 1966Ba25.

^{123}Sb Levels

Cross sections in comments are from 2014MiZZ. Uncertainties in spectroscopic factors and cross sections from 2012MiZY are statistical.

E(level)[†]	L[#]	C^{2}S[#]	Comments
0	4	0.84	L,C^{2}S: from 1968Co22. C^{2}S for J=L−1/2. dσ/dΩ=0.04 *1* (6°), 0.12 *1* (15°) (mb/sr).
159 *3*	2[@]	0.99 *9*	E(level): others: 160 *10* (1966Ba45), 165 *10* (1966Ba25). C^{2}S: other: 0.8 for J=5/2 (1968Co22). dσ/dΩ=0.71 *4* (6°), 2.17 *9* (15°) (mb/sr).
542 *1*	2[@]	0.128 *11*	E(level): others: 537 *10* (1966Ba45), 541 *10* (1966Ba25). C^{2}S: others: 0.184 *22* (2012MiZY), 0.3 (1968Co22), for J=L−1/2. dσ/dΩ=0.14 *1* (6°), 0.45 *2* (15°) (mb/sr).
713 *1*	0[@]	0.184 *22*	E(level): others: 712 *10* (1966Ba45), 722 *10* (1966Ba25). C^{2}S: other: 0.35 (1968Co22). dσ/dΩ=0.81 *4* (6°), 0.68 *3* (15°) (mb/sr).
1179[‡] *10*			
1253[‡] *10*			
1509 *1*	2[@]	0.240 *12*	E(level): other: 1502 *10* (1966Ba45). C^{2}S: other: 0.123 *10* for J=L−1/2 (2012MiZY); 0.1 for J=L+1/2 and 0.05 for J=L−1/2 (1968Co22). dσ/dΩ=0.31 *2* (15°) (mb/sr).
1575 *1*	2	0.123 *11*	E(level): other: 1574 *10* (1966Ba45). C^{2}S: other: 0.176 *8* for J=L−1/2 (2012MiZY). dσ/dΩ=0.53 *2* (15°) (mb/sr).
1644 *1*	2+5		E(level): other: 1644 *10* (1966Ba45). L,C^{2}S: from 1968Co22. C^{2}S=0.15 for J=L+1/2 and 0.07 for J=L−1/2 with L=2, 0.5 for L+1/2 with L=5. dσ/dΩ=0.08 *1* (6°), 0.13 *1* (15°) (mb/sr).
1732 *1*	2	0.246 *20*	E(level): other: 1740 *30* (1968Co22). L: from 1968Co22. Other: (2) from 2012MiZY. C^{2}S: for J=L−1/2 (2012MiZY). Others: 0.1 for J=L+1/2 and 0.05 for J=L−1/2 (1968Co22). dσ/dΩ=0.26 *2* (6°).
2105 *4*	2[@]	0.055 *5*	E(level): other: 2100 *30* (1968Co22). C^{2}S: others: 0.082 *8* for J=L−1/2 (2012MiZY); 0.2 for J=L+1/2 and 0.12 for J=L−1/2 (1968Co22). dσ/dΩ=0.17 *2* (6°), 0.25 *1* (15°) (mb/sr).
2250 *5*	(2)	0.018 *2*	C^{2}S: other: 0.028 *3* for J=L−1/2. dσ/dΩ=0.07 *1* (6°), 0.09 *1* (15°) (mb/sr).
2377 *4*	0	0.023 *3*	L: contains L=4 component from (α,t) data in 2012MiZY.

Continued on next page (footnotes at end of table)

^{122}Sn(^{3}He,d) 2014MiZZ,2012MiZY,1968Co22 (continued)

^{123}Sb Levels (continued)

E(level)[†]	L[#]	C^2S[#]	Comments
			dσ/dΩ=0.14 *1* (6°), 0.06 *1* (15°) (mb/sr).
2522 *4*	0[@]	0.173 *20*	E(level): other: 2520 *30* (1968Co22). L: other: L=2 component also reported in 2012MiZY. C^2S: others: 0.4 for L=0 (1968Co22); 0.088 *8* for J=L−1/2 and 0.058 *5* for J=L+1/2, with L=2 (2012MiZY). dσ/dΩ=1.30 *6* (6°), 0.84 *4* (15°) (mb/sr).
2584 *5*	2	0.042 *4*	C^2S: other: 0.064 *6* for J=L−1/2. dσ/dΩ=0.08 *1* (6°), 0.21 *1* (15°) (mb/sr).
2687 *9*	(2)	0.028 *3*	C^2S: other: 0.042 *4* for J=L−1/2. dσ/dΩ=0.10 *2* (6°), 0.14 *1* (15°) (mb/sr).
2757 *1*	(2)[@]	0.027 *3*	E(level): other: 2750 *30* (probable multiplet, 1968Co22). C^2S: others: 0.041 *5* for J=L−1/2 (2012MiZY); 0.58 for J=L+1/2 and 0.25 for J=L+1/2 (1968Co22). dσ/dΩ=0.11 *8* (6°), 0.14 *1* (15°) (mb/sr).
2811 *7*	0	0.044 *13*	L: contains L=4 component from (α,t) data in 2012MiZY. dσ/dΩ=0.32 *9* (6°), 0.27 *2* (15°) (mb/sr).
2891 *8*	2	0.092 *8*	C^2S: other: 0.138 *12* for J=L−1/2. dσ/dΩ=0.16 *2* (6°), 0.48 *2* (15°) (mb/sr).

[†] From 2014MiZZ, unless otherwise noted.
[‡] From 1966Ba45.
[#] From DWBA analysis of experimental differential cross sections in 2012MiZY, unless otherwise noted. Quoted values are for J=L+1/2 and values for J=L−1/2 are given under comments, unless otherwise noted.
[@] Also from 1968Co22.

^{122}Sn(α,t) 2014MiZZ,2012MiZY

2014MiZZ, 2012MiZY: E=37.5 MeV alpha beam was produced from tandem van de Graaff accelerator at A.W. Wright Nuclear Structure Laboratory of Yale University. Target was 100 μg/cm^2 thick, 92.19% enriched ^{122}Sn. Reaction products were momentum analyzed with an Enge split-pole magnetic spectrograph (FWHM≈45-60 keV) and detected by a gas-filled ionization chamber and scintillator. Measured σ(E$_t$,θ), at 6° and 18°. Deduced levels, J, π, L-transfers, spectroscopic factors from DWBA analysis. See also 2004Sc16.

^{123}Sb Levels

Cross sections in comments are from 2014MiZZ. Uncertainties in spectroscopic factors and cross sections from 2012MiZY are statistical.

E(level)[†]	L[‡]	C^{2}S[‡]	Comments
0	4	0.714[#] *29*	dσ/dΩ=6.22 *25* (6°), 2.47 *10* (18°) (mb/sr).
159 *3*			dσ/dΩ=8.57 *34* (6°), 2.57 *10* (18°) (mb/sr).
542 *1*			dσ/dΩ=1.64 *7* (6°), 0.50 *2* (18°) (mb/sr).
713 *1*			dσ/dΩ=0.13 *1* (6°), 0.09 *1* (18°) (mb/sr).
1017 *1*	5	0.005[@] *1*	dσ/dΩ=0.07 *1* (6°), 0.039 *3* (18°) (mb/sr).
1262 *1*	5	0.011[@] *1*	dσ/dΩ=0.14 *1* (6°), 0.078 *5* (18°) (mb/sr).
1509 *1*			dσ/dΩ=1.10 *5* (6°), 0.37 *2* (18°) (mb/sr).
1575 *1*			dσ/dΩ=1.19 *6* (6°), 0.40 *2* (18°) (mb/sr).
1644 *1*	5	0.703[@] *28*	dσ/dΩ=8.61 *33* (6°), 4.29 *16* (18°) (mb/sr).
1732 *1*	(2)	0.169[@] *14*	dσ/dΩ=0.22 *6* (6°), 0.12 *2* (18°) (mb/sr).
1764 *1*	4	0.218[#] *11*	dσ/dΩ=1.63 *8* (6°), 0.57 *4* (18°) (mb/sr).
2289 *3*	5	0.050[@] *3*	dσ/dΩ=0.59 *3* (6°), 0.26 *1* (18°) (mb/sr).
2377 *4*	4	0.033[#] *3*	L: contains L=0 component from (^{3}He,d) data in 2012MiZY. dσ/dΩ=0.24 *2* (6°), 0.12 *1* (18°) (mb/sr).
2452 *4*			dσ/dΩ=0.20 *2* (6°), 0.09 *1* (18°) (mb/sr).
2522 *4*			dσ/dΩ=0.49 *3* (6°), 0.22 *1* (18°) (mb/sr).
2584 *5*			dσ/dΩ=0.13 *4* (6°), 0.07 *1* (18°) (mb/sr).
2633 *5*	4	0.046[#] *6*	dσ/dΩ=0.29 *4* (6°), 0.12 *1* (18°) (mb/sr).
2732 *6*	5	0.025[@] *3*	dσ/dΩ=0.28 *4* (6°), 0.15 *1* (18°) (mb/sr).
2811 *7*	4	0.086[#] *5*	L: contains L=0 component from (^{3}He,d) data in 2012MiZY. dσ/dΩ=0.54 *3* (6°), 0.22 *1* (18°) (mb/sr).
2917 *8*	4	0.054[#] *5*	dσ/dΩ=0.32 *3* (6°), 0.13 *1* (18°) (mb/sr).
2972 *10*	5	0.021[@] *3*	dσ/dΩ=0.23 *3* (6°), 0.10 *1* (18°) (mb/sr).
3016 *10*	(5)	0.009[@] *4*	dσ/dΩ=0.09 *4* (6°), 0.04 *1* (18°) (mb/sr).
3156 *11*	5	0.052[@] *3*	dσ/dΩ=0.55 *3* (6°), 0.26 *1* (18°) (mb/sr).
3225 *12*	5	0.022[@] *2*	dσ/dΩ=0.22 *2* (6°), 0.10 *1* (18°) (mb/sr).
3391 *13*	5	0.016[@] *2*	dσ/dΩ=0.17 *2* (6°), 0.09 *1* (18°) (mb/sr).
3464 *14*	4	0.066[#] *4*	dσ/dΩ=0.33 *2* (6°), 0.13 *1* (18°) (mb/sr).
3544 *15*	5	0.018[@] *2*	dσ/dΩ=0.18 *2* (6°), 0.09 *1* (18°) (mb/sr).
3738 *16*	5	0.024[@] *2*	dσ/dΩ=0.23 *2* (6°), 0.10 *1* (18°) (mb/sr).

[†] From 2014MiZZ.
[‡] From DWBA analysis of experimental differential cross sections (2012MiZY).
[#] For J=L−1/2.
[@] For J=L+1/2.

^{122}Sn(^{7}Li,α2nγ) 2009Wa02

Data for decays of the isomers populated in this reaction (2009Wa02, 2007Ju06) are also presented in ^{123}Sb IT decay.

2009Wa02: E=54 MeV ^{7}Li beam was produced from the 14UD Pelletron at the Australian National University. Target was 3.5 mg/cm^2 enriched ^{122}Sn. γ rays were detected with the CAESAR array of six Ge detectors with BGO anti-Compton shields and two LEPS detectors; conversion electrons were detected with a cooled Si(Li) detector. Measured Eγ, Iγ, E(ce), I(ce), $\gamma\gamma$-coin, $\gamma\gamma(\theta)$, γ(t), $\gamma\gamma$(t). Deduced levels, J, π, isomer $T_{1/2}$, conversion coefficients, γ-ray multipolarities, mixing ratios, branching ratios, transition strengths. Comparisons with theoretical calculations. Systematics of neighboring Sb isotopes. 2009Wa02 also performed a second experiment on ^{123}Sb isomers using Yb,Lu,W,Os(^{136}Xe,X) with E=6.0-6.2 MeV/nucleon at ANL. See more details in ^{123}Sb IT decay.

1985Pi02: E=27 MeV ^{7}Li beam was produced from the Stony Brook FN tandem accelerator. Target was ≈10 mg/cm^2 isotopically enriched ^{122}Sn. γ rays were detected with coaxial Ge(Li) detectors. Measured Eγ, $\gamma\gamma$-coin, $\gamma(\theta)$. Deduced levels.

2007Ju06: E=35 MeV beam was provided by 14UD Pelletron accelerator at the Australian National University. Target was 3.5 mg/cm^2 ^{122}Sn. γ rays were detected with CAESAR Ge detector array and three Compton-suppressed Ge detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, γ(t) using pulsed beam. Deduced half-life of 2614 level.

^{123}Sb Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	Comments
0.0	7/2$^+$		
160.20 *21*	5/2$^+$		
1030.20 *21*	9/2$^+$		
1088.52 *21*	11/2$^+$		
1260.31 *20*	9/2$^+$		
1337.41 *24*	9/2$^+$		
1655.91 *18*	11/2$^-$		
1773.4 *11*	(11/2)		E(level),J$^\pi$: level proposed in 1985Pi02 only.
2037.49 *23*	15/2$^-$	37.3 ns *8*	$T_{1/2}$: from $\gamma\gamma$(t) (2009Wa02).
2044.1 *3*	15/2$^+$		
2237.8 *3*	(19/2$^-$)	214 ns *3*	$T_{1/2}$: from $\gamma\gamma$(t) (2009Wa02).
2338.3 *3*	(15/2$^+$)		
2385.4 *3*	(17/2,19/2)$^-$		
2485.9 *3*	19/2$^+$	0.7 ns *2*	$T_{1/2}$: from centroid-shift analysis (2009Wa02).
2613.4 *4*	23/2$^+$	65 μs *1*	$T_{1/2}$: from summed double gated time spectra for 127-442-956-1089 cascade (2009Wa02). Other: 66 μs *4* from 2007Ju06 (pulsed beam timing).

[†] From a least-squares fit to γ-ray energies, assuming $\Delta E\gamma$=0.3 keV, except for 436γ where 1 keV is assumed in the fitting.

[‡] Proposed by 2009Wa02 based on $\gamma\gamma(\theta)$, γ-decay pattern, analog states in ^{121}Sb, and known assignments for low-lying states, unless otherwise noted. When considered in Adopted Levels, these assignments are placed inside parenthesis by the evaluator if there is no firm evidence from other studies.

γ(^{123}Sb)

E$_i$(level)	J$_i^\pi$	E$_\gamma$[†]	E$_f$	J$_f^\pi$	Mult.[‡]	Comments
160.20	5/2$^+$	160.2	0.0	7/2$^+$		
1030.20	9/2$^+$	1030.2	0.0	7/2$^+$		
1088.52	11/2$^+$	1088.5	0.0	7/2$^+$	Q	
1260.31	9/2$^+$	1100.1	160.20	5/2$^+$		
		1260.3	0.0	7/2$^+$		
1337.41	9/2$^+$	1177.2	160.20	5/2$^+$		
		1337.4	0.0	7/2$^+$	D	Mult.: from 1985Pi02 based on $\gamma(\theta)$, A_2=−0.31 *20*.
1655.91	11/2$^-$	395.6	1260.31	9/2$^+$		
		567.4	1088.52	11/2$^+$		
		625.7	1030.20	9/2$^+$	D	Mult.: E2 in 2009Wa02 could be a misprint and it should be E1 instead from their proposed level scheme.

Continued on next page (footnotes at end of table)

^{122}Sn(^{7}Li,α2nγ) 2009Wa02 (continued)

$\gamma(^{123}Sb)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	α[#]	Comments
1655.91	11/2$^-$	1655.9		0.0	7/2$^+$	[M2]	1.25×10^{-3}	
1773.4	(11/2)	436		1337.41	9/2$^+$	(D)		E_γ: from 1985Pi02 only, seen in coincidence with 1177γ. Mult.: from 1985Pi02 based on $\gamma(\theta)$.
2037.49	15/2$^-$	381.6	95.9 *24*	1655.91	11/2$^-$	E2	0.01727	E_γ: other: 381.7 (2007Ju06). Mult.: (382γ)(626γ)(θ): A_2=−0.045 *7*, A_4=−0.003 *10* gives δ(O/Q)=−0.07 *2* in 2009Wa02; but M2 and M3 ruled out by RUL.
		949.0	1.5 *4*	1088.52	11/2$^+$	[M2]	0.00475	
		1007.3	2.5 *4*	1030.20	9/2$^+$	[E3]	0.00281	
2044.1	15/2$^+$	955.6		1088.52	11/2$^+$	Q		
2237.8	(19/2$^-$)	200.4	100	2037.49	15/2$^-$	[E2]	0.1435	E_γ: other: 201.0 (2007Ju06).
2338.3	(15/2$^+$)	1249.7		1088.52	11/2$^+$			
2385.4	(17/2,19/2)$^-$	147.5		2237.8	(19/2$^-$)	D		Mult.: M1 or E1 from α(exp)=0.2 *2* (2009Wa02).
		347.9		2037.49	15/2$^-$			
2485.9	19/2$^+$	100.4	1.4 *1*	2385.4	(17/2,19/2)$^-$	E1	0.187	E_γ: from figure 1 of 2009Wa02, 100.5 in table II. Mult.: from α(exp)=0.1 *2* in 2009Wa02.
		147.6	1.6 *2*	2338.3	(15/2$^+$)	[E2]	0.416	
		441.7	97 *3*	2044.1	15/2$^+$	E2	0.01111	E_γ: other: 441.9 (2007Ju06). Mult.: Q from $\gamma\gamma(\theta)$; M2 ruled out by RUL.
2613.4	23/2$^+$	127.4	97.4 *11*	2485.9	19/2$^+$	(E2)	0.699	E_γ: other: 127.6 (2007Ju06). Mult.: δ(O/Q)=+0.01 *6* from (127γ)(442γ)(θ)+(127γ)(956γ)(θ)+(127γ)(1089γ)(θ): A_2=+0.106 *25*, A_4=+0.006 *36* (2009Wa02); M3 ruled out by RUL; E2 preferred since M2 would require a large B(M2).
		375.7	2.6 *6*	2237.8	(19/2$^-$)	[M2]	0.0671	

[†] From 2009Wa02.

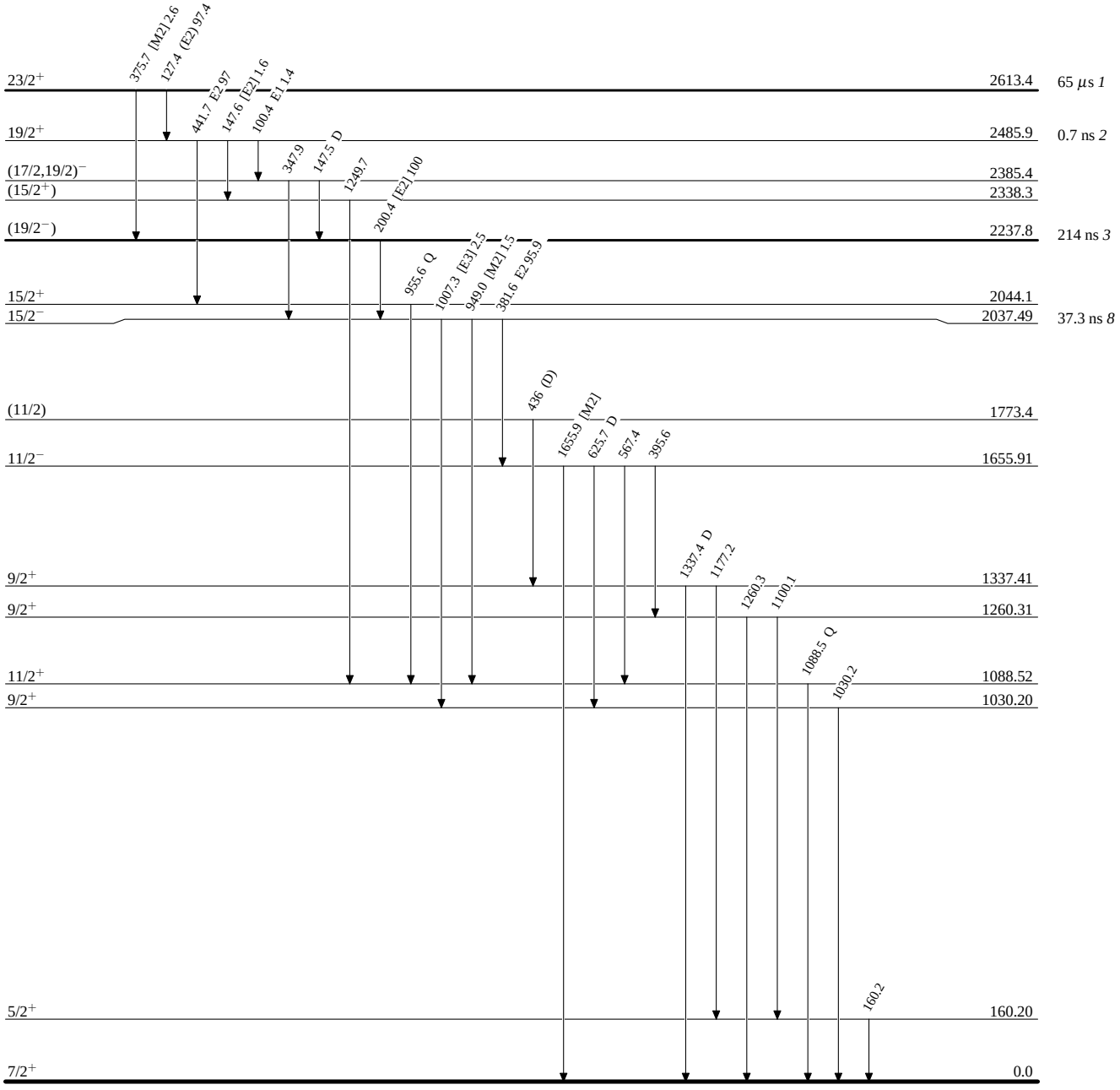
[‡] From analysis of $\gamma\gamma(\theta)$ in 2009Wa02, unless otherwise noted. The evaluator has replaced E2 from 2009Wa02 with Q and E1 with D, since magnetic or electric nature of a transition cannot be determined based on $\gamma\gamma(\theta)$. Assignments in square brackets are assumed by 2009Wa02, without any experimental evidence.

[#] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

^{122}Sn(^{7}Li,α2nγ) 2009Wa02

Level Scheme

Intensities: % photon branching from each level



$^{123}_{51}Sb_{72}$

^{124}Sn(p,2nγ) 1969PrZY

1969PrZY (also 1969PrZT): E=8 and 13 MeV proton beams were produced from the tandem accelerator at the Niels Bohr Institute at Riso. γ rays were detected with a Ge(Li) detector and conversion electrons were detected with a six-gap β-ray spectrometer. Measured Eγ, Iγ, E(x ray), I(x ray), E(ce), I(ce). Deduced levels, J, π, conversion coefficients, γ-ray multipolarities.

^{123}Sb Levels

E(level)[†]	J$^\pi$[‡]
0.0	7/2$^+$
160	5/2$^+$
540	(3/2)$^+$
710	1/2$^+$

[†] From Eγ.
[‡] From Adopted Levels.

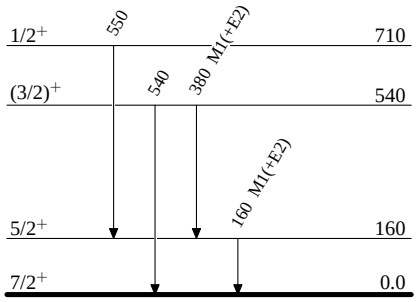
γ(^{123}Sb)

E$_\gamma$	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.	δ	α[‡]	Comments
160	160	5/2$^+$	0.0	7/2$^+$	M1(+E2)	0.2 *+4–2*	0.1665	Mult.,δ: from α(K)exp=0.15 *2* (from comparison of x- and γ-ray intensities) (1969PrZY), with δ obtained using BrIccMixing by the evaluator.
380	540	(3/2)$^+$	160	5/2$^+$	M1(+E2)			Mult.: mainly M1 from K/L≈9.5 (1969PrZY).
540[†]	540	(3/2)$^+$	0.0	7/2$^+$				
550[†]	710	1/2$^+$	160	5/2$^+$				

[†] Iγ and I(ce K) of the 540γ and 550γ are observed equal, indicating their α(K)exp to be equal and suggesting the two γ rays have the same multipolarity.
[‡] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

^{124}Sn(p,2nγ) 1969PrZY

Level Scheme



$^{123}_{51}Sb_{72}$

^{123}Sb(γ,γ') 2002Br05,1973Bo12,1978Be45

2002Br05: E<3.8 MeV photon beams were produced from bremsstrahlung at the bremsstrahlung NRF facility at the 4.3-MV Dynamitron accelerator of the Stuttgart University. Target was 2376 mg pill of Sb powder (98.0% in ^{123}Sb). Scattered photons were detected with three HPGe detectors (efficiency=100% relative to 3 in.×3 in. NaI(Tl) crystal). Measured Eγ, Iγ, σ(E$_\gamma$,θ), at θ=90°, 127° and 150°. Deduced levels, widths, B(E1)↑, γ-ray branching ratios. Comparisons with available data.

1973Bo12: E=0.6-3.0 MeV photon beams were produced from bremsstrahlung with electrons provided from the 4-MV Van de Graaff in the High Voltage Research Laboratory at MIT. Target was 1600 g natural antimony. Scattered photons were detected with a 40-cm^3 Ge(Li) detector. Measured Eγ, Iγ, σ(E$_\gamma$). Deduced levels, J, π, widths, B(E2). Comparisons with theoretical calculations.

1978Be45: photon sources were produced via V(n,γ) and Ti(n,γ) reactions with thermal neutrons provided by the IRR-2 reactor at the Nuclear Research Centre, Israel. Target was natural Sb. Scattered photons were detected with NaI detectors. Measured Eγ, Iγ, $\gamma(\theta)$. Deduced levels, spins.

1981Ca10: E=0.5-1.65 MeV photons were produced by bremsstrahlung with electrons provided by the accelerator of the Pierre and Marie Curie University. Natural Sb target. Scattered photons were detected with a 50-cm^3 Ge(Li) detector. Measured Eγ, $\gamma(\theta)$, σ(E$_\gamma$). Deduced levels, J, π, T$_{1/2}$, widths, γ-ray transition strengths, mixing ratios, branching ratios. Comparisons with available data.

^{123}Sb Levels

Quoted values of gΓ_0^2/Γ are in units of eV. Γ is the total width, Γ_0 is the decay width to g.s. and statistical factor g=(2J+1)/(2J(g.s.)+1).

E(level)[†]	J$^\pi$[@]	T$_{1/2}$	gΓ_0^2/Γ[a]	Comments
0.0	7/2$^+$[&]			
160.3 *3*	5/2$^+$[&]			
1030.5 *3*	9/2	0.190 ps *+16−14*	0.00300 *23*	T$_{1/2}$: from gΓ_0=0.0030 eV *23* if Γ_0/Γ=1.0. gΓ_0^2/Γ: weighted average of 0.00302 *23* (2002Br05), 0.00296 *27* (1981Ca10) and 0.0030 *3* (1973Bo12), assuming Γ_0/Γ=1.0.
1088.8 *5*	9/2	0.53 ps *+5−4*	0.00107 *9*	J$^\pi$: 11/2$^+$ in Adopted Levels. T$_{1/2}$: from gΓ_0=0.00107 eV *7* if Γ_0/Γ=1.0. gΓ_0^2/Γ: weighted average of 0.00112 *15* (2002Br05), 0.00106 *9* (1981Ca10) and 0.0010 *2* (1973Bo12), assuming $\Gamma(\gamma_0)/\Gamma$=1.0.
1181.5 *25*	11/2		<0.0002[c]	J$^\pi$: (7/2,9/2)$^+$ in Adopted Levels.
1262.5 *20*			<0.0002[c]	
1336 *4*			<0.00017[c]	
1424.8 *4*			0.00039 *12*	
1509.0 *4*			0.00103 *18*	E(level): not reported in 1973Bo12, 1978Be45.
1513.5 *3*	7/2		0.0021[b] *4*	J$^\pi$: (3/2,5/2)$^+$ quoted in 1973Bo12. gΓ_0=0.00295 eV *39* (2002Br05), 0.0038 eV *8* (1973Bo12).
1643 *3*			0.00013[b] *6*	
1764.3 *3*			0.00204 *24*	
1777.7 *4*			0.00161 *23*	E(level): other: 1778 *2* with gΓ_0^2/Γ=0.0016 eV *6* unassigned to ^{121}Sb or ^{123}Sb by 1973Bo12.
1896.4 *3*			0.00190 *24*	E(level): other: 1897 *2* with gΓ_0^2/Γ=0.0015 eV *5* unassigned to ^{121}Sb or ^{123}Sb by 1973Bo12.
2011.6 *4*			0.00063 *16*	
2026 *3*			0.0012[b] *4*	
2033 *3*			<0.0004[c]	
2036.4 *4*			0.00072 *17*	
2047.6 *3*			0.00351 *34*	
2059.0 *6*			0.00129 *27*	
2115 *3*			0.0014[b] *7*	
2137.9 *8*			0.00096 *27*	

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^{123}Sb(γ,γ') 2002Br05,1973Bo12,1978Be45 (continued)

^{123}Sb Levels (continued)

E(level)[†]	$g\Gamma_0^2/\Gamma$[a]	Comments
2170.0 *6*	0.00040 *17*	
2230.3 *4*	0.00199 *29*	
2235.0 *6*	0.00072 *27*	
2238.6 *6*	0.00055 *23*	
2252.0 *6*	0.00046 *18*	
2270.0 *7*	0.00082 *21*	
2273.7 *5*		$g\Gamma_0$=0.00236 eV *41* (2002Br05).
2278.7 *5*		$g\Gamma_0$=0.00206 eV *47* (2002Br05).
2283.3 *7*	0.00095 *21*	
2292.1 *8*	0.00068 *19*	
2296.6 *4*	0.00219 *27*	
2300.8 *5*	0.00136 *22*	
2306.4 *3*	0.00275 *29*	
2322.3 *3*	0.00505 *43*	E(level): other: 2321 *2* with $g\Gamma_0^2/\Gamma$=0.0053 eV *15* unassigned to ^{121}Sb or ^{123}Sb by 1973Bo12.
2329.5 *3*	0.00395 *37*	
2371.3 *3*	0.00537 *43*	
2423.0 *4*		$g\Gamma_0$=0.00391 eV *63* (2002Br05).
2429.3 *3*	0.00223 *30*	E(level): other: 2429 *2* with $g\Gamma_0^2/\Gamma$=0.0025 eV *7* unassigned to ^{121}Sb or ^{123}Sb by 1973Bo12.
2447.3 *6*		$g\Gamma_0$=0.00233 eV *53* (2002Br05).
2455.4 *6*	0.00152 *46*	
2459.1 *4*	0.00317 *52*	
2472 *3*	0.0053[b] *12*	
2507.3 *6*	0.00081 *23*	
2521.8 *3*	0.00494 *43*	
2597.7 *4*	0.00193 *27*	
2605.9 *8*	0.00066 *21*	
2620.1 *4*	0.00295 *33*	
2647.4 *4*		$g\Gamma_0$=0.00482 eV *98* (2002Br05).
2701.6 *5*	0.00157 *31*	
2756.7 *4*	0.00308 *40*	
2843.1 *10*	0.00090 *35*	
2860.6 *9*	0.00098 *35*	
2883.1 *5*	0.00167 *33*	
2904.9 *5*	0.00202 *37*	
2919.0 *6*	0.00132 *34*	
2934.6 *7*	0.00206 *44*	
2989.0 *6*	0.00198 *52*	
3000.8 *5*	0.00349 *99*	
3017.3 *3*	0.0150 *11*	
3056.8 *3*	0.00653 *66*	
3062.6 *4*	0.00223 *41*	
3098.1 *7*	0.00124 *36*	
3147.9 *5*	0.00069 *25*	
3152.4 *6*	0.00077 *27*	
3158.5 *10*	0.00080 *36*	
3184.5 *4*	0.00603 *68*	
3190.6 *3*	0.00096 *24*	
3198.2 *5*	0.00230 *45*	
3209.8 *8*	0.00074 *32*	
3228.4 *9*	0.00416 *82*	
3277.6 *10*	0.00140 *61*	
3281.1 *6*		$g\Gamma_0$=0.00361 eV *102* (2002Br05).
3294.2 *3*		$g\Gamma_0$=0.00912 eV *102* (2002Br05).
3331.9 *5*	0.00556 *80*	
3351.7 *6*	0.00078 *32*	
3385.7 *7*	0.00366 *72*	

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^{123}Sb(γ,γ') 2002Br05,1973Bo12,1978Be45 (continued)

^{123}Sb Levels (continued)

E(level)[†]	$g\Gamma_0^2/\Gamma$[a]	E(level)[†]	J^π[@]	$g\Gamma_0^2/\Gamma$[a]	E(level)[†]	J^π[@]
3399.7 *9*	0.00132 *43*	3476.2 *6*		0.00151 *52*	7163.8[#] *16*	7/2
3412.3 *10*	0.00117 *44*	6417.6[‡] *17*	9/2		7309.6[#] *17*	9/2
3418.3 *10*	0.00140 *49*	6760.3[‡] *14*	7/2			
3427.6 *9*	0.00149 *48*	6874.7[#] *16*	7/2			

[†] From a least-squares fit to γ-ray energies.
[‡] Excited by γ lines from V(n,γ) source in 1978Be45.
[#] Excited by γ lines from Ti(n,γ) source in 1978Be45.
[@] From $\gamma(\theta)$ in 1978Be45, unless otherwise noted. Spin of the excited levels by dipole excitations from $7/2^+$ g.s. are expected to be (5/2,7/2,9/2).
[&] From Adopted Levels.
[a] From 2002Br05, unless otherwise noted.
[b] From 1973Bo12.
[c] Upper limit given by 1973Bo12.

$\gamma(^{123}Sb)$

A_2 values given in comments are from 1978Be45.

E_γ[†]	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Comments
1030.5 *3*		1030.5	9/2	0.0	$7/2^+$	E_γ: weighted average of 1030.6 *3* (2002Br05), 1030 *1* (1973Bo12), 1029.5 *10* (1981Ca10).
1088.8 *5*		1088.8	9/2	0.0	$7/2^+$	E_γ: weighted average of 1089.0 *3* (2002Br05), 1089 *1* (1973Bo12), and 1086.5 *10* (1981Ca10).
1353.4 *4*	56[&] *11*	1513.5	7/2	160.3	$5/2^+$	I_γ: other: I(1353γ)/I(1513γ)=34/66=0.52 (1973Bo12).
1424.8 *4*		1424.8		0.0	$7/2^+$	
1509.0 *4*		1509.0		0.0	$7/2^+$	
1513.4 *3*	100[&]	1513.5	7/2	0.0	$7/2^+$	E_γ: other: 1512 *2* (1973Bo12).
1643[‡] *3*		1643		0.0	$7/2^+$	
1764.3 *3*		1764.3		0.0	$7/2^+$	
1777.7 *4*		1777.7		0.0	$7/2^+$	
1896.4 *3*		1896.4		0.0	$7/2^+$	
2011.6 *4*		2011.6		0.0	$7/2^+$	
2026[‡] *3*		2026		0.0	$7/2^+$	
2033[‡] *3*		2033		0.0	$7/2^+$	
2036.4 *4*		2036.4		0.0	$7/2^+$	
2047.6 *3*		2047.6		0.0	$7/2^+$	
2059.0 *6*		2059.0		0.0	$7/2^+$	
2112.9 *9*	27[&] *13*	2273.7		160.3	$5/2^+$	
2115[‡] *3*		2115		0.0	$7/2^+$	
2118.3 *6*	80[&] *24*	2278.7		160.3	$5/2^+$	
2137.9 *8*		2137.9		0.0	$7/2^+$	
2170.0 *6*		2170.0		0.0	$7/2^+$	
2230.3 *4*		2230.3		0.0	$7/2^+$	
2235.0 *6*		2235.0		0.0	$7/2^+$	
2238.6 *6*		2238.6		0.0	$7/2^+$	

Continued on next page (footnotes at end of table)

^{123}Sb(γ,γ') 2002Br05,1973Bo12,1978Be45 (continued)

$\gamma(^{123}Sb)$ (continued)

E_γ [†]	I_γ	E_i(level)	J_i^π	E_f	J_f^π
2252.0 *6*		2252.0		0.0	$7/2^+$
2262.2 *6*	51[&] *12*	2423.0		160.3	$5/2^+$
2270.0 *7*		2270.0		0.0	$7/2^+$
2273.8 *5*	100[&]	2273.7		0.0	$7/2^+$
2278.7 *6*	100[&]	2278.7		0.0	$7/2^+$
2283.3 *7*		2283.3		0.0	$7/2^+$
2287.3 *10*	50[&] *17*	2447.3		160.3	$5/2^+$
2292.1 *8*		2292.1		0.0	$7/2^+$
2296.6 *4*		2296.6		0.0	$7/2^+$
2300.8 *5*		2300.8		0.0	$7/2^+$
2306.4 *3*		2306.4		0.0	$7/2^+$
2322.3 *3*		2322.3		0.0	$7/2^+$
2329.5 *3*		2329.5		0.0	$7/2^+$
2371.3 *3*		2371.3		0.0	$7/2^+$
2423.2 *4*	100[&]	2423.0		0.0	$7/2^+$
2429.3 *3*		2429.3		0.0	$7/2^+$
2447.2 *6*	100[&]	2447.3		0.0	$7/2^+$
2455.4 *6*		2455.4		0.0	$7/2^+$
2459.1 *4*		2459.1		0.0	$7/2^+$
2472[‡] *3*		2472		0.0	$7/2^+$
2487.0 *4*	196[&] *32*	2647.4		160.3	$5/2^+$
2507.3 *6*		2507.3		0.0	$7/2^+$
2521.8 *3*		2521.8		0.0	$7/2^+$
2597.7 *4*		2597.7		0.0	$7/2^+$
2605.9 *8*		2605.9		0.0	$7/2^+$
2620.1 *4*		2620.1		0.0	$7/2^+$
2647.4 *4*	100[&]	2647.4		0.0	$7/2^+$
2701.6 *5*		2701.6		0.0	$7/2^+$
2756.7 *4*		2756.7		0.0	$7/2^+$
2843.1 *10*		2843.1		0.0	$7/2^+$
2860.6 *9*		2860.6		0.0	$7/2^+$
2883.1 *5*		2883.1		0.0	$7/2^+$
2904.9 *5*		2904.9		0.0	$7/2^+$
2919.0 *6*		2919.0		0.0	$7/2^+$
2934.6 *7*		2934.6		0.0	$7/2^+$
2989.0 *6*		2989.0		0.0	$7/2^+$
3000.8 *5*		3000.8		0.0	$7/2^+$
3017.3 *3*		3017.3		0.0	$7/2^+$
3056.8 *3*		3056.8		0.0	$7/2^+$
3062.6 *4*		3062.6		0.0	$7/2^+$
3098.1 *7*		3098.1		0.0	$7/2^+$
3120.3 *8*	35[&] *16*	3281.1		160.3	$5/2^+$
3134.5 *8*	19[&] *6*	3294.2		160.3	$5/2^+$
3147.9 *5*		3147.9		0.0	$7/2^+$
3152.4 *6*		3152.4		0.0	$7/2^+$
3158.5 *10*		3158.5		0.0	$7/2^+$
3184.5 *4*		3184.5		0.0	$7/2^+$
3190.6 *3*		3190.6		0.0	$7/2^+$
3198.2 *5*		3198.2		0.0	$7/2^+$
3209.8 *8*		3209.8		0.0	$7/2^+$
3228.4 *9*		3228.4		0.0	$7/2^+$
3277.6 *10*		3277.6		0.0	$7/2^+$
3281.4 *8*	100[&]	3281.1		0.0	$7/2^+$

Continued on next page (footnotes at end of table)

^{123}Sb(γ,γ') 2002Br05,1973Bo12,1978Be45 (continued)

$\gamma(^{123}Sb)$ (continued)

E_γ[†]	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Comments
3294.1 *3*	100[&]	3294.2		0.0	7/2$^+$	
3331.9 *5*		3331.9		0.0	7/2$^+$	
3351.7 *6*		3351.7		0.0	7/2$^+$	
3385.6 *7*		3385.7		0.0	7/2$^+$	
3399.6 *9*		3399.7		0.0	7/2$^+$	
3412.2 *10*		3412.3		0.0	7/2$^+$	
3418.2 *10*		3418.3		0.0	7/2$^+$	
3427.5 *9*		3427.6		0.0	7/2$^+$	
3476.1 *6*		3476.2		0.0	7/2$^+$	
5236[#] *3*	5[#] *2*	6417.6	9/2	1181.5	11/2	
5248[#] *3*	4[#] *3*	6760.3	7/2	1513.5	7/2	
5329[#] *3*	4[#] *3*	6417.6	9/2	1088.8	9/2	
5362[@] *3*	2[@] *3*	6874.7	7/2	1513.5	7/2	
5386[#] *3*	26[#] *3*	6417.6	9/2	1030.5	9/2	A_2=−0.14 *11*.
5498[#] *3*	9[#] *2*	6760.3	7/2	1262.5		
5612[@] *3*	8[@] *3*	6874.7	7/2	1262.5		
5651[@] *3*	23[@] *4*	7163.8	7/2	1513.5	7/2	A_2=+0.40 *20*.
5728[#] *3*	22[#] *4*	6760.3	7/2	1030.5	9/2	A_2=−0.06 *13*.
5901[@] *3*	8[@] *3*	7163.8	7/2	1262.5		
5973[@] *3*	15[@] *3*	7309.6	9/2	1336		
6128[@] *3*	65[@] *3*	7309.6	9/2	1181.5	11/2	A_2=+0.01 *3*.
6221[@] *3*	14[@] *3*	7309.6	9/2	1088.8	9/2	A_2=−0.19 *9*.
6278[@] *3*	27[@] *3*	7309.6	9/2	1030.5	9/2	A_2=−0.22 *8*.
6418[#] *3*	138[#] *2*	6417.6	9/2	0.0	7/2$^+$	A_2=+0.09 *3*.
6600[#] *3*	69[#] *3*	6760.3	7/2	160.3	5/2$^+$	A_2=−0.14 *4*.
6714[@] *3*	3[@] *2*	6874.7	7/2	160.3	5/2$^+$	
6760[#] *3*	100[#]	6760.3	7/2	0.0	7/2$^+$	A_2=+0.17 *4*.
6874[@] *3*	32[@] *3*	6874.7	7/2	0.0	7/2$^+$	A_2=+0.19 *13*.
7003[@] *3*	96[@] *4*	7163.8	7/2	160.3	5/2$^+$	
7163[@] *3*	78[@] *3*	7163.8	7/2	0.0	7/2$^+$	A_2=−0.17 *4*.
7310[@] *3*	100[@]	7309.6	9/2	0.0	7/2$^+$	A_2=+0.06 *3*.

[†] From 2002Br05, unless noted otherwise. Note that Eγ values of many g.s. transitions, which are assumed as the only transitions from parent levels, are not explicitly given in 2002Br05. For those transitions, Eγ values are deduced by the evaluator from level energies in 2002Br05 (obtained from g.s. transition energies as stated in 2002Br05) with de-correction for recoil.

[‡] From 1973Bo12.

[#] γ rays depopulate the E(levels) photoexcited by V(n,γ) source in 1978Be45. Relative to I(6760γ)=100.

[@] γ rays depopulate the E(levels) photoexcited by Ti(n,γ) source in 1978Be45. Relative to I(7310γ)=100.

[&] Relative intensities from each level (2002Br05).

^{123}Sb(γ,γ′) 2002Br05,1973Bo12,1978Be45

Level Scheme

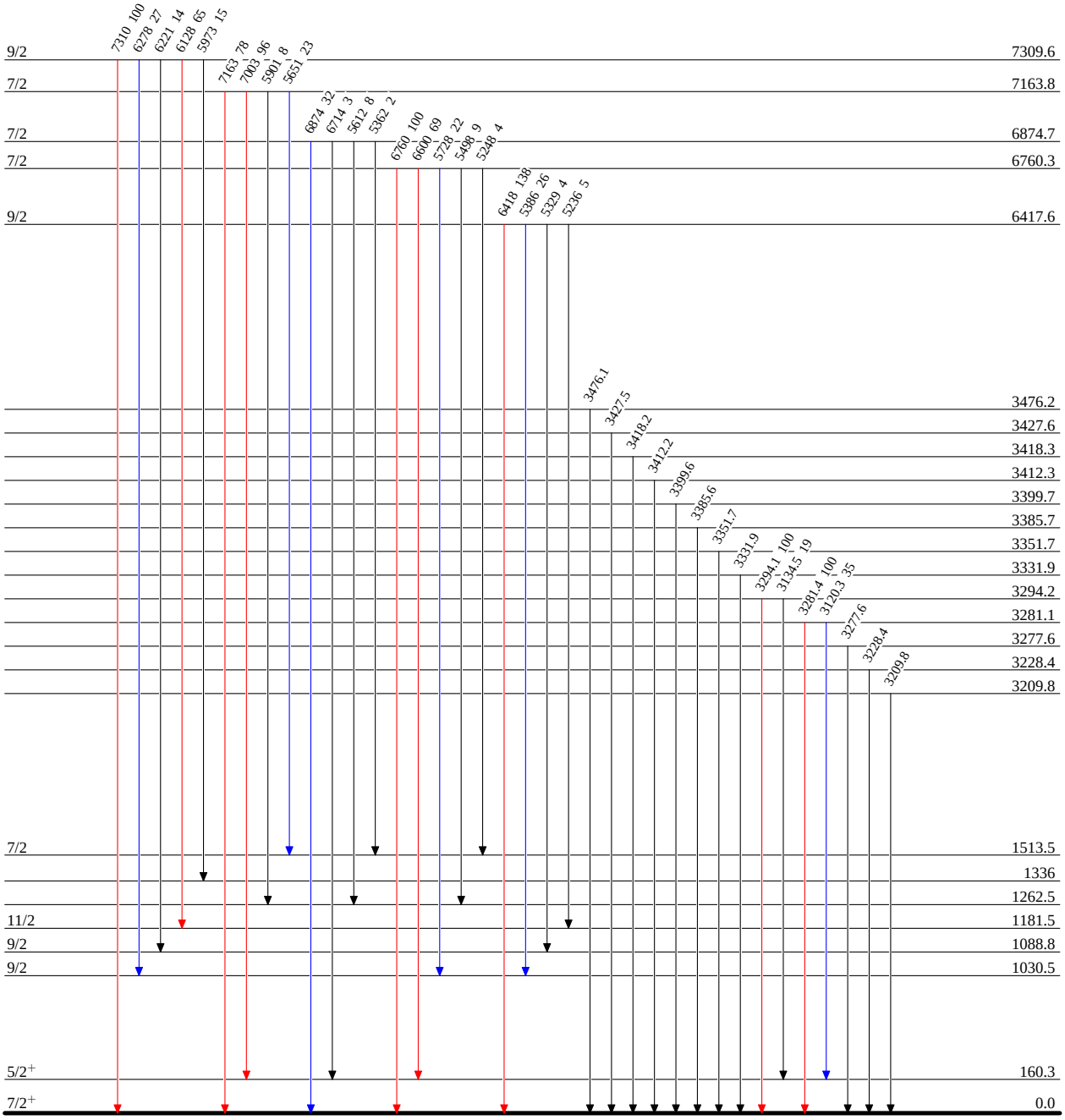
Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

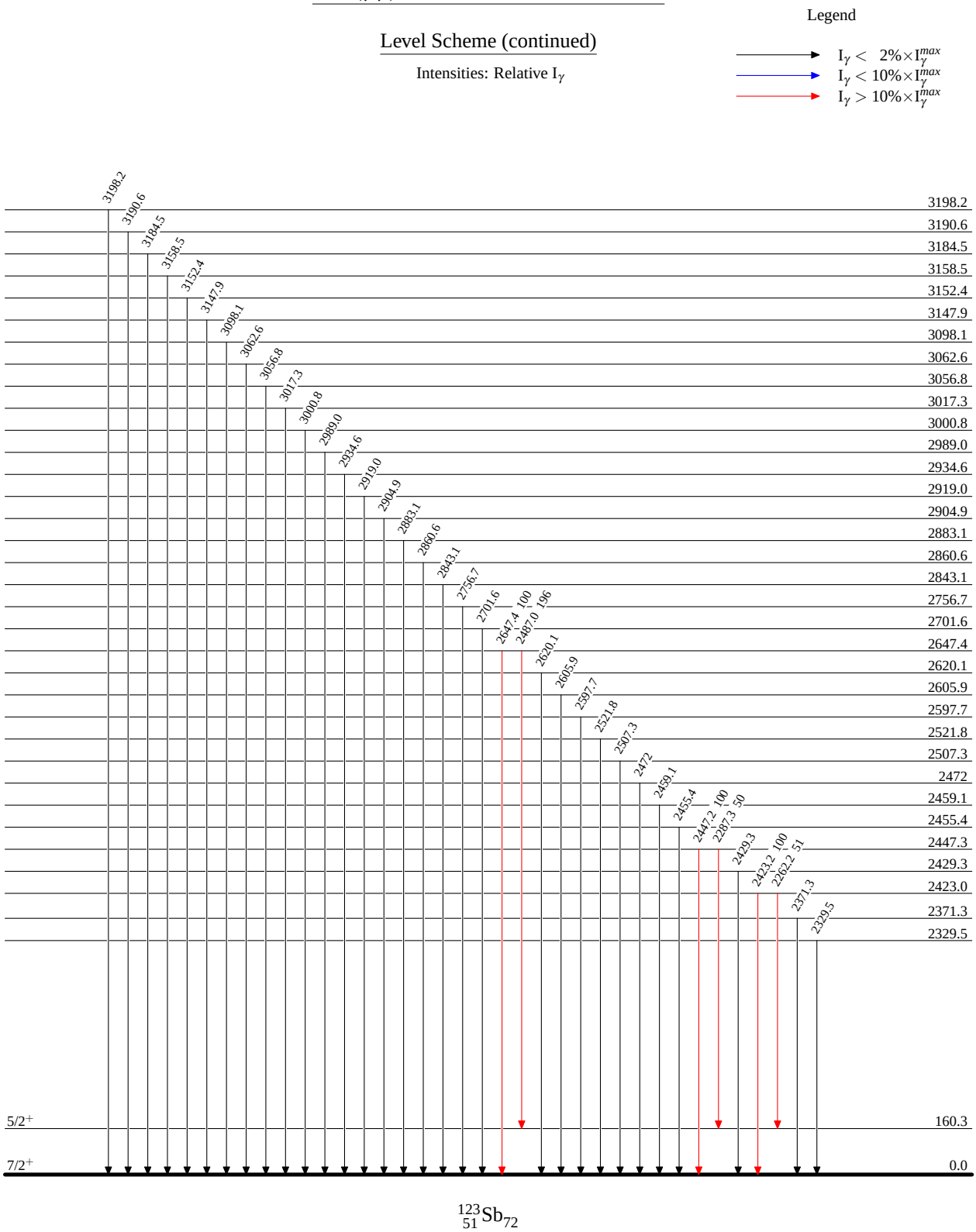


$^{123}_{51}Sb_{72}$

^{123}Sb(γ,γ′) 2002Br05,1973Bo12,1978Be45

Level Scheme (continued)

Intensities: Relative I_γ

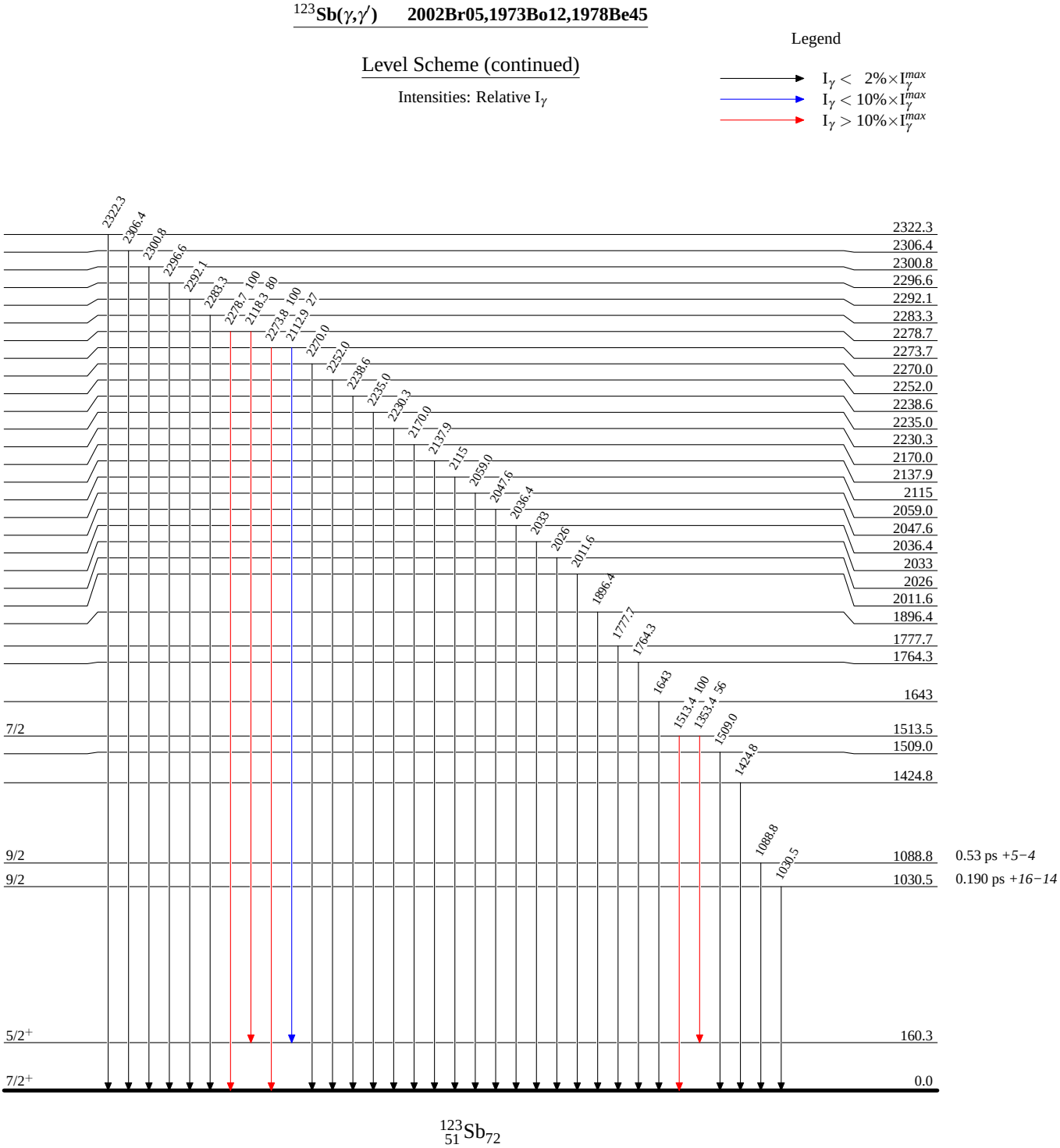


$^{123}_{51}Sb_{72}$

^{123}Sb(γ,γ′) 2002Br05,1973Bo12,1978Be45

Level Scheme (continued)

Intensities: Relative I_γ



$^{123}_{51}Sb_{72}$

^{123}Sb(n,n′γ) 1978AhZX,1979Ho28

1978AhZX: E=0.12-3.4 MeV fast neutron beams were produced from the reactor at the Baghdad Nuclear Research Institute. γ rays were detected with a 30 cm^3 Ge(Li) detector. Measured Eγ, Iγ. Deduced levels.

1979Ho28: E=1.5-2.7 MeV neutron beams were produced by ^{3}H(p,n) with proton beams at the Nuclear Research Centre of the University of Alberta, Canada. γ rays were detected with two Ge(Li) detectors. Measured Eγ, Iγ, γ(θ). Deduced levels, J, γ-ray mixing ratios. Comparisons with theoretical calculations.

1971Ba47: E=0.6-1.9 MeV neutron beams were produced via ^{7}Li(p,n), ^{3}H(p,n) with proton beams from the Atomic Energy Board 3-MeV Van de Graaff accelerator, South Africa. Natural target. γ rays were detected with a 40 cm^3 Ge(Li) detector. Measured Eγ, Iγ. Deduced levels. Comparisons with available data and theoretical calculations.

Others: 1967NaZX (E(n)=0.4-2.8 MeV), 1972LaZA (E(n)=8 and 8.8 MeV), 1979HaZS (E(n)=3 MeV; measured σ).

The level scheme is that proposed by 1971Ba47 and 1978AhZX, unless otherwise noted.

^{123}Sb Levels

E(level)†	Jπ‡	Comments
0.0	7/2$^+$	
160.34 *22*	5/2$^+$	
542.12 *18*	(3/2)$^+$	
712.4 *3*	1/2$^+$	
1030.3 *3*	9/2$^+$	Jπ: spin=9/2 (favored) or 11/2 (0.13% confidence) from γ(θ) in 1979Ho28.
1088.7 *4*	11/2$^+$	Jπ: (9/2,11/2) from γ(θ) in 1979Ho28.
1181.5 *5*	(5/2,7/2)	
1261.3 *3*	(9/2$^+$)	
1337.5 *3*	7/2$^+$,9/2$^+$	Jπ: 9/2 from γ(θ) in 1979Ho28.
1509.7 *6*	(5/2)$^+$	
1514.6 *12*	7/2	
1575.5 *6*	3/2$^+$,5/2$^+$	
1585.8? *7*		

† From a least-squares fit to γ-ray energies.

‡ From Adopted Levels. Assignments and arguments from this study are given in comments, where available.

γ(^{123}Sb)

Eγ†	Iγ†	Ei(level)	Jiπ	Ef	Jfπ	Mult.‡	δ‡	Comments
160.9 *10*	100 *34*	160.34	5/2$^+$	0.0	7/2$^+$			Eγ: from 1971Ba47. Other: 160.33 used for calibration in 1978AhZX.
381.79 *15*	15.3 *11*	542.12	(3/2)$^+$	160.34	5/2$^+$			Eγ: weighted average of 381.78 *15* (1978AhZX), 381.8 *2* (1979Ho28), and 382.1 *10* (1971Ba47).
542.1 *2*	7.2 *8*	542.12	(3/2)$^+$	0.0	7/2$^+$			Eγ: others: 542.1 *2* (1979Ho28), 542.5 *10* (1971Ba47). Iγ: others: I(542.1γ)/I(381.8γ)=40/60 (1979Ho28), 42/58 (1971Ba47).
552.1 *2*	3.9 *6*	712.4	1/2$^+$	160.34	5/2$^+$			Eγ: weighted average of 552.0 *3* (1978AhZX), 552.2 *2* (1979Ho28), and 552.5 *10* (1971Ba47).
1021.2 *4*	9.4 *22*	1181.5	(5/2,7/2)	160.34	5/2$^+$			Eγ: weighted average of 1019.8 *8* (1978AhZX), 1021.3 *3* (1979Ho28), and 1022.0 *10* (1971Ba47).
1030.3 *3*	28 *3*	1030.3	9/2$^+$	0.0	7/2$^+$	D+Q	−1.6 *15*	Eγ: weighted average of 1030.1 *3* (1978AhZX), 1030.5 *3* (1979Ho28), and 1030.4 *10* (1971Ba47). δ: from −3.1 to −0.16 for J=9/2 (1979Ho28).
1088.7 *4*	20.0 *14*	1088.7	11/2$^+$	0.0	7/2$^+$			Eγ: weighted average of 1088.8 *4* (1979Ho28)

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^{123}Sb(n,n′γ) 1978AhZX,1979Ho28 (continued)

γ(^{123}Sb) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Comments
						and 1088.4 *10* (1971Ba47). Other: 1088.64 used for calibration in 1978AhZX.
						δ: 0.32 to 6.3 if J=9/2 (1979Ho28).
1101.0 *3*	<18.6	1261.3	(9/2$^+$)	160.34	5/2$^+$	E_γ: weighted average of 1101.1 *3* (1978AhZX), 1100.2 *6* (1979Ho28), 1102.0 *10* (1971Ba47).
						I_γ: from Iγ=16.4 *22* including γ ray from ^{121}Sb.
1176.8 *6*	<4.1	1337.5	7/2$^+$,9/2$^+$	160.34	5/2$^+$	E_γ: weighted average of 1176.5 *5* (1979Ho28) and 1178.0 *10* (1971Ba47). Other: 1179.0 (composite peak, 1978AhZX).
						I_γ: from 3.3 *8* for a composite peak in 1978AhZX. Others: I(1176.8γ)/I(1337.5γ)=21/79 (1979Ho28), 27/72 (1971Ba47).
1261.0 *5*	3.9 *6*	1261.3	(9/2$^+$)	0.0	7/2$^+$	E_γ: other: 1262.0 *20* (1971Ba47).
1337.6 *3*	9.2 *8*	1337.5	7/2$^+$,9/2$^+$	0.0	7/2$^+$	E_γ: weighted average of 1337.5 *3* (1978AhZX), 1337.8 *5* (1979Ho28), and 1338.0 *20* (1971Ba47).
						δ: >28 or <0.18 if J=9/2 (1979Ho28).
1350.0 *20*	<5.0	1509.7	(5/2)$^+$	160.34	5/2$^+$	E_γ: from 1971Ba47. Others: 1352.4 (composite peak, 1978AhZX); in Fig 1 of 1979Ho28 a composite peak is seen around this energy but not reported by the authors.
						I_γ: from 4.2 *8* for a composite peak (1978AhZX). Other: I(1350.0γ)/I(1509.6γ)=34/66 (1971Ba47).
1425.5# *6*	3.1 *6*	1585.8?		160.34	5/2$^+$	E_γ,I_γ: energy and placement from 1979Ho28, intensity from 1978AhZX for the 1425.8 *8* assigned to ^{121}Sb by 1978AhZX.
1509.6 *6*	4.2 *8*	1509.7	(5/2)$^+$	0.0	7/2$^+$	E_γ: others: 1510.6 *20* (1971Ba47); a composite peak of 1509+1515+1519 is shown in Fig 1 of 1979Ho28, but 1509γ is assigned to ^{121}Sb by the authors.
1514.6 *12*		1514.6	7/2	0.0	7/2$^+$	E_γ: from 1979Ho28, for a composite peak of 1509+1515+1519 shown in Fig 1.
1575.5 *6*	3.1 *6*	1575.5	3/2$^+$,5/2$^+$	0.0	7/2$^+$	E_γ: others: 1575.4 *7* (1979Ho28), 1576.7 *20* (1971Ba47).

† From 1978AhZX, unless otherwise noted. Intensities have been re-normalized to I(160.33γ)=100 *34*, from its original value of 360 *120* in 1978AhZX normalized to Iγ=100 for 909.77γ in ^{121}Sb. Eγ=160.33, 1088.64 in ^{123}Sb together with Eγ=573.08 from ^{121}Sb were used for energy calibration of the γ spectrum by 1978AhZX.

‡ From γ(θ) (1979Ho28).

Placement of transition in the level scheme is uncertain.

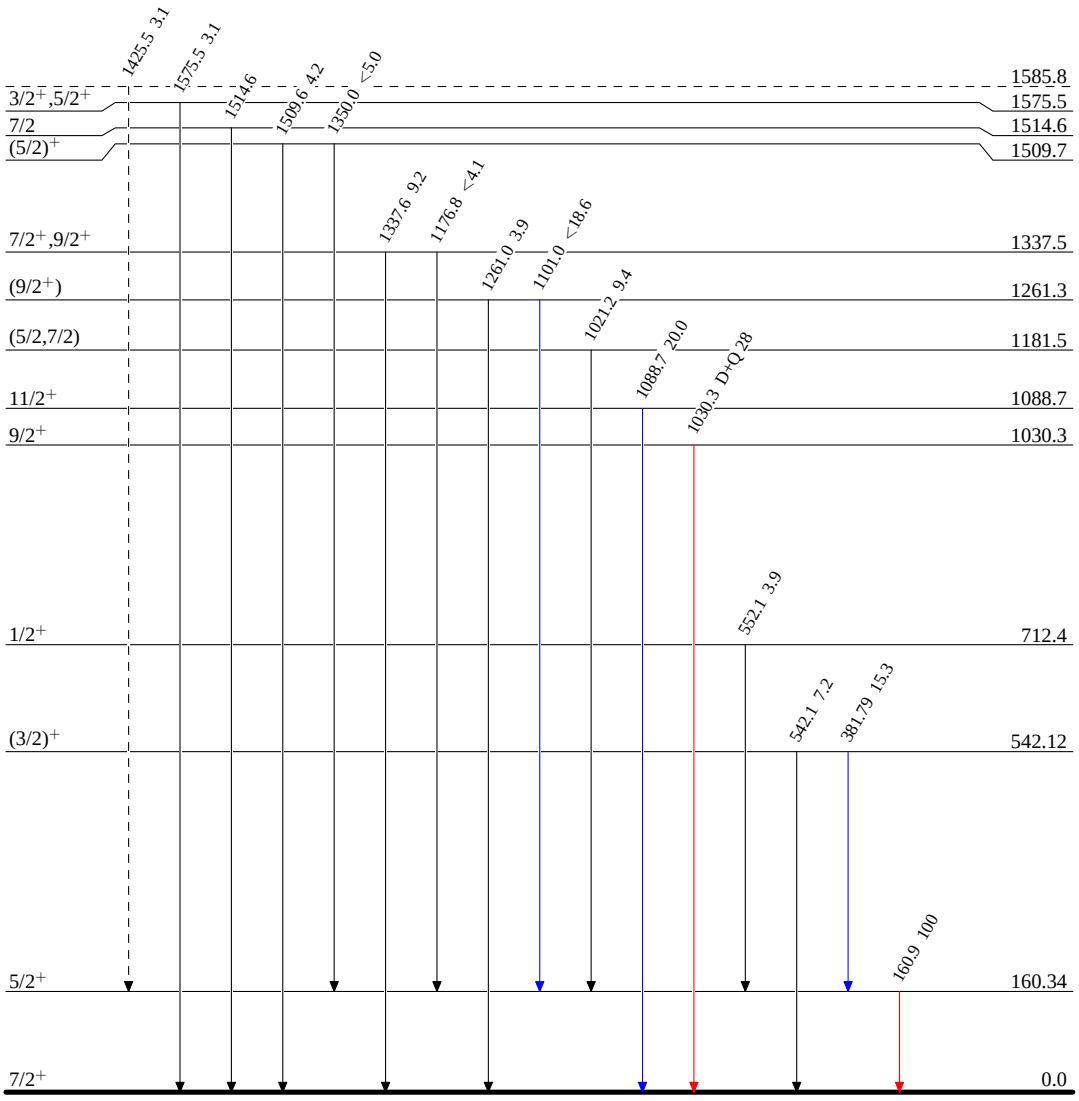
^{123}Sb(n,n′γ) 1978AhZX,1979Ho28

Level Scheme

Intensities: Relative I_γ

Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)



$^{123}_{51}Sb_{72}$

^{123}Sb(d,d′) 1966Ba45,1967Hj04

1966Ba45: E=12 MeV deuteron beam was produced from the tandem accelerator at the Niels Bohr Institute. Target was 100 μg/cm^2 98% enriched carbon-backed ^{123}Sb. Reaction products were momentum-analyzed with a magnetic spectrograph. Measured $\sigma(E_d,\theta)$, at θ=90°, 105°, 125°. Deduced levels.

1967Hj04; E=15 MeV beam on 98% enriched target. Reaction products were momentum-analyzed with a magnetic wedge spectrograph (FWHM=30-50 keV). Measured $\sigma(E_d,\theta)$ at θ=45°, 60°. Deduced levels.

^{123}Sb Levels

E(level)[†]	Relative σ[#]	E(level)[†]	Relative σ[#]	E(level)[†]	E(level)[†]
0.0	4500	1258 *5*		2200 *30*	2750? *30*
160 *5*	5	1510 *5*	15	2270 *30*	2860[‡] *30*
541 *5*	18	1653 *5*		2380? *30*	3000[‡] *30*
1029 *5*	85	1750 *30*		2440? *30*	
1087 *5*	57	1810 *30*		2580 *30*	
1181 *5*	5	2070 *30*		2690? *30*	

[†] E(levels)≤1653 keV are from 1966Ba45; E(levels)≥1750 keV are from 1967Hj04 and appear to be systematically higher by 20-30 keV.

[‡] Probable multiplet.

[#] From 1966Ba45, measured at θ=125°.

^{124}Te(t,α) 1973Co33

$J^{\pi}(^{124}Te\ g.s.)=0^{+}$.

1973Co33: E=12 MeV triton beam was produced from the Aldermaston tandem accelerator. Target was 100 μg/cm^2 83.7% enriched ^{124}Te on a 20 μg/cm^2 carbon backing. Reaction products were momentum-analyzed with a multi-angle spectrograph (FWHM≈30 keV). Measured $\sigma(E_\alpha,\theta)$ at θ=12.5°−175°. Deduced levels, L-transfers, spectroscopic factors from DWBA analysis. Comparisons with available data.

Others: 1980Sh03 (E=16 MeV), 1972Ca41 (E=11.8 MeV).

^{123}Sb Levels

E(level)	L	C^{2}S[†]	Comments
0.0	4	1.45	C^{2}S: other: 1.59 (1980Sh03).
144 *10*	2	0.28	C^{2}S: other: 0.22 (1980Sh03).
528 *10*	2	0.22	C^{2}S: other: 0.14 (1980Sh03).
705 *10*	0	0.04	
1262 *10*			
1324 *10*	4	1.60	
1649 *10*			
1729 *10*	1	0.91	
1884 *10*	1	0.85	
2105 *10*			
2184 *10*			
2235 *10*	1	0.18,0.15	
2296 *10*			
2378 *10*			
2441 *10*			
2506 *10*			
2636 *10*	4	1.09	
2799 *10*			
2915 *10*	4	0.40	
2982 *10*			
3178 *10*	4	0.48	
3327 *10*	1	0.12,0.10	

[†] DWBA analysis was made by using local and zero-range approximations (1973Co33). Spectroscopic factors C^{2}S are relative values, normalizing sum(C^{2}S)=2 with the assumption that Te isotopes are represented by two protons above Z=50 core distributed along the $1g_{7/2}$, $2d_{5/2}$, $2d_{3/2}$, $3s_{1/2}$ and $1h_{11/2}$ orbitals; C^{2}S deduced assuming $2p_{1/2}$ (1729), $2p_{3/2}$ (1884) and $2p_{1/2}$,$2p_{3/2}$ (2235,3327); $2d_{3/2}$ (528), $2d_{5/2}$ (144); $1g_{7/2}$ (g.s.), $1g_{9/2}$ single-particle orbits for L=1; 2; 4 transfer, respectively.

^{176}Yb(^{31}P,Xγ) 2005Po03

Also includes ^{238}U(^{12}C,Xγ) for measuring $T_{1/2}$ of isomers in 2005Po03.

2005Po03: E=152 MeV ^{31}P beam was produced from the Vivitron accelerator of IReS at Strasbourg. Target was 1.5 mg/cm^2 ^{176}Yb on a 15 mg/cm^2 Au backing. γ rays were detected with the EUROBALL IV spectrometer consisting of an inner ball of 210 BGO crystals, 15 Cluster Ge detectors in the backward hemisphere, 26 Clover Ge detectors around 90°, and 30 tapered single-crystal Ge detectors at forward angles, with each Cluster detector consisting of seven closely packed large-volume Ge crystals and each Clover detector consisting of four smaller Ge crystals. Measured Eγ, Iγ, $\gamma\gamma$-coin. Deduced levels, J, π, band structures, configurations. Systematics of neighboring Sb isotopes.

The isomeric state in the fission fragment ^{123}Sb was identified using a fission fragment detector to trigger the EUROBALL III array and isolate the delayed γ-ray cascades in the ^{238}U(^{12}C,Xγ) reaction at 90 MeV. Fragments escaping from the target were stopped in the heavy-ion detector, SAPhIR, consisting of 32 photovoltaic modules laying in four rings around the target. The EUROBALL III time window was 1 μs, allowing detection of delayed γ-rays emitted during the de-excitation of the isomeric state.

^{123}Sb Levels

E(level)[†]	J$^\pi$[#]	$T_{1/2}$	Comments
0.0[&]	7/2$^+$		
160.16 *18*	5/2$^+$		
1030.07 *24*	9/2$^+$		
1088.52[&] *24*	11/2$^+$		
1260.49 *22*	9/2$^+$		
1655.74 *23*	(11/2$^-$)		Configuration=(πd$_{5/2}\otimes$3$^-$)$\otimes$(πh$_{11/2}$).
2036.7 *3*	(15/2$^-$)		
2043.9[&] *4*	(15/2$^+$)		Configuration=πg$_{7/2}\otimes$4$^+$.
2237.1[@] *4*	(19/2$^-$)	110 ns *10*	$T_{1/2}$: from γ(t) (2005Po03).
2485.6[&] *6*	(19/2$^+$)		
2612.6[&] *8*	(21/2$^+$)		J$^\pi$: (23/2$^+$) from Adopted Levels.
2734.4[@] *5*	(21/2$^-$)		
2967.6[&] *8*	(23/2$^+$)		
3347.9[@] *5*	(23/2$^-$)		
3786.0?[‡@] *6*	(25/2$^-$)		
4024.5[@] *6*	(27/2$^-$)		
4391.9?[‡@] *7*			
4772.2[@] *8*			

[†] From a least-squares fit to γ-ray energies.

[‡] Since the ordering of the 380-367 and 238-438 cascades is not well established, energies of 4392 and 3786 levels can be different.

[#] As proposed by 2005Po03 based on band assignments, analogy with the level structures of the lighter Sb isotopes, and known assignments of low-lying states.

[@] Band(A): Band based on (19/2$^-$). Possible configuration=πg$_{7/2}\nu$h$_{11/2}\nu$d$_{3/2}$ coupled to quadrupole vibration. Higher spins (J>29/2) the configuration may become πg$_{7/2}\nu$h$^3_{11/2}\nu$d$_{3/2}$ (2005Po03).

[&] Band(B): γ-cascade based on g.s. high-spin members (19/2 to 23/2) may be from πg$_{9/2}\otimes\nu$h$^2_{11/2}$ configuration in analogy with odd-A In isotopes (2005Po03).

^{176}Yb(^{31}P,Xγ) 2005Po03 (continued)

$\gamma(^{123}Sb)$

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.
127.0 *5*	5 *2*	2612.6	$(21/2^+)$	2485.6	$(19/2^+)$	
160.1	15 *4*	160.16	$5/2^+$	0.0	$7/2^+$	
200.4 *2*	73 *15*	2237.1	$(19/2^-)$	2036.7	$(15/2^-)$	[E2][#]
238.5[‡] *3*	12 *4*	4024.5	$(27/2^-)$	3786.0?	$(25/2^-)$	
367.4[‡] *4*	11 *4*	4391.9?		4024.5	$(27/2^-)$	
380.3[‡] *4*	11 *4*	4772.2		4391.9?		
381.0 *2*	100 *15*	2036.7	$(15/2^-)$	1655.74	$(11/2^-)$	
395.2 *2*	22 *5*	1655.74	$(11/2^-)$	1260.49	$9/2^+$	
438.1[‡] *3*	12 *4*	3786.0?	$(25/2^-)$	3347.9	$(23/2^-)$	
441.7 *4*	12 *4*	2485.6	$(19/2^+)$	2043.9	$(15/2^+)$	
482.0 *5*	3 *1*	2967.6	$(23/2^+)$	2485.6	$(19/2^+)$	
497.2 *3*	19 *5*	2734.4	$(21/2^-)$	2237.1	$(19/2^-)$	
567.3 *3*	12 *3*	1655.74	$(11/2^-)$	1088.52	$11/2^+$	
613.4 *3*	12 *3*	3347.9	$(23/2^-)$	2734.4	$(21/2^-)$	
625.7 *3*	63 *12*	1655.74	$(11/2^-)$	1030.07	$9/2^+$	
676.8 *5*	6 *3*	4024.5	$(27/2^-)$	3347.9	$(23/2^-)$	
955.4 *3*	25 *6*	2043.9	$(15/2^+)$	1088.52	$11/2^+$	
1030.1 *3*	63 *9*	1030.07	$9/2^+$	0.0	$7/2^+$	
1088.6 *3*	37 *5*	1088.52	$11/2^+$	0.0	$7/2^+$	
1100.2 *3*	15 *4*	1260.49	$9/2^+$	160.16	$5/2^+$	
1110.8 *4*	13 *4*	3347.9	$(23/2^-)$	2237.1	$(19/2^-)$	
1260.5 *4*	7 *2*	1260.49	$9/2^+$	0.0	$7/2^+$	

[†] From 2005Po03.

[‡] The ordering of the γ cascades 380-367 and 238-438 is not precisely determined due to the similarity in the relative γ-ray intensities of the respective transitions in the two cascades.

[#] Isomer half-life is consistent with mult(200.4γ)=E2. The transition is assigned as $(19/2^-)$–>$(15/2^-)$ in analogy with similar transitions in ^{119}Sb and ^{121}Sb.

^{176}Yb(^{31}P,Xγ) 2005Po03

Level Scheme

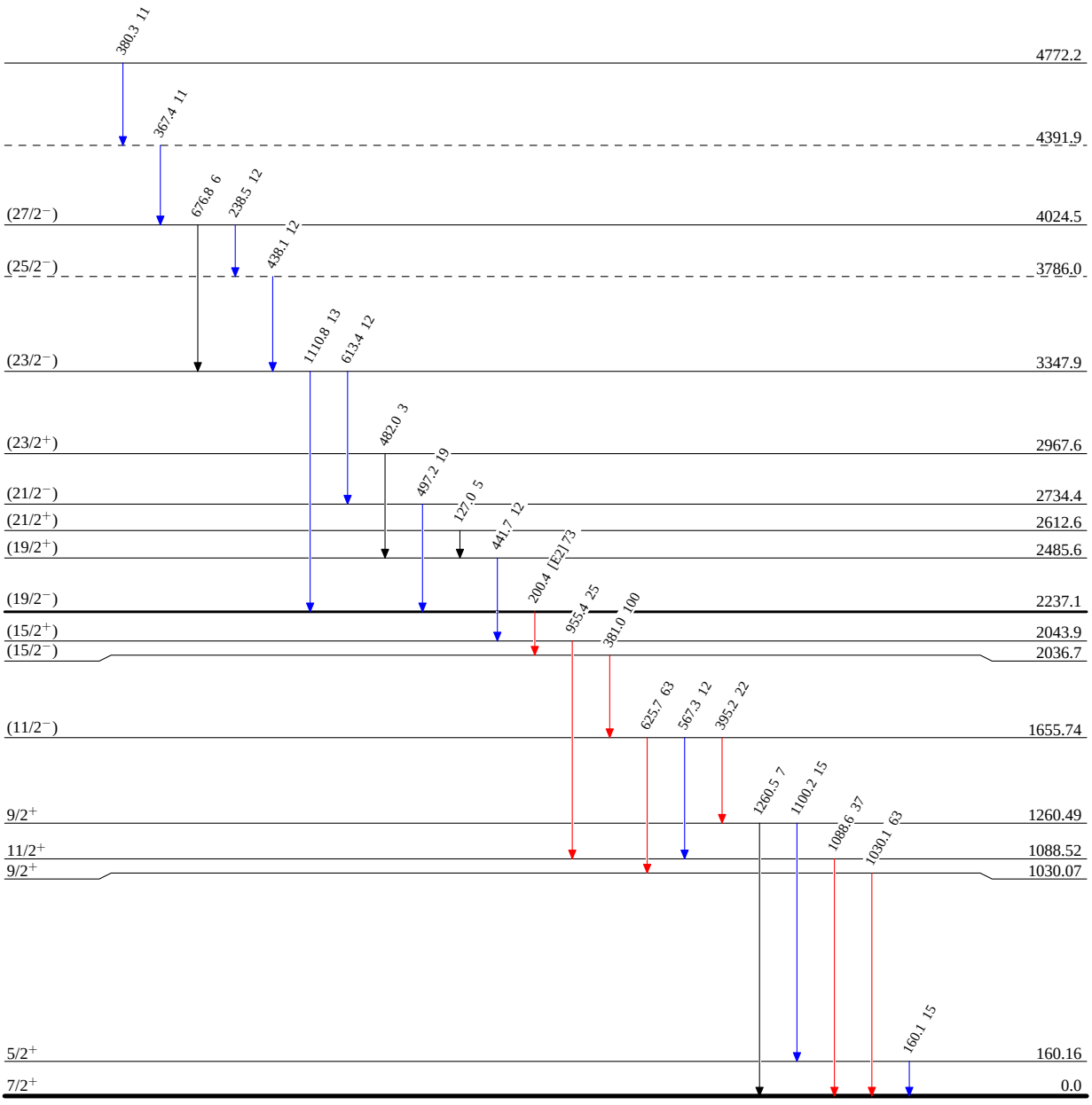
Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

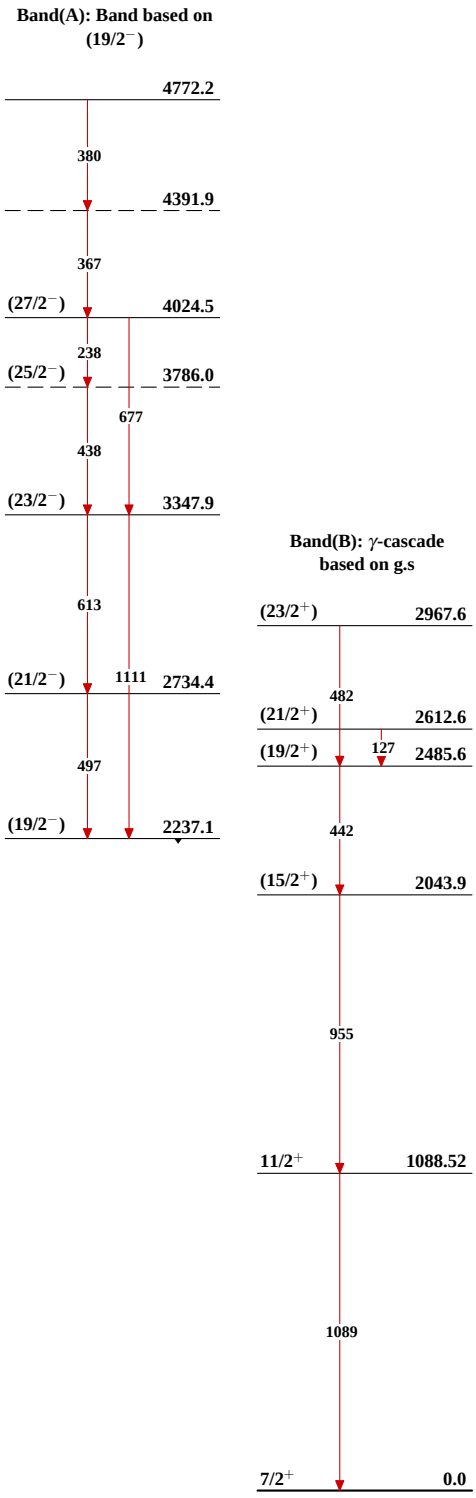
$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$



$^{123}_{51}Sb_{72}$

^{176}Yb(^{31}P,Xγ) 2005Po03



$^{123}_{51}Sb_{72}$

Coulomb excitation 1975An16,1989Ja13,1977Ku23

1975An16: (^{12}C,^{12}C′) E=37 MeV, (α,α′) E=12 MeV at the Ioffe Physical-technical Institute. γ rays were detected with Ge(Li) detectors. Measured Eγ, Iγ, $\gamma(\theta)$, Doppler shift attenuation. Deduced levels, $T_{1/2}$, γ-ray mixing ratios, transition strengths.

1989Ja13: (p,p′) E=3.0-4.0 MeV proton beams were produced from the Variable Energy Cyclotron at Panjab University. Target was pure antimony. γ rays were detected with a HPGe detector. Measured Eγ, $\gamma(\theta)$, γ-ray yields. Deduced levels, J, π, γ-ray branching ratios, transition strengths. Comparisons with available data and theoretical calculations.

1977Ku23: (α,α′) E=5.0-5.5 MeV, (p,p′) E=2.4-4.5 MeV. Alpha and proton beams were produced from the 5.5 MeV Van de Graaff accelerator at the Bhabha Atomic Research Centre. Target was natural metallic antimony. γ rays were detected with a Ge(Li) detector. Measured Eγ, Iγ, $\gamma(\theta)$, γ-ray yields. Deduced levels, J, π, transition strengths. Comparisons with available data.

1966Ba45: (^{16}O,^{16}O′) E=45 MeV ^{16}O beam was produced from the tandem accelerator at the Niels Bohr Institute. Target was 100 μg/cm^2 98% enriched carbon-backed ^{123}Sb. γ rays were detected with a Ge(Li) detector and NaI(Tl) detectors. Measured Eγ, γ-ray yields. Deduced levels, J, π, γ-ray transition strengths.

1969Ga25: (^{14}N,^{14}N′) E=43.5 MeV at the cyclotron laboratory of the Physical-technical Institute (FTI). γ rays were detected with a Ge(Li) detector. Measured Eγ, Iγ, γ-ray yields. Deduced transition strengths.

Others: 1973Re08 (quoted B(E2)↑ values from an unpublished work), 1964Al28, 1961An07.

^{123}Sb Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	Comments
0.0	7/2$^+$	stable	
160.29 *14*	5/2$^+$	0.61 ns *4*	B(E2)↑=0.0034 *6* J$^\pi$: spin=5/2 supported by $\gamma(\theta)$ in 1977Ku23. $T_{1/2}$: from Adopted Levels. B(E2)↑: unweighted average of 0.0043 *7* (1966Ba45), 0.0023 *8* (1969Ga25), 0.0046 *4* (1977Ku23), and 0.0023 *4* (1989Ja13). Other: 0.005 (1973Re08).
541.90 *10*	(3/2)$^+$	5.3 ps *+12−10*	B(E2)↑=0.033 *3* $T_{1/2}$: from B(E2)↑=0.033 *3*, adopted branching=29% *3* for 541.9γ. B(E2)↑: weighted average of 0.040 *3* (1975An16), 0.028 *4* (1966Ba45), 0.028 *6* (1969Ga25), and 0.030 *3* (1989Ja13). Other: 0.036 (1973Re08).
1030.40 *20*	9/2$^+$	90 fs *35*	B(E2)↑=0.073 *4* J$^\pi$: spin=11/2 from $\gamma(\theta)$ in 1977Ku23 is considered questionable by the evaluator. $T_{1/2}$: from DSAM in 1975An16. Value from Adopted Levels is 190 fs *+16−14*. B(E2)↑: weighted average of 0.073 *9* (1975An16), 0.08 *1* (1966Ba45), 0.090 *20* (1969Ga25), 0.0700 *45* (1977Ku23). Others: 0.0196 *30* (1989Ja13) seems discrepant; 0.084 (1973Re08).
1088.61 *20*	11/2$^+$	0.45 ps *11*	B(E2)↑=0.055 *11* J$^\pi$: spin=9/2 from $\gamma(\theta)$ in 1977Ku23, but 11/2 from $\gamma(\theta)$ in 1989Ja13. $T_{1/2}$: from DSAM in 1975An16. Value from Adopted Levels is 0.52 ps *+5−4*. B(E2)↑: unweighted average of 0.076 *8* (1975An16), 0.07 *1* (1966Ba45), 0.042 *9* (1969Ga25), 0.0300 *28* (1977Ku23). Other: 0.0206 *30* (1989Ja13) is discrepant with all other values; 0.087 (1973Re08).
1182.0 *4*	(5/2,7/2)		B(E2)↑=0.0084 *8* J$^\pi$: spin=(5/2,7/2) from $\gamma(\theta)$ in 1977Ku23. B(E2)↑: weighted average of 0.0085 *8* (from 1181γ yield in 1977Ku23) and 0.008 *2* (from yield of 1021.8γ in 1975An16).
1334.2 *8*	7/2$^+$,9/2$^+$		B(E2)↑=0.0081 *8* J$^\pi$: spin=5/2 from $\gamma(\theta)$ in 1977Ku23 is inconsistent. B(E2)↑: from 1977Ku23.

[†] From a least-squares fit to γ-ray energies, assuming $\Delta E\gamma$=1 keV where not available.

[‡] From Adopted Levels. Assignments from this studies are given in comments where available.

Coulomb excitation 1975An16,1989Ja13,1977Ku23 (continued)

$\gamma(^{123}Sb)$

Relative uncertainties of A_2 in 1977Ku23, as deduced from their measured W(0°)/W(90°) ratios, are too small compared to those of the ratios. The evaluator has re-deduced those uncertainties of A_2 from uncertainties of W(0°)/W(90°) and given them in comments.

Mixing ratios are reported in 1977Ku23 for 160γ, 1030γ, 1089γ, 1173γ, 1183γ, and 1335γ (given in comments), but considered questionable by the evaluator since they are significantly different from those in other studies and cannot be reproduced from their A_2 values.

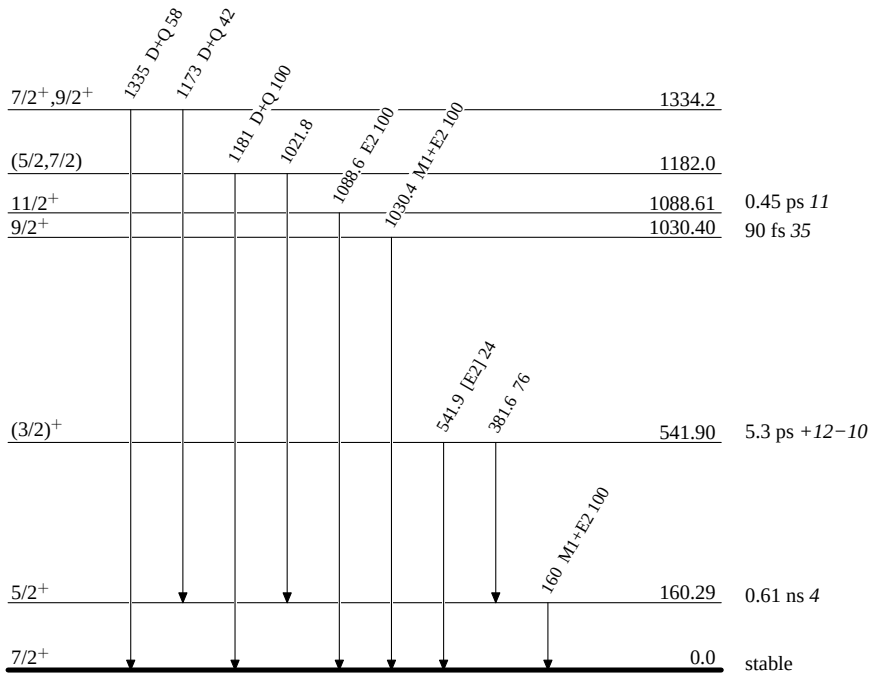
E_i(level)	J_i^π	E_γ †	I_γ ‡	E_f	J_f^π	Mult.#	δ	Comments
160.29	$5/2^+$	160	100	0.0	$7/2^+$	M1+E2	−0.10 *6*	E_γ: from 1966Ba45. Mult.,δ: from $\gamma(\theta)$ in 1964Al28; M2 ruled out by RUL. Other: δ(Q/D)=+0.86 *7* from $\gamma(\theta)$ in 1977Ku23. A_2=−0.153 *8* (1977Ku23); re-calculated by the evaluator: −0.154 *+166−176*.
541.90	$(3/2)^+$	381.6 *1*	76 *1*	160.29	$5/2^+$			
		541.9 *1*	24 *1*	0.0	$7/2^+$	[E2]		I_γ: other: I(542γ)/I(382γ)=36/64 (1975An16).
1030.40	$9/2^+$	1030.4 *2*	100	0.0	$7/2^+$	M1+E2	−0.54 *5*	Mult.: from Adopted Gammas. δ: deduced (by the evaluator) from B(E2)↑=0.073 *4* and adopted $T_{1/2}$(1030)=190 fs *+16−14*. Other: from their $\gamma(\theta)$ data, 1977Ku23 report $\delta=\infty$, which is considered questionable by the evaluator. A_2=+0.170 *11* (1977Ku23); re-calculated: +0.171 *+49−51*.
1088.61	$11/2^+$	1088.6 *2*	100	0.0	$7/2^+$	E2		Mult.: from $\gamma(\theta)$ in 1989Ja13 and RUL. A_2=+0.175 *21* from 1989Ja13 giving $\Delta J=2$ is significantly different from +0.015 *2* from 1977Ku23 (re-calculated=+0.015 *14*), from which 1977Ku23 report δ(Q/D)=+0.82 *7*.
1182.0	(5/2,7/2)	1021.8 *3*		160.29	$5/2^+$			E_γ: from 1975An16; not reported in 1977Ku23, a 1024γ assigned to ^{121}Sb by the authors.
		1181	100	0.0	$7/2^+$	D+Q		E_γ,I_γ: from 1977Ku23, not reported in 1975An16. Mult.,δ: 1977Ku23 report +0.39 *4* for J=5/2 and −0.039 *4* for J=7/2 from $\gamma(\theta)$. A_2=−0.101 *15* (1977Ku23); re-calculated: −0.101 *+59−62*.
1334.2	$7/2^+$,$9/2^+$	1173	42 *1*	160.29	$5/2^+$	D+Q		E_γ,I_γ,Mult.: from 1977Ku23, with Mult from $\gamma(\theta)$. 1977Ku23 report δ(Q/D)=−0.47 *5* for J=5/2. A_2=+0.023 *3* (1977Ku23); re-calculated: +0.023 *+65−69*.
		1335	58 *1*	0.0	$7/2^+$	D+Q		E_γ,I_γ,Mult.: from 1977Ku23, with Mult from $\gamma(\theta)$. 1977Ku23 report δ(Q/D)=−0.17 *2* for J=5/2. A_2=+0.120 *18* (1977Ku23); re-calculated: +0.120 *+67−72*.

† From 1975An16, unless otherwise noted.
‡ From 1977Ku23.
# From $\gamma(\theta)$ in 1977Ku23, unless otherwise noted.

Coulomb excitation 1975An16,1989Ja13,1977Ku23

Level Scheme

Intensities: % photon branching from each level



$^{123}_{51}Sb_{72}$

^{9}Be(^{238}U,Fγ) 2019Bi04

2019Bi04: E=6.2 MeV/nucleon ^{238}U beam was produced from at GANIL. Targets were 1.6μm and 5 μm thick ^{9}Be. Fragments were identified in atomic weight, atomic number and charge state (A,Z,q) using the VAMOS++ magnetic spectrometer, and detected using multiwire proportional counter (MWPC), two drift chambers, and a segmented ionization chamber. Prompt gamma rays were detected using AGATA γ-ray tracking array, consisting of 32 crystals, placed at 13.5 cm from the target position. The recoiling ions and the γ-ray emission angle were used to obtain the Doppler-corrected prompt γ rays (γ_P), on an event by-event basis. The delayed γ rays (γ_D) were detected by using seven EXOGAM HPGe Clover detectors. Measured Eγ, Iγ, (fragment)γ-coin, $\gamma\gamma$-coin in terms of three matrices the time range of 100 ns to 200 μs: γ_P-γ_P, γ_D-γ_D, and γ_P-γ_D. Deduced level energies, J^π, isomer half-lives, B(M1)/B(E2) ratios. Comparison with large-scale shell-model calculations.

^{123}Sb Levels

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$	Comments
0.0	7/2$^+$		
160.0 *10*	5/2$^+$		
1030.6 *10*	9/2$^+$		
1088.7 *10*	11/2$^+$		
1261.1 *10*	(9/2$^+$)		
1656.7 *10*	11/2$^-$		
2038.7 *14*	(15/2)$^-$		
2044.8 *13*	(15/2)$^+$		
2239.1 *17*	(19/2$^-$)	222 ns *23*	%IT=100 T$_{1/2}$: from (200γ)(fragment)(t) (2019Bi04), using one-component fit.
2486.4 *17*	(19/2)$^+$		
2614.6 *20*	(23/2$^+$)	66 μs *4*	%IT=100 T$_{1/2}$: from (128γ+442γ+956γ)(fragment)(t) (2019Bi04), using one-component fit.
3053.8 *22*	(25/2$^+$)[#]		
3297.9 *24*	(27/2$^+$)[#]		

[†] From a least-squares fit to γ-ray energies.
[‡] From Adopted Levels, unless otherwise noted.
[#] Proposed by 2019Bi04 based on decay pattern.

γ(^{123}Sb)

E$_\gamma$[†]	I$_\gamma$[†]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[#]	α[@]	Comments
128.2 *10*	29 *16*	2614.6	(23/2$^+$)	2486.4	(19/2)$^+$	(E2)	0.684	
159.8 *10*	63 *36*	160.0	5/2$^+$	0.0	7/2$^+$			
200.4 *10*	108 *57*	2239.1	(19/2$^-$)	2038.7	(15/2)$^-$	E2	0.144	
244.1[‡] *10*	78 *16*	3297.9	(27/2$^+$)	3053.8	(25/2$^+$)			I$_\gamma$: relative to 100 for 439.2γ from (25/2$^+$) level.
382.0 *10*	112 *54*	2038.7	(15/2)$^-$	1656.7	11/2$^-$			
395.4 *10*	44 *23*	1656.7	11/2$^-$	1261.1	(9/2$^+$)			
439.2[‡] *10*	100	3053.8	(25/2$^+$)	2614.6	(23/2$^+$)			I$_\gamma$: not relative to 100 for 1089γ.
441.6 *10*	32 *11*	2486.4	(19/2)$^+$	2044.8	(15/2)$^+$			
568.2 *10*	35 *17*	1656.7	11/2$^-$	1088.7	11/2$^+$			
626.0 *10*	125 *56*	1656.7	11/2$^-$	1030.6	9/2$^+$			
956.0 *10*	37 *14*	2044.8	(15/2)$^+$	1088.7	11/2$^+$			
1030.5 *10*	141 *64*	1030.6	9/2$^+$	0.0	7/2$^+$			
1089.0 *10*	100	1088.7	11/2$^+$	0.0	7/2$^+$	E2		
1101.0 *10*	44 *22*	1261.1	(9/2$^+$)	160.0	5/2$^+$			

[†] From 2019Bi04. Intensities are normalized to 100 for the 1089.0γ from 11/2$^+$ level, unless otherwise specified. All the transitions

Continued on next page (footnotes at end of table)

^{9}Be(^{238}U,Fγ) 2019Bi04 (continued)

$\gamma(^{123}Sb)$ (continued)

are delayed, except for the two prompt transitions 244.1 and 439.2 above the $23/2^+$ level.

‡ Prompt transition, identified in 2019Bi04; not seen in other work.

From Adopted Gammas.

@ Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

^{9}Be(^{238}U,Fγ) 2019Bi04

Level Scheme

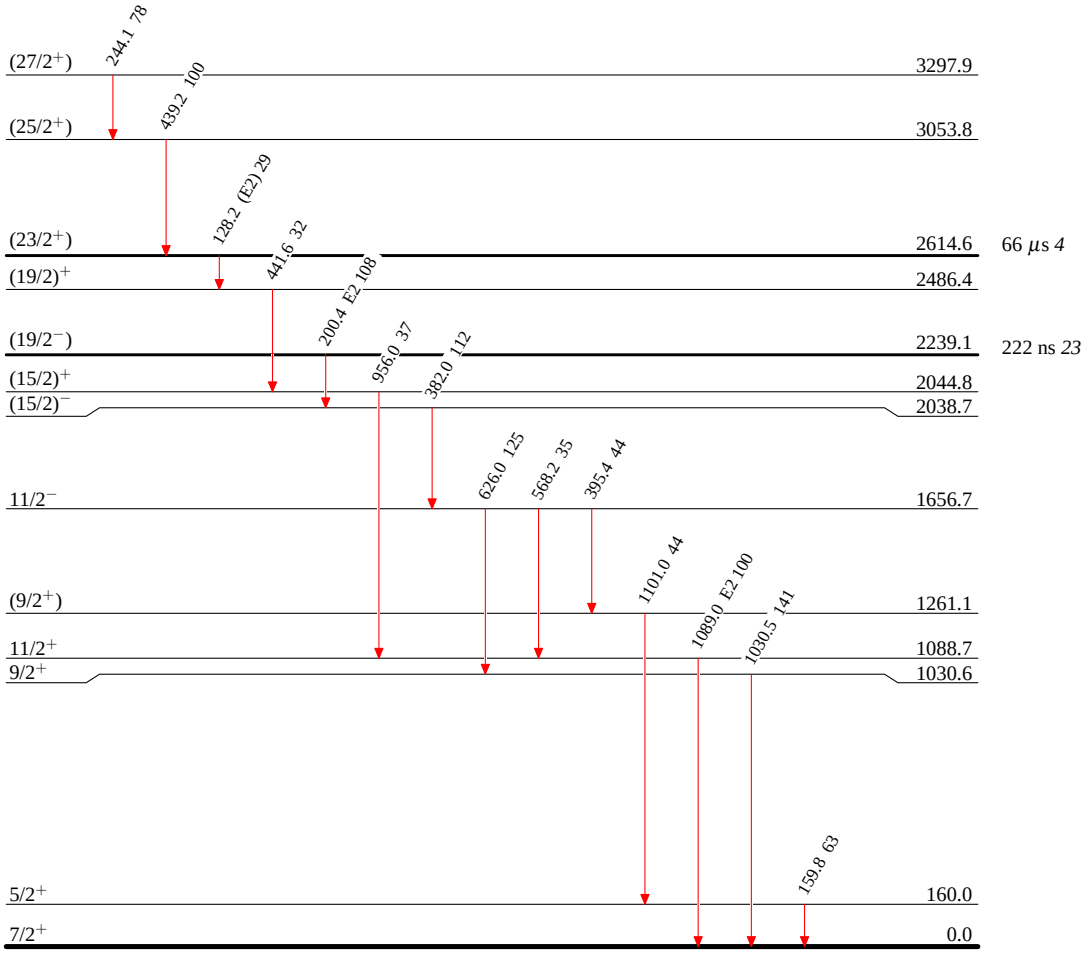
Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$



$^{123}_{51}Sb_{72}$

Adopted Levels, Gammas

Q(β^-)=−1228 *3*; S(n)=6929.01 *8*; S(p)=8125.7 *21*; Q(α)=−1530.9 *15* 2021Wa16
S(2n)=16771 *26*, S(2p)=14552.3 *14* (2021Wa16).
Other measurements:
^{120}Sn(α,nγ): 1981Io03, 1981Io05: measured $\gamma(\theta$,H,t) of 331γ. Deduced g-factor and spin, $T_{1/2}$, magnetic moment for the 490,7/2$^+$ level.
Mass measurement: 2016Fi07: measured ^{123}Te and ^{123}Sb mass difference.

^{123}Te Levels

Cross Reference (XREF) Flags

A	^{123}I ε decay (13.2230 h)	E	^{122}Te(d,p)	I	^{124}Te(d,t)
B	^{123}Te IT decay (119.2 d)	F	^{123}Sb(p,nγ)	J	^{124}Te(^{3}He,α)
C	^{116}Cd(^{11}B,p3nγ)	G	^{124}Sn(^{3}He,4nγ),^{123}Sb(d,2nγ)	K	^{125}Te(p,t)
D	^{122}Te(n,γ) E=th	H	^{124}Te(p,d)	L	Coulomb excitation

E(level)[†]	J$^\pi$	$T_{1/2}$	XREF	Comments
0.0	1/2$^+$	>9.2×10^{16} y	AB DEFGHIJKL	%ε=100 μ=−0.7369478 *8* Configuration=(ν 3s$_{1/2}$). J$^\pi$: spin=1/2 from hyperfine structure using optical spectroscopy (1949Ma47, 1950Fo08); L(d,p)=L(p,d)=L(d,t)=L(^{3}He,α)=0 from 0$^+$. $T_{1/2}$: from 2003Al02, measured half-life $T_{1/2}(\varepsilon$ K)>5×10^{19} y. Others: $T_{1/2}$>3.2×10^{16} y (2003Mu02), $T_{1/2}(\varepsilon$ K)>2.4×10^{19} y (1996Al30), $T_{1/2}(\varepsilon$ K)>2×10^{14} y (1945Ru03), $T_{1/2}(\varepsilon$ K)>1×10^{15} y (1955He13), $T_{1/2}(\varepsilon$ L)>5×10^{13} y (1954Se93), $T_{1/2}(\varepsilon$ L)>1×10^{13} y (1955He13), $T_{1/2}(\varepsilon$ K)=1.24×10^{13} y *10* (1962Wa15). μ: from 2014StZZ compilation, deduced from $\mu(^{125}Te)/\mu(^{123}Te)$=1.205581816 *48* from Nuclear Magnetic Resonance (NMR) measurement in 1977Bu29 and $\mu(^{125}Te)$=−0.8884509 *10* reference to ^{23}Na in 2014StZZ. Others: $\mu(^{125}Te)/\mu(^{123}Te)$=1.20560 *7* (NMR, 1953We51), 1.208 60 (hyperfine structure, 1949Ma47); $\mu(^{125}Te)$=−0.7 *2* and $\mu(^{123}Te)$=−0.6 *2* (hyperfine structure, 1952Ro05). Nuclear rms charge radius=4.7117 fm *35* (2013An02).
158.994 *22*	3/2$^+$	196 ps *10*	AB DEFGHIJKL	μ=0.71 *12* Configuration=(ν 2d$_{3/2}$) J$^\pi$: L(d,p)=L(p,d)=L(d,t)=L(^{3}He,α)=2 from 0$^+$; 159.0γ M1+E2 to 1/2$^+$. $T_{1/2}$: from ce-ce(t) in ^{123}Te IT decay, weighted average of 199 ps *10* (1968Ra02), 186 ps *20* (1963Sc12), and 190 ps *30* (1953Gr07). Other: 0.32 ns *+26−14* from B(E2)↑=0.018 *5* in Coulomb excitation and adopted δ(E2/M1)=+0.079 *11* for 158.99γ. μ: from integral perturbed angular correlation (IPAC) in 1970Ro31 and adopted $T_{1/2}$=196 ps *10*, based on original value of 0.72 *12* in 1970Ro31 using $T_{1/2}$=199 ps *10* from 1968Ra02. 0.72 *12* in 2014StZZ compilation.
247.45[‡] *4*	11/2$^-$	119.2 d *3*	ABCDEFGHIJK	%IT=100 μ=−0.927 *8* Configuration=(ν 1h$_{11/2}$) J$^\pi$: L(d,p)=L(p,d)=L(d,t)=L(^{3}He,α)=5 from 0$^+$; 88.5γ M4 to 3/2$^+$. $T_{1/2}$: from ^{123}Te IT decay, as unweighted average of 119.3 d *1* (1992Co11), 119.7 d *1* (1970EmZY) and 118.6 d *9* (1987Ja13). Others: 117 d *6* (1965An05), 104 d (1951Hi80), 121 d (1951Co34). μ: value from 1987Ni11 using nuclear magnetic resonance of oriented

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{123}Te Levels (continued)

E(level)[†]	Jπ	$T_{1/2}$	XREF	Comments
				nuclei, sign from 1973Si26 with μ=−1.00 *5* measured using nuclear orientation with gamma detection (1973Si26). Also in 2014StZZ compilation.
384.31 *5*	(7/2⁻,9/2⁺)		DE	Jπ: 136.8γ to 11/2⁻, 148.4γ from (7/2⁻), 968.9γ from (5/2)⁺.
440.00 *4*	3/2⁺	22 ps *4*	A DEFG KL	μ=+0.63 *11* Jπ: spin=3/2 from $\gamma\gamma(\theta)$ in ^{123}I ε decay (1969Se09); L(p,t)=2 from 1/2⁺; 439.9γ M1+E2 to 1/2⁺. $T_{1/2}$: deduced from B(E2)=0.21 *3* in Coulomb excitation, adopted δ(E2/M1)=−2.1 *1* and branching ratio 83.2% *5* for 439.7γ (1974Ro40). Other: 1.23 ps *21* from DSAM in 1973ErZS is discrepant. μ: from g-factor=0.34 *6* by IMPAC using $T_{1/2}$=27 ps *3* deduced from their B(E2) in 1974Ro40, with correction by using adopted $T_{1/2}$=22 ps *4*. Other: +0.66 *28*, from g-factor=+0.36 *15* by transient field technique using $T_{1/2}$=27 ps in 1989Be22 and corrected by using adopted $T_{1/2}$=22 ps *4*. Other: +0.51 *9* in 2014StZZ compilation, as quoted from 1974Ro40.
489.78 *5*	7/2⁺	30.7 ns *4*	A DEFGh JK	μ=+0.787 *14* XREF: h(504)J(498). Jπ: spin=7/2 from $\gamma(\theta)$ in 1981Io05; L(^{3}He,α)=4 from 0⁺. $T_{1/2}$: from beam-γ(t)-coin in 1981Io05. μ: from TDPAD (1981Io03, 1981Io05). Also in 2014StZZ compilation.
505.35 *4*	5/2⁺	13 ps *3*	A DEFGhI KL	μ=+0.14 *9* XREF: h(504)I(490). Jπ: spin=5/2 from particle-$\gamma(\theta)$ in Coulomb excitation (1989Be22) and $\gamma\gamma(\theta)$ in ^{123}I ε decay (1969Se09); L(d,t)=2 from 0⁺, L(p,t)=2 from 1/2⁺. $T_{1/2}$: deduced from B(E2)=0.27 *5* from Coulomb excitation, adopted branching ratio 69.7% *11* for 505.3γ. μ: from g-factor=0.040 *25* by IMPAC using $T_{1/2}$=18 ps *2* deduced from their B(E2) in 1974Ro40, with correction by using adopted $T_{1/2}$=13 ps *3*. Other: +0.17 *31*, from g-factor=+0.05 *9* by transient field technique using $T_{1/2}$=18 ps in 1989Be22 and corrected by using adopted $T_{1/2}$. Other: +0.10 *6* in 2014StZZ compilation, as quoted from 1974Ro40.
532.68 *4*	(7/2⁻)		A DEF K	Jπ: 285.3γ to 11/2⁻ and 812.1γ from 1345 level which has L(p,d)=1 (from 0⁺) together favor 7/2⁻ for 533 level and 3/2⁻ for 1345 level.
599.00 *8*	1/2⁺		A DEF H K	Jπ: L(d,p)=0 from 0⁺; L(p,t)=0 from 1/2⁺.
687.97 *3*	3/2⁺		A DEFGHIJkL	XREF: H(702)J(712)k(683). Jπ: L(d,p)=L(p,d)=L(d,t)=2 from 0⁺; L(p,t)=2 from 1/2⁺; spin=3/2 from $\gamma\gamma(\theta)$ in ^{123}I ε decay (1969Se09). But spin=5/2 from $\gamma(\theta)$ anisotropy in 1979Sc13 in ^{123}I ε decay is inconsistent.
697.50 *5*	(7/2)⁺		A DEFG Jk	XREF: J(690)k(683). Jπ: L(^{3}He,α)=4 from 0⁺; 538.5γ to 3/2⁺.
769.26 *14*			A F	
783.62 *3*	3/2⁺	52 fs *+33−21*	A DEF HIJK	XREF: H(801). Jπ: L(d,p)=L(p,d)=2 from 0⁺; spin=3/2 from $\gamma(\theta)$ anisotropy in ^{123}I ε decay (1979Sc13). $T_{1/2}$: from DSAM in (p,nγ) (1990Ja01).
862.11 *4*	(5/2)		DE	Jπ: 482.6γ from (3/2)⁻, 421.9γ to 3/2⁺, 329.4γ to (7/2⁻), 372.2γ to 7/2⁺.
870.94 *22*	(3/2⁺,5/2,7/2⁺)		DE G	Jπ: 380.8γ to 7/2⁺, 712.3γ to 3/2⁺.
879.69 *7*	(7/2⁻)		DE K	Jπ: 632.3γ to 11/2⁻, 464.7γ from (3/2)⁻.

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Adopted Levels, Gammas (continued)

^{123}Te Levels (continued)

E(level)[†]	J^π	$T_{1/2}$	XREF	Comments
886.9[‡] *9*	(15/2$^-$)		C G	J^π: 639.4γ to 11/2$^-$; band assignment.
894.77 *6*	3/2$^+$,5/2$^+$	45 fs *+24−14*	A DEF HIJK	XREF: H(914)J(906). J^π: L(p,d)=L(d,t)=L(^{3}He,α)=2 from 0$^+$, L(p,t)=2 from 1/2$^+$. $T_{1/2}$: from DSAM in (p,nγ) (1990Ja01).
919.7 *9*	(13/2$^-$)		C G	J^π: proposed in (^{11}B,p3nγ) based on measured $\gamma\gamma$(DCO) (1996Bl12); 672.3γ to 11/2$^-$.
920.3 *7*			E	E(level): this level in (d,p) should be a different level from 919.8 in (^{11}B,p3nγ), since it would require L(d,p)=(7) for J^π=(13/2$^-$) if same, which is unlikely.
996.05 *11*	(5/2)$^-$		A D K	J^π: L(p,t)=3 from 1/2$^+$; 837.1γ and 556.1γ to 3/2$^+$.
1036.62 *5*	3/2$^+$	43 fs *+16−12*	A DEF h K	XREF: h(1053). J^π: L(p,t)=2 from 1/2$^+$; primary 5892.7γ from 1/2$^+$ in (n,γ) E=th; 437.6γ to 1/2$^+$ cannot be E2 or M2 (ΔJ=2) based on RUL. $T_{1/2}$: from DSAM in (p,nγ) (1990Ja01).
1068.23 *6*	3/2$^+$,5/2$^+$		A DE h JK	XREF: h(1053)J(1059)K(?). J^π: L(^{3}He,α)=2 from 0$^+$.
1081.7 *7*	7/2$^+$,9/2$^+$		E K	E(level): from (d,p). Other: 1080 *5* from (p,t). J^π: L(p,t)=4 from 1/2$^+$.
1097.76 *8*	(3/2$^-$,5/2,7/2$^+$)		DE	J^π: 409.6γ to 3/2$^+$, 565.2γ to (7/2$^-$).
1138.5? *8*			G	
1153 *10*			H	
1210 *5*	(5/2$^-$,7/2$^-$)		e K	E(level): from (p,t). Other: 1211.9 *7* from (d,p) could also correspond to the 1212.5 level. J^π: L(p,t)=(3) from 1/2$^+$.
1212.51 *9*	(3/2$^-$,5/2$^+$)		De	J^π: 613.0γ to 1/2$^+$, 828.4γ to (7/2$^-$,9/2$^+$).
1244.3 *10*	7/2$^+$,9/2$^+$		GHiJ	XREF: H(1239)i(1240)J(1232). J^π: L(p,d)=L(^{3}He,α)=4 from 0$^+$.
1254.0 *4*	(3/2$^-$ to 9/2$^-$)		DE i	XREF: i(1240). J^π: 259.1γ to (5/2)$^-$, 867.8γ to (7/2$^-$,9/2$^+$).
1268 *10*	($^+$)		H	J^π: L(p,d)=(4)+(2) from 0$^+$.
1318.11 *13*	(1/2$^+$,3/2$^+$)		DE	J^π: 1318.3γ to 1/2$^+$, primary 5610.6γ from 1/2$^+$ in (n,γ) E=th.
1327.61 *11*			DE	
1330 *5*	7/2$^+$,9/2$^+$		K	J^π: L(p,t)=4 from 0$^+$.
1344.76 *5*	(3/2)$^-$		DE K	J^π: L(d,p)=1 from 0$^+$; 812.1γ-285.3γ cascade to 11/2$^-$ favors 3/2$^-$.
1353.84 *8*	(5/2)$^+$		DE H	J^π: L(p,d)=2 from 0$^+$; 821.2γ and 474.1γ to (7/2$^-$).
1414.15 *9*	(5/2$^+$)		DE i k	XREF: i(1420)k(1410). J^π: L(p,t)=2 from 1/2$^+$ for 1410 multiplet; 880.7γ to (7/2$^-$).
1418 *10*	(5/2$^-$,7/2$^-$)		E i	XREF: i(1420). J^π: L(d,p)=(3) from 0$^+$.
1422.82 *11*	(3/2$^+$,5/2$^+$)		DE i k	XREF: i(1420)k(1410). J^π: L(p,t)=2 from 1/2$^+$ for 1410 multiplet.
1427 *10*	7/2$^+$,9/2$^+$		iJ	XREF: i(1420). J^π: L(^{3}He,α)=4 from 0$^+$.
1446.35 *20*	(3/2)$^+$		DE H	J^π: L(p,d)=2 from 0$^+$; primary 5482.6γ from 1/2$^+$ in (n,γ) E=th.
1474.5 *6*			E	
1483.3 *67*	1/2$^-$,3/2$^-$		E i	XREF: i(1500). J^π: L(d,p)=1 from 0$^+$.
1483.9 *5*	(5/2$^-$)		D i K	XREF: i(1500). J^π: L(p,t)=3 from 1/2$^+$ for 1480 multiplet; 1323.9γ to 3/2$^+$.
1496.3? *11*			G i	XREF: i(1500).
1515 *10*	3/2$^+$,5/2$^+$		Hi	XREF: i(1500). J^π: L(p,d) from 0$^+$.

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Adopted Levels, Gammas (continued)

^{123}Te Levels (continued)

E(level)[†]	Jπ	XREF	Comments
1552.3[#] *10*	(17/2⁻)	C G	Jπ: 632.7γ to (13/2⁻); band assignment.
1558.35 *18*	(3/2)⁺	DE K	E(level): other: 1558.3 *6* from (d,p). Jπ: L(p,t)=2 from 1/2⁺; primary 5371γ from 1/2⁺ in (n,γ) E=th.
1584.7 *4*	(3/2⁻,5/2,7/2⁺)	DE	E(level): other: 1585.1 *6* from (d,p). Jπ: 706.0γ to (7/2⁻), 1144.9γ to 3/2⁺.
1606 *10*	(⁺)	H	Jπ: L(p,d)=(0)+(2) from 0⁺.
1610.2[‡] *11*	(19/2⁻)	C G	
1622.7 *6*		DE	XREF: D(1621.6?). E(level): from (d,p).
1654.6 *8*	7/2⁺,9/2⁺	E iJk	XREF: i(1660)J(1660)k(1675). Jπ: L(^{3}He,α)=4 from 0⁺.
1672.0 *3*		DE i k	XREF: i(1660)k(1675).
1683.7 *4*	5/2⁻,7/2⁻	DE k	XREF: k(1675). E(level): other: 1682.4 *9* from (d,p). Jπ: L(d,p)=3 from 0⁺.
1693.64 *20*		DE	E(level): other: 1693.6 *6* from (d,p).
1708.0 *15*	3/2⁺,5/2⁺	E GH K	E(level): other: 1707.0 *8* from (d,p). Jπ: L(p,d)=2 from 0⁺.
1732.5 *3*	(5/2⁺)	DE	E(level): other: 1733.1 *6* from (d,p). Jπ: 1133.2γ to 1/2⁺, 1034.3γ to (7/2)⁺, 1200.7γ to (7/2⁻).
1759.61 *6*	(3/2)⁻	DE	Jπ: L(d,p)=1 from 0⁺; 881.7γ to 7/2⁻.
1788.4 *6*		E	
1795.8 *7*	3/2⁻,5/2⁺	DE	E(level): other: 1796.6 *5* from (d,p). Jπ: γ to 7/2⁻ and 1/2⁺.
1807.72 *5*	(3/2⁻)	D h	XREF: h(1829). Jπ: 1274.9γ and 927.3γ to (7/2⁻); primary 5121.6γ from 1/2⁺ in (n,γ) E=th.
1839.26 *23*	(1/2,3/2)	DE hij	XREF: h(1829)i(1850)j(1850). Jπ: primary 5088.7γ from 1/2⁺ in (n,γ) E=th.
1854.1 *3*	(5/2⁺)	DE ij	XREF: i(1850)j(1850). E(level): other: 1853.7 *6* from (d,p). Jπ: L(^{3}He,α)=(2) from 0⁺ for possible 1850 doublet; 976.3γ o (7/2⁻).
1864.4 *10*	(3/2⁺,5/2⁺)	DE ijK	XREF: i(1850)j(1850). E(level): other: 1863.8 *7* from (d,p). Jπ: L(^{3}He,α)=(2) from 0⁺ for possible 1850 doublet.
1887.38 *16*	(3/2)⁻	DE	Jπ: L(d,p)=1 from 0⁺; 1354.5γ to (7/2⁻).
1903.36 *15*	(⁺)	DE H	Jπ: L(p,d)=(4)+(2) from 0⁺.
1930.3[#] *11*	(21/2⁻)	C G	Jπ: 378γ to (17/2⁻); band assignment.
1946.1 *10*	1/2⁺	E K	Jπ: L(p,t)=0 from 0⁺.
1958.4 *3*	(3/2⁺,5/2⁺)	DE	E(level): other: 1956.7 *6* from (d,p). Jπ: 1359.6γ to 1/2⁺, 1468.5γ to 7/2⁺.
1978.05 *9*	(3/2)⁻	DE K	XREF: K(1990). Jπ: L(d,p)=1 from 0⁺; 1472.0 γ to 5/2⁺. But L(p,t)≥2 from 1/2⁺ seems inconsistent.
2011.1 *6*		E	
2020.74 *14*	1/2⁻,3/2⁻	DE i	XREF: i(2040). Jπ: L(d,p)=1 from 0⁺.
2051.1 *5*	5/2⁻,7/2⁻	E i	XREF: i(2040). Jπ: L(d,p)=3 from 0⁺.
2054 *15*	7/2⁺,9/2⁺	iJK	XREF: i(2040). E(level): weighted average of 2066 *25* from (^{3}He,α) and 2050 *15* from (p,t). This level could correspond to the 2065.6 level in (d,p). Jπ: L(^{3}He,α)=L(p,t)=4 from 0⁺.
2065.6 *7*		E	E(level): from (d,p). See comment for 2054 level.
2076 *10*	3/2⁺,5/2⁺	H	Jπ: L(p,d)=2 from 0⁺.
2083.1 *9*		E	

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Adopted Levels, Gammas (continued)

^{123}Te Levels (continued)

E(level)[†]	Jπ	XREF	Comments
2092.57 *11*	(1/2,3/2)	DE	Jπ: primary 4836.8γ from 1/2+ in (n,γ) E=th.
2118.4 *5*	(+)	E K	XREF: K(2115). Jπ: L(p,t)=(0)+(4) from 1/2+.
2129.80 *12*	(3/2)−	DE	E(level): other: 2130.1 *5* from (d,p). Jπ: L(d,p)=1 from 0+; 1597.3γ to (7/2−), 1624.4γ to 5/2+.
2143.7 *5*		E	
2151.3 *6*		E k	XREF: k(2160).
2158.06 *5*	1/2−,3/2−	DE k	XREF: k(2160). Jπ: L(d,p)=1 from 0+.
2163 *10*	3/2+,5/2+	H k	XREF: k(2160). Jπ: L(p,d)=2 from 0+.
2197.30 *20*	(1/2+,3/2)	DE	Jπ: primary 2197.3γ from 1/2+ in (n,γ) E=th; 1690.8γ to 5/2+.
2201.1 *6*	(3/2+,5/2+)	E	Jπ: L(d,p)=(2) from 0+.
2264.0 *11*	5/2−,7/2−	E K	E(level): from (d,p). Other: 2265 *15* from (p,t). Jπ: L(p,t)=3 from 1/2+.
2285.0 *10*	(+)	E H	XREF: H(2275). Jπ: L(p,d)=(4)+(2) from 0+.
2296.7 *17*	7/2+,9/2+	E K	XREF: K(2290). Jπ: L(p,t)=4 from 1/2+.
2332 *10*	7/2+,9/2+	H J	XREF: J(2340). Jπ: L(p,d)=L(^{3}He,α)=4 from 0+.
2348.2 *8*		E	
2357.9 *13*		C	E(level): This level is proposed to be a different level from the 2358, (23/2−) level by 1996Bl12.
2358.3[‡] *12*	(23/2−)	C G	Jπ: band assignment.
2369.1 *7*	(5/2−,7/2−)	E k	XREF: k(2370). Jπ: L(p,t)=3 for possible 2370 doublet.
2376.6 *7*	(5/2−,7/2−)	E k	XREF: k(2370). Jπ: L(p,t)=3 for possible 2370 doublet.
2398.7 *8*		E	
2413.6 *10*	5/2−,7/2−	E H	Jπ: L(d,p)=3 from 0+. But L(p,d)=(4)+(2) from 0+ is inconsistent.
2442.6 *10*		E	
2457.4 *7*		E	
2464.9 *7*	(+)	E H	XREF: H(2469). Jπ: L(p,d)=(4)+(2) from 0+.
2478.7 *8*		E	
2497.7 *6*		E	
2514.9 *6*		E	
2525.5 *6*		E	
2533.3 *6*		E	
2540.7 *6*		E	
2551.6 *7*	1/2−,3/2−	E	Jπ: L(d,p)=1 from 0+.
2555.8 *6*		E	
2565.2 *6*		E	
2572.1 *6*	(+)	E H	XREF: H(2576). Jπ: L(p,d)=(2)+(4) from 0+.
2604.3 *6*		E h	XREF: h(2615).
2614 *6*		E h	XREF: h(2615).
2621.89 *20*	(1/2+,3/2)	DE h	XREF: h(2615). Jπ: primary 4307.7γ from 1/2+ in (n,γ) E=th; 2115.2γ to 5/2+.
2630.3 *6*		E	
2638.1 *6*		E	
2644.7 *7*	(1/2,3/2)	DE	E(level): other: 2643.4 *7* from (d,p). Jπ: primary 4285.1γ from 1/2+ in (n,γ) E=th.
2657.0 *6*		E	
2670.2 *6*	(7/2+,9/2+)	E j	XREF: j(2670).

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Adopted Levels, Gammas (continued)

^{123}Te Levels (continued)

E(level)[†]	Jπ	XREF	Comments
			Jπ: L(^{3}He,α)=4 for possible 2670 *25* multiplet.
2676.2 *6*	(7/2$^+$,9/2$^+$)	E j	XREF: j(2670).
			Jπ: L(^{3}He,α)=4 for possible 2670 *25* multiplet.
2684.2 *12*	(21/2$^-$,23/2$^-$)	C	Jπ: 1074γ to (19/2$^-$), 355γ from (25/2$^-$).
2686.8 *5*	1/2$^-$,3/2$^-$	DE	E(level): from (n,γ) E=th. Other: 2687.0 *6* from (d,p).
			Jπ: L(d,p)=1 from 0$^+$.
2695 *1*	($^+$)	E H	XREF: H(2691).
			Jπ: L(p,d)=(4)+(2) from 0$^+$.
2713.0 *6*		E	
2726.23 *16*	(1/2,3/2)	DE	Jπ: primary 4203.0γ from 1/2$^+$ in (n,γ) E=th.
2735.3 *7*		E	
2741.7 *7*		E	
2751 *2*	(5/2$^-$,7/2$^-$)	E	Jπ: L(d,p)=(3) from 0$^+$.
2773.4 *6*	1/2$^-$,3/2$^-$	E	Jπ: L(d,p)=1 from 0$^+$.
2782.0 *7*		E	
2794.0 *7*		E	
2807.0 *6*		E	
2811.9 *3*	1/2$^-$,3/2$^-$	DE	E(level): other: 2812.3 *7* from (d,p).
			Jπ: L(d,p)=1 from 0$^+$.
2812.6[@] *13*	(23/2)	C G	Jπ: 881.8γ D, ΔJ=1 to (21/2$^-$).
2834.0 *7*		E	
2848.6 *7*		E	
2857.4 *6*		E	
2864.0 *7*		E	
2869.5 *7*		E	
2875.2 *7*		E	
2880.8 *9*		E	
2887.3 *9*		E	
2894.6 *7*		E	
2906.1 *8*		E	
2915.8 *7*		E	
2922.5 *9*		E	
2937.2 *5*	1/2$^-$,3/2$^-$	DE	Jπ: L(d,p)=1 from 0$^+$.
2946.8 *3*	(1/2,3/2)	DE	Jπ: primary 3982.4γ from 1/2$^+$ in (n,γ) E=th.
2950 *15*	5/2$^-$,7/2$^-$	K	Jπ: L(p,t)=3 from 1/2$^+$.
2957.3 *8*	(1/2,3/2)	DE	XREF: E(2963).
			E(level): from (n,γ) E=th.
			Jπ: primary 3972γ from 1/2$^+$ in (n,γ) E=th.
2967.9 *10*		E	
2983.8 *10*		E	
3002.5 *12*		E	
3007.7 *16*	1/2$^-$,3/2$^-$	E	Jπ: L(d,p)=1 from 0$^+$.
3033 *10*		E	
3039.0[#] *13*	(25/2$^-$)	C	Jπ: 1109γ to (21/2$^-$); band assignment.
3055 *10*		E	
3079 *10*		E	
3106 *10*		E	
3151 *10*		E	
3181 *10*		E	
3197 *10*	1/2$^-$,3/2$^-$	E	Jπ: L(d,p)=1 from 0$^+$.
3321 *10*		E	
3337 *10*		E	
3375 *10*		E	
3376.7[‡] *14*	(27/2$^-$)	C	Jπ: 1018γ to (23/2$^-$); band assignment.
3401 *10*	1/2$^-$,3/2$^-$	E	Jπ: L(d,p)=1 from 0$^+$.

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Adopted Levels, Gammas (continued)

^{123}Te Levels (continued)

E(level)[†]	J^π	XREF	Comments
3439 *10*		E	
3469 *10*		E	
3492 *10*		E	
3513 *10*		E	
3551 *20*	$1/2^-,3/2^-$	E	J^π: L(d,p)=1 from 0^+.
3551.6[@] *15*	(27/2)	C	J^π: 739γ to (23/2); band assignment.
3625 *10*		E	
3744 *10*		E	
3766 *10*		E	
3787 *10*		E	
3813.1 *14*		C	
3822 *10*		E	
3849 *10*		E	
3866 *10*		E	
3912 *10*		E	
3935 *10*		E	
3975 *10*		E	
4014 *10*		E	
4040 *10*		E	
4055 *10*		E	
4075 *10*		E	
4113.0[#] *14*	$(29/2^-)$	C	J^π: 1074γ to $(25/2^-)$; band assignment.
4134 *10*		E	
4173 *10*		E	
4200 *10*		E	
4201.7[@] *15*	(31/2)	C	J^π: 650γ to (27/2); band assignment.
4253.8[‡] *15*	$(31/2^-)$	C	J^π: 650γ to $(27/2^-)$; band assignment.
4271 *10*		E	
4302 *10*		E	
4317 *10*		E	
4347 *10*		E	
4358.0? *16*		C	
4380 *10*		E	
4411 *10*		E	
4441 *10*		E	
4476 *10*		E	
4500 *10*		E	
4538 *10*		E	
4570 *10*		E	
4606 *10*		E	
4627.8[#] *15*	$(33/2^-)$	C	J^π: 515γ to $(29/2^-)$; band assignment.
4655 *10*		E	
4669 *10*		E	
4685 *10*		E	
4715 *10*		E	
4748 *10*		E	
4748.7[@] *18*	(33/2)	C	J^π: 547γ D, ΔJ=1 to (31/2).
4776 *10*		E	
4789 *10*		E	
4854 *10*		E	
4876 *10*		E	
4966 *10*		E	
5009.8[‡] *16*	$(35/2^-)$	C	J^π: 756γ to $(31/2^-)$; band assignment.
5015 *10*		E	
5034.7[@] *21*		C	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{123}Te Levels (continued)

E(level)[†]	Jπ	XREF	Comments
5088 *10*		E	
5140 *10*		E	
5169 *10*		E	
5190 *10*		E	
5232 *10*		E	
5329 *10*		E	
5450 *10*		E	
5565.8[#] *18*	($37^-/2$)	C	Jπ: band assignment.
5588.8 *18*		C	
5644.8[‡] *19*		C	
5952.8 *19*		C	
6274.7[@] *23*		C	
6558.8 *21*		C	
6912.8[‡] *21*		C	
(6929.21 *5*)	$1/2^+$	D	Jπ: s-wave capture on 0^+.
7062.8 *24*		C	
7090[@] *3*		C	
7296 *3*		C	
7481.4?[@] *4*		C	
8030.4?[‡] *4*		C	

[†] From a least-squares fit to γ-ray energies for level connected by γ transitions, assuming ΔEγ=1 keV for those (weak transitions) from (n,γ) E=th and those quoted to nearest keV and ΔEγ=0.3 keV for others where ΔEγ is not given.

[‡] Band(A): Negative-parity band based on $1h_{11/2}$.

[#] Band(B): Negative-parity band based on ($17/2^-$).

[@] Seq.(C): Sequence based on (23/2).

Adopted Levels, Gammas (continued)

γ(^{123}Te)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.	δ	α [b]	Comments
158.994	3/2$^+$	158.99 *3*	100	0.0	1/2$^+$	M1+E2	+0.079 *11*	0.187	B(M1)(W.u.)=0.0234 *+13−11*; B(E2)(W.u.)=4.1 *+13−11* E_γ: weighted average of 159.00 *5* from ^{123}I ε decay, 159.00 *3* from ^{123}Te IT decay, 158.99 *3* from (n,γ) E=th, and 158.9 *1* from Coulomb excitation. Mult.: from ce data in ^{123}Te IT decay and ^{123}I ε decay and γ(θ) in Coulomb excitation. δ: unweighed average of 0.062 $^{10-11}$ (from B(E2)=0.018 *5* in Coulomb excitation, adopted $T_{1/2}$=196 ps *10* and adopted α(exp)=0.1910 *14* from ^{123}Te IT decay), +0.06 *4* from γ(θ) in Coulomb excitation (1964Al28), 0.103 *7* from independently measured δ^2 from ce-γ(θ) or γγ(θ) in ^{123}Te IT decay, 0.09 *+4−7* deduced (by the evaluator using the BrIccMixing code) from all measured conversion coefficients in ^{123}Te IT decay and ^{123}I ε decay.
247.45	11/2$^-$	88.46 *3*	100 *4*	158.994	3/2$^+$	M4		1122	B(M4)(W.u.)=3.65 *5* E_γ,I_γ,Mult.: from ^{123}Te IT decay, with Mult. from ce data.
		247.5 *2*	0.37 *4*	0.0	1/2$^+$	[E5]		7.83	B(E5)(W.u.)=0.047 *6* E_γ,I_γ: from ^{123}Te IT decay.
384.31	(7/2$^-$,9/2$^+$)	136.76 *7*	100	247.45	11/2$^-$				
440.00	3/2$^+$	281.00 *4*	18.5 *7*	158.994	3/2$^+$	M1+E2	−0.24 *+10−14*	0.0409 *8*	B(M1)(W.u.)=0.0067 *+14−12*; B(E2)(W.u.)=3.4 *+47−22* E_γ: weighted average of 281.03 *5* from ^{123}I ε decay, 281.01 *3* from (n,γ) E=th, and 280.8 *1* from Coulomb excitation. I_γ: from ^{123}I ε decay. Other: 18.5 *8* from (n,γ) E=th. Mult.,δ: D+Q from γγ(θ) in ^{123}I ε decay (1969Se09); M2 ruled out by RUL. Other: δ(Q/D)=−2.9 *28* from particle-γ(θ) in Coulomb excitation (1989Be22).
		439.91 *11*	100 *3*	0.0	1/2$^+$	M1+E2	−2.1 *1*	0.01200	B(M1)(W.u.)=0.0018 *+44−31*; B(E2)(W.u.)=29 *+7−5* E_γ: unweighted average of 440.02 *5* from ^{123}I ε decay, 440.01 *6* from (n,γ) E=th, and 439.7 *1* from Coulomb excitation. I_γ: from ^{123}I ε decay and (n,γ) E=th. Mult.,δ: D+Q from γγ(θ) in Coulomb excitation (1974Ro40); M2 ruled out by RUL. Others: δ(Q/D)=+0.14 to 0.20 or −4.9 to −2.5 from γ(θ) anisotropy in ^{123}I ε decay (1979Sc13).
489.78	7/2$^+$	330.75 *6*	100	158.994	3/2$^+$	[E2]		0.0282	B(E2)(W.u.)=0.1247 *16* E_γ: weighted average of 330.70 *8* from ^{123}I ε decay and 330.78 *6* from (n,γ) E=th.

Adopted Levels, Gammas (continued)

$\gamma(^{123}Te)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.	δ	α[b]	Comments
505.35	$5/2^+$	346.35 *4*	41.7 *9*	158.994	$3/2^+$	M1+E2	+0.07 *8*	0.0236	B(M1)(W.u.)=0.0118 *+34−23*; BE2WLT 1.8 E_γ: weighted average of 346.36 *5* from ^{123}I ε decay, 346.37 *4* from (n,γ) E=th, and 346.2 *1* from Coulomb excitation. I_γ: weighted average of 41.9 *9* from ^{123}I ε decay and 41.4 *12* from (n,γ) E=th. Mult.,δ: D+Q from $\gamma\gamma(\theta)$ in ^{123}I ε decay (1969Se09); M2 ruled out by RUL. Other: δ(Q/D)=1.9 from particle-$\gamma(\theta)$ in Coulomb excitation (1989Be22).
		505.30 *7*	100 *3*	0.0	$1/2^+$	(E2)		0.00792	B(E2)(W.u.)=25 *+8−5* E_γ: weighted average of 505.33 *5* from ^{123}I ε decay, 505.38 *10* from (n,γ) E=th, and 505.1 *1* from Coulomb excitation. I_γ: from ^{123}I ε decay. Other: 100 *4* from (n,γ) E=th. Mult.: Q from $\gamma(\theta)$ anisotropy in ^{123}I ε decay (1979Sc13); E2 required by level scheme.
532.68	$(7/2^-)$	148.35 *5*	6.4 *4*	384.31	$(7/2^-,9/2^+)$				
		285.28 *4*	100 *3*	247.45	$11/2^-$	[E2]		0.0454	E_γ: other: 285.32 *11* from ^{123}I ε decay.
599.00	$1/2^+$	599.4 *3*	100	0.0	$1/2^+$				E_γ: unweighted average of 599.69 *16* from ^{123}I ε decay and 599.18 *6* from (n,γ) E=th.
687.97	$3/2^+$	182.62[‡] *6*	1.03[‡] *5*	505.35	$5/2^+$	[M1,E2]		0.17 *4*	
		198.2[a]	0.26[‡] *7*	489.78	$7/2^+$	[E2]		0.1546	E_γ: other: 198.0 from (p,nγ).
		247.93 *7*	5.50 *18*	440.00	$3/2^+$	(M1+E2)		0.064 *8*	E_γ: weighted average of 247.97 *5* from ^{123}I ε decay and 247.80 *9* from (n,γ) E=th. I_γ: weighted average of 5.45 *12* from ^{123}I ε decay and 6.1 *4* from (n,γ) E=th. Mult.: D+Q from $\gamma(\theta)$ anisotropy in ^{123}I ε decay (1979Sc13); M1+E2 required by level scheme.
		529.00 *3*	100.0 *22*	158.994	$3/2^+$	(M1+E2)		0.0076 *7*	E_γ: weighted average of 528.97 *5* from ^{123}I ε decay, 529.01 *3* from (n,γ) E=th, and 528.8 *5* from Coulomb excitation. I_γ: other: 100 *8* from ^{123}I ε decay. Mult.: from $\gamma\gamma(\theta)$ in ^{123}I ε decay (1969Se09), with δ(Q/D)=−2.8 *+6−7* or −0.09 *6*; M1+E2 required by level scheme.
		687.93 *8*	2.11 *6*	0.0	$1/2^+$				E_γ: weighted average of 687.94 *8* from ^{123}I ε decay and 687.91 *12* from (n,γ) E=th. I_γ: from ^{123}I ε decay. Other: 10 *4* from (n,γ) E=th.
697.50	$(7/2)^+$	192.18[‡] *7*	5.7[‡] *4*	505.35	$5/2^+$	[M1,E2]		0.14 *3*	
		207.7[a]	0.35[‡] *11*	489.78	$7/2^+$	[M1,E2]		0.111 *21*	
		257.51[‡] *15*	0.49[‡] *14*	440.00	$3/2^+$	[E2]		0.0637	

Adopted Levels, Gammas (continued)

γ(^{123}Te) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.	α[b]	Comments
697.50	(7/2)$^+$	538.48 *6*	100[‡] *11*	158.994	3/2$^+$			E_γ: weighted average of 538.54 *5* from ^{123}I ε decay and 538.42 *5* from (n,γ) E=th.
769.26		329.38[‡] *17*	100[‡] *23*	440.00	3/2$^+$			
		610.05[‡] *23*	42[‡] *13*	158.994	3/2$^+$			
783.62	3/2$^+$	278.36[‡] *12*	2.9[‡] *5*	505.35	5/2$^+$	[M1,E2]	0.045 *4*	
		343.73[‡] *14*	5.5[‡] *5*	440.00	3/2$^+$	[M1,E2]	0.0245 *6*	
		624.61 *4*	100 *3*	158.994	3/2$^+$	M1+E2	0.0050 *6*	E_γ: weighted average of 624.58 *5* from ^{123}I ε decay (13.2234 h), 624.65 *4* from (n,γ) E=th, and 624.5 *1* from (p,nγ). I_γ: from ^{123}I ε decay and (n,γ). Mult.: D+Q from γ(θ) anisotropy (1979Sc13) and γγ(θ) (1969Se09) in ^{123}I ε decay, with δ(Q/D)=+0.10 to +0.18 or +2.3 to +4.9 from γ(θ) (1979Sc13); M2 ruled by RUL.
		783.61 *4*	70 *3*	0.0	1/2$^+$	M1+E2	0.0029 *4*	E_γ: weighted average of 783.60 *6* from ^{123}I ε decay (13.2234 h) and 783.62 *4* from (n,γ) E=th. I_γ: weighted average of 68.2 *22* from ^{123}I ε decay (13.2234 h) and 74 *3* from (n,γ) E=th. Mult.: D+Q from γ(θ) anisotropy, with δ(Q/D)=+0.20 to +0.33 or −4.9 to −3.0 in ^{123}I ε decay (1979Sc13); M2 ruled out by RUL.
862.11	(5/2)	329.37 *4*	100 *3*	532.68	(7/2$^-$)			
		372.21 *15*	≈0.6	489.78	7/2$^+$			
		421.9 *2*	4.2 *11*	440.00	3/2$^+$			
		477.80 *3*	31 *1*	384.31	(7/2$^-$,9/2$^+$)			
		703.0[d]	0.4	158.994	3/2$^+$			
870.94	(3/2$^+$,5/2,7/2$^+$)	380.8 *3*	100 *25*	489.78	7/2$^+$			
		712.3 *3*	75 *25*	158.994	3/2$^+$			
879.69	(7/2$^-$)	495.32 *8*	100 *15*	384.31	(7/2$^-$,9/2$^+$)			
		632.27 *15*	33 *8*	247.45	11/2$^-$			
886.9	(15/2$^-$)	639.4[@]	100	247.45	11/2$^-$			
894.77	3/2$^+$,5/2$^+$	197.3[a]	0.7[‡] *4*	697.50	(7/2)$^+$	[M1,E2]	0.13 *3*	
		206.8[a]	7.1[‡] *18*	687.97	3/2$^+$	[M1,E2]	0.112 *22*	
		295.8[a]	3.4[‡]	599.00	1/2$^+$			
		405.00 *13*	5.7[‡] *7*	489.78	7/2$^+$			E_γ: weighted average of 405.02 *13* from ^{123}I ε decay and 404.8 *4* from (n,γ) E=th. I_γ: other: ≈4.1 from (n,γ) E=th.
		454.69 *15*	7.3[‡] *5*	440.00	3/2$^+$			E_γ: weighted average of 454.76 *15* from ^{123}I ε decay and 454.4 *3* from (n,γ) E=th. I_γ: other: 7.1 *21* from (n,γ) E=th.
		735.82 *7*	100 *5*	158.994	3/2$^+$			E_γ: weighted average of 735.87 *11* from ^{123}I ε decay,

$^{123}_{52}Te_{71}$-11

Adopted Levels, Gammas (continued)

γ(^{123}Te) (continued)

E_i(level)	J_i^π	E_γ [†]	I_γ [†]	E_f	J_f^π	Mult.	α [b]	Comments
								735.86 *7* from (n,γ) E=th, and 735.7 *1* from (p,nγ). I_γ: other: 100 *13* from ^{123}I ε decay.
894.77	$3/2^+,5/2^+$	894.8[‡] *2*	1.5[‡] *2*	0.0	$1/2^+$			
919.7	$(13/2^-)$	672.3[@]	100	247.45	$11/2^-$			
996.05	$(5/2)^-$	556.05[‡] *13*	100[‡] *10*	440.00	$3/2^+$			
		837.10[‡] *20*	19[‡] *3*	158.994	$3/2^+$			
1036.62	$3/2^+$	437.6 *1*	48 *7*	599.00	$1/2^+$			E_γ: other: 437.5 *3* from ^{123}I ε decay.
		546.79 *10*	24 *7*	489.78	$7/2^+$			
		596.43 *18*	47 *10*	440.00	$3/2^+$			
		877.65 *7*	77 *9*	158.994	$3/2^+$			E_γ: weighted average of 877.52 *17* from ^{123}I ε decay and 877.67 *7* from (n,γ) E=th. I_γ: weighted average of 93 *12* from ^{123}I ε decay and 72 *7* from (n,γ) E=th.
		1036.67 *8*	100 *5*	0.0	$1/2^+$			E_γ: weighted average of 1036.63 *17* from ^{123}I ε decay, 1036.69 *8* from (n,γ) E=th, and 1036.6 *2* from (p,nγ). I_γ: other: 100 *8* from ^{123}I ε decay.
1068.23	$3/2^+,5/2^+$	174.2[‡] *3*	53[‡] *16*	894.77	$3/2^+,5/2^+$	[M1,E2]	0.19 *5*	
		562.77 *12*	55 *9*	505.35	$5/2^+$			E_γ: weighted average of 562.79 *12* from ^{123}I ε decay and 562.71 *18* from (n,γ) E=th. I_γ: weighted average of 57 *9* from ^{123}I ε decay and 52 *9* from (n,γ) E=th.
		578.36 *15*	62 *6*	489.78	$7/2^+$			E_γ: weighted average of 578.26 *20* from ^{123}I ε decay and 578.42 *15* from (n,γ) E=th. I_γ: weighted average of 100 *26* from ^{123}I ε decay and 61 *4* from (n,γ) E=th.
		628.19 *14*	100 *13*	440.00	$3/2^+$			E_γ: weighted average of 628.26 *22* from ^{123}I ε decay and 628.16 *14* from (n,γ) E=th. I_γ: other: 100 *16* from ^{123}I ε decay.
		909.26 *7*	81 *6*	158.994	$3/2^+$			E_γ: weighted average of 909.12 *12* from ^{123}I ε decay and 909.29 *6* from (n,γ) E=th. I_γ: weighted average of 82 *6* from ^{123}I ε decay and 78 *13* from (n,γ) E=th.
		1068.26 *21*	76 *13*	0.0	$1/2^+$			E_γ: weighted average of 1068.12 *15* from ^{123}I ε decay and 1068.58 *23* from (n,γ) E=th. I_γ: from ^{123}I ε decay. Other: ≈65 from (n,γ) E=th.
1097.76	$(3/2^-,5/2,7/2^+)$	235.72 *11*	57 *4*	862.11	(5/2)			
		409.6 *10*	≈21	687.97	$3/2^+$			
		565.15 *15*	68 *4*	532.68	$(7/2^-)$			
		713.38 *9*	100 *14*	384.31	$(7/2^-,9/2^+)$			
1138.5?		267.4[@d]		870.94	$(3/2^+,5/2,7/2^+)$			
		648.8[@d]		489.78	$7/2^+$			

Adopted Levels, Gammas (continued)

$\gamma(^{123}Te)$ (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π
1212.51	$(3/2^-,5/2^+)$	351.4		862.11	(5/2)
		525.0 *3*	≈16	687.97	$3/2^+$
		613.0	≈14	599.00	$1/2^+$
		707.0 *2*	≈35	505.35	$5/2^+$
		772.49 *9*	100 *10*	440.00	$3/2^+$
		828.4	≈18	384.31	$(7/2^-,9/2^+)$
		1053.8		158.994	$3/2^+$
1244.3	$7/2^+,9/2^+$	546.8@		697.50	$(7/2)^+$
1254.0	$(3/2^-$ to $9/2^-)$	259.1	≈63	996.05	$(5/2)^-$
		374.4 *5*	≈100	879.69	$(7/2^-)$
		391.8	≈38	862.11	(5/2)
		721.6	≈75	532.68	$(7/2^-)$
		867.8	≈88	384.31	$(7/2^-,9/2^+)$
1318.11	$(1/2^+,3/2^+)$	534.7 *3*	23 *7*	783.62	$3/2^+$
		812.8 *3*	30 *9*	505.35	$5/2^+$
		878.5	≈9	440.00	$3/2^+$
		1158.93 *18*	93 *14*	158.994	$3/2^+$
		1318.3 *3*	100 *14*	0.0	$1/2^+$
1327.61		822.28 *11*	100 *14*	505.35	$5/2^+$
		888.29& *17*	56 *11*	440.00	$3/2^+$
		1167.79c& *18*	64 *11*	158.994	$3/2^+$
1344.76	$(3/2)^-$	464.7 *2*	12 *3*	879.69	$(7/2^-)$
		482.55 *5*	70 *3*	862.11	(5/2)
		561	≈9	783.62	$3/2^+$
		745.80 *12*	≈41	599.00	$1/2^+$
		812.12 *3*	100 *4*	532.68	$(7/2^-)$
		839.16 *20*	15 *3*	505.35	$5/2^+$
		905.1 *3*	13 *2*	440.00	$3/2^+$
		1345	<7	0.0	$1/2^+$
1353.84	$(5/2)^+$	474.12 *10*	73 *6*	879.69	$(7/2^-)$
		821.22 *8*	100 *9*	532.68	$(7/2^-)$
		968.91& *10*	55 *9*	384.31	$(7/2^-,9/2^+)$
		1193.9	≈24	158.994	$3/2^+$
1414.15	$(5/2^+)$	880.7	≈10	532.68	$(7/2^-)$
		925.4	≈12	489.78	$7/2^+$
		1255.15 *8*	100 *7*	158.994	$3/2^+$
1422.82	$(3/2^+,5/2^+)$	427.0	≈17	996.05	$(5/2)^-$
		917.6 *5*	≈20	505.35	$5/2^+$
		933.26 *20*	47 *7*	489.78	$7/2^+$
		982.75 *12*	100 *17*	440.00	$3/2^+$
		1262.6	≈7	158.994	$3/2^+$
1446.35	$(3/2)^+$	1005.0	≈48	440.00	$3/2^+$

Adopted Levels, Gammas (continued)

γ(^{123}Te) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π
1446.35	(3/2)$^+$	1287.4 *2*	100 *18*	158.994	3/2$^+$
1483.9	(5/2$^-$)	994.4 *5*	≈100	489.78	7/2$^+$
		1323.9	≈73	158.994	3/2$^+$
1496.3?		625.4[@d]		870.94	(3/2$^+$,5/2,7/2$^+$)
1552.3	(17/2$^-$)	632.7[@]		919.7	(13/2$^-$)
		665.7[@]		886.9	(15/2$^-$)
1558.35	(3/2)$^+$	870.1	>35	687.97	3/2$^+$
		958.7		599.00	1/2$^+$
		1118.7 *3*	>45	440.00	3/2$^+$
		1397.99[c&] *17*	100	158.994	3/2$^+$
1584.7	(3/2$^-$,5/2,7/2$^+$)	706.0	≈40	879.69	(7/2$^-$)
		721.5	≈60	862.11	(5/2)
		1079.5 *4*	≈100	505.35	5/2$^+$
		1144.9	≈100	440.00	3/2$^+$
		1425		158.994	3/2$^+$
1610.2	(19/2$^-$)	722.9[@]		886.9	(15/2$^-$)
1672.0		1166.6 *3*	100	505.35	5/2$^+$
1683.7	5/2$^-$,7/2$^-$	1149.2	≈100	532.68	(7/2$^-$)
		1178.8	≈43	505.35	5/2$^+$
		1194.1 *4*	≈100	489.78	7/2$^+$
1693.64		625.5		1068.23	3/2$^+$,5/2$^+$
		832.2	≈85	862.11	(5/2)
		1160.9 *2*	100 *30*	532.68	(7/2$^-$)
		1204.4	≈77	489.78	7/2$^+$
1708.0	3/2$^+$,5/2$^+$	463.7[@]		1244.3	7/2$^+$,9/2$^+$
1732.5	(5/2$^+$)	736		996.05	(5/2)$^-$
		1034.3	≈36	697.50	(7/2)$^+$
		1044.8	≈82	687.97	3/2$^+$
		1133.2	100	599.00	1/2$^+$
		1200.7	≈55	532.68	(7/2$^-$)
		1292.5 *4*	≈100	440.00	3/2$^+$
1759.61	(3/2)$^-$	405.4		1353.84	(5/2)$^+$
		415.9	≈2	1344.76	(3/2)$^-$
		881.7	≈5	879.69	(7/2$^-$)
		897.49 *4*	99 *9*	862.11	(5/2)
		1070.8	≈6	687.97	3/2$^+$
		1160.7 *2*	≈4	599.00	1/2$^+$
		1225.6	≈4	532.68	(7/2$^-$)
		1254.8	≈9	505.35	5/2$^+$
		1759.58 *14*	100 *5*	0.0	1/2$^+$
1795.8	3/2$^-$,5/2$^+$	933.1		862.11	(5/2)
		1197.4		599.00	1/2$^+$

$^{123}_{52}Te_{71}$-14

Adopted Levels, Gammas (continued)

$\gamma(^{123}Te)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π
1807.72	(3/2⁻)	454.2	≈5	1353.84	(5/2)⁺
		927.3	≈9	879.69	(7/2⁻)
		945.61 *3*	100 *9*	862.11	(5/2)
		1207.5	≈7	599.00	1/2⁺
		1274.9	≈13	532.68	(7/2⁻)
		1807.77 *10*	33 *3*	0.0	1/2⁺
1839.26	(1/2,3/2)	1399.33 *24*	78 *22*	440.00	3/2⁺
		1838.8 *6*	100 *19*	0.0	1/2⁺
1854.1	(5/2⁺)	976.3	≈95	879.69	(7/2⁻)
		992.0	≈37	862.11	(5/2)
		1321.4 *3*	100	532.68	(7/2⁻)
		1349.3	≈21	505.35	5/2⁺
		1412.6	≈26	440.00	3/2⁺
		1694.9	≈63	158.994	3/2⁺
1864.4	(3/2⁺,5/2⁺)	1002.3		862.11	(5/2)
1887.38	(3/2)⁻	1026	≈5	862.11	(5/2)
		1288.9	≈76	599.00	1/2⁺
		1354.5	≈17	532.68	(7/2⁻)
		1384.6	≈19	505.35	5/2⁺
		1447.14 *17*	100	440.00	3/2⁺
		1730.4	≈17	158.994	3/2⁺
		1888.2 *6*	71 *19*	0.0	1/2⁺
1903.36	(⁺)	1119.8 *3*	>52	783.62	3/2⁺
		1397.99[c] *17*	100	505.35	5/2⁺
1930.3	(21/2⁻)	319.7[@]		1610.2	(19/2⁻)
		378[#]		1552.3	(17/2⁻)
1958.4	(3/2⁺,5/2⁺)	1270.5	≈45	687.97	3/2⁺
		1359.6 *3*	≈100	599.00	1/2⁺
		1468.5	≈35	489.78	7/2⁺
		1796.5	≈25	158.994	3/2⁺
1978.05	(3/2)⁻	1116.04 *12*	78 *10*	862.11	(5/2)
		1290.2	≈17	687.97	3/2⁺
		1378.2	≈20	599.00	1/2⁺
		1472.0	≈24	505.35	5/2⁺
		1538.6	≈44	440.00	3/2⁺
		1818.99 *21*	78 *9*	158.994	3/2⁺
		1977.92 *14*	100 *7*	0.0	1/2⁺
2020.74	1/2⁻,3/2⁻	1158.4 *2*	49 *6*	862.11	(5/2)
		1861.1 *5*	22 *5*	158.994	3/2⁺
		2021.06 *20*	100 *6*	0.0	1/2⁺
2092.57	(1/2,3/2)	333	≈20	1759.61	(3/2)⁻
		1651.9	≈10	440.00	3/2⁺
		1933.57 *11*	100 *7*	158.994	3/2⁺

Adopted Levels, Gammas (continued)

γ(^{123}Te) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.	Comments
2129.80	(3/2)$^-$	1267.72 *15*	73 *11*	862.11	(5/2)		
		1597.3 *4*	≈27	532.68	(7/2$^-$)		
		1624.24 *20*	100 *11*	505.35	5/2$^+$		
		1973.6	≈22	158.994	3/2$^+$		E_γ: poor-fit, level-energy difference=1970.8.
		2129.7	≈78	0.0	1/2$^+$		
2158.06	1/2$^-$,3/2$^-$	350.2	≈4	1807.72	(3/2$^-$)		
		397.6	≈3	1759.61	(3/2)$^-$		
		1373.6	≈7	783.62	3/2$^+$		
		1718.73[&] *10*	34 *3*	440.00	3/2$^+$		
		1999.04 *4*	100 *3*	158.994	3/2$^+$		
		2158.5	≈12	0.0	1/2$^+$		
2197.30	(1/2$^+$,3/2)	437.5 *3*	≈41	1759.61	(3/2)$^-$		
		842.8	≈18	1353.84	(5/2)$^+$		
		1335.9	≈59	862.11	(5/2)		
		1690.8	≈21	505.35	5/2$^+$		
		2038.0	≈12	158.994	3/2$^+$		
		2197.6 *3*	100 *21*	0.0	1/2$^+$		
2357.9		806[#]		1552.3	(17/2$^-$)		
2358.3	(23/2$^-$)	427.7[@]		1930.3	(21/2$^-$)		
		748[#]		1610.2	(19/2$^-$)		
2621.89	(1/2$^+$,3/2)	1759.8 *2*	54 *13*	862.11	(5/2)		
		2023.2	≈100	599.00	1/2$^+$		
		2115.2	≈69	505.35	5/2$^+$		
		2622	≈75	0.0	1/2$^+$		
2644.7	(1/2,3/2)	666.6	≈100	1978.05	(3/2)$^-$		
		1085.86[d] *15*	59 *10*	1558.35	(3/2)$^+$		
		1782.6		862.11	(5/2)		
2684.2	(21/2$^-$,23/2$^-$)	326[#]		2358.3	(23/2$^-$)		
		754[#]		1930.3	(21/2$^-$)		
		1074[#]		1610.2	(19/2$^-$)		
2726.23	(1/2,3/2)	919.6	≈14	1807.72	(3/2$^-$)		
		1167.79[c] *18*		1558.35	(3/2)$^+$		
		1864.19 *18*	100 *9*	862.11	(5/2)		
		2567.1	≈30	158.994	3/2$^+$		
		2725	≈59	0.0	1/2$^+$		
2811.9	1/2$^-$,3/2$^-$	614.51[d] *10*	100	2197.30	(1/2$^+$,3/2)		
2812.6	(23/2)	455[#]		2357.9			
		881.8[@]		1930.3	(21/2$^-$)	D	Mult.: from γγ(DCO) in (^{11}B,p3nγ).
2937.2	1/2$^-$,3/2$^-$	1129.5 *5*	100	1807.72	(3/2$^-$)		
3039.0	(25/2$^-$)	355[#]		2684.2	(21/2$^-$,23/2$^-$)		

$^{123}_{52}Te_{71}$-16

Adopted Levels, Gammas (continued)

$\gamma(^{123}Te)$ (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.	Comments
3039.0	(25/2$^-$)	1109#		1930.3	(21/2$^-$)		
3376.7	(27/2$^-$)	338#		3039.0	(25/2$^-$)		
		1018#		2358.3	(23/2$^-$)		
3551.6	(27/2)	739#		2812.6	(23/2)		
3813.1		774#		3039.0	(25/2$^-$)		
		1129#		2684.2	(21/2$^-$,23/2$^-$)		
4113.0	(29/2$^-$)	300#		3813.1			
		1074#		3039.0	(25/2$^-$)		
4201.7	(31/2)	650#		3551.6	(27/2)		
4253.8	(31/2$^-$)	877#		3376.7	(27/2$^-$)		
4358.0?		1319#d		3039.0	(25/2$^-$)		
4627.8	(33/2$^-$)	269#d		4358.0?			
		374#		4253.8	(31/2$^-$)		
		426#		4201.7	(31/2)		
		515#		4113.0	(29/2$^-$)		
4748.7	(33/2)	547#		4201.7	(31/2)	D	Mult.: from $\gamma\gamma$(DCO) in (^{11}B,p3nγ).
5009.8	(35/2$^-$)	382#		4627.8	(33/2$^-$)		
		756#		4253.8	(31/2$^-$)		
5034.7		286#		4748.7	(33/2)		
5565.8	(37$^-$/2)	556#		5009.8	(35/2$^-$)		
5588.8		579#		5009.8	(35/2$^-$)		
5644.8		635#		5009.8	(35/2$^-$)		
5952.8		307#d		5644.8			
		364#		5588.8			
		387#		5565.8	(37$^-$/2)		
6274.7		1240#		5034.7			
6558.8		606#		5952.8			
6912.8		1268#		5644.8			
(6929.21)	1/2$^+$	3972		2957.3	(1/2,3/2)		
		3982.4 *3*	0.19 *3*	2946.8	(1/2,3/2)		
		3991.5 *3*	0.38 *3*	2937.2	1/2$^-$,3/2$^-$		
		4117.3 *3*	0.30 *8*	2811.9	1/2$^-$,3/2$^-$		
		4203.0 *4*	0.92 *4*	2726.23	(1/2,3/2)		
		4242.4 *5*	0.58 *5*	2686.8	1/2$^-$,3/2$^-$		
		4285.1 *4*	0.18 *2*	2644.7	(1/2,3/2)		
		4307.7 *3*	0.58 *2*	2621.89	(1/2$^+$,3/2)		

$^{123}_{52}Te_{71}$-17

Adopted Levels, Gammas (continued)

γ(^{123}Te) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π
(6929.21)	1/2+	4731.7 *3*	0.96 *3*	2197.30	(1/2+,3/2)
		4770.70 *9*	2.60 *5*	2158.06	1/2−,3/2−
		4797.3 *6*	0.43 *3*	2129.80	(3/2)−
		4836.79 *11*	0.52 *3*	2092.57	(1/2,3/2)
		4908.76 *23*	0.92 *2*	2020.74	1/2−,3/2−
		4950.88 *23*	0.77 *3*	1978.05	(3/2)−
		5041.1 *3*	0.45 *3*	1887.38	(3/2)−
		5088.7 *5*	≈0.05	1839.26	(1/2,3/2)
		5121.63 *10*	1.33 *3*	1807.72	(3/2−)
		5169.55 *7*	2.26 *5*	1759.61	(3/2)−
		5371		1558.35	(3/2)+
		5482.6 *8*	≈0.05	1446.35	(3/2)+
		5584.45 *11*	1.27 *3*	1344.76	(3/2)−
(6929.21)	1/2+	5610.6 *3*	0.13 *4*	1318.11	(1/2+,3/2+)
		5892.7 *3*	0.13 *4*	1036.62	3/2+
		6329.6 *3*	0.18 *6*	599.00	1/2+
		6424.6[d] *3*	≈0.01	505.35	5/2+
		6489.0 *5*	0.06 *2*	440.00	3/2+
		6770.17 *23*	0.16 *1*	158.994	3/2+
		6928.9 *3*	0.08 *1*	0.0	1/2+
7062.8		504[#]		6558.8	
7090		815[#]		6274.7	
7296		233[#]		7062.8	
7481.4?		394[#d]		7090	
8030.4?		1119[#d]		6912.8	

† From ^{122}Te(n,γ) E=th, unless otherwise noted. Those γ rays from (n,γ) E=th without uncertainty in energy are weak transitions seen only in γγ-coin, for which ΔEγ=1 keV has been assumed in the fitting procedure to obtain level energies by the evaluator.

‡ From ^{123}I ε decay.

From ^{116}Cd(^{11}B,p3nγ) (1996Bl12).

@ From ^{124}Sn(^{3}He,4nγ),^{123}Sb(d,2nγ) (1978HaYQ). No uncertainties are given in 1978HaYQ and an uncertainty of ΔEγ=0.3 keV for each Eγ has been assumed by the evaluator in the fitting procedure to obtain level energies.

& Poor fit. Uncertainty is increased to 0.3 keV in the fitting (except for 0.5 keV for 1397.99γ).

[a] From level-energy difference.

[b] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

[c] Multiply placed.

[d] Placement of transition in the level scheme is uncertain.

$^{123}_{52}Te_{71}$-18

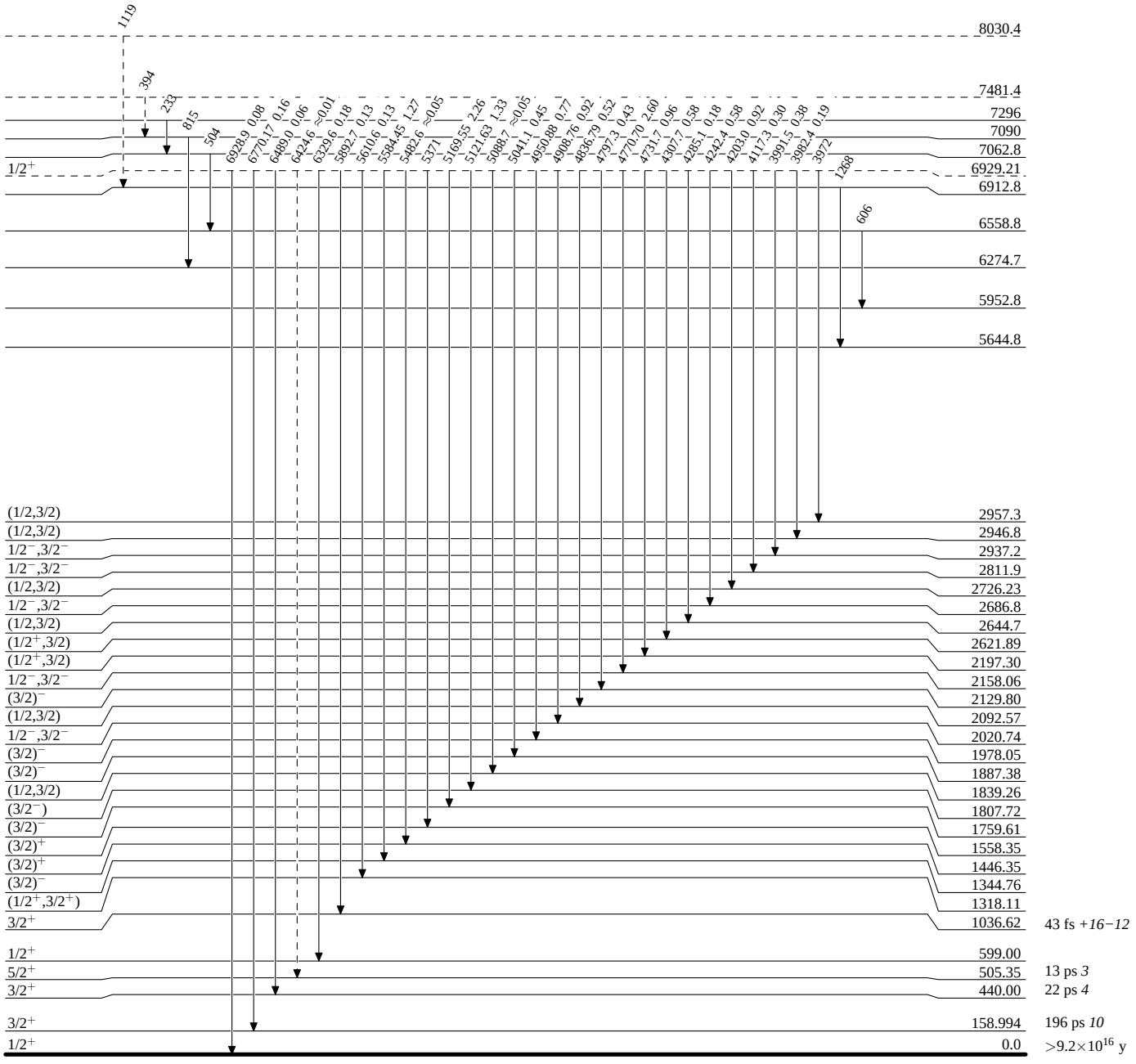
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{123}_{52}Te_{71}$

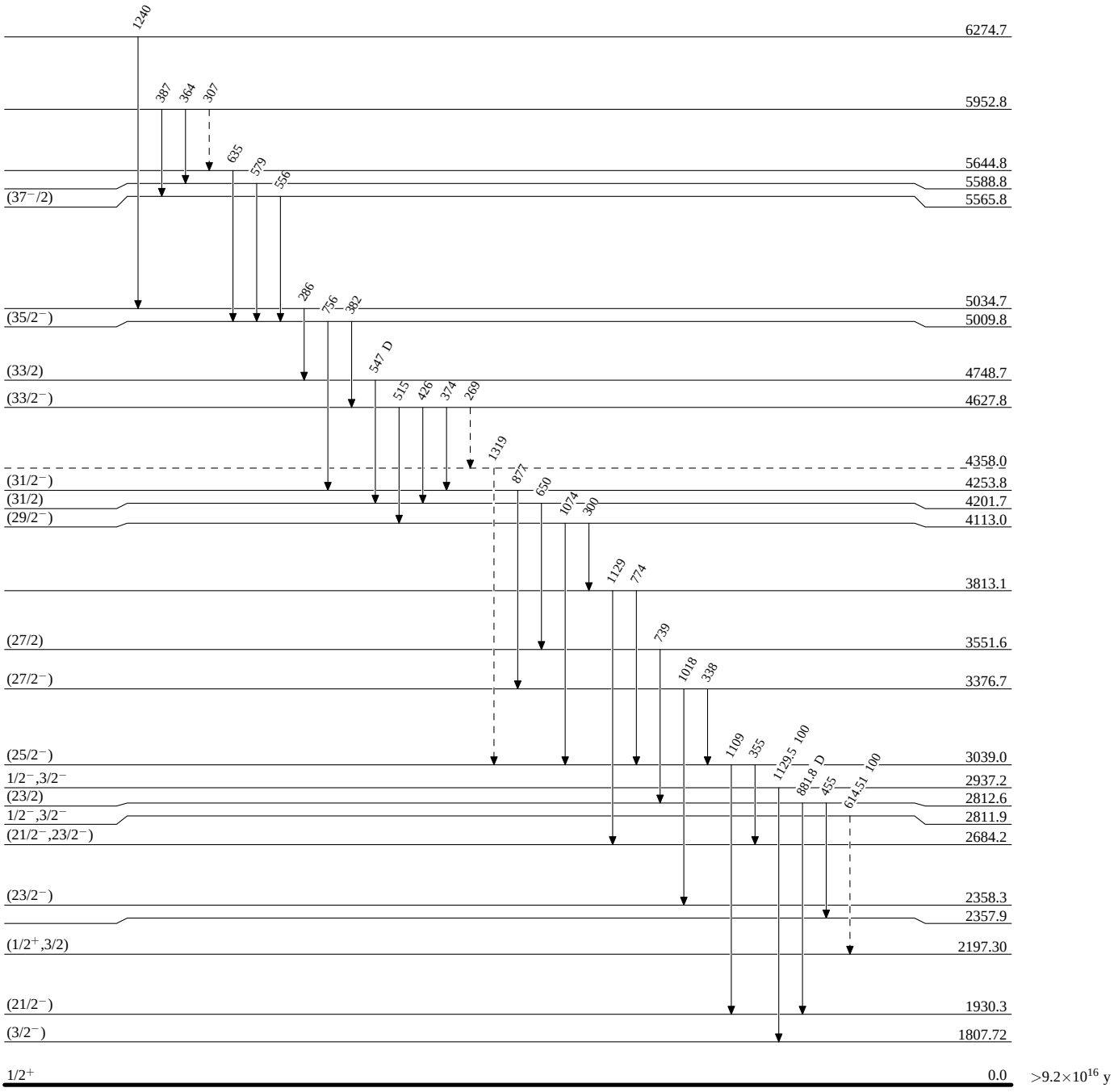
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

- - - - - - ► γ Decay (Uncertain)



$^{123}_{52}Te_{71}$

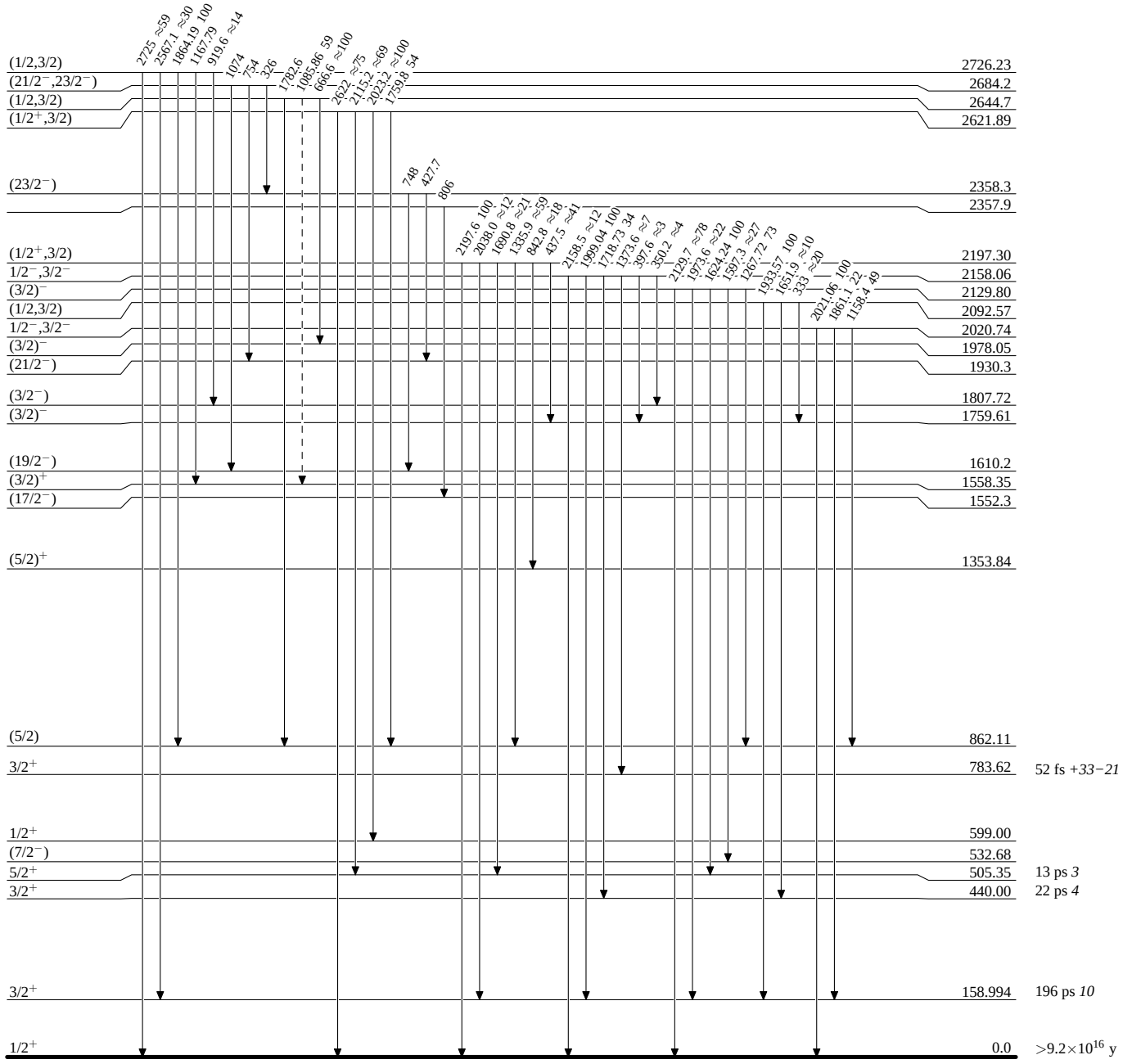
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

– – – – – – ► γ Decay (Uncertain)

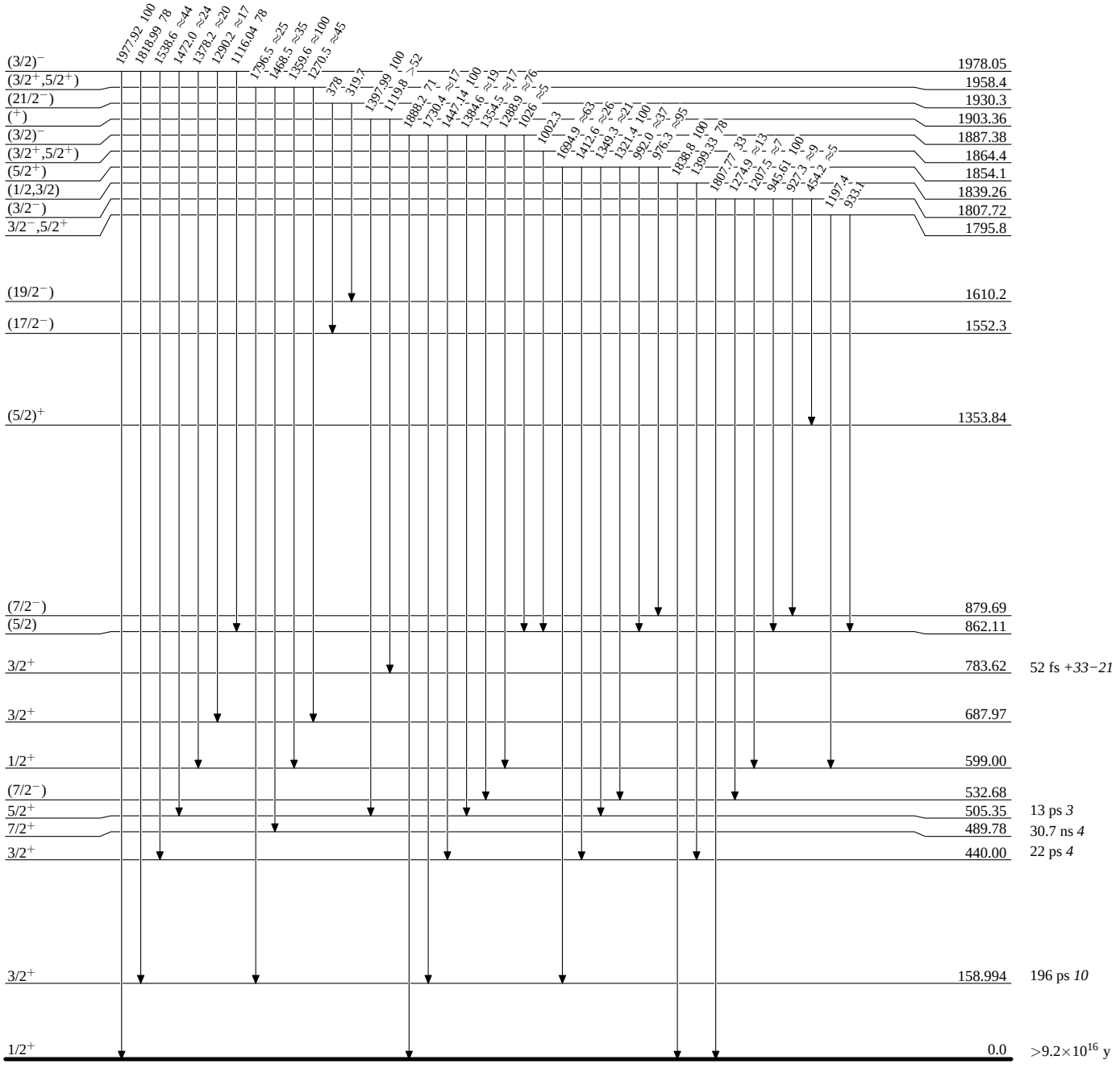


$^{123}_{52}Te_{71}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

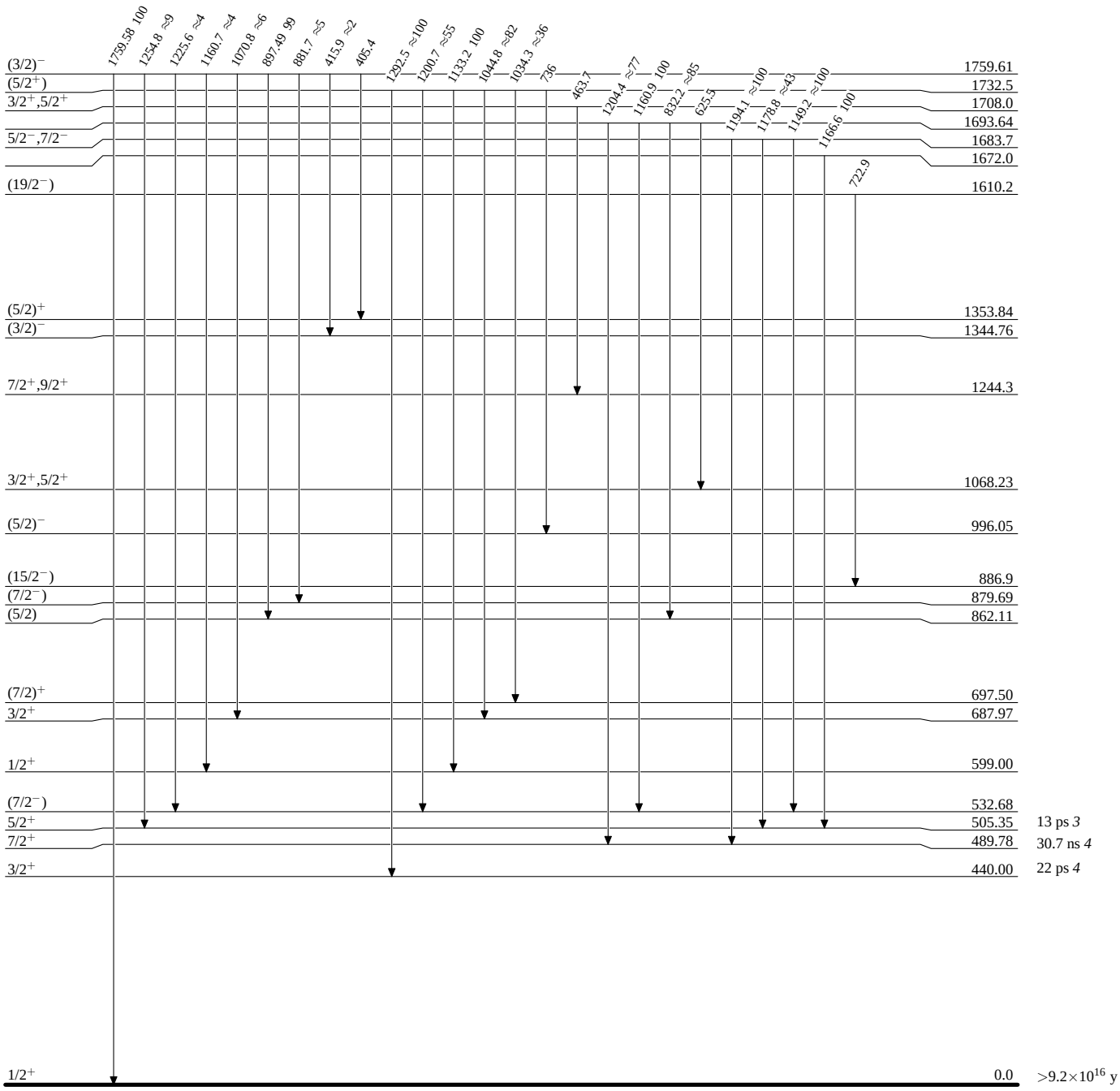


$^{123}_{52}Te_{71}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{123}_{52}Te_{71}$

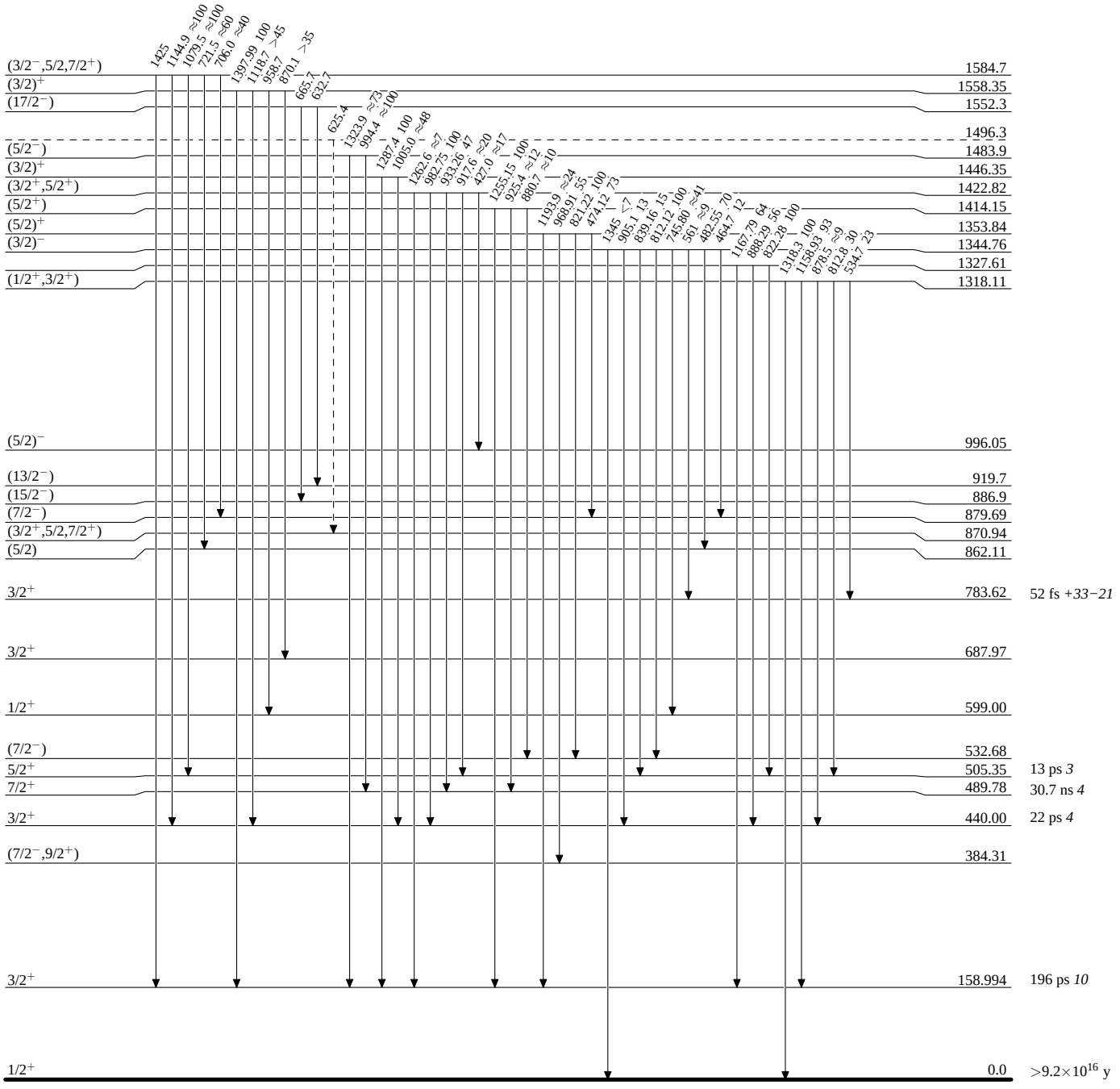
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{123}_{52}Te_{71}$

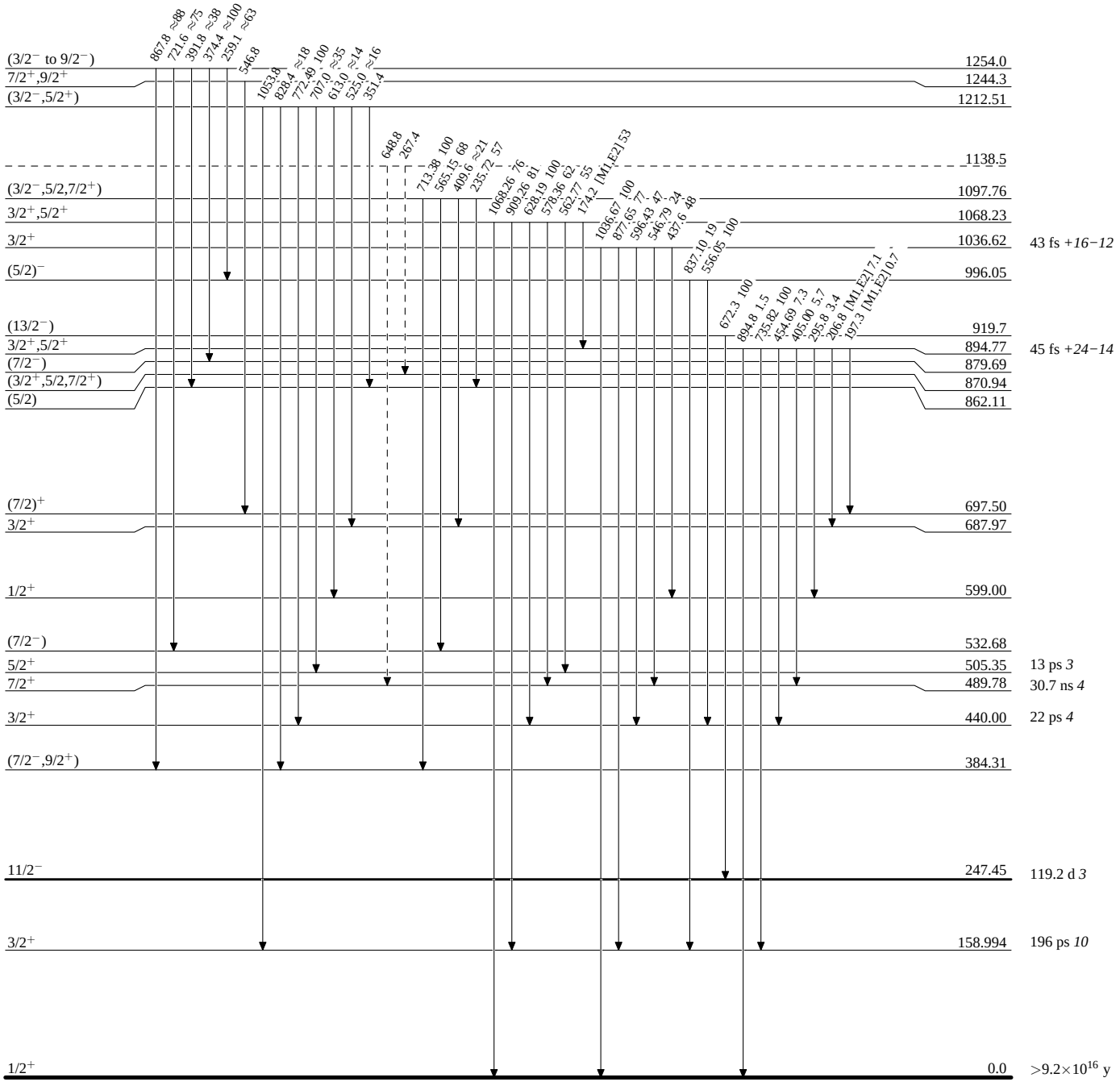
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{123}_{52}Te_{71}$

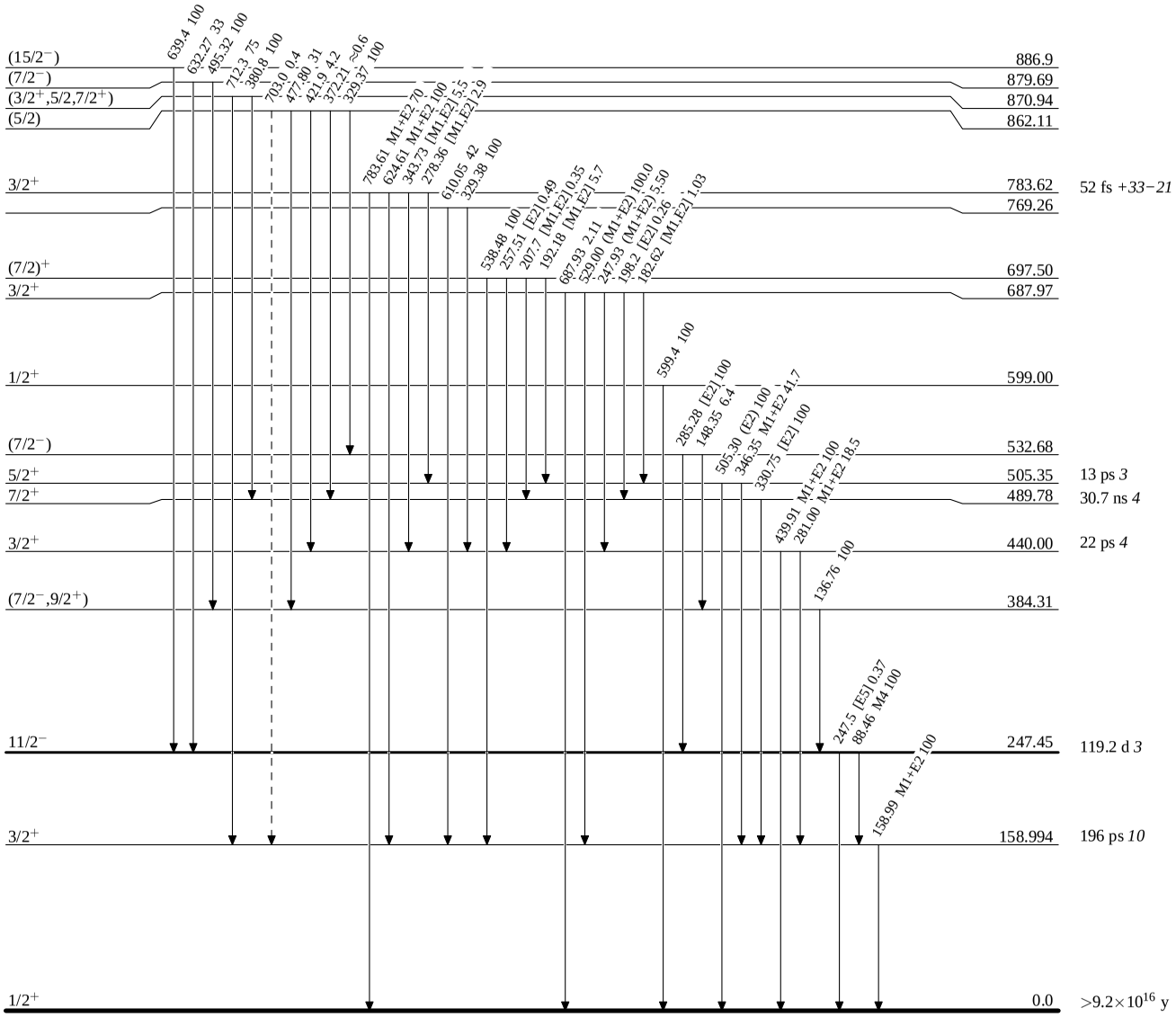
Adopted Levels, Gammas

Legend

Level Scheme (continued)

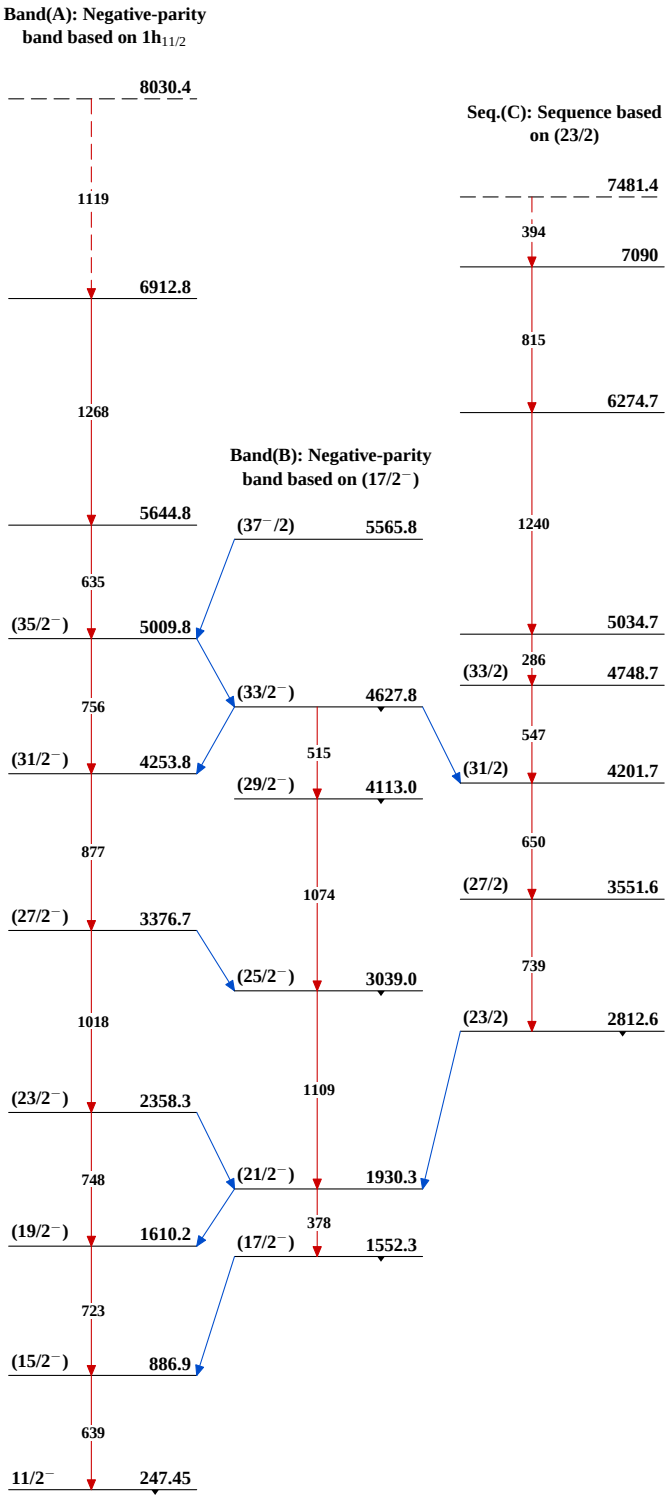
Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{123}_{52}Te_{71}$

Adopted Levels, Gammas



$^{123}_{52}Te_{71}$

^{123}I ε decay (13.2230 h) 1976Wa13,2012Ko47

Parent: ^{123}I: E=0.0; $J^{\pi}=5/2^{+}$; $T_{1/2}$=13.2230 h *19*; Q(ε)=1228 *3*; %ε+%β^{+} decay=100

^{123}I-J^{π},$T_{1/2}$: From Adopted Levels of ^{123}I.

^{123}I-Q(ε): From 2021Wa16.

2012Ko47: radionuclide ^{123}I was produced at the IPEN Cyclone-30 cyclotron at the Nuclear Metrology Laboratory (LMN) at the Nuclear and Energy Research Institute (IPEN) , by means of ^{124}Xe(p,2n)^{123}Cs reaction, followed by ^{123}Cs decay. γ and X rays were detected by NaI(Tl) and HPGe detectors and electrons were detected by a gas-flow or pressured 4π proportional counter in 4$\pi\beta$-γ coincidence systems. Measured Eγ, Iγ, E(X-ray), I(X-ray), Eβ, Iβ. Deduced γ-ray emission probabilities, 159γ conversion coefficient from the experimental extrapolation curve. Comparisons with available data.

1976Wa13: ^{123}I source was produced via ^{123}Te(p,n) on isotopically enriched targets at Lawrence Livermore Laboratory. γ rays were detected with ordinary and Compton-suppressed Ge(Li) spectrometers. Measured Eγ, Iγ. Deduced levels, J, π, β branching ratios, log *ft*. Comparisons with theoretical calculations. Systematics of neighboring Te isotopes.

1979Sc13: ^{123}I activity was obtained from the decay of ^{123}Xe produced by proton bombardment of iodine. γ rays were detected with a NaI detector. Measured Eγ, $\gamma(\theta$,T). Deduced levels, J, π, γ-ray mixing ratios. Deduced magnetic moment of ^{123}I g.s. using the technique of nuclear magnetic resonance of oriented nuclei (NMR/ON).

1970Sp03: source of ^{123}I was produced by high-energy spallation of 3 GeV proton from the Princeton-Pennsylvania Accelerator on a natural lanthanum target. γ rays were detected with four Ge(Li) detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin. Deduced levels. Comparisons with available data.

1968Ra11: source of ^{123}I was produced by ^{121}Sb(^{4}He,2n) with 30 MeV ^{4}He beam from the MIT cyclotron on Sb metal (98.4% in ^{121}Sb). γ rays were detected with a Ge(Li) detector and a NaI(Tl) crystal. Measured Eγ, Iγ, $\gamma\gamma$-coin. Deduced levels, J, π, β branching ratios, log *ft*. Comparisons with theoretical calculations. Systematics of neighboring Te isotopes.

1969Se09: ^{123}I source was produced via Te(p,xn) with 80 MeV proton beam from the synchrocyclotron at Orsay. γ rays were detected with a Ge(Li) detector and a NaI detector. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma(\theta)$. Deduced γ-ray mixing ratios. See 1967Se05 for deduced levels, J, π, β-decay branching ratios, log *ft*.

Others:

Iγ: 1960Gu02, 1986AgZW, 1986Fl03, 1987Ja13, 1990Ma24.

Parent $T_{1/2}$: 2012Re25, 2018Bo02, 2004Da05, 1973Ka45.

^{123}Te Levels

E(level)[†]	J^{π}[‡]	$T_{1/2}$[‡]	Comments
0.0	$1/2^{+}$		
159.00 *3*	$3/2^{+}$	196 ps *10*	
247.5	$11/2^{-}$	119.2 d *3*	E(level): rounded value from Adopted Levels.
440.01 *4*	$3/2^{+}$	22 ps *4*	J^{π}: spin=3/2 from $\gamma\gamma(\theta)$ in 1969Se09.
489.73 *8*	$7/2^{+}$	30.7 ns *4*	
505.34 *4*	$5/2^{+}$	13 ps *3*	J^{π}: spin=5/2 from $\gamma\gamma(\theta)$ in 1969Se09.
532.82 *11*	$(7/2^{-})$		
599.57 *15*	$1/2^{+}$		
687.97 *4*	$3/2^{+}$		J^{π}: spin=3/2 from $\gamma\gamma(\theta)$ in 1969Se09; 5/2 from $\gamma(\theta)$ anisotropy in 1979Sc13.
697.53 *5*	$(7/2)^{+}$		J^{π}: spin=7/2 from $\gamma\gamma(\theta)$ in 1969Se09.
769.27 *14*			
783.61 *4*	$3/2^{+}$	52 fs *+33−21*	J^{π}: spin=(3/2,5/2) from $\gamma\gamma(\theta)$ in 1969Se09; 5/2 ruled out by $\gamma(\theta)$ anisotropy in 1979Sc13.
894.77 *8*	$3/2^{+}$,$5/2^{+}$	45 fs *+24−14*	
996.07 *12*	$(5/2)^{-}$		
1036.65 *12*	$3/2^{+}$	43 fs *+16−12*	
1068.16 *7*	$3/2^{+}$,$5/2^{+}$		

[†] From a least-squares fit to γ-ray energies, assuming $\Delta E\gamma$=0.3 keV where not given.

[‡] From Adopted Levels.

^{123}I ε decay (13.2230 h) 1976Wa13,2012Ko47 (continued)

ε,β+ radiations

E(decay)	E(level)	Iε[‡]	Log *ft*	I(ε+β+)[†‡]	Comments
(160 *3*)	1068.16	0.0079 *8*	7.3 *20*	0.0079 *8*	
(191 *3*)	1036.65	0.0028 *11*	8.0 *12*	0.0028 *11*	
(232 *3*)	996.07	0.0036 *5*	8.1 *8*	0.0036 *5*	
(333 *3*)	894.77	0.074 *3*	7.2 *4*	0.074 *3*	
(444 *3*)	783.61	0.150 *4*	7.2 *3*	0.150 *4*	
(459 *3*)	769.27	0.0037 *7*	8.8 *3*	0.0037 *7*	
(531 *3*)	697.53	0.406 *13*	6.95 *21*	0.406 *13*	
(540 *3*)	687.97	1.51 *5*	6.40 *21*	1.51 *5*	
(695 *3*)	532.82	0.0044 *5*	9.17 *16*	0.0044 *5*	
(723 *3*)	505.34	0.405 *11*	7.25 *15*	0.405 *11*	
(738 *3*)	489.73	0.0026 *14*	9.5 *3*	0.0026 *14*	
(788 *3*)	440.01	0.424 *13*	7.31 *13*	0.424 *13*	Iε: 0.015 *16* with a 95% confidence level from a direct measurement by 1990Ma24.
(1069 *3*)	159.00	97.0 *5*	5.23 *9*	97.0 *5*	

† From γ+ce intensity balance at each level.
‡ Absolute intensity per 100 decays.

γ(^{123}Te)

Iγ normalization: From ΣI(γ+ce to g.s.+247.5 levels)=100. No direct ε decay to g.s. and 247.5 level is expected.

E_γ [†]	I_γ [†&]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[#]	α[a]	Comments
159.00 *5*	100	159.00	3/2$^+$	0.0	1/2$^+$	M1+E2	+0.079 *11*	0.187	%Iγ=83.60 *19* B(M1)(W.u.)=0.0234 *11*; B(E2)(W.u.)=2.5 *5* E_γ: weighted average of 159.1 *1* (1968Ra11), 159.0 *3* (1970Sp03), and 158.97 *5* (1976Wa13). Other: 159 *1* (1967Se05). δ: 0.18 *+8−14* from α(exp)=0.1905 *32* (2012Ko47), using the BrIccMixing program.
174.2 *3*	0.0010 *3*	1068.16	3/2$^+$,5/2$^+$	894.77	3/2$^+$,5/2$^+$	[M1,E2]		0.19 *5*	%Iγ=0.0008 *3* I_γ: weighted average of 0.0010 *3* (1976Wa13) and 0.0012 *6* (2012Ko47).
182.62 *6*	0.0156 *7*	687.97	3/2$^+$	505.34	5/2$^+$	[M1,E2]		0.17 *4*	%Iγ=0.0130 *6* E_γ: weighted average of 183.7 *10* (1968Ra11), 183.0 *7* (1970Sp03), and 182.61 *6* (1976Wa13). Other: 183 *1* (1967Se05). I_γ: weighted average of 0.03 *2* (1968Ra11), 0.03 *1* (1970Sp03), 0.0155 *7* (1976Wa13), and 0.018 *7* (2012Ko47). Other: 0.026 (1967Se05).
[x]190.7 *1*	0.0006 *2*								%Iγ=0.00050 *17*
192.18 *7*	0.0212 *13*	697.53	(7/2)$^+$	505.34	5/2$^+$	[M1,E2]		0.14 *3*	%Iγ=0.0177 *11* E_γ: weighted average of 192.7 *10* (1968Ra11), 193 *1* (1970Sp03), and 192.17 *7* (1976Wa13). Other: 192 *1* (1967Se05). I_γ: weighted average of 0.03 *2* (1968Ra11), 0.03 *2* (1970Sp03), 0.0238 *11* (1976Wa13), and 0.0194 *9* (2012Ko47). Other: 0.023 (1967Se05).
197.23[‡]	0.0004 *2*	894.77	3/2$^+$,5/2$^+$	697.53	(7/2)$^+$	[M1,E2]		0.13 *3*	%Iγ=0.00033 *17*
198.23	0.004 *1*	687.97	3/2$^+$	489.73	7/2$^+$	[E2]		0.1545	%Iγ=0.0033 *9* I_γ: other: 0.003 *5* for 198.2γ+197.2γ (2012Ko47).
206.80[‡]	0.004 *1*	894.77	3/2$^+$,5/2$^+$	687.97	3/2$^+$	[M1,E2]		0.112 *22*	%Iγ=0.0033 *9*
207.80[‡]	0.0013 *4*	697.53	(7/2)$^+$	489.73	7/2$^+$	[M1,E2]		0.111 *21*	%Iγ=0.0011 *4* I_γ: other: 0.0046 *5* for 207.8γ+206.8γ (2012Ko47).
247.97 *5*	0.0829 *18*	687.97	3/2$^+$	440.01	3/2$^+$	(M1+E2)		0.064 *8*	%Iγ=0.0693 *16* E_γ: weighted average of 248.3 *5* (1968Ra11), 248.4 *5* (1970Sp03), and 247.96 *5* (1976Wa13). Other: 248 *1* (1967Se05). I_γ: weighted average of 0.08 *1* (1968Ra11), 0.07 *2* (1970Sp03), 0.085 *3* (1976Wa13), and 0.0824 *18* (2012Ko47). Other: 0.070 (1967Se05).

^{123}I ε decay (13.2230 h) 1976Wa13,2012Ko47 (continued)

γ(^{123}Te) (continued)

E_γ[†]	I_γ[†&]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[#]	α[a]	Comments
									δ: −0.55 to −0.14, or −2.1 to −1.0 from $\delta^2/(1+\delta^2)$=0.02 to 0.23 or 0.48 to 0.81 (δ<0), respectively, from γ(θ) anisotropy in 1979Sc13, with J(688)=5/2.
257.51 *15*	0.0018 *5*	697.53	(7/2)$^+$	440.01	3/2$^+$	[E2]		0.0637	%Iγ=0.0015 *5* I_γ: other: %Iγ=0.00016 *4* in Table 3 of 2012Ko47 could be a misprint.
[x]259.0 *2*	0.0011 *5*								%Iγ=0.0009 *5*
278.36 *12*	0.0027 *5*	783.61	3/2$^+$	505.34	5/2$^+$	[M1,E2]		0.045 *4*	%Iγ=0.0023 *5*
281.03 *5*	0.086 *3*	440.01	3/2$^+$	159.00	3/2$^+$	M1+E2	−0.24[@] *+10−14*	0.0409 *8*	%Iγ=0.072 *3* E_γ: others: 281.0 *5* (1968Ra11), 281.3 *5* (1970Sp03), 282 *1* (1967Se05). Other: 282 *1* (1967Se05), 275 *10* (1960Gu02). I_γ: weighted average of 0.08 *1* (1968Ra11), 0.08 *3* (1970Sp03), 0.095 *3* (1976Wa13), and 0.0841 *16* (2012Ko47). Other: 0.053 (1967Se05), 0.14 *3* (1960Gu02). δ: from A_2=−0.26 *3* of 281γ-159γ(θ) (1969Se09), also giving other possible δ=−1.9 *5* which is less likely since it would require a much larger B(E2)(W.u.). Others: −0.08 to 0, or +3.4 to +4.9 from $\delta^2/(1+\delta^2)$<0.007 (δ<0) or 0.92 to 0.96 (δ>0), respectively, from γ(θ) anisotropy in 1979Sc13.
285.32 *11*	0.0051 *5*	532.82	(7/2$^-$)	247.5	11/2$^-$				%Iγ=0.0043 *5*
295.19[‡]	0.0019	894.77	3/2$^+$,5/2$^+$	599.57	1/2$^+$				%Iγ=0.001588 *4* E_γ,I_γ: From author's FIG.4; not given in table 2 (1976Wa13). Other: Iγ<0.00084 (2012Ko47).
329.38 *17*	0.0031 *7*	769.27		440.01	3/2$^+$				%Iγ=0.0026 *6*
330.70 *8*	0.0139 *7*	489.73	7/2$^+$	159.00	3/2$^+$	[E2]		0.0282	%Iγ=0.0116 *6* I_γ: other: 0.0149 *6* for 330.7γ+329.4γ (2012Ko47).
343.73 *14*	0.0051 *5*	783.61	3/2$^+$	440.01	3/2$^+$				%Iγ=0.0043 *5*
346.36 *5*	0.144 *3*	505.34	5/2$^+$	159.00	3/2$^+$	M1+E2	+0.07[@] *8*	0.0236	%Iγ=0.120 *3* E_γ: weighted average of 346.6 *5* (1968Ra11), 347.0 *5* (1970Sp03), and 346.35 *5* (1976Wa13). Others: 346 *1* (1967Se05), 340 *10* (1960Gu02). I_γ: weighted average of 0.16 *3* (1960Gu02), 0.12 *2* (1968Ra11), 0.11 *3* (1970Sp03), 0.151 *5* (1976Wa13), and 0.142 *3* (2012Ko47). Other: 0.087 (1967Se05). δ: from A_2=+0.006 *30* of 346γ-159γ(θ) in 1969Se09, also giving other possible δ=+3.4 *+13−8* which is less likely since it would require a much larger B(E2)(W.u.). Others: +0.20 to +0.29 from $\delta^2/(1+\delta^2)$=0.04 to 0.08 (δ>0) from γ(θ) anisotropy in 1979Sc13, with J(688)=5/2.
405.02 *13*	0.0032 *4*	894.77	3/2$^+$,5/2$^+$	489.73	7/2$^+$				%Iγ=0.0027 *4*

$^{123}_{52}Te_{71}$-31

^{123}I ε decay (13.2230 h) 1976Wa13,2012Ko47 (continued)

γ(^{123}Te) (continued)

E_γ †	I_γ †&	E_i(level)	J_i^π	E_f	J_f^π	Mult.#	δ#	α[a]	Comments
									I_γ: weighted average of 0.0035 *7* (1976Wa13) and 0.0031 *4* (2012Ko47).
437.5 *3*	0.0009 *9*	1036.65	3/2$^+$	599.57	1/2$^+$				%Iγ=0.0008 *8*
440.02 *5*	0.464 *12*	440.01	3/2$^+$	0.0	1/2$^+$	M1+E2	−2.1 *1*	0.01199	%Iγ=0.388 *10* E_γ: weighted average of 440.4 *5* (1968Ra11), 440.2 *4* (1970Sp03), and 440.02 *5* (1976Wa13). Others: 440 *1* (1967Se05), 439.2 (1969Se09), 440.0 (1987Ja13), 435 *10* (1960Gu02). I_γ: weighted average of 0.42 *2* (1968Ra11), 0.42 *8* (1970Sp03), 0.514 *17* (1976Wa13), 0.464 *9* (2012Ko47), 0.450 *15* (1987Ja13), and 0.44 *9* (1960Gu02). Other: 0.255 (1967Se05). δ: +0.14 to +0.20, or −4.9 to −2.5 from $\delta^2/(1+\delta^2)$=0.02 to 0.04 (δ>0) or 0.86 to 0.96 (δ<0), respectively, from γ(θ) anisotropy in 1979Sc13.
454.76 *15*	0.0041 *3*	894.77	3/2$^+$,5/2$^+$	440.01	3/2$^+$				%Iγ=0.0034 *3* I_γ: weighted average of 0.0047 *6* (1976Wa13) and 0.00396 *24* (2012Ko47).
505.33 *5*	0.344 *9*	505.34	5/2$^+$	0.0	1/2$^+$	(E2)			%Iγ=0.288 *8* E_γ: others: 505.6 *6* (1968Ra11), 505.6 *5* (1970Sp03), 505 *1* (1967Se05), 500 *10* (1960Gu02). I_γ: weighted average of 0.31 *5* (1968Ra11), 0.32 *8* (1970Sp03), 0.379 *12* (1976Wa13), 0.337 *6* (2012Ko47), and 0.28 *6* (1960Gu02). Other: 0.193 (1967Se05). Mult.: Q from γ(θ) anisotropy in 1979Sc13.
528.97 *5*	1.52 *12*	687.97	3/2$^+$	159.00	3/2$^+$	(M1+E2)			%Iγ=1.27 *10* E_γ: weighted average of 529.0 *4* (1968Ra11), 529.3 *4* (1970Sp03), and 528.96 *5* (1976Wa13). Others: 529.0 (1987Ja13), 530 *10* (1960Gu02). I_γ: unweighted average of 1.27 *11* (1968Ra11), 1.26 *24* (1970Sp03), 1.67 *5* (1976Wa13), 1.49 *3* (2012Ko47), 1.411 *29* (1987Ja13), and 2.0 *3* (1960Gu02). Other: 0.780 (1967Se05). δ: −0.09 *6* or −2.8 *+6−7* deduced (by the evaluator) from A_2=−0.19 *2* of 529γ-159γ(θ) in 1969Se09, using adopted δ(E2/M1)=+0.079 *11* for 159γ, with J(688)=3/2. Others: +0.44 to +0.64, or +4 to +10 from $\delta^2/(1+\delta^2)$=0.16 to 0.29 or 0.94 to 0.99 (δ>0), respectively, from γ(θ) anisotropy in 1979Sc13, with J(688)=5/2.
538.54 *5*	0.37 *4*	697.53	(7/2)$^+$	159.00	3/2$^+$				%Iγ=0.31 *4* E_γ: others: 538.5 *5* (1968Ra11), 538.5 *5* (1970Sp03), 538 *1* (1967Se05), 538.0 (1987Ja13). I_γ: unweighted average of 0.32 *2* (1968Ra11), 0.31 *6* (1970Sp03), 0.458 *15* (1976Wa13), 0.411 *7* (2012Ko47) and 0.379 *16* (1987Ja13). Other: 0.195 (1967Se05).
556.05 *13*	0.0030 *3*	996.07	(5/2)$^-$	440.01	3/2$^+$				%Iγ=0.0025 *3* I_γ: weighted average of 0.0037 *5* (1976Wa13) and 0.00288 *24* (2012Ko47).

γ(^{123}Te) (continued)

E_γ †	I_γ †&	E_i(level)	J_i^π	E_f	J_f^π	Mult.#	α[a]	Comments
562.79 *12*	0.00108 *16*	1068.16	3/2$^+$,5/2$^+$	505.34	5/2$^+$			%Iγ=0.00090 *14* I_γ: weighted average of 0.0013 *5* (1976Wa13) and 0.00106 *16* (2012Ko47).
[x]574[b] *1*	0.007							%Iγ=0.005852 *13* E_γ,I_γ: from 1967Se05 only.
578.26 *20*	0.0019 *5*	1068.16	3/2$^+$,5/2$^+$	489.73	7/2$^+$			%Iγ=0.0016 *5* I_γ: weighted average of 0.0018 *5* (1976Wa13) and 0.0024 *10* (2012Ko47).
599.69 *16*	0.0031 *4*	599.57	1/2$^+$	0.0	1/2$^+$			%Iγ=0.0026 *4* I_γ: from 2012Ko47. Other: 0.0031 *11* (1976Wa13).
610.05 *23*	0.0013 *4*	769.27		159.00	3/2$^+$			%Iγ=0.0011 *4* I_γ: other: <0.00012 (2012Ko47).
624.58 *5*	0.093 *3*	783.61	3/2$^+$	159.00	3/2$^+$	M1+E2	0.0050 *6*	%Iγ=0.078 *3* E_γ: weighted average of 624.9 *5* (1968Ra11), 624.9 *5* (1970Sp03), and 624.57 *5* (1976Wa13). Other: 624 *1* (1967Se05). I_γ: weighted average of 0.08 *1* (1968Ra11), 0.07 *2* (1970Sp03), 0.100 *3* (1976Wa13), and 0.0910 *17* (2012Ko47). Other: 0.044 (1967Se05). δ: +0.10 to +0.18, or +2.3 to +4.9 from $\delta^2/(1+\delta^2)$=0.01 to 0.03 or 0.84 to 0.96 (δ>0), respectively, from γ(θ) anisotropy in 1979Sc13.
628.26 *22*	0.0019 *3*	1068.16	3/2$^+$,5/2$^+$	440.01	3/2$^+$			%Iγ=0.0016 *3*
687.94 *8*	0.0321 *9*	687.97	3/2$^+$	0.0	1/2$^+$			%Iγ=0.0268 *8* E_γ: weighted average of 687.7 *6* (1968Ra11), 687.7 *5* (1970Sp03), and 687.95 *8* (1976Wa13). Other: 688 *1* (1967Se05). I_γ: weighted average of 0.03 *1* (1968Ra11), 0.04 *2* (1970Sp03), 0.0321 *18* (1976Wa13), and 0.0321 *9* (2012Ko47). Others: 0.017 (1967Se05), <0.08 (1960Gu02).
735.87 *11*	0.056 *7*	894.77	3/2$^+$,5/2$^+$	159.00	3/2$^+$			%Iγ=0.047 *6* E_γ: unweighted average of 736.10 *6* (1968Ra11), 735.6 *6* (1970Sp03), 735.78 *7* (1976Wa13), and 736 *1* (1967Se05). I_γ: unweighted average of 0.04 *1* (1968Ra11), 0.05 *2* (1970Sp03), 0.074 *3* (1976Wa13), and 0.0593 *11* (2012Ko47). Other: 0.029 (1967Se05).
[x]760.85 *20*	0.00075 *25*							%Iγ=0.00063 *21*
783.60 *6*	0.0634 *20*	783.61	3/2$^+$	0.0	1/2$^+$	M1+E2		%Iγ=0.0530 *17* E_γ: weighted average of 784.4 *6* (1968Ra11), 784.0 *6* (1970Sp03), and 783.59 *6* (1976Wa13). Other: 784 *1* (1967Se05). I_γ: weighted average of 0.05 *1* (1968Ra11), 0.05 *2* (1970Sp03), 0.071 *3* (1976Wa13), and 0.0624 *12* (2012Ko47). Other: 0.030 (1967Se05). δ: +0.20 to +0.33, or −4.9 to −3.0 from $\delta^2/(1+\delta^2)$=0.04 to 0.10 (δ>0) or 0.90 to 0.96 (δ<0), respectively, from γ(θ) anisotropy in 1979Sc13.
837.10 *20*	0.00056 *10*	996.07	(5/2)$^-$	159.00	3/2$^+$			%Iγ=0.00047 *9* I_γ: weighted average of 0.0006 *1* (1976Wa13) and 0.00049 *13* (2012Ko47).
877.52 *17*	0.00086 *11*	1036.65	3/2$^+$	159.00	3/2$^+$			%Iγ=0.00072 *10* E_γ: Value of 887.52 listed in author's table 2 is a misprint. See FIG.4. I_γ: weighted average of 0.0013 *8* (1976Wa13) and 0.00085 *11* (2012Ko47).
894.8 *2*	0.00084 *9*	894.77	3/2$^+$,5/2$^+$	0.0	1/2$^+$			%Iγ=0.00070 *8* I_γ: weighted average of 0.0011 *3* (1976Wa13) and 0.00082 *9* (2012Ko47).

^{123}I ε decay (13.2230 h) 1976Wa13,2012Ko47 (continued)

γ(^{123}Te) (continued)

E_γ †	I_γ †&	E_i(level)	J_i^π	E_f	J_f^π	Comments
[x]898.2 *2*	0.0007 *4*					%Iγ=0.0006 *4*
909.12 *12*	0.00155 *11*	1068.16	3/2+,5/2+	159.00	3/2+	%Iγ=0.00130 *10* I_γ: weighted average of 0.0016 *3* (1976Wa13) and 0.00154 *11* (2012Ko47).
1036.63 *17*	0.00092 *7*	1036.65	3/2+	0.0	1/2+	%Iγ=0.00077 *6* I_γ: weighted average of 0.0012 *3* (1976Wa13) and 0.00091 *7* (2012Ko47).
1068.12 *15*	0.00145 *25*	1068.16	3/2+,5/2+	0.0	1/2+	%Iγ=0.00121 *21* I_γ: unweighted average of 0.0017 *1* (1976Wa13) and 0.00120 *10* (2012Ko47).

† From 1976Wa13, unless otherwise noted. Intensities quoted as from 2012Ko47 are deduced by the evaluator by normalizing their absolute intensities to I(159γ)=100. For values from 1976Wa13, a 3% uncertainty has been added in quadruture by the evaluator to the quoted uncertainties in 1976Wa13 to account for the uncertainty in efficiency calibration, which is normally 2%−3% and is considered not included by 1976Wa13, since some of their uncertainties are unrealistically small (<1%).

‡ From energy difference of E(levels).

From Adopted Gammas. Values from this study are given in comments.

@ Adopted value is deduced (by the evaluator) from A_4=0 and A_2 (given in comments) of γ-159γ(θ) in 1969Se09 with adopted δ(E2/M1)=+0.079 *11* for 159γ.

& For absolute intensity per 100 decays, multiply by 0.8360 *19*.

[a] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

[b] Placement of transition in the level scheme is uncertain.

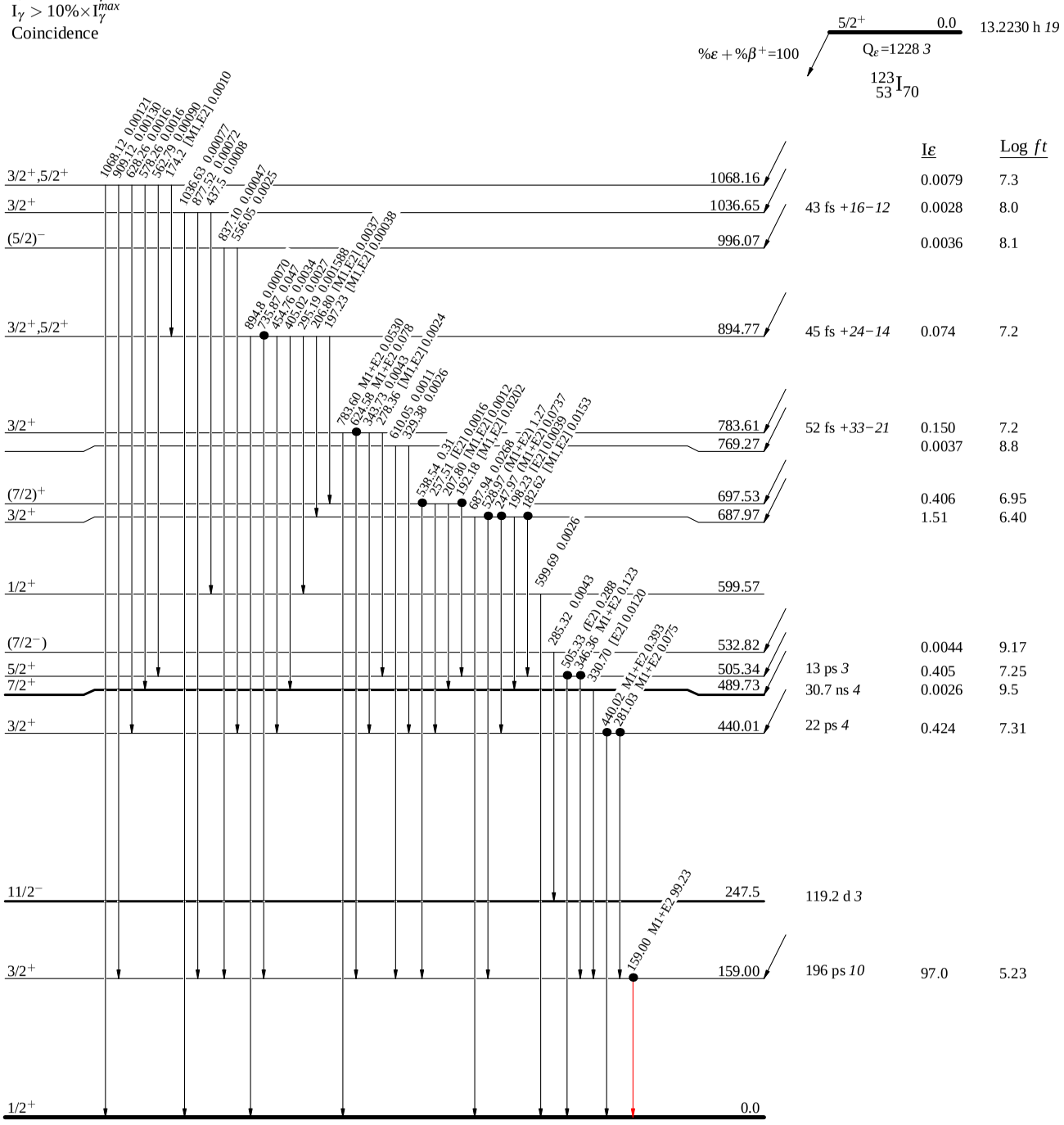
[x] γ ray not placed in level scheme.

^{123}I ε decay (13.2230 h) 1976Wa13,2012Ko47

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- Coincidence



$^{123}_{52}Te_{71}$

^{123}Te IT decay (119.2 d) 1992Ja15,1992Co11,1964Ch18

Parent: ^{123}Te: E=247.5 *2*; $J^{\pi}=11/2^{-}$; $T_{1/2}=119.2$ d *3*; %IT decay=100

^{123}Te-E,J^{π},$T_{1/2}$: From Adopted Levels.

1992Ja15: measurement was performed at Physikalisch Technische Bundesanstalt (PTB), with a $4\pi\beta$-γ-coin detector system, consisting of a NaI(Tl) crystal and a pressurized proportional counter. Measured Eγ, Iγ, E(ce), I(ce), γ-ce-coin. Deduced conversion coefficient, absolute γ emission probability for 159γ.

1992Co11: ^{123m}Te was produced from neutron irradiation at NIST. Conversion electrons were detected with a liquid scintillator and γ rays were detected with a HPGe detector. Measured Eγ, Iγ, E(ce), I(ce), total activity, γ(t). Deduced isomer halflife, absolute γ-ray emission probability of 159γ.

1992ScZZ: measurement was performed at PTB with a $4\pi\beta$-γ-coin system. Measured Eγ, Iγ, E(ce), I(ce), γ-ce-coin. Deduced conversion coefficient, absolute γ emission probability for 159γ.

1973Ra32, 1972Ra07: ^{123m}Te from thermal-neutron irradiation. γ rays were detected with a Ge(Li) detector. Measured Eγ, Iγ. Deduced transition strength for 248γ (in 1973Ra32) and total conversion coefficient for 88γ (in 1972Ra07).

1964Ch18: measured conversion electrons with a double-focusing iron-magnet spectrometer at BNL. Deduced conversion coefficients. See also 1964Ch08 from the same author.

Others:

2003Vi13: measured Eγ, Iγ, $\gamma\gamma$-coin.

1987Ja13: measured isomer halflife with Ge(Li) detector.

1987Ni11: measured I$\gamma(\theta$,T,H). Deduced magnetic moment of the isomer.

1973Si26: I$\gamma(\theta$,T). Deduced magnetic moment of the isomer.

1972Ka31: measured conversion electrons with an UMB-1 prism magnetic β spectrometer. Deduced conversion coefficient ratios. Also 1972Ka61, 1972Ka60, 1969Ka32, 1968Ka20.

1970EmZY: measured isomer $T_{1/2}$.

1970Ro31: measured ce-$\gamma(\theta$,H). Deduced magnetic moment for the 159 level.

1969To02: measured ce-γ-coin with a lens spectrometer for conversion electrons. Deduced mixing ratio of 159γ.

1968Ra02: measured ce-ce(t) at Andhra University in India. Deduced halflife for 159 level.

1966Ha03: measured ce-γ-coin with a magnetic spectrometer for conversion electrons and a NaI crystal for γ rays. Deduced conversion coefficients for 159γ.

1966Gu02: measured $\gamma\gamma(\theta)$. Deduced mixing ratio of 159γ.

1965An05: measured isomer halflife with NaI(Tl) and beta counter.

1964Ch08: measured γ rays with a NaI(Tl) scintillation counter and conversion electrons with a γ-ray spectrometer at BNL. Deduced conversion coefficient ratios and mixing ratio of 159γ.

1963Sc12: measured ce-ce(t) at BNL. Deduced halflife for 159 level.

1956Go23: measured conversion electrons.

1955Go61: measured ce-γ-coin with a lens spectrometer for conversion electrons and a NaI crystal for γ rays. Deduced mixing ratio of 159γ.

1953Gr07: measured ce-ce(t). Deduced halflife for 159 level.

1954Mc10: measured conversion electrons at ORNL.

1951Co34, 1951Hi80: measured isomer halflife.

1950Ka04: measured ce-γ-coin.

^{123}Te Levels

E(level)†	J^{π}‡	$T_{1/2}$‡	Comments
0.0	$1/2^{+}$		
159.00 *3*	$3/2^{+}$	196 ps *10*	μ=0.71 *12* (1970Ro31) $T_{1/2}$: adopted value from this study as weighted average of 190 ps *30* (1953Gr07), 186 ps *20* (1963Sc12) and 199 ps *10* (1968Ra02), with all measured using (ce 88.46γ)(ce 159.00γ)(t). μ: from integral perturbed angular correlation (IPAC) in 1970Ro31 and adopted $T_{1/2}$=196 ps *10*, based on original value of 0.72 *12* in 1970Ro31 using $T_{1/2}$=199 ps *10* from 1968Ra02.
247.46 *5*	$11/2^{-}$	119.2 d *3*	%IT=100 μ=−0.927 *8* (1987Ni11) $T_{1/2}$: adopted value from this study as unweighted average of 119.3 d *1* (1992Co11), 119.7 d *1* (1970EmZY) and 118.6 d *9* (1987Ja13). Others: 117 d *6* (1965An05), 104 d (1951Hi80), 121 d

Continued on next page (footnotes at end of table)

^{123}Te IT decay (119.2 d) 1992Ja15,1992Co11,1964Ch18 (continued)

^{123}Te Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	T$_{1/2}$[‡]	Comments
			(1951Co34). μ: value from 1987Ni11 using nuclear magnetic resonance of oriented nuclei, sign from 1973Si26 with μ=−1.00 *5* measured using nuclear orientation with gamma detection (1973Si26).

† From a least-squares fit to γ-ray energies.
‡ From Adopted Levels. Data from this study are given in comments.

γ(^{123}Te)

Iγ normalization: From I(γ+ce)=100 for 159γ. See comments for 159γ for the measured absolute emission probability of 159γ.

E$_{\gamma}$	I$_{\gamma}$[‡]	E$_i$(level)	J$_i^{\pi}$	E$_f$	J$_f^{\pi}$	Mult.[†]	δ[†]	α[#]	Comments
88.46 *3*	0.110 *4*	247.46	11/2$^-$	159.00	3/2$^+$	M4		1122	E$_{\gamma}$: 1964Ch18 quote this value as from 1964Ch08 of the same author; but this value is not shown in 1964Ch08. The uncertainty is assumed (by the evaluator) to be the same as that of 159γ in 1964Ch08. Other: 88.5 *1* (1973Ra32). I$_{\gamma}$: from I(159.0γ)/I(88.5γ)=906 *33* (1972Ra07). Mult.: adopted assignment from ratios between α(K)=455 *9* (theoretical value for normalization), α(L1)exp=171 *10*, α(L2)exp=42.1 *40*, α(L3)exp=269 *9*,α(M1)exp=38.6 *35*, α(M2)exp+α(M3)exp=66.9 *35*, α(M4)exp+α(M5)exp=2.98 *50* (1964Ch18), and from K:L:M:N=0.93 *4*:1:0.236 *13*:0.058 *4* (1972Ka31). Total conversion coefficient α(exp)=1082 *17* from 1964Ch18, 1076 *42* from 1972Ra07 based on assumed α(K)=0.189 *14* for 159γ.
159.00 *3*	100	159.00	3/2$^+$	0.0	1/2$^+$	M1+E2	+0.079 *11*	0.187 *3*	E$_{\gamma}$: from energies of conversion electrons in 1964Ch08. Other: 159.0 *1* (1973Ra32). I$_{\gamma}$: absolute emission probability=0.839 *6* from measured activity with liquid scintillator and γ-ray intensity with a HPGe detector in 1992Co11; 0.8481 *32* (2π and 4π) and 0.8407 *9* (slope) from 4$\pi\beta$-γ-coin in 1992Ja15; 0.832 *5* from 4$\pi\beta$-γ-coin in

Continued on next page (footnotes at end of table)

^{123}Te IT decay (119.2 d) 1992Ja15,1992Co11,1964Ch18 (continued)

$\gamma(^{123}Te)$ (continued)

E_γ	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	α[#]	Comments
								1992ScZZ; 0.8365 *43* deduced (by evaluator) from α(exp)=0.1954 *61* in 1964Ch18; 0.8348 *29* deduced (by evaluator) from α(exp)=0.1970 *41* in 1966Ha03. Mult.: α(K)exp=0.169 *6*, α(L1)exp=0.0201 *10*, α(L2)exp=0.00138 *10*, α(L3)exp=0.000389 *30*, α(M)exp=0.00454 *23* (1964Ch08, 1964Ch18); α(K)exp=0.170 *4*, α(L)exp=0.0229 *9*, α(M+N+...)=0.0050 *5* (1966Ha03); α(K)exp=0.165 *5*, K:L=6.6 *3* (1956Go23); α(K)exp=0.19 *2* (1954Mc10); α(K)exp=0.18 *8*, K:L=8.9 *8* (1950Ka04). The experimental total conversion coefficient α(exp)=0.192 *9* (deduced from %Iγ=0.839 *6* in 1992Co11), 0.202 *7* (deduced from %Iγ=0.832 *5* in 1992ScZZ), 0.1895 *13* (slope method) and 0.1932 *46* (2π and 4π methods) in 1992Ja15, 0.1954 *61* in 1964Ch08 and 0.1979 *41* in 1966Ha03 both from sum of all ce lines, with the weighted average equal to 0.1910 *14*. δ: values from this study: 0.103 *7* from δ^2=0.0107 *14*, unweighted average of 0.0119 *9* from ce-$\gamma(\theta)$ in 1969To02, 0.011 *8* from $\gamma\gamma(\theta)$ in 1966Gu02, 0.013 *1* from ce-$\gamma(\theta)$ in 1955Go61, 0.0067 *11* from ce data in 1964Ch08; 0.09 *+4−6* from all conversion coefficients given above (using the BrIccMixing code).
247.5 *2*	4.1×10^{-4} *4*	247.46	11/2$^-$	0.0	1/2$^+$	[E5]	7.83	E_γ: from 1973Ra32. I_γ: from I(248γ)/I(159γ)=4.1×10^6 *4* in 1973Ra32.

[†] From Adopted Gammas. Supporting data from this study are given in comments. Conversion coefficients of 88γ from 1964Ch18 are normalized toα(K)theory=455 *9*; those of 159γ quoted in 1964Ch18 are from absolute measurements in 1964Ch08.

[‡] For absolute intensity per 100 decays, multiply by 0.8425 *28*.

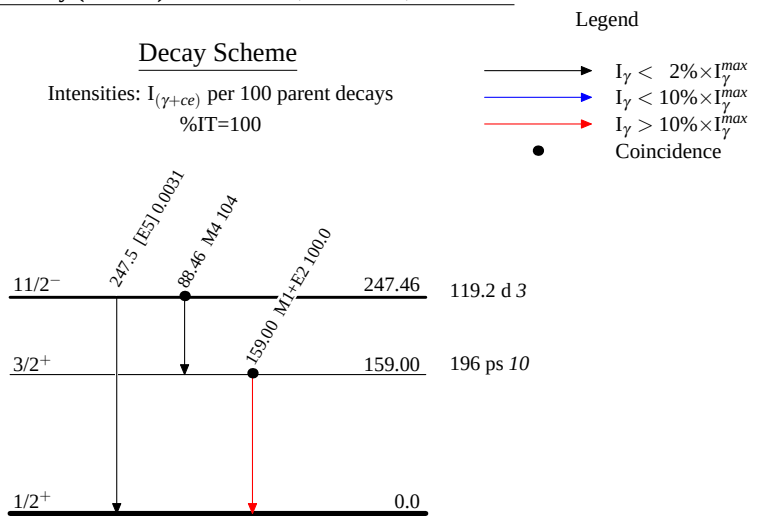
[#] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

^{123}Te IT decay (119.2 d) 1992Ja15,1992Co11,1964Ch18

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays

%IT=100



$^{123}_{52}Te_{71}$

^{116}Cd(^{11}B,p3nγ) 1996Bl12

1996Bl12: E=53, 55, and 57 MeV ^{11}B beams were produced from the XTU tandem accelerator of the Laboratori Nazionali di Legnaro. Target was 1 mg/cm^2 isotopically enriched ^{116}Cd on a 15 mg/cm^2 gold backing. γ rays were detected with the GASP array of 40 large volume Compton-suppressed Ge detector and an inner ball of 80 BGO counters. Measured Eγ, $\gamma\gamma$-coin, $\gamma\gamma$(DCO). Deduced levels, J, π, band structures, configurations. The authors mention that information on transition multipolarities was derived from DCO ratios, but no details are given.

^{123}Te Levels

E(level)[†]	J$^\pi$[‡]	E(level)[†]	J$^\pi$[‡]	E(level)[†]	J$^\pi$[‡]	E(level)[†]
247[#c]	11/2$^-$	2813.9[e] *15*	23/2	4628.8[d] *15*	33/2$^-$	6559.7 *22*
887.0[@c] *9*	15/2$^-$	3039.8[d] *13*	25/2$^-$	4749.8[e] *19*		6913.7[c] *22*
920.0 *9*	13/2$^-$	3377.6[c] *14*	27/2$^-$	5010.7[c] *16*	35/2$^-$	7063.7 *24*
1553.0 *10*	17/2$^-$	3552.9[e] *16*	27/2	5035.8[e] *22*		7091[e] *3*
1611.0[&c] *12*	19/2$^-$	3813.9 *14*		5566.7[d] *19*	37/2	7297 *3*
1931.0[d] *12*	21/2$^-$	4113.8[d] *14*	29/2$^-$	5589.7 *19*		7485?[e]
2358.9[b] *18*		4202.8[e] *16*	31/2	5645.7[c] *19*		8033?[c]
2359.1[ac] *13*	23/2$^-$	4254.7[c] *15*	31/2$^-$	5953.7 *19*		
2685.0 *13*		4359?		6275.8[e] *24*		

[†] From a least-squares fit to γ-ray energies, assuming $\Delta E\gamma$=1 keV.

[‡] Proposed by 1996Bl12 based on measured $\gamma\gamma$(DCO), band structures and known assignments of low-lying states. But no details on $\gamma\gamma$(DCO) and multipolarities are given in 1996Bl12. When considered in Adopted Levels, those assignments are placed inside parenthesis by the evaluator if there are no other experimental evidence.

[#] Configuration=$\nu h_{11/2}$.

[@] $\nu h_{11/2}$ coupled to 2$^+$.

[&] $\nu h_{11/2}$ coupled to 4$^+$.

[a] $\nu h_{11/2}$ coupled to 6$^+$.

[b] This level is proposed to be a different level from the 2359, 23/2$^-$ level by 1996Bl12.

[c] Band(A): Band based on 11/2$^-$.

[d] Seq.(B): Sequence based on 21/2$^-$. Configuration=$\pi g^2_{7/2}\nu h_{11/2}$ or $\pi g_{7/2}d_{5/2}\nu h_{11/2}$.

[e] Seq.(C): Sequence based on 23/2.

γ(^{123}Te)

Eγ	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Eγ	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[†]
233	7297		7063.7		426	4628.8	33/2$^-$	4202.8	31/2	
269[‡]	4628.8	33/2$^-$	4359?		428	2359.1	23/2$^-$	1931.0	21/2$^-$	
286	5035.8		4749.8		455	2813.9	23/2	2358.9		
300	4113.8	29/2$^-$	3813.9		504	7063.7		6559.7		
307[‡]	5953.7		5645.7		515	4628.8	33/2$^-$	4113.8	29/2$^-$	
320	1931.0	21/2$^-$	1611.0	19/2$^-$	547	4749.8		4202.8	31/2	D
326	2685.0		2359.1	23/2$^-$	556	5566.7	37/2	5010.7	35/2$^-$	
338	3377.6	27/2$^-$	3039.8	25/2$^-$	579	5589.7		5010.7	35/2$^-$	
355	3039.8	25/2$^-$	2685.0		606	6559.7		5953.7		
364	5953.7		5589.7		633	1553.0	17/2$^-$	920.0	13/2$^-$	
374	4628.8	33/2$^-$	4254.7	31/2$^-$	635	5645.7		5010.7	35/2$^-$	
378	1931.0	21/2$^-$	1553.0	17/2$^-$	640	887.0	15/2$^-$	247	11/2$^-$	
382	5010.7	35/2$^-$	4628.8	33/2$^-$	650	4202.8	31/2	3552.9	27/2	
387	5953.7		5566.7	37/2	666	1553.0	17/2$^-$	887.0	15/2$^-$	
394[‡]	7485?		7091		673	920.0	13/2$^-$	247	11/2$^-$	

Continued on next page (footnotes at end of table)

^{116}Cd(^{11}B,p3nγ) 1996Bl12 (continued)

$\gamma(^{123}Te)$ (continued)

E_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	E_γ	E_i(level)	J_i^π	E_f	J_f^π
724	1611.0	$19/2^-$	887.0	$15/2^-$		1018	3377.6	$27/2^-$	2359.1	$23/2^-$
739	3552.9	27/2	2813.9	23/2		1074	2685.0		1611.0	$19/2^-$
748	2359.1	$23/2^-$	1611.0	$19/2^-$		1074	4113.8	$29/2^-$	3039.8	$25/2^-$
754	2685.0		1931.0	$21/2^-$		1109	3039.8	$25/2^-$	1931.0	$21/2^-$
756	5010.7	$35/2^-$	4254.7	$31/2^-$		1119[‡]	8033?		6913.7	
774	3813.9		3039.8	$25/2^-$		1129	3813.9		2685.0	
806	2358.9		1553.0	$17/2^-$		1240	6275.8		5035.8	
815	7091		6275.8			1268	6913.7		5645.7	
877	4254.7	$31/2^-$	3377.6	$27/2^-$		1319[‡]	4359?		3039.8	$25/2^-$
883	2813.9	23/2	1931.0	$21/2^-$	D					

[†] From $\gamma\gamma$(DCO) in 1996Bl12.

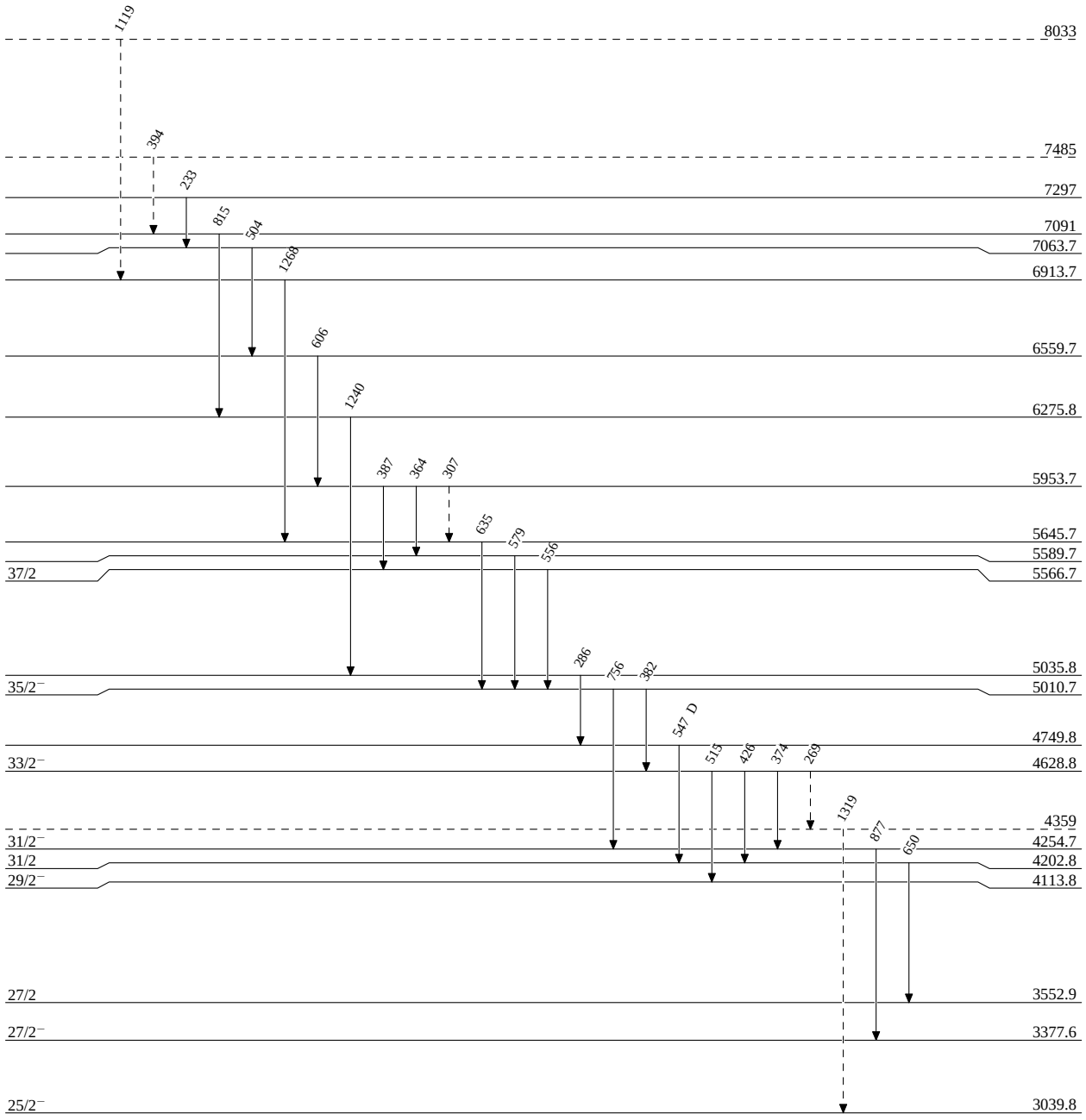
[‡] Placement of transition in the level scheme is uncertain.

Legend

^{116}Cd(^{11}B,p3nγ) **1996Bl12**

Level Scheme

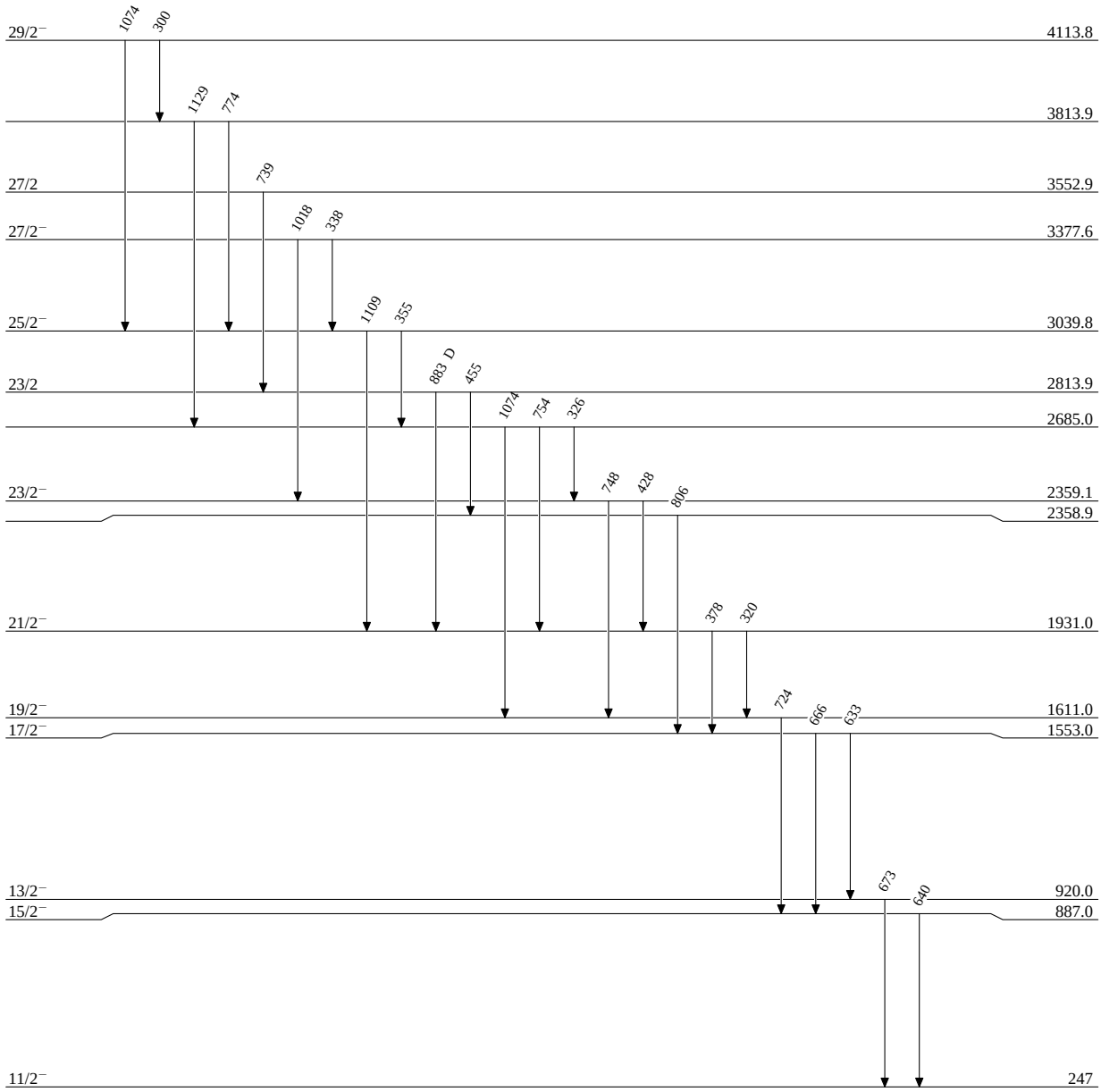
γ Decay (Uncertain)



$^{123}_{52}Te_{71}$

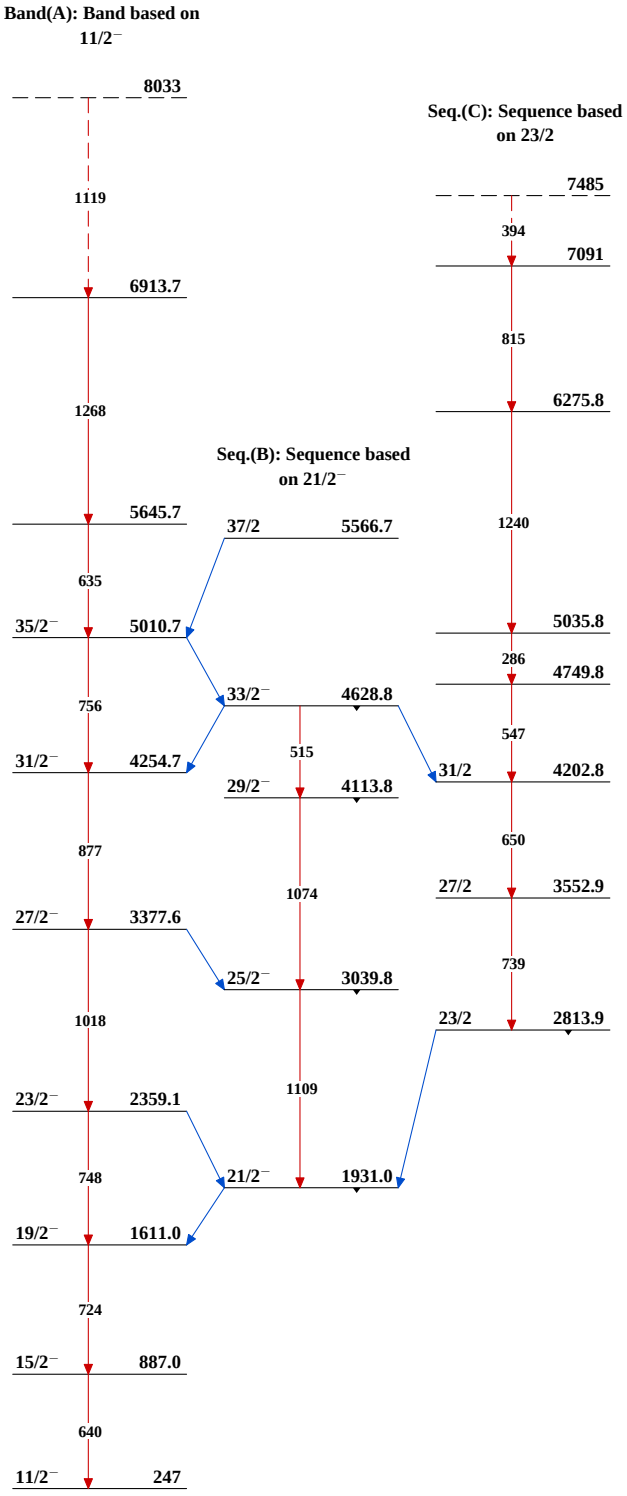
^{116}Cd(^{11}B,p3nγ) 1996Bl12

Level Scheme (continued)



$^{123}_{52}Te_{71}$

$^{116}Cd(^{11}B,p3n\gamma)$ 1996Bl12



$^{123}_{52}Te_{71}$

^{124}Sn(^{3}He,4nγ),^{123}Sb(d,2nγ) 1978HaYQ

1978HaYQ: measured Eγ, $\gamma\gamma$-coin. Deduced levels, J, π, band structures.

^{123}Te Levels

E(level)†	J$^\pi$‡	Comments
0.0@	1/2$^+$	
159.0@	3/2$^+$	
247.5#	11/2$^-$	
440.0	3/2$^+$	
489.8@	(5/2$^+$)	J$^\pi$: (7/2$^+$) in Adopted Levels.
505.4	5/2$^+$,3/2$^+$	J$^\pi$: 5/2$^+$ in Adopted Levels.
688.0	3/2$^+$	
697.6		
871.2@	(7/2$^+$)	J$^\pi$: (3/2$^+$,5/2,7/2$^+$) in Adopted Levels.
886.9#	(15/2$^-$)	
919.8	(13/2$^-$)	
1138.6?@		
1244.4		
1496.6?		
1552.6	(17/2$^-$)	
1609.8#	(19/2$^-$)	
1708.1		
1929.6# *3*	(21/2$^-$)	
2357.2#	(23/2$^-$)	
2811.8		

† As given in 1978HaYQ based on Eγ data.
‡ As given in 1978HaYQ based on band assignments. Some assignments are different from adopted ones as given under comments.
# Seq.(A): Negative-parity sequence based on 1νh$_{11/2}$.
@ Seq.(B): Sequence based on g.s.

γ(^{123}Te)

E$_\gamma$†	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	E$_\gamma$†	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$
159.0	159.0	3/2$^+$	0.0	1/2$^+$	529.0	688.0	3/2$^+$	159.0	3/2$^+$
192.2‡	697.6		505.4	5/2$^+$,3/2$^+$	538.6	697.6		159.0	3/2$^+$
267.4#	1138.6?		871.2	(7/2$^+$)	546.8	1244.4		697.6	
280.9	440.0	3/2$^+$	159.0	3/2$^+$	625.4#	1496.6?		871.2	(7/2$^+$)
319.7 *1*	1929.6	(21/2$^-$)	1609.8	(19/2$^-$)	632.7	1552.6	(17/2$^-$)	919.8	(13/2$^-$)
330.8	489.8	(5/2$^+$)	159.0	3/2$^+$	639.4	886.9	(15/2$^-$)	247.5	11/2$^-$
346.4	505.4	5/2$^+$,3/2$^+$	159.0	3/2$^+$	648.8#	1138.6?		489.8	(5/2$^+$)
377#	1929.6	(21/2$^-$)	1552.6	(17/2$^-$)	665.7	1552.6	(17/2$^-$)	886.9	(15/2$^-$)
381.4	871.2	(7/2$^+$)	489.8	(5/2$^+$)	672.3	919.8	(13/2$^-$)	247.5	11/2$^-$
427.7	2357.2	(23/2$^-$)	1929.6	(21/2$^-$)	712.2	871.2	(7/2$^+$)	159.0	3/2$^+$
440.1	440.0	3/2$^+$	0.0	1/2$^+$	722.9	1609.8	(19/2$^-$)	886.9	(15/2$^-$)
463.7	1708.1		1244.4		881.8	2811.8		1929.6	(21/2$^-$)
505.4	505.4	5/2$^+$,3/2$^+$	0.0	1/2$^+$					

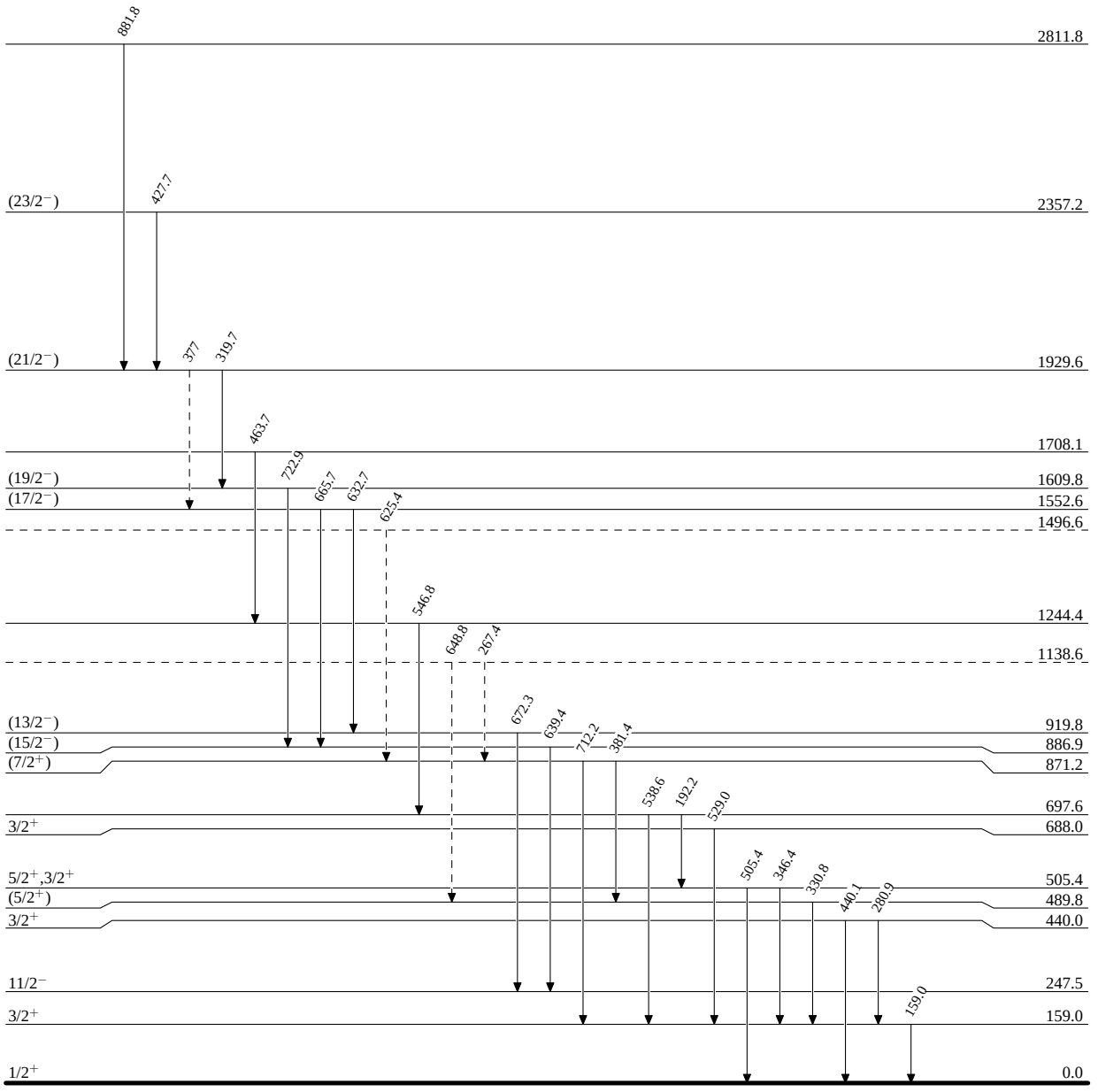
† From 1978HaYQ.
‡ 1978HaYQ could have mistakenly assigned 192.2γ to be from 688.0 level to 505.4 level, since E(688.0)-E(505.4)=182.6.
# Placement of transition in the level scheme is uncertain.

Legend

^{124}Sn(^{3}He,4nγ),^{123}Sb(d,2nγ) 1978HaYQ

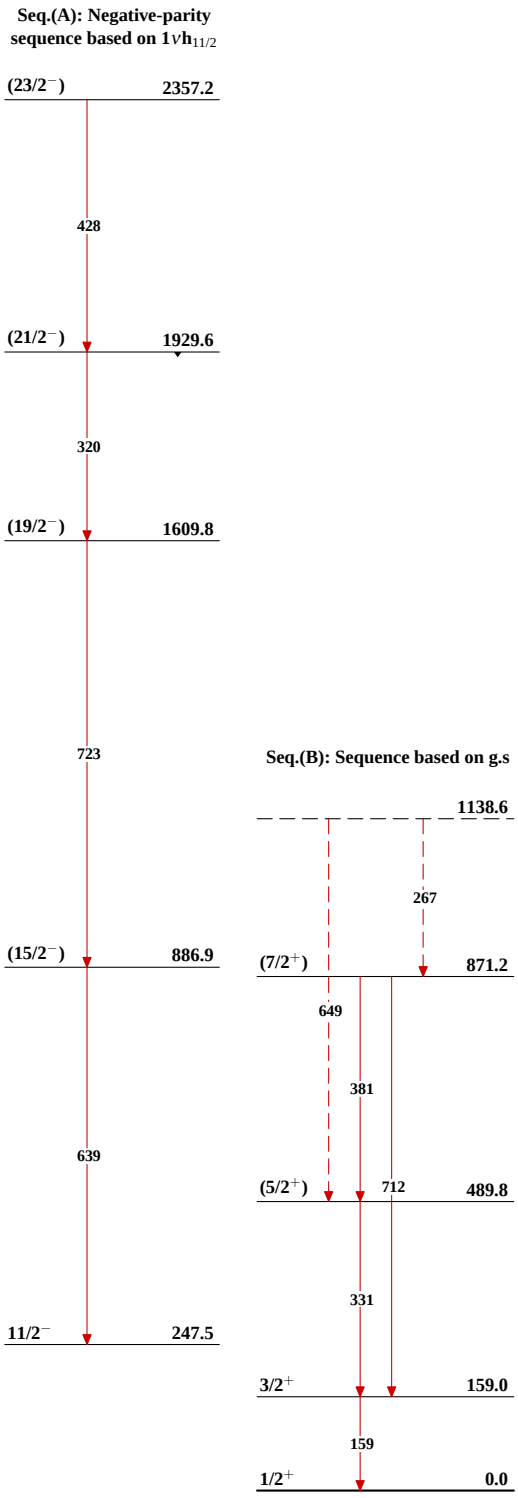
Level Scheme

γ Decay (Uncertain)



$^{123}_{52}Te_{71}$

^{124}Sn(^{3}He,4nγ),^{123}Sb(d,2nγ) 1978HaYQ



$^{123}_{52}Te_{71}$

^{123}Sb(p,nγ) 1990Ja01

E(p)=4.0 MeV proton beam was produced from the Chandigarh Cyclotron. Target was a self-supporting pellet of pure natural Sb. γ rays were detected with a HPGe detector. Measured Eγ, Iγ, Doppler-shift attenuation at 0°, 30°, 45°, 55°, 75°, 90°. Deduced level, $T_{1/2}$.

Other: 1977BaYJ.

^{123}Te Levels

E(level)†	Jπ#	E(level)†	Jπ#	$T_{1/2}$‡
0.0	$1/2^+$	599.09 *13*	$1/2^+$	
159.05 *10*	$3/2^+$	687.8 *5*	$3/2^+$	
247.5 *10*	$11/2^-$	697.5 *5*	$(7/2)^+$	
440.1 *5*	$3/2^+$	769.2 *8*		
489.7 *6*	$7/2^+$	783.56 *14*	$3/2^+$	52 fs *+33−21*
505.3 *5*	$5/2^+$	894.73 *9*	$3/2^+,5/2^+$	45 fs *+24−14*
532.8 *15*	$(7/2^-)$	1036.59 *9*	$3/2^+$	43 fs *+16−12*

† From a least-squares fit to γ-ray energies, assuming ΔEγ=0.3 keV if not given.
‡ From Doppler-shift attenuation method (1990Ja01).
# From Adopted Levels.

γ(^{123}Te)

Eγ	Ei(level)	J_i^π	Ef	J_f^π	Mult.
88.4†	247.5	$11/2^-$	159.05	$3/2^+$	[M4]
158.9	159.05	$3/2^+$	0.0	$1/2^+$	
182.6†#	687.8	$3/2^+$	505.3	$5/2^+$	
192.2†#	697.5	$(7/2)^+$	505.3	$5/2^+$	
197.2†#	894.73	$3/2^+,5/2^+$	697.5	$(7/2)^+$	
198.0†#	687.8	$3/2^+$	489.7	$7/2^+$	
206.7†#	894.73	$3/2^+,5/2^+$	687.8	$3/2^+$	
207.8†#	697.5	$(7/2)^+$	489.7	$7/2^+$	
247.0†‡#	247.5	$11/2^-$	0.0	$1/2^+$	[E5]
247.0†‡#	687.8	$3/2^+$	440.1	$3/2^+$	
257.5†#	697.5	$(7/2)^+$	440.1	$3/2^+$	
278.3†#	783.56	$3/2^+$	505.3	$5/2^+$	
281.0†#	440.1	$3/2^+$	159.05	$3/2^+$	
285.3	532.8	$(7/2^-)$	247.5	$11/2^-$	
295.1†#	894.73	$3/2^+,5/2^+$	599.09	$1/2^+$	
329.3	769.2		440.1	$3/2^+$	
330.7	489.7	$7/2^+$	159.05	$3/2^+$	
343.7†#	783.56	$3/2^+$	440.1	$3/2^+$	
346.3	505.3	$5/2^+$	159.05	$3/2^+$	
405.0†#	894.73	$3/2^+,5/2^+$	489.7	$7/2^+$	
437.5†#	1036.59	$3/2^+$	599.09	$1/2^+$	
440.0	440.1	$3/2^+$	0.0	$1/2^+$	
454.7†#	894.73	$3/2^+,5/2^+$	440.1	$3/2^+$	
505.3	505.3	$5/2^+$	0.0	$1/2^+$	
528.8	687.8	$3/2^+$	159.05	$3/2^+$	
538.5	697.5	$(7/2)^+$	159.05	$3/2^+$	
599.5	599.09	$1/2^+$	0.0	$1/2^+$	

Continued on next page (footnotes at end of table)

^{123}Sb(p,nγ) 1990Ja01 (continued)

γ(^{123}Te) (continued)

E_γ	E_i(level)	J_i^π	E_f	J_f^π	E_γ	E_i(level)	J_i^π	E_f	J_f^π
610.0	769.2		159.05	$3/2^+$	783.6	783.56	$3/2^+$	0.0	$1/2^+$
624.5 *1*	783.56	$3/2^+$	159.05	$3/2^+$	877.5	1036.59	$3/2^+$	159.05	$3/2^+$
687.9†#	687.8	$3/2^+$	0.0	$1/2^+$	894.7†#	894.73	$3/2^+$,$5/2^+$	0.0	$1/2^+$
735.7 *1*	894.73	$3/2^+$,$5/2^+$	159.05	$3/2^+$	1036.6 *2*	1036.59	$3/2^+$	0.0	$1/2^+$

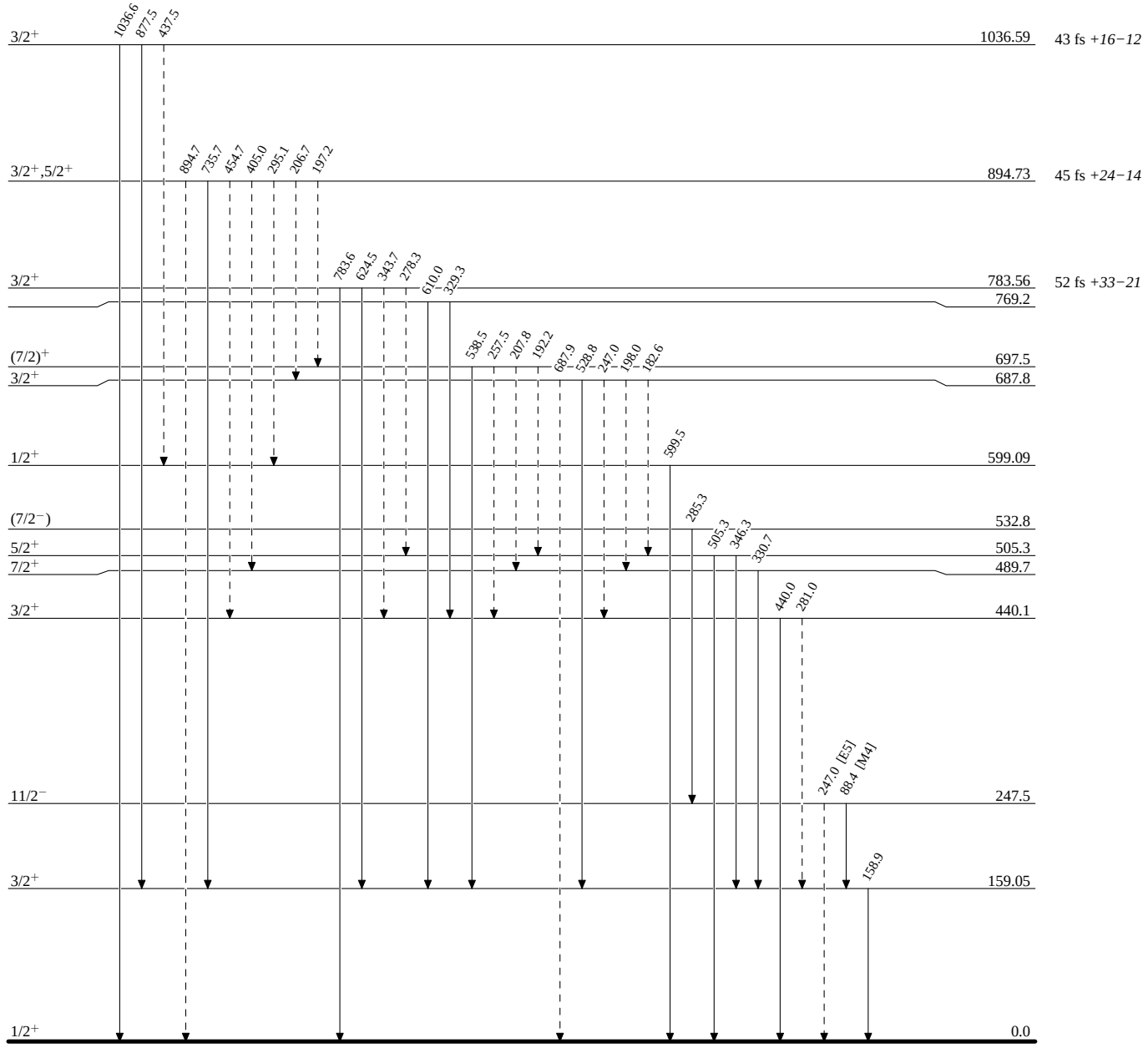
† Peak contains contribution from γ by other competing reactions.
‡ Multiply placed.
# Placement of transition in the level scheme is uncertain.

^{123}Sb(p,nγ) 1990Ja01

Legend

Level Scheme

– – – – – – ► γ Decay (Uncertain)



$^{123}_{52}Te_{71}$

^{122}Te(n,γ) E=th 2000Bo24

2000Bo24,1999Bo31,1996Bo10: thermal neutrons were produced from the light-water reactor LWR-15 at Rez. Target was 88.4% enriched ^{122}Te. γ rays were detected with HPGe detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin. Deduced levels, absolute intensity.
1991Ho08: thermal neutrons were produced from the VVR-S reactor at Rez. Target was enriched $^{122}TeO_2$. γ rays were detected with a Ge(Li) detector. Measured Eγ, Iγ. Deduced levels, absolute intensity.

^{123}Te Levels

E(level)[†]	J$^\pi$[&]	E(level)[†]	J$^\pi$[&]	E(level)[†]	J$^\pi$[&]
0.0	$1/2^+$	1253.9 *4*	$(3/2^-$ to $9/2^-)$	1864.4 *10*	$(3/2^+,5/2^+)$
159.014 *22*	$3/2^+$	1318.18 *12*	$(1/2^+,3/2^+)$	1887.54 *14*	$(3/2)^-$
247.39 *6*	$11/2^-$	1327.67 *11*		1903.41 *16*	$(^+)$
384.27 *6*	$(7/2^-,9/2^+)$	1344.71 *5*	$(3/2)^-$	1958.4 *3*	$(3/2^+,5/2^+)$
440.04 *3*	$3/2^+$	1353.76 *8*	$(5/2)^+$	1978.05 *9*	$(3/2)^-$
489.81 *5*	$7/2^+$	1414.17 *9*	$(5/2^+)$	2020.63 *12*	$1/2^-,3/2^-$
505.40 *4*	$5/2^+$	1422.87 *11*	$(3/2^+,5/2^+)$	2092.46 *9*	(1/2,3/2)
532.63 *5*	$(7/2^-)$	1446.37 *20*	$(3/2)^+$	2129.81 *12*	$(3/2)^-$
599.10 *5*	$1/2^+$	1484.0 *5*	$(5/2^-)$	2158.15 *5*	$1/2^-,3/2^-$
688.00 *4*	$3/2^+$	1557.18 *16*	$(3/2)^+$	2197.32 *17*	$(1/2^+,3/2)$
697.44 *6*	$(7/2)^+$	1584.8 *4*	$(3/2^-,5/2,7/2^+)$	2621.73 *17*	$(1/2^+,3/2)$
783.64 *3*	$3/2^+$	1621.6?[@] *6*		2644.2 *4*	(1/2,3/2)
862.06 *5*	(5/2)	1672.0 *3*		2686.7 *5*	$1/2^-,3/2^-$
870.97 *22*	$(3/2^+,5/2,7/2^+)$	1683.7 *4*	$5/2^-,7/2^-$	2726.24 *17*	(1/2,3/2)
879.63 *8*	$(7/2^-)$	1693.59 *20*		2811.8 *3*	$1/2^-,3/2^-$
894.85 *7*	$3/2^+,5/2^+$	1732.5 *3*	$(5/2^+)$	2937.5 *3*	$1/2^-,3/2^-$
996.13 *11*	$(5/2)^-$	1759.57 *5*	$(3/2)^-$	2946.7 *3*	(1/2,3/2)
1036.66 *5*	$3/2^+$	1796.5 *10*	$3/2^-,5/2^+$	2957.3 *8*	(1/2,3/2)
1068.28 *6*	$3/2^+,5/2^+$	1807.66 *5*	$(3/2^-)$	(6929.21[‡#] *5*)	$1/2^+$[#]
1097.71 *8*	$(3/2^-,5/2,7/2^+)$	1839.48 *21*	(1/2,3/2)		
1212.55 *9*	$(3/2^-,5/2^+)$	1854.1 *3*	$(5/2^+)$		

[†] From a least-squares fit to γ-ray energies, assuming $\Delta E\gamma$=1 keV where not given, unless otherwise noted.
[‡] Neutron-separation energy from author's value without a systematic error of about 80 eV.
[#] s-wave capture.
[@] Tentative level listed in Table 3 of 2000Bo24, without any additional information.
[&] From Adopted Levels, unless otherwise noted.

γ(^{123}Te)

Iγ normalization: From 2000Bo24; absolute intensities normalized with 1759.6 keV γ from 1991Ho08.

E$_\gamma$[†]	I$_\gamma$[†c]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$
136.76 *7*	2.50 *10*	384.27	$(7/2^-,9/2^+)$	247.39	$11/2^-$
148.35 *5*	0.53 *3*	532.63	$(7/2^-)$	384.27	$(7/2^-,9/2^+)$
158.99 *3*	19.5 *6*	159.014	$3/2^+$	0.0	$1/2^+$
235.72 *11*	0.16 *1*	1097.71	$(3/2^-,5/2,7/2^+)$	862.06	(5/2)
247.80 *9*	0.14 *1*	688.00	$3/2^+$	440.04	$3/2^+$
259.1[&]	≈0.05[&]	1253.9	$(3/2^-$ to $9/2^-)$	996.13	$(5/2)^-$
278.6[&]		783.64	$3/2^+$	505.40	$5/2^+$
281.01 *3*	1.49 *6*	440.04	$3/2^+$	159.014	$3/2^+$
285.28 *4*	8.26 *25*	532.63	$(7/2^-)$	247.39	$11/2^-$
329.37 *4*	5.30 *16*	862.06	(5/2)	532.63	$(7/2^-)$

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^{122}Te(n,γ) E=th 2000Bo24 (continued)

$\gamma(^{123}Te)$ (continued)

E_γ †	I_γ †c	E_i(level)	J_i^π	E_f	J_f^π
330.78 *6*	1.36 *5*	489.81	$7/2^+$	159.014	$3/2^+$
333&	≈0.14&	2092.46	(1/2,3/2)	1759.57	$(3/2)^-$
343.2&		783.64	$3/2^+$	440.04	$3/2^+$
346.37 *4*	1.35 *4*	505.40	$5/2^+$	159.014	$3/2^+$
350.2&	≈0.08&	2158.15	$1/2^-,3/2^-$	1807.66	$(3/2^-)$
351.4&		1212.55	$(3/2^-,5/2^+)$	862.06	(5/2)
372.21 *15*	≈0.03	862.06	(5/2)	489.81	$7/2^+$
374.4@ *5*	≈0.08@	1253.9	$(3/2^-$ to $9/2^-)$	879.63	$(7/2^-)$
380.8@ *3*	0.08@ *2*	870.97	$(3/2^+,5/2,7/2^+)$	489.81	$7/2^+$
391.8&	≈0.03&	1253.9	$(3/2^-$ to $9/2^-)$	862.06	(5/2)
397.6&	≈0.06&	2158.15	$1/2^-,3/2^-$	1759.57	$(3/2)^-$
404.8@ *4*	≈0.04@	894.85	$3/2^+,5/2^+$	489.81	$7/2^+$
405.4&		1759.57	$(3/2)^-$	1353.76	$(5/2)^+$
409.6&	≈0.06&	1097.71	$(3/2^-,5/2,7/2^+)$	688.00	$3/2^+$
415.9&	≈0.03&	1759.57	$(3/2)^-$	1344.71	$(3/2)^-$
421.9 *2*	0.22 *6*	862.06	(5/2)	440.04	$3/2^+$
427.0&	≈0.05&	1422.87	$(3/2^+,5/2^+)$	996.13	$(5/2)^-$
437.5& *3*	≈0.14&	2197.32	$(1/2^+,3/2)$	1759.57	$(3/2)^-$
437.6@ *1*	0.29@ *4*	1036.66	$3/2^+$	599.10	$1/2^+$
440.01 *6*	8.04 *24*	440.04	$3/2^+$	0.0	$1/2^+$
454.2&	≈0.07&	1807.66	$(3/2^-)$	1353.76	$(5/2)^+$
454.4@ *3*	0.07@ *2*	894.85	$3/2^+,5/2^+$	440.04	$3/2^+$
464.7@ *2*	0.12@ *3*	1344.71	$(3/2)^-$	879.63	$(7/2^-)$
474.12 *10*	0.24 *2*	1353.76	$(5/2)^+$	879.63	$(7/2^-)$
477.80 *3*	1.64 *5*	862.06	(5/2)	384.27	$(7/2^-,9/2^+)$
482.55 *5*	0.68 *3*	1344.71	$(3/2)^-$	862.06	(5/2)
495.32 *8*	0.48 *7*	879.63	$(7/2^-)$	384.27	$(7/2^-,9/2^+)$
505.38 *10*	3.26 *13*	505.40	$5/2^+$	0.0	$1/2^+$
525.0@ *3*	≈0.08@	1212.55	$(3/2^-,5/2^+)$	688.00	$3/2^+$
529.01 *3*	2.31 *5*	688.00	$3/2^+$	159.014	$3/2^+$
534.7@ *3*	0.10@ *3*	1318.18	$(1/2^+,3/2^+)$	783.64	$3/2^+$
538.42 *5*	0.62 *5*	697.44	$(7/2)^+$	159.014	$3/2^+$
546.79 *10*	0.14 *4*	1036.66	$3/2^+$	489.81	$7/2^+$
556.1@ *1*	0.26@ *4*	996.13	$(5/2)^-$	440.04	$3/2^+$
561&	≈0.09&	1344.71	$(3/2)^-$	783.64	$3/2^+$
562.71 *18*	0.12 *2*	1068.28	$3/2^+,5/2^+$	505.40	$5/2^+$
565.15 *15*	0.19 *1*	1097.71	$(3/2^-,5/2,7/2^+)$	532.63	$(7/2^-)$
578.42 *15*	0.14 *1*	1068.28	$3/2^+,5/2^+$	489.81	$7/2^+$
596.43@ *18*	0.28@ *6*	1036.66	$3/2^+$	440.04	$3/2^+$
599.18 *6*	4.4 *4*	599.10	$1/2^+$	0.0	$1/2^+$
613.0&	≈0.07&	1212.55	$(3/2^-,5/2^+)$	599.10	$1/2^+$
614.51f *10*	0.34 *7*	2811.8	$1/2^-,3/2^-$	2197.32	$(1/2^+,3/2)$
624.65 *4*	1.54 *5*	783.64	$3/2^+$	159.014	$3/2^+$
625.5@	@	1693.59		1068.28	$3/2^+,5/2^+$
628.16 *14*	0.23 *3*	1068.28	$3/2^+,5/2^+$	440.04	$3/2^+$
632.27 *15*	0.16 *4*	879.63	$(7/2^-)$	247.39	$11/2^-$
666.6&	≈0.39&	2644.2	(1/2,3/2)	1978.05	$(3/2)^-$
687.91 *12*	0.23 *8*	688.00	$3/2^+$	0.0	$1/2^+$
703.0f	0.02	862.06	(5/2)	159.014	$3/2^+$

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^{122}Te(n,γ) E=th 2000Bo24 (continued)

γ(^{123}Te) (continued)

E_γ †	I_γ †c	E_i(level)	J_i^π	E_f	J_f^π	Comments
706.0&	≈0.04&	1584.8	(3/2$^-$,5/2,7/2$^+$)	879.63	(7/2$^-$)	
707.0@ 2	≈0.17@	1212.55	(3/2$^-$,5/2$^+$)	505.40	5/2$^+$	
712.3@ 3	0.06@ 2	870.97	(3/2$^+$,5/2,7/2$^+$)	159.014	3/2$^+$	
713.38@ 9	0.28@ 4	1097.71	(3/2$^-$,5/2,7/2$^+$)	384.27	(7/2$^-$,9/2$^+$)	
721.5&	≈0.06&	1584.8	(3/2$^-$,5/2,7/2$^+$)	862.06	(5/2)	
721.6&	≈0.06&	1253.9	(3/2$^-$ to 9/2$^-$)	532.63	(7/2$^-$)	
735.86 7	0.98 5	894.85	3/2$^+$,5/2$^+$	159.014	3/2$^+$	
736&		1732.5	(5/2$^+$)	996.13	(5/2)$^-$	
x741.2 3	0.06 2					
745.80 12	≈0.4	1344.71	(3/2)$^-$	599.10	1/2$^+$	
772.49 9	0.49 5	1212.55	(3/2$^-$,5/2$^+$)	440.04	3/2$^+$	
x775.27f 11	0.32 4					I_γ: partly may due to ^{124}Te (2000Bo24).
783.62 4	1.14 5	783.64	3/2$^+$	0.0	1/2$^+$	
812.12 3	0.97 4	1344.71	(3/2)$^-$	532.63	(7/2$^-$)	
812.8@ 3	0.13@ 4	1318.18	(1/2$^+$,3/2$^+$)	505.40	5/2$^+$	
821.22@ 8	0.33@ 3	1353.76	(5/2)$^+$	532.63	(7/2$^-$)	
822.28@ 11	0.36@ 5	1327.67		505.40	5/2$^+$	
x823.28 12	0.14 4					
828.4&	≈0.09&	1212.55	(3/2$^-$,5/2$^+$)	384.27	(7/2$^-$,9/2$^+$)	
832.2&	≈0.11&	1693.59		862.06	(5/2)	
839.16@ 20	0.15@ 3	1344.71	(3/2)$^-$	505.40	5/2$^+$	
842.8&	≈0.06&	2197.32	(1/2$^+$,3/2)	1353.76	(5/2)$^+$	
867.8&	≈0.07&	1253.9	(3/2$^-$ to 9/2$^-$)	384.27	(7/2$^-$,9/2$^+$)	
870.1&	≈0.11&	1557.18	(3/2)$^+$	688.00	3/2$^+$	
877.67 7	0.43 4	1036.66	3/2$^+$	159.014	3/2$^+$	
878.5&	≈0.04&	1318.18	(1/2$^+$,3/2$^+$)	440.04	3/2$^+$	
880.7&	≈0.04&	1414.17	(5/2$^+$)	532.63	(7/2$^-$)	
881.7&	≈0.07&	1759.57	(3/2)$^-$	879.63	(7/2$^-$)	
888.29@a 17	0.20@ 4	1327.67		440.04	3/2$^+$	
x889.01 11	0.30 3					
897.49 4	1.39 13	1759.57	(3/2)$^-$	862.06	(5/2)	
905.1 3	0.13 2	1344.71	(3/2)$^-$	440.04	3/2$^+$	
909.29 6	0.18 3	1068.28	3/2$^+$,5/2$^+$	159.014	3/2$^+$	
917.6@ 5	≈0.06@	1422.87	(3/2$^+$,5/2$^+$)	505.40	5/2$^+$	
919.6&	≈0.08&	2726.24	(1/2,3/2)	1807.66	(3/2$^-$)	
925.4&	≈0.05&	1414.17	(5/2$^+$)	489.81	7/2$^+$	
927.3&	≈0.12&	1807.66	(3/2$^-$)	879.63	(7/2$^-$)	
933.1f		1796.5	3/2$^-$,5/2$^+$	862.06	(5/2)	E_γ: multiplet peak.
933.26 20	0.14 2	1422.87	(3/2$^+$,5/2$^+$)	489.81	7/2$^+$	
945.61 3	1.39 13	1807.66	(3/2$^-$)	862.06	(5/2)	
958.7&		1557.18	(3/2)$^+$	599.10	1/2$^+$	
968.91a 10	0.18 3	1353.76	(5/2)$^+$	384.27	(7/2$^-$,9/2$^+$)	
976.3&	≈0.18&	1854.1	(5/2$^+$)	879.63	(7/2$^-$)	
982.75 12	0.30 5	1422.87	(3/2$^+$,5/2$^+$)	440.04	3/2$^+$	
992&	≈0.07&	1854.1	(5/2$^+$)	862.06	(5/2)	
994.4@ 5	≈0.11@	1484.0	(5/2$^-$)	489.81	7/2$^+$	
1002.3&		1864.4	(3/2$^+$,5/2$^+$)	862.06	(5/2)	
1005.0&	≈0.11&	1446.37	(3/2)$^+$	440.04	3/2$^+$	

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^{122}Te(n,γ) E=th 2000Bo24 (continued)

γ(^{123}Te) (continued)

E_γ †	I_γ †c	E_i(level)	J_i^π	E_f	J_f^π
1026&	≈0.02&	1887.54	(3/2)$^-$	862.06	(5/2)
1034.3&	≈0.04&	1732.5	(5/2$^+$)	697.44	(7/2)$^+$
1036.69 *8*	0.60 *3*	1036.66	3/2$^+$	0.0	1/2$^+$
1044.8&	≈0.09&	1732.5	(5/2$^+$)	688.00	3/2$^+$
1053.8&		1212.55	(3/2$^-$,5/2$^+$)	159.014	3/2$^+$
1068.58 *23*	≈0.15	1068.28	3/2$^+$,5/2$^+$	0.0	1/2$^+$
1070.8@	≈0.09@	1759.57	(3/2)$^-$	688.00	3/2$^+$
1079.5@ *4*	≈0.1@	1584.8	(3/2$^-$,5/2,7/2$^+$)	505.40	5/2$^+$
1085.86&f *15*	0.23& *4*	2644.2	(1/2,3/2)	1557.18	(3/2)$^+$
x1087.07 *15*	0.27 *4*				
1116.04@ *12*	0.32@ *4*	1978.05	(3/2)$^-$	862.06	(5/2)
1118.7&a *3*	≈0.14&	1557.18	(3/2)$^+$	440.04	3/2$^+$
1119.8& *3*	≈0.16&	1903.41	($^+$)	783.64	3/2$^+$
1129.5@ *5*	≈0.07@	2937.5	1/2$^-$,3/2$^-$	1807.66	(3/2$^-$)
1133.2&	≈0.11&	1732.5	(5/2$^+$)	599.10	1/2$^+$
1144.9&	≈0.1&	1584.8	(3/2$^-$,5/2,7/2$^+$)	440.04	3/2$^+$
1149.2&	≈0.07&	1683.7	5/2$^-$,7/2$^-$	532.63	(7/2$^-$)
1158.4@ *2*	0.40@ *4*	2020.63	1/2$^-$,3/2$^-$	862.06	(5/2)
1158.93@ *18*	0.40@ *6*	1318.18	(1/2$^+$,3/2$^+$)	159.014	3/2$^+$
1160.7@ *2*	≈0.06@	1759.57	(3/2)$^-$	599.10	1/2$^+$
1160.9@ *2*	0.13@ *4*	1693.59		532.63	(7/2$^-$)
1166.6@ *3*	0.23@ *4*	1672.0		505.40	5/2$^+$
1167.79da *18*	0.23 *4*	1327.67		159.014	3/2$^+$
1167.79df *18*		2726.24	(1/2,3/2)	1557.18	(3/2)$^+$
1178.8&	≈0.03&	1683.7	5/2$^-$,7/2$^-$	505.40	5/2$^+$
1193.9&	≈0.08&	1353.76	(5/2)$^+$	159.014	3/2$^+$
1194.1@ *4*	≈0.07@	1683.7	5/2$^-$,7/2$^-$	489.81	7/2$^+$
1197.4&		1796.5	3/2$^-$,5/2$^+$	599.10	1/2$^+$
1200.7&	≈0.06&	1732.5	(5/2$^+$)	532.63	(7/2$^-$)
1204.4&	≈0.1&	1693.59		489.81	7/2$^+$
1207.5&	≈0.10&	1807.66	(3/2$^-$)	599.10	1/2$^+$
1225.6&	≈0.05&	1759.57	(3/2)$^-$	532.63	(7/2$^-$)
1254.8&	≈0.13&	1759.57	(3/2)$^-$	505.40	5/2$^+$
1255.15 *8*	0.42 *3*	1414.17	(5/2$^+$)	159.014	3/2$^+$
1262.6&	≈0.02&	1422.87	(3/2$^+$,5/2$^+$)	159.014	3/2$^+$
1267.72‡ *15*	0.27‡ *3*	2129.81	(3/2)$^-$	862.06	(5/2)
1270.5&	≈0.09&	1958.4	(3/2$^+$,5/2$^+$)	688.00	3/2$^+$
1274.9&	≈0.18&	1807.66	(3/2$^-$)	532.63	(7/2$^-$)
1287.4@ *2*	0.23@ *4*	1446.37	(3/2)$^+$	159.014	3/2$^+$
1288.9&	≈0.32&	1887.54	(3/2)$^-$	599.10	1/2$^+$
1290.2&	≈0.07&	1978.05	(3/2)$^-$	688.00	3/2$^+$
1292.5@ *4*	≈0.11@	1732.5	(5/2$^+$)	440.04	3/2$^+$
1318.3 *3*	0.43 *6*	1318.18	(1/2$^+$,3/2$^+$)	0.0	1/2$^+$
1321.4@ *3*	0.19@ *2*	1854.1	(5/2$^+$)	532.63	(7/2$^-$)
1323.9&	≈0.08&	1484.0	(5/2$^-$)	159.014	3/2$^+$
x1329.6 *5*	0.11 *2*				

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^{122}Te(n,γ) E=th 2000Bo24 (continued)

$\gamma(^{123}Te)$ (continued)

E_γ †	I_γ †c	E_i(level)	J_i^π	E_f	J_f^π	Comments
1335.9&	≈0.20&	2197.32	(1/2$^+$,3/2)	862.06	(5/2)	
1345&	<0.07&	1344.71	(3/2)$^-$	0.0	1/2$^+$	
1349.3&	≈0.04&	1854.1	(5/2$^+$)	505.40	5/2$^+$	
1354.5&	≈0.07&	1887.54	(3/2)$^-$	532.63	(7/2$^-$)	
1359.6@ *3*	≈0.2@	1958.4	(3/2$^+$,5/2$^+$)	599.10	1/2$^+$	
1373.6&	≈0.14&	2158.15	1/2$^-$,3/2$^-$	783.64	3/2$^+$	
1378.2&	≈0.08&	1978.05	(3/2)$^-$	599.10	1/2$^+$	
1384.6&	≈0.08&	1887.54	(3/2)$^-$	505.40	5/2$^+$	
1397.99e@ *17*	0.25e@ *6*	1557.18	(3/2)$^+$	159.014	3/2$^+$	
1397.99e@ *17*	0.25e@ *6*	1903.41	($^+$)	505.40	5/2$^+$	
1399.33@ *24*	0.21@ *6*	1839.48	(1/2,3/2)	440.04	3/2$^+$	
1412.6&	≈0.05&	1854.1	(5/2$^+$)	440.04	3/2$^+$	
1425&		1584.8	(3/2$^-$,5/2,7/2$^+$)	159.014	3/2$^+$	
1447.14 *17*	0.42 *3*	1887.54	(3/2)$^-$	440.04	3/2$^+$	
1468.5&	≈0.07&	1958.4	(3/2$^+$,5/2$^+$)	489.81	7/2$^+$	
1472&	≈0.10&	1978.05	(3/2)$^-$	505.40	5/2$^+$	
1538.6&	≈0.18&	1978.05	(3/2)$^-$	440.04	3/2$^+$	
x1549.76 *14*	0.35 *3*					
1597.3 *4*	≈0.1	2129.81	(3/2)$^-$	532.63	(7/2$^-$)	
1624.24 *20*	0.37 *4*	2129.81	(3/2)$^-$	505.40	5/2$^+$	
1651.9&	≈0.07&	2092.46	(1/2,3/2)	440.04	3/2$^+$	
1690.8&	≈0.07&	2197.32	(1/2$^+$,3/2)	505.40	5/2$^+$	
x1694.7&#	≈0.16&#					
1694.9&	≈0.12&	1854.1	(5/2$^+$)	159.014	3/2$^+$	
1718.73a *10*	0.66 *5*	2158.15	1/2$^-$,3/2$^-$	440.04	3/2$^+$	
1730.4&	≈0.07&	1887.54	(3/2)$^-$	159.014	3/2$^+$	
1759.58 *14*	1.41 *7*	1759.57	(3/2)$^-$	0.0	1/2$^+$	
1759.8@ *2*	0.33@ *8*	2621.73	(1/2$^+$,3/2)	862.06	(5/2)	
1782.6&		2644.2	(1/2,3/2)	862.06	(5/2)	
1796.5&	≈0.05&	1958.4	(3/2$^+$,5/2$^+$)	159.014	3/2$^+$	
1807.77 *10*	0.46 *4*	1807.66	(3/2$^-$)	0.0	1/2$^+$	
1818.99 *21*	0.32 *3*	1978.05	(3/2)$^-$	159.014	3/2$^+$	
1838.8@ *6*	0.27@ *5*	1839.48	(1/2,3/2)	0.0	1/2$^+$	
1861.1 *5*	0.18 *4*	2020.63	1/2$^-$,3/2$^-$	159.014	3/2$^+$	
1864.19 *18*	0.56 *5*	2726.24	(1/2,3/2)	862.06	(5/2)	
1888.2@ *6*	0.30@ *8*	1887.54	(3/2)$^-$	0.0	1/2$^+$	
1933.57 *11*	0.69 *5*	2092.46	(1/2,3/2)	159.014	3/2$^+$	
1973.6&	≈0.08&	2129.81	(3/2)$^-$	159.014	3/2$^+$	E_γ: poor-fit, level-energy difference=1970.78.
1977.92 *14*	0.41 *3*	1978.05	(3/2)$^-$	0.0	1/2$^+$	
1999.04 *4*	1.95 *6*	2158.15	1/2$^-$,3/2$^-$	159.014	3/2$^+$	
2021.06 *20*	0.81 *5*	2020.63	1/2$^-$,3/2$^-$	0.0	1/2$^+$	
2023.2&	≈0.61&	2621.73	(1/2$^+$,3/2)	599.10	1/2$^+$	
2038&	≈0.04&	2197.32	(1/2$^+$,3/2)	159.014	3/2$^+$	
2115.2&	≈0.42&	2621.73	(1/2$^+$,3/2)	505.40	5/2$^+$	
2129.7&	≈0.29&	2129.81	(3/2)$^-$	0.0	1/2$^+$	
2158.5&	≈0.23&	2158.15	1/2$^-$,3/2$^-$	0.0	1/2$^+$	
2197.6 *3*	0.34 *7*	2197.32	(1/2$^+$,3/2)	0.0	1/2$^+$	
2567.1&	≈0.17&	2726.24	(1/2,3/2)	159.014	3/2$^+$	

Continued on next page (footnotes at end of table)

^{122}Te(n,γ) E=th 2000Bo24 (continued)

γ(^{123}Te) (continued)

E_γ [†]	I_γ [†c]	E_i(level)	J_i^π	E_f	J_f^π
2622[&]	≈0.46[&]	2621.73	(1/2$^+$,3/2)	0.0	1/2$^+$
2725[&]	≈0.33[&]	2726.24	(1/2,3/2)	0.0	1/2$^+$
[x]3427.70[‡] *15*	0.38[‡] *5*				
[x]3572.3[‡] *4*	0.29[‡] *4*				
[x]3709.02[‡] *18*	0.37[‡] *4*				
3972[b]		(6929.21)	1/2$^+$	2957.3	(1/2,3/2)
3982.4 *3*	0.19 *3*	(6929.21)	1/2$^+$	2946.7	(1/2,3/2)
3991.5 *3*	0.38 *3*	(6929.21)	1/2$^+$	2937.5	1/2$^-$,3/2$^-$
4117.3 *3*	0.30 *8*	(6929.21)	1/2$^+$	2811.8	1/2$^-$,3/2$^-$
4203.0 *4*	0.92 *4*	(6929.21)	1/2$^+$	2726.24	(1/2,3/2)
4242.4 *5*	0.58 *5*	(6929.21)	1/2$^+$	2686.7	1/2$^-$,3/2$^-$
4285.1 *4*	0.18 *2*	(6929.21)	1/2$^+$	2644.2	(1/2,3/2)
4307.7 *3*	0.58 *2*	(6929.21)	1/2$^+$	2621.73	(1/2$^+$,3/2)
4731.7 *3*	0.96 *3*	(6929.21)	1/2$^+$	2197.32	(1/2$^+$,3/2)
4770.70 *9*	2.60 *5*	(6929.21)	1/2$^+$	2158.15	1/2$^-$,3/2$^-$
4797.3[a] *6*	0.43 *3*	(6929.21)	1/2$^+$	2129.81	(3/2)$^-$
4836.79 *11*	0.52 *3*	(6929.21)	1/2$^+$	2092.46	(1/2,3/2)
4908.76 *23*	0.92 *2*	(6929.21)	1/2$^+$	2020.63	1/2$^-$,3/2$^-$
4950.88 *23*	0.77 *3*	(6929.21)	1/2$^+$	1978.05	(3/2)$^-$
5041.1 *3*	0.45 *3*	(6929.21)	1/2$^+$	1887.54	(3/2)$^-$
5088.7 *5*	≈0.05	(6929.21)	1/2$^+$	1839.48	(1/2,3/2)
5121.63 *10*	1.33 *3*	(6929.21)	1/2$^+$	1807.66	(3/2$^-$)
5169.55 *7*	2.26 *5*	(6929.21)	1/2$^+$	1759.57	(3/2)$^-$
5371[b]		(6929.21)	1/2$^+$	1557.18	(3/2)$^+$
5482.6 *8*	≈0.05	(6929.21)	1/2$^+$	1446.37	(3/2)$^+$
5584.45 *11*	1.27 *3*	(6929.21)	1/2$^+$	1344.71	(3/2)$^-$
5610.6 *3*	0.13 *4*	(6929.21)	1/2$^+$	1318.18	(1/2$^+$,3/2$^+$)
5892.7 *3*	0.13 *4*	(6929.21)	1/2$^+$	1036.66	3/2$^+$
6329.6 *3*	0.18 *6*	(6929.21)	1/2$^+$	599.10	1/2$^+$
6424.6[f] *3*	≈0.01	(6929.21)	1/2$^+$	505.40	5/2$^+$
6489.0 *5*	0.06 *2*	(6929.21)	1/2$^+$	440.04	3/2$^+$
6770.17 *23*	0.16 *1*	(6929.21)	1/2$^+$	159.014	3/2$^+$
6928.9 *3*	0.08 *1*	(6929.21)	1/2$^+$	0.0	1/2$^+$

[†] From 2000Bo24, unless otherwise noted. Values in 2000Bo24 are taken by the authors from weighted average of their data and those of 1991Ho08, with their intensities normalized to I(1759.6γ)=1.41 *7* per 100 neutron captures in 1991Ho08.
[‡] From 1991Ho08.
[#] 2000Bo24 proposed a 1694.7-keV γ-ray (from 2129.2 level to 440.01 level) from $\gamma\gamma$-coin. Evaluator unplaced this γ-ray because the energy difference is large (4.1 keV).
[@] Energies and intensities determined from $\gamma\gamma$-coin (2000Bo24).
[&] Weak peaks observed in $\gamma\gamma$-coin only (2000Bo24).
[a] Poor fit. Uncertainty is doubled in the fitting.
[b] Not listed in Table 1 of 2000Bo24, but implied from levels which are noted from primary γ in Table 3.
[c] Intensity per 100 neutron captures.
[d] Multiply placed.
[e] Multiply placed with undivided intensity.
[f] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

^{122}**Te(n,γ) E=th 2000Bo24**

Level Scheme

Intensities: I_γ per 100 neutron captures

Legend

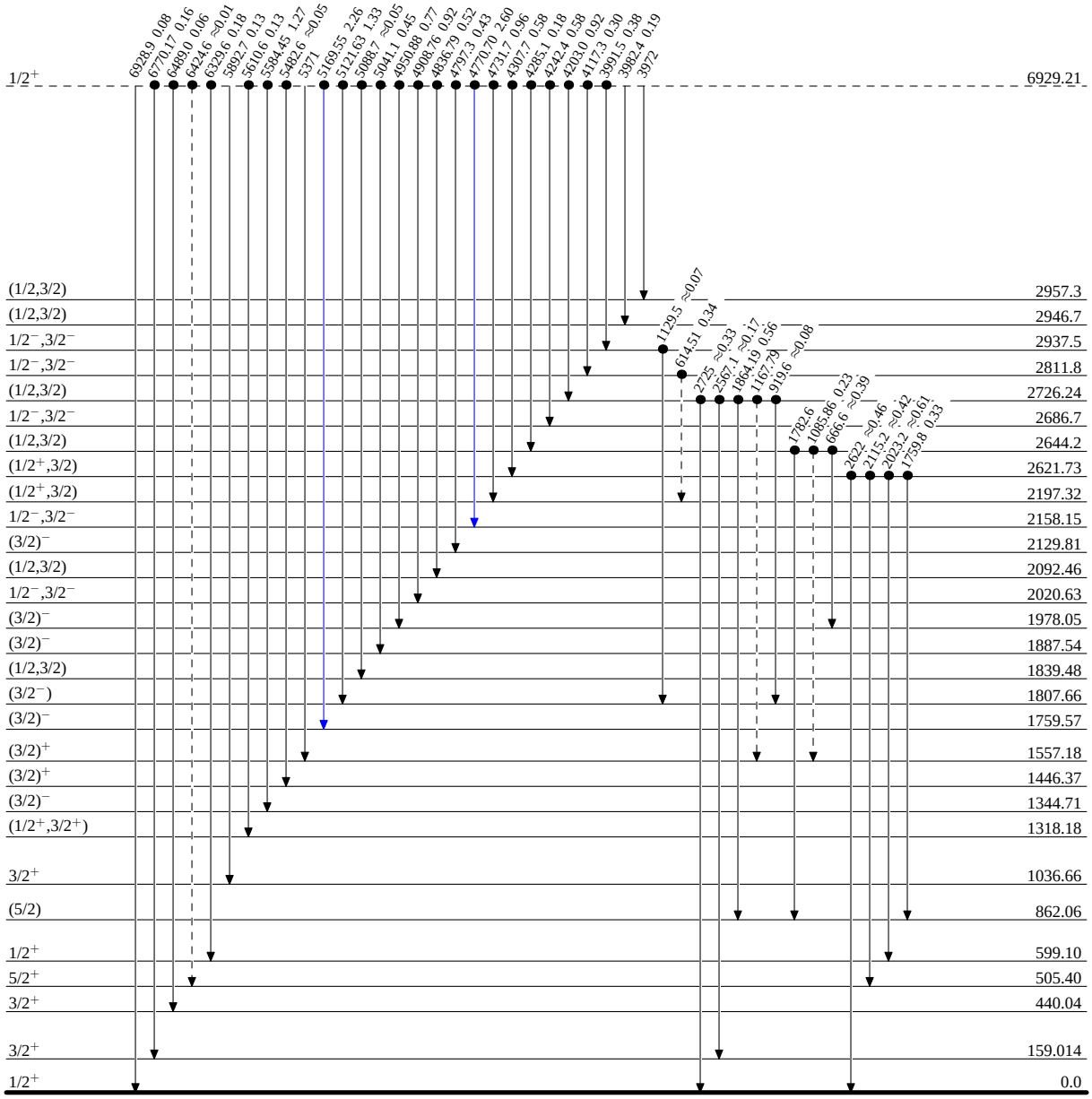
$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

γ Decay (Uncertain)

Coincidence



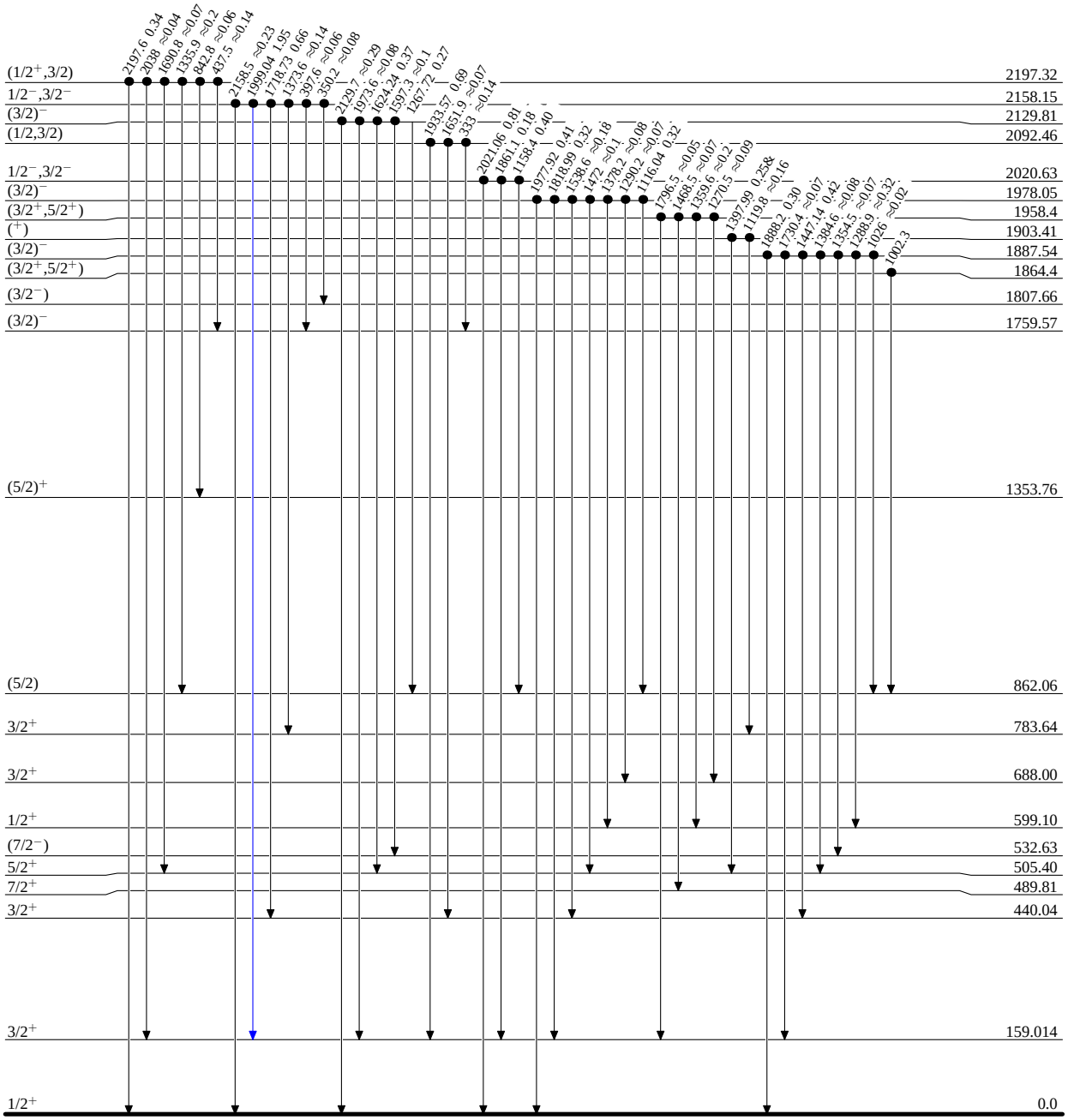
$^{123}_{52}Te_{71}$

^{122}Te(n,γ) E=th 2000Bo24

Level Scheme (continued)

Intensities: I_γ per 100 neutron captures
& Multiply placed: undivided intensity given

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
Coincidence



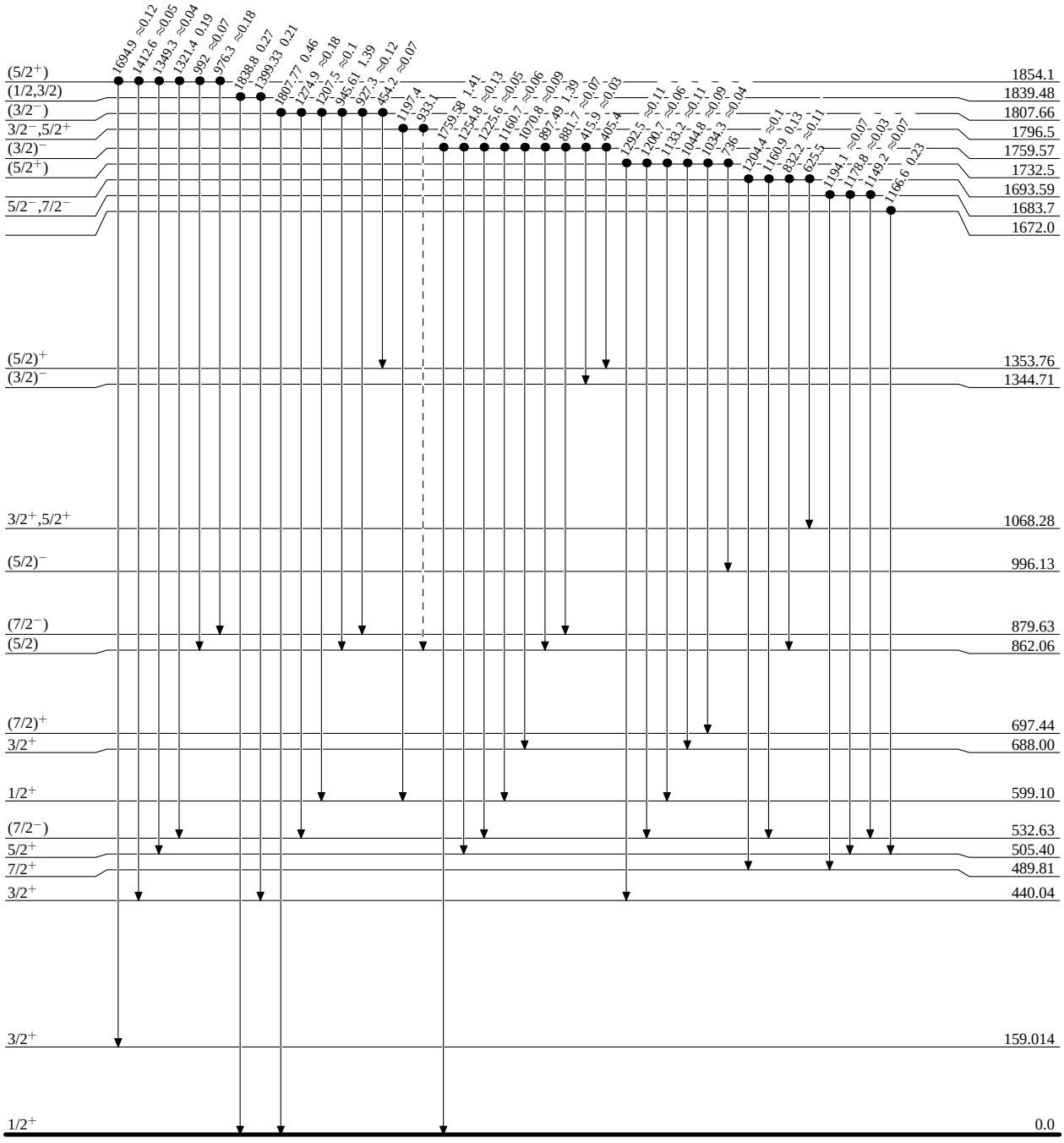
$^{123}_{52}Te_{71}$

^{122}Te(n,γ) E=th 2000Bo24

Level Scheme (continued)

Intensities: I_γ per 100 neutron captures
& Multiply placed: undivided intensity given

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)
- Coincidence



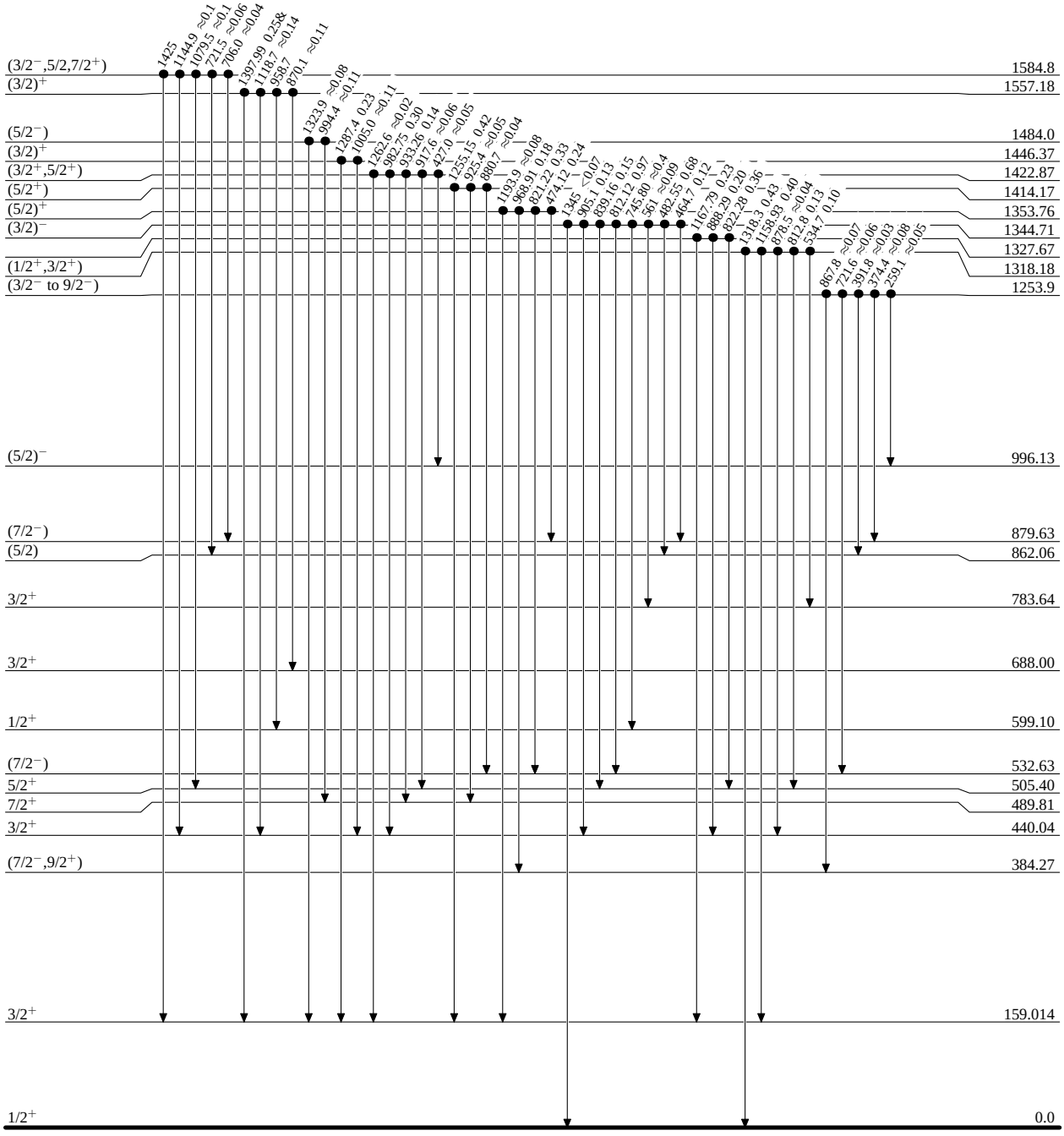
$^{123}_{52}Te_{71}$

^{122}Te(n,γ) E=th 2000Bo24

Level Scheme (continued)

Intensities: I_γ per 100 neutron captures
& Multiply placed: undivided intensity given

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
Coincidence



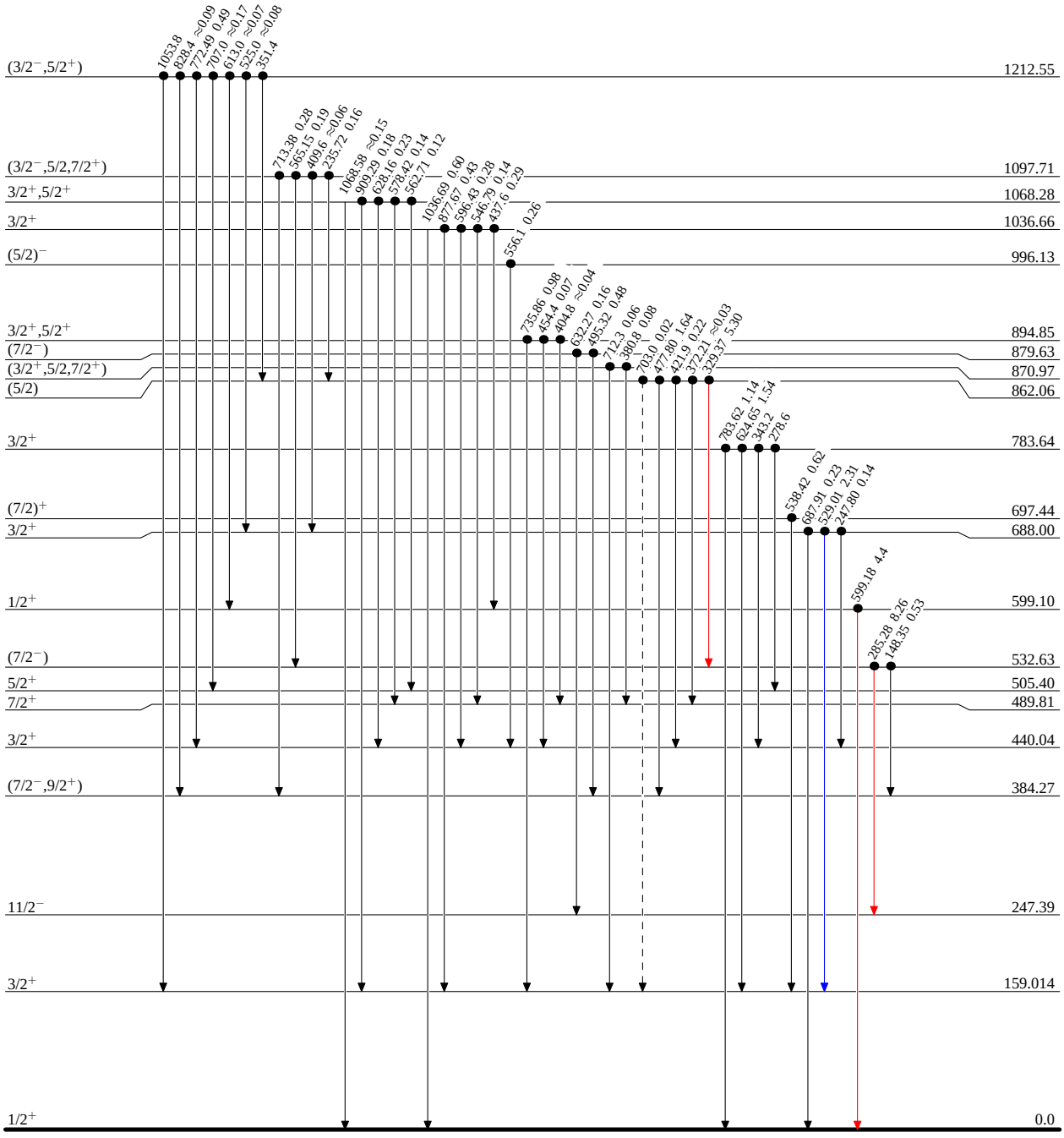
$^{123}_{52}Te_{71}$

^{122}Te(n,γ) E=th 2000Bo24

Level Scheme (continued)

Intensities: I_γ per 100 neutron captures
& Multiply placed: undivided intensity given

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)
Coincidence



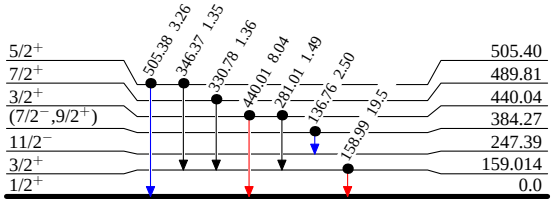
$^{123}_{52}Te_{71}$

^{122}Te(n,γ) E=th 2000Bo24

Level Scheme (continued)

Intensities: I_γ per 100 neutron captures
& Multiply placed: undivided intensity given

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
Coincidence



$^{123}_{52}Te_{71}$

^{122}Te(d,p) 2000Bo24,1975Li22

$J^{\pi}(^{122}Te\ g.s.)=0^{+}$.

2000Bo24: E=17 MeV deuteron beam was produced from the Tandem accelerator of the Technical University of Munich. Target was 88.4% enriched ^{122}Te on a carbon backing. Reaction products were momentum-analyzed with a Q3D magnetic spectrograph (FWHM=5 keV) and detected with a position-sensitive cathode strip detector. Measured $\sigma(E_p,\theta)$, θ=15° and 30°. Deduced levels. Comparisons with available data. Report 116 levels. 2000Bo24 also report data in (n,γ) E=thermal.

1975Li22: E=7.5 MeV deuteron beam was produced from the MIT-ONR Van de Graaff accelerator. Target was 16.2 μg/cm^2 94.8% enriched ^{122}Te on a 3 μg/cm^2 organic Formvar backing. Reaction products were momentum-analyzed with a multi-gap broad-range magnetic spectrograph (FWHM≈10 keV) and detected with nuclear-track plates. Measured $\sigma(E_p,\theta)$ (15% uncertainty), θ=0° to 172.5°. Deduced levels, J, π, L-transfers, spectroscopic factors from DWBA analysis. Comparisons with available data for neighboring Te isotopes. Report 105 levels.

Other: 1964Jo12, 1983Za07.

^{123}Te Levels

Spectroscopic factor C^2S is obtained from $d\sigma/d\Omega(exp)=N\times(2J+1)\times C^2S\times d\sigma/d\Omega(DWBA)$, where N=1.5 is the normalization factor for (d,p) and J the spin of final state in ^{123}Te (1975Li22).

E(level)[†]	L[‡]	(2J+1)C^{2}S.[‡]	Comments
0.0	0	0.78	E(level): other: 0 (1975Li22).
159.1 *5*	2	2.02	E(level): other: 159 (1975Li22).
247.2 *5*	5	3.63	E(level): other: 248 (1975Li22).
384.9 *6*	[5][#]	0.08[#]	
440.0 *5*	[2][#]	0.09[#]	E(level): other: 444 (1975Li22).
489.8 *5*	[4][#]	0.14[#]	E(level): other: 496 (1975Li22).
505.3 *5*	(2)	≈0.30	E(level): other: 509 (1975Li22). (2J+1)C^{2}S.: for 496+509 with L=(2) 1975Li22. Other: 0.39 (2000Bo24).
532.7 *5*	[3][#]	0.05[#]	
598.8 *5*	0	0.13	E(level): other: 600 (1975Li22).
688.0 *5*	2	0.27	E(level): other: 691 (1975Li22). (2J+1)C^{2}S.: other: 0.29 (2000Bo24).
698.7 *5*	[4][#]	0.07[#]	
783.8 *5*	2	0.42	E(level): other: 785 (1975Li22). (2J+1)C^{2}S.: or 0.34 (1975Li22). Other: 0.44 (2000Bo24).
862.1 *6*	[3][#]	(0.002)[#]	
870.7 *7*			
879.5 *5*	[3][#]	0.18[#]	E(level): other: 883 (1975Li22).
894.7 *5*	(2)	≈0.30	E(level): other: 898 (1975Li22). (2J+1)C^{2}S.: for 883+898 with L=(2) in 1975Li22. Other: 0.40 (2000Bo24).
920.3 *7*			
1036.9 *5*	[2][#]	0.02[#]	
1068.7 *9*	[2][#]	(0.002)[#]	
1081.7 *7*			
1099.0 *6*	[3][#]	0.003[#]	
1211.9 *7*			
1253.4 *10*	[3][#]	0.007[#]	
1318.4 *10*	[2][#]	0.015[#]	
1327.7 *6*	[2][#]	(0.03)[#]	
1344.6 *6*	1	0.035	E(level): other: 1347 (1975Li22). (2J+1)C^{2}S.: other: 0.03 (2000Bo24).
1353.8 *6*	[2][#]	0.006[#]	
1414.0 *6*	[2][#]	0.11[#]	

Continued on next page (footnotes at end of table)

^{122}Te(d,p) 2000Bo24,1975Li22 (continued)

^{123}Te Levels (continued)

E(level)[†]	L[‡]	(2J+1)C^{2}S.[‡]	Comments
1418 *10*	(3)	0.18	E(level): from 1975Li22.
1422.8 *5*	[2]#	0.065#	
1446.4 *6*	[2]#	(0.016)#	
1474.5 *6*			
1483.3 *6*	1	0.038	E(level): other: 1484 (1975Li22). (2J+1)C^{2}S.: other: (0.06) (2000Bo24).
1558.3 *6*	[2]#	0.026#	E(level): other: 1562 (1975Li22).
1585.1 *6*			
1622.7 *6*			
1654.6 *8*			
1672.3 *6*	[2]#	0.021#	
1682.4 *9*	3	0.18	E(level): other: 1684 (1975Li22). (2J+1)C^{2}S.: other: 0.11 (2000Bo24).
1693.6 *6*			
1707.0 *8*			
1733.1 *6*	[2]#	0.017#	
1759.4 *6*	1	0.051	E(level): other: 1761 (1975Li22). (2J+1)C^{2}S.: other: 0.041 (2000Bo24).
1788.4 *6*			
1796.6 *5*			
1840.3 *6*	[2]#	0.027#	
1853.7 *6*			
1863.8 *7*	[2]#	(0.009)#	
1887.7 *6*	1	0.119	E(level): other: 1890 (1975Li22). (2J+1)C^{2}S.: other: 0.095 (2000Bo24).
1902.9 *9*	[2]#	(0.008)#	
1946.1 *7*			
1956.7 *6*	[2]#	(0.022)#	
1978.2 *5*	1	0.115	E(level): other: 1980 (1975Li22). (2J+1)C^{2}S.: other: 0.079 (2000Bo24).
2011.1 *6*			
2020.4 *5*	1	0.131	E(level): other: 2122 (1975Li22). (2J+1)C^{2}S.: other: 0.091 (2000Bo24).
2051.1 *5*	3	0.77	E(level): other: 2054 (1975Li22). (2J+1)C^{2}S.: other: 0.42 (2000Bo24).
2065.6 *7*			
2083.1 *9*			
2093.7 *6*	[1]#	(0.002)#	
2118.4 *5*			
2130.1 *5*	1	0.083	E(level): other: 2125 (1975Li22). (2J+1)C^{2}S.: other: 0.030 (2000Bo24).
2143.7 *5*			
2151.3 *6*			
2158.0 *5*	1	0.194	E(level): other: 2156 (1975Li22). (2J+1)C^{2}S.: other: 0.089 (2000Bo24).
2197.1 *6*	[1]#	0.034#	
2201.1 *6*	(2)	0.26	E(level): other: 2201 (1975Li22). (2J+1)C^{2}S.: or 0.32 (1975Li22). Other: (0.18) (2000Bo24).
2264.0 *11*			
2285.0 *10*			
2296.7 *9*			E(level): other: 2298 (1975Li22).
2348.2 *8*			E(level): other: 2357 (1975Li22).
2369.1 *7*			E(level): other: 2357 (1975Li22).

Continued on next page (footnotes at end of table)

^{122}Te(d,p) 2000Bo24,1975Li22 (continued)

^{123}Te Levels (continued)

E(level)[†]	L[‡]	(2J+1)C^{2}S.[‡]	Comments
2376.6 *7*			E(level): other: 2380 (1975Li22).
2398.7 *8*			
2413.6 *10*	3	0.09	E(level): other: 2422 (1975Li22).
2442.6 *10*			
2457.4 *7*			
2464.9 *7*			
2478.7 *8*			
2497.7 *6*			
2514.9 *6*			
2525.5 *6*			
2533.3 *6*			
2540.7 *6*			
2551.6 *7*	1	0.13	E(level): other: 2547 (1975Li22).
2555.8 *6*			
2565.2 *6*			
2572.1 *6*			
2604.3 *6*			
2614 *6*			
2621.8 *6*	[1][#]	0.01[#]	
2630.3 *6*			E(level): other: 2631 (1975Li22).
2638.1 *6*			
2643.4 *7*	[1][#]	0.009[#]	
2657.0 *6*			E(level): other: 2660 (1975Li22).
2670.5 *7*			
2676.2 *6*			
2687.0 *6*	1	0.118	E(level): other: 2688 (1975Li22). (2J+1)C^{2}S.: other: 0.027 (2000Bo24).
2695[@] *1*			
2713.0 *6*			
2725.0 *6*			E(level): other: 2723 (1975Li22).
2735.3 *7*			
2741.7 *7*			
2751[@] *2*	(3)	0.15	E(level): other: 2749 (1975Li22).
2773.4 *6*	1	0.039	E(level): other: 2772 (1975Li22).
2782.0 *7*			
2794.0 *7*			
2807.0 *6*			
2812.3 *7*	1	0.041	E(level): other: 2812 (1975Li22). (2J+1)C^{2}S.: other: 0.0007 (2000Bo24).
2834.0 *7*			
2848.6 *7*			E(level): other: 2840 (1975Li22).
2857.4 *6*			
2864.0 *7*			
2869.5 *7*			
2875.2 *7*			
2880.8 *9*			
2887.3 *9*			
2894.6 *7*			E(level): other: 2895 (1975Li22).
2906.1 *8*			
2915.8 *7*			E(level): other: 2916 (1975Li22).
2922.5 *9*			
2937.4 *9*	1	0.065	E(level): other: 2941 (1975Li22). (2J+1)C^{2}S.: other: 0.009 (2000Bo24).
2947.1 *10*	[1][#]	0.002[#]	
2963 *10*			E(level): from 1975Li22.

Continued on next page (footnotes at end of table)

^{122}Te(d,p) 2000Bo24,1975Li22 (continued)

^{123}Te Levels (continued)

E(level)[†]	L[‡]	(2J+1)C^{2}S.[‡]	Comments
2967.9 *10*			
2983.8 *10*			E(level): other: 2989 (1975Li22).
3002.5 *12*			
3007.7 *12*	1	0.050	E(level): other: 3007 (1975Li22).
3033 *10*			
3055 *10*			
3079 *10*			
3106 *10*			
3151 *10*			
3181 *10*			
3197 *10*	1	0.064	
3321 *10*			
3337 *10*			
3375 *10*			
3401 *10*	1	0.052	
3439 *10*			
3469 *10*			
3492 *10*			
3513 *10*			
3551 *10*	1	0.110	
3625 *10*			
3744 *10*			
3766 *10*			
3787 *10*			
3822 *10*			
3849 *10*			
3866 *10*			
3912 *10*			
3935 *10*			
3975 *10*			
4014 *10*			
4040 *10*			
4055 *10*			
4075 *10*			
4134 *10*			
4173 *10*			
4200 *10*			
4271 *10*			
4302 *10*			
4317 *10*			
4347 *10*			
4380 *10*			
4411 *10*			
4441 *10*			
4476 *10*			
4500 *10*			
4538 *10*			
4570 *10*			
4606 *10*			
4655 *10*			
4669 *10*			
4685 *10*			
4715 *10*			
4748 *10*			
4776 *10*			
4789 *10*			
4854 *10*			

Continued on next page (footnotes at end of table)

^{122}Te(d,p) 2000Bo24,1975Li22 (continued)

^{123}Te Levels (continued)

E(level)[†]	E(level)[†]	E(level)[†]
4876 *10*	5088 *10*	5190 *10*
4966 *10*	5140 *10*	5232 *10*
5015 *10*	5169 *10*	5329 *10*
		5450 *10*

[†] From 2000Bo24 up to 3008 level and from 1975Li22 above that. A systematic uncertainty of 0.5 keV has been added in quadruture (by the evaluator) for those from 2000Bo24. No uncertainty is given in 1975Li22 for level energies and an uncertainty of 10 keV has been assigned by the evaluator, considering an uncertainty of 6 keV given in Q-value in 1975Li22 for the g.s. which is the strongest peak in the their proton spectrum.

[‡] From 1975Li22, extracted from DWBA analysis of experimental differential cross sections, unless otherwise noted. Authors of 1975Li22 used the optical potential which is a local, surface-derivative Saxon-Woods potential without spin-orbit coupling; the parameter values are from 1963Pe28.

[#] From 2000Bo24. Authors estimated roughly the L values by comparing the ratios of DWBA cross section with experimental ones at 15° and 30°, and C^2S values are normalized to those for the $1/2^+$ g.s., $3/2^+$ 159 and $11/2^-$ 247 levels in 1975Li22.

[@] Possible doublet (2000Bo24).

^{124}Te(p,d) 1982Ga18

$J^{\pi}(^{124}Te\ g.s.)=0^{+}$.

1982Ga18: E=42 MeV proton beam was produced from the Michigan State University K50 Cyclotron. Target was isotopically enriched (99.5% in ^{124}Te) metallic power on a carbon backing. Reaction products were momentum-analyzed with an Enge split-pole spectrometer and detected with an E-ΔE counter telescope (FWHM≈30-40 keV). Measured $\sigma(E_{\alpha},\theta)$ (accurate to 10%), θ(lab)=7°, 15° and 25°. Deduced levels, J, π, L-transfers from DWBA analysis. Comparisons with available data. 1982Ga18 also report data on ^{124}Te(^{3}He,α).

^{123}Te Levels

E(level)‡	L†	E(level)‡	L†	E(level)‡	L†	E(level)‡	L†
0.0	0	914 *5*	2	1515 *10*	2	2275 *10*	(4)+(2)
163 *5*	2	1053 *10*	2	1606 *10*	(0)+(2)	2332 *10*	4
251 *5*	5	1153 *10*		1708 *10*	2	2415 *10*	(4)+(2)
504 *5*	(4)+(2)	1239 *5*	4	1829 *10*	(0)+(2)	2469 *10*	(4)+(2)
597 *10*	(0)+(2)	1268 *10*	(4)+(2)	1904 *10*	(4)+(2)	2576 *15*	(4)+(2)
702 *5*	2	1357 *5*	2	2076 *10*	2	2615 *15*	
801 *10*	2	1448 *5*	2	2163 *10*	2	2691 *15*	(4)+(2)

† From DWBA analysis of the ratio of experimental cross-sections at 15° and 25° (1982Ga18).

‡ Uncertainties from a general statement in 1982Ga18: 5 keV for strong peaks below 1500, 10 for others up to 2500 and 15 for others above 2500, except for a few weak peaks below 1500 for which 10 keV is estimated by the evaluator.

^{124}Te(d,t) 1977Fe16

$J^{\pi}(^{124}Te\ g.s.)=0^{+}$.

1977Fe16: E=10.126 MeV deuteron beam was produced from the 8UD Pelletron tandem accelerator of the University of Sao Paulo. Targets were 60-200 $\mu g/cm^2$ enriched metallic tellurium (96.21% in ^{124}Te) on 20 $\mu g/cm^2$ carbon backings. Reaction products were detected with a E-ΔE counter telescope (FWHM=35 keV). Measured $\sigma(E_d,\theta)$, θ=45°−105°. Deduced levels, J, π, L-transfers, spectroscopic factors from DWBA analysis. Comparisons with available data.

Other: 1964Jo12: E(d)=14.8 MeV.

All data are from 1977Fe16.

^{123}Te Levels

Spectroscopic factor C^2S is obtained from $d\sigma/d\Omega(exp)=N\times C^2S/(2j+1)\times d\sigma/d\Omega(DWBA)$, where N=3.33 is the normalization factor for (d,t) and j the total angular momentum of the transferred neutron (1977Fe16).

E(level)	L[#]	C^2S[#]	Comments
0.0	0	1.10	
160 *10*	2	1.70	C^2S: for $2d_{3/2}$.
247[†]	5	5.75	C^2S: for $1h_{11/2}$.
490 *20*	2	1.20	C^2S: for $2d_{5/2}$.
690 *10*	2	0.63,0.51	C^2S: for $2d_{3/2}$,$2d_{5/2}$.
790 *10*			
894[†]	2	2.0	C^2S: for $2d_{5/2}$.
1240[‡] *20*			
1420[‡] *20*			
1500 *20*			
1660 *20*			
1850 *20*			
2040 *20*			

[†] Used as energy calibration.

[‡] Probably multiplet.

[#] From DWBA analysis of experimental differential cross sections, assuming $2d_{3/2}$ (for 160 and 690 levels) and $2d_{5/2}$, $1h_{11/2}$ single-particle orbits for L=2, 5 transfer, respectively, with 15-20% uncertainty in spectroscopic factor (1977Fe16).

^{124}Te(^{3}He,α) 1982Ga18,1977Fe16

$J^{\pi}(^{124}Te\ g.s.)=0^{+}$.

1982Ga18: E=70 MeV ^{3}He beam was produced from the Michigan State University K50 Cyclotron. Target was isotopically enriched (99.5% in ^{124}Te) metallic power on a carbon backing. Reaction products were momentum-analyzed with an Enge split-pole spectrometer and detected with an E-ΔE counter telescope (FWHM≈70 keV). Measured $\sigma(E_{\alpha},\theta)$ (accurate to 10%), θ(lab)=2.5° to 30°. Deduced levels, J, π, L-transfers and spectroscopic factors from DWBA analysis. Comparisons with available data. 1982Ga18 also observed a giant resonance-like peak at 3.5-18 MeV; discussed L=4 inner-hole strength. 1982Ga18 also report data on ^{124}Te(p,d).

1977Fe16: E=19.408 MeV ^{3}He beam was produced from the 8UD Pelletron tandem accelerator of the University of Sao Paulo. Targets were 60-200 μg/cm^2 enriched metallic tellurium (96.21% in ^{124}Te) on 20 μg/cm^2 carbon backings. Reaction products were detected with four silicon surface-barrier detectors (FWHM=45 keV). Measured $\sigma(E_{\alpha},\theta)$, θ=25°−95°. Deduced levels, J, π, L-transfers, spectroscopic factors from DWBA analysis. Comparisons with available data.

Other: 1997BoZW (E=32 MeV).

^{123}Te Levels

Spectroscopic factor C^2S is obtained from $d\sigma/d\Omega(exp)=N\times C^2S/(2j+1)\times d\sigma/d\Omega(DWBA)$, where N=21.3 is the normalization factor for (^{3}He,α) and j the total angular momentum of the transferred neutron (1977Fe16).

E(level)†	L‡	C^2S‡	E(level)†	L‡	C^2S‡	E(level)†	L‡	C^2S‡	E(level)†	L‡	C^2S‡
0.0@	0	1.22@	690@ *10*	4	0.76@	1059 *10*	2		1850@ *20*	(2)	0.34@
160@ *10*	2	1.70@	712 *10*	2		1232 *10*	4#	0.87 *9*	2066 *25*	4	0.30 *3*
252 *10*	5	3.3 *3*	790@ *10*		@	1427 *10*	4#	0.5 *1*	2340 *25*	4	0.49 *5*
498 *10*	4	2.9 *3*	906 *10*	2	1.80 *20*	1660 *10*	4	0.68 *7*	2670 *25*	4	0.38 *4*

† From 1982Ga18, unless noted otherwise.

‡ From DWBA analysis of experimental differential cross sections, assuming $3s_{1/2}$, $2d_{3/2}$ (only for 160 level) and $2d_{5/2}$,$1g_{7/2}$, $1h_{11/2}$ single-particle orbits for L=0, 2, 4, 5 transfer, respectively (1982Ga18). Quoted values are from 1982Ga18, unless otherwise noted.

L=4+2 in 1977Fe16.

@ From 1977Fe16.

^{125}Te(p,t) 1972SeZQ,1973SeZL

$J^{\pi}(^{125}Te\ g.s.)=1/2^{+}$.

1972SeZQ, 1973SeZL: E=19 MeV proton beam at University of Minnesota.

Reaction products were momentum-analyzed with an split-pole spectrometer and detected with emulsion and 6-position sensitive semi-conductor. Deduced levels, L-transfers for two-neutron transfers from DWBA analysis. The energies and L values for levels above 1946 are considered less certain (by evaluator) because of contaminants.

^{123}Te Levels

E(level)	L	E(level)	L	E(level)	L	E(level)	L
0.0	0	782 *5*	2	1342? *5*		2050 *15*	4
159 *5*	2	877? *5*		1410† *5*	2	2115 *15*	(0),(4)
248 *5*	5	895 *5*	2	1480† *5*	3	2160† *15*	(3),(4)
440 *5*	2	990 *5*	3	1560 *10*	2	2265 *15*	3
487 *5*	>3‡	1037 *5*	2	1675† *10*	≥2	2290 *15*	4
505 *5*	2	1067? *5*		1710 *10*	(2)	2370 *15*	3
536? *5*		1080 *5*	4	1866 *10*	≥2	2950 *15*	3
598 *5*	0	1210 *5*	(3)	1946 *10*	0		
683† *5*	2	1330 *5*	4	1990 *10*	≥2		

† Multiplet.

‡ From 1973SeZL. Reported as L=5 in 1972SeZQ.

Coulomb excitation **1975An16,1974Ro40,1989Be22**

1989Be22: (^{32}S,^{32}S′) E= 72-80 MeV ^{32}S beams were produced from the Rutgers Tandem Van de Graaff accelerator. γ rays were detected with four Ge detectors and scattered particles were detected with an annular surface barrier detector. Measured Eγ, Iγ, particle-$\gamma(\theta$,H). Deduced levels, g-factors by transient field technique, γ-ray multipolarities, mixing ratios. Comparisons with available data and theoretical calculations. See also 1988Be45.

1975An16: (^{12}C,^{12}C′) E=37 MeV, (α,α′) E=12 MeV at the IOffe Physical-technical Institute. γ rays were detected with Ge(Li) detectors. Measured Eγ, Iγ, $\gamma(\theta)$, Doppler shift attenuation. Deduced levels, $T_{1/2}$, γ-ray mixing ratios, transition strengths.

1974Ro40: (^{16}O,^{16}O′) E=33 MeV ^{16}O beam from the Wisconsin tandem electrostatic accelerator. γ rays were detected with Ge(Li) and NaI detectors. Measured Eγ, Iγ, $\gamma\gamma(\theta)$, ^{16}O′-$\gamma(\theta$,H). Deduced levels, g-factors by ion implantation perturbed angular correlation (IMPAC) technique, γ-ray mixing ratios, transition strengths.

1970Se03: (^{14}N,^{14}N′) E=44, 48 MeV at Orsay. γ rays were detected with a Ge(Li) detector. Measured γ-ray yields. Deduced transition strengths.

1969Ga25, 1968Ga07: (^{14}N,^{14}N′) E=46 MeV at the cyclotron laboratory of the Physico-technical Institute (FTI). γ rays were detected with a Ge(Li) detector. Measured Eγ, Iγ, γ-ray yields. Deduced transition strengths.

1964Al28: (^{14}N,^{14}N′) E=16 MeV. γ rays were detected with four NaI(Tl) crystals. Measured Eγ, Iγ, particle-γ-coin. $\gamma(\theta)$. Deduced γ-ray mixing ratio for 159γ.

1955Fa40: (p,p′) E=3.7 MeV, (α,α′) E=4 MeV, from the NRL 5-MeV Van de Graaff. γ rays were detected with NaI(Tl) counters. Measured Eγ, Iγ, $\gamma\gamma$-coin, γ-ray yields. Deduced transition strength for 159γ.

^{123}Te Levels

E(level)†	J^π	$T_{1/2}$	Comments
0.0	$1/2^+$		
158.90 *7*	$3/2^+$	0.32 ns *+26−14*	B(E2)↑=0.018 *5* $T_{1/2}$: from B(E2)↑=0.018 *5*, adopted δ(E2/M1)=+0.079 *11*. B(E2)↑: weighted average of 0.021 *5* (1975An16), 0.015 *6* (1969Ga25) and 0.018 *5* (1955Fa40).
439.70 *8*	$3/2^+$	22 ps *4*	μ=+0.63 *11* (1974Ro40) B(E2)↑=0.21 *3* $T_{1/2}$: from B(E2)↑=0.21 *3*, adopted δ(E2/M1)=−2.1 *1* and branching ratio 83.2% *5* for 439.7γ (1974Ro40). Other: 1.23 ps *21* from DSAM in 1973ErZS. B(E2)↑: unweighted average of 0.24 *3* (1975An16), 0.27 *3* (1970Se03), 0.15 *5* (1969Ga25) and 0.17 *2* (1974Ro40). μ: from g-factor=0.34 *6* by IMPAC using $T_{1/2}$=27 ps *3* deduced from their B(E2)↑ in 1974Ro40, with correction by using adopted $T_{1/2}$=22 ps *4*. Other: +0.66 *28*, from g-factor=+0.36 *15* by transient field technique using $T_{1/2}$=27 ps in 1989Be22 and corrected by using adopted $T_{1/2}$.
505.10 *8*	$5/2^+$	13 ps *3*	μ=+0.14 *9* (1974Ro40) B(E2)↑=0.27 *5* J^π: spin=5/2 from particle-$\gamma(\theta)$ in 1989Be22. $T_{1/2}$: from B(E2)↑=0.27 *5*, adopted branching ratio 69.8% *8* for 505.1γ. B(E2)↑: unweighted average of 0.35 *4* (1975An16), 0.36 *3* (1970Se03), 0.17 *7* (1969Ga25) and 0.20 *2* (1974Ro40). μ: from g-factor=0.040 *25* by IMPAC using $T_{1/2}$=18 ps *2* deduced from their B(E2)↑ in 1974Ro40, with correction by using adopted $T_{1/2}$=13 ps *3*. Other: +0.17 *31*, from g-factor=+0.05 *9* by transient field technique using $T_{1/2}$=18 ps in 1989Be22 and corrected by using adopted $T_{1/2}$.
687.7 *5*	$3/2^+$		B(E2)↑=0.004 *1* B(E2)↑ deduced by 1975An16 from their measured yield of 528.8γ and γ-branchings for 528.8γ and 687.7γ from 1972Au10 evaluation.

† From a least-squares fit to γ-ray energies.

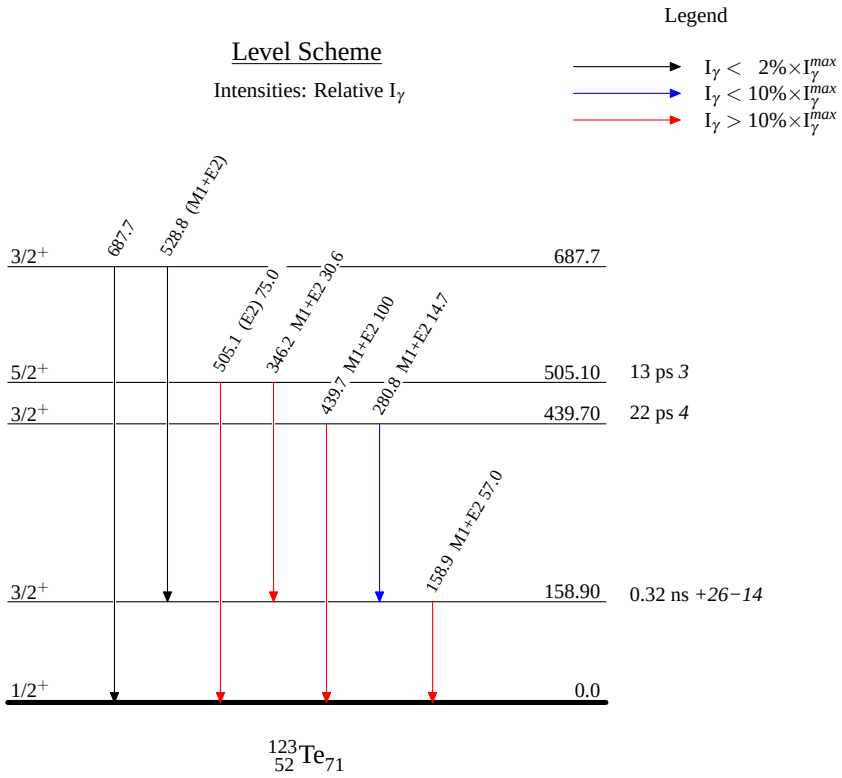
Coulomb excitation **1975An16,1974Ro40,1989Be22** **(continued)**

$\gamma(^{123}Te)$

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ	Comments
158.9 *1*	57.0	158.90	$3/2^+$	0.0	$1/2^+$	M1+E2	+0.06 *4*	E_γ: other: 159.0 (1989Be22). δ: from $\gamma(\theta)$ in 1964Al28. Other: 0.02 to 1.8 from particle-$\gamma(\theta)$ in 1989Be22.
280.8 *1*	14.7	439.70	$3/2^+$	158.90	$3/2^+$	M1+E2	−2.9 *28*	E_γ: others: 281.3 (1989Be22), 280.6 (1970Se03). δ: from $-5.6<\delta<-0.1$ from particle-$\gamma(\theta)$ in 1989Be22.
346.2 *1*	30.6	505.10	$5/2^+$	158.90	$3/2^+$	M1+E2	1.9	E_γ: others: 347.0 (1989Be22), 346.3 (1970Se03). δ: from particle-$\gamma(\theta)$ in 1989Be22.
439.7 *1*	100	439.70	$3/2^+$	0.0	$1/2^+$	M1+E2	−2.1 *1*	B(M1)(W.u.)=0.0019 *3*; B(E2)(W.u.)=31 *5* E_γ: others: 440.2 (1989Be22), 439.2 (1970Se03). I_γ: other: I(440γ)/I(281γ)=87/13 (1975An16). δ: from $\gamma\gamma(\theta)$ in 1974Ro40. Other: $0.1<\delta<1.7$ from particle-$\gamma(\theta)$ in 1989Be22.
505.1 *1*	75.0	505.10	$5/2^+$	0.0	$1/2^+$	(E2)		E_γ: others: 505.6 (1989Be22), 505.2 (1970Se03). I_γ: other: I(505γ)/I(346γ)=74/26 (1975An16).
528.8 *5*		687.7	$3/2^+$	158.90	$3/2^+$	(M1+E2)		
687.7		687.7	$3/2^+$	0.0	$1/2^+$			E_γ: from level-energy different; not reported in 1975An16.

[†] From 1975An16.
[‡] From 1974Ro40.
[#] From Adopted Gammas.

Coulomb excitation 1975An16,1974Ro40,1989Be22



Adopted Levels, Gammas

Q(β^-)=−2694 *10*; S(n)=9935 *6*; S(p)=4918 *3*; Q(α)=−892 *8* 2021Wa16
S(2n)=17840 *6*, S(2p)=12921 *4* (2021Wa16).
Mass measurements: 1978Sz04.

^{123}I Levels

Band assignments and configurations are adopted from (^{14}N,α3nγ) (2006Wa05) and ^{48}Ca,p4nγ) (2012Si04, 2012Si21), unless otherwise noted.

Cross Reference (XREF) Flags

A	^{123}Xe ε decay	F	^{121}Sb(α,2nγ)
B	^{80}Se(^{48}Ca,p4nγ)	G	^{122}Sn(^{7}Li,6nγ)
C	^{110}Pd(^{18}O,p4nγ)	H	^{122}Te(p,p′) IAR
D	^{116}Cd(^{14}N,α3nγ)	I	^{122}Te(^{3}He,d)
E	^{120}Sn(^{6}Li,3nγ)		

E(level)†	J$^\pi$‡	T$_{1/2}$	XREF	Comments
0.0[f]	5/2$^+$	13.2230 h *19*	ABCDEFG I	%ε+%β^+=100 μ=2.818 *7* (1979Sc13) Configuration=(π 2d$_{5/2}$) J$^\pi$: spin=5/2 from atomic beam (1958Ga18); L(^{3}He,d)=2 from 0$^+$. T$_{1/2}$: Weighted average of 13.25 h *3* (2018Bo02), 13.218 h *7* (2012Re25), 13.232 h *7* (2004Sc04), 13.2216 h *24* (2004Da05), 13.2235 h *19* (2002Un02, 1992Un01), 13.21 h *3* (1987Ja13), 13.21 h *2* (1982La25), 13.4 h *5* (1968Jo02), 13.30 h *5* (1965An05). Others: 13.50 h *11* (1973Ka45) and 13.02 h *4* (1968Hu01) are discrepant. μ: from nuclear magnetic resonance on oriented nuclei (1979Sc13). Also in 2014StZZ compilation. 1992Oh03 measured magnetic hyperfine splitting frequency by NMR-ON method.
138.33[d] *5*	7/2$^+$		ABCDEFG i	Configuration=(π 1g$_{7/2}$) XREF: i(144). J$^\pi$: 138.4γ M1+E2, ΔJ=1 to 5/2$^+$, 532.6γ from 9/2$^+$; L(^{3}He,d)=0+4 from 0$^+$ for a composite peak at 144 keV.
148.94 *10*	1/2$^+$	2.35 ns *3*	A F i	Configuration=(π 3s$_{1/2}$) XREF: i(144). J$^\pi$: 148.99γ E2, ΔJ=2 to 5/2$^+$, 899.6γ M1 from 1/2$^+$; L(^{3}He,d)=0+4 from 0$^+$ for a composite peak at 144 keV gives 1/2$^+$ for one component and 7/2$^+$ for the other. T$_{1/2}$: from $\gamma\gamma$(t) and γ-ce(t) in ^{123}Xe ε decay.
178.04 *10*	3/2$^+$	0.36 ns *2*	A F I	J$^\pi$: L(^{3}He,d)=2 from 0$^+$; 178.1γ M1(+E2) to 5/2$^+$, 870.7γ M1(+E2) from 1/2$^+$. T$_{1/2}$: from γ-ce(t) in ^{123}Xe ε decay. Other: 0.3 ns *1* from generalized centroid-shift method (1988Ko16) in (α,2nγ).
302.2? *3*		0.8 ns *1*	F	T$_{1/2}$: from generalized centroid-shift in (α,2nγ).
330.30 *9*	3/2$^+$	42 ps *13*	A F I	J$^\pi$: 912.0γ M1 from 1/2$^+$; 192.3γ to 7/2$^+$ must be D or E2, required by RUL. T$_{1/2}$: from γ-ce(t) in ^{123}Xe ε decay.
474.20[g] *9*	7/2$^+$		B DEF	J$^\pi$: 474.2γ M1+E2, ΔJ=1 to 5/2$^+$, 167.1γ and 196.7γ from 9/2$^+$.
552.30[e] *6*	9/2$^+$		B DEF	J$^\pi$: 413.97γ M1+E2, ΔJ=1 to 7/2$^+$, 552.3γ E2, ΔJ=2 to 5/2$^+$.
641.27[c] *7*	9/2$^+$	0.2 ns *1*	DEFG	J$^\pi$: 641.3γ E2, ΔJ=2 to 5/2$^+$, 502.9γ M1+E2, ΔJ=1 to 7/2$^+$. T$_{1/2}$: from generalized centroid-shift in (α,2nγ).
671.00[f] *6*	9/2$^+$		BCDEF	J$^\pi$: 671.0γ E2, ΔJ=2 to 5/2$^+$, 118.7γ to 9/2$^+$; band assignment.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{123}I Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$	XREF	Comments
794.08[d] *10*	$11/2^+$		B DEF	Jπ: 655.8γ E2, ΔJ=2 to $7/2^+$, 241.7γ D, ΔJ=1 to $9/2^+$.
943.46[h] *7*	$11/2^-$	0.2 ns *1*	BCDEF I	Configuration=(π $1h_{11/2}$) Jπ: L(^{3}He,d)=5 from 0^+; 272.5γ E1, ΔJ=1 to $9/2^+$. $T_{1/2}$: from generalized centroid-shift in (α,2nγ).
972.42[b] *9*	$11/2^+$		DEFG	Jπ: 331.2γ M1+E2, ΔJ=1 to $9/2^+$; no γ decays to $5/2^+$, $7/2^+$ and $3/2^+$ low-lying levels; band assignment.
1011.07 *14*	$(3/2)^+$		A I	Jπ: L(^{3}He,d)=2 from 0^+; ε feeding (ΔJ=0,1) from $1/2^{(+)}$ in ^{123}Xe.
1048.71 *13*	$1/2^+$		A I	Jπ: L(^{3}He,d)=0 from 0^+.
1080.22[g] *18*	$11/2^{(+)}$		B DEF	Jπ: 606.0γ Q, ΔJ=2 to $7/2^+$, 528.0γ and 409.1γ to $9/2^+$; band assignment.
1113.12 *13*	$(1/2,3/2)^+$		A	Jπ: 964.0γ M1,E2 to $1/2^+$; ε feeding (ΔJ=0,1) from $1/2^{(+)}$ parent in ^{123}Xe.
1153.4? *3*	$(3/2)^+$		A i	XREF: A(?)i(1152). Jπ: L(^{3}He,d)=2 from 0^+ for a level at 1152; probable ε feeding (ΔJ=0,1) from $1/2^{(+)}$ parent in ^{123}Xe.
1156.11[e] *14*	$13/2^+$		B DEF i	XREF: i(1152). Jπ: 362.1γ M1+E2, ΔJ=1 to $11/2^+$, 603.9γ Q, ΔJ=2 to $9/2^+$; band assignment.
1189.9? *3*	$(1/2^+,3/2,5/2^+)$		A	Jπ: possible 1041.0γ to $1/2^+$, possible 1189.9γ to $5/2^+$.
1242.38 *16*	$1/2^+$		A I	Jπ: L(^{3}He,d)=0 from 0^+.
1271 *5*			I	
1310.12 *14*	$(3/2)^+$		A I	XREF: I(1307). Jπ: L(^{3}He,d)=2 from 0^+; ε feeding (ΔJ=0,1) from $1/2^{(+)}$ parent in ^{123}Xe.
1315.52[c] *12*	$13/2^+$		DEFG	Jπ: 674.2γ Q, ΔJ=2 to $9/2^+$, 343.1γ M1+E2, ΔJ=1 to $11/2^+$.
1338 *3*	$1/2^+$		I	Jπ: L(^{3}He,d)=0 from 0^+.
1368 *3*	$3/2^+,5/2^+$		I	Jπ: L(^{3}He,d)=2 from 0^+.
1390.82 *14*	$(1/2,3/2)^+$		A I	Jπ: 1060.7γ M1 to $3/2^+$; ε feeding (ΔJ=0,1) from $1/2^{(+)}$ parent in ^{123}Xe.
1437.4[f] *3*	$13/2^{(+)}$		D F	Jπ: 766.2γ Q, ΔJ=2 to $9/2^+$, 357.3γ to $11/2^{(+)}$; band assignment.
1440 *10*			I	
1453.00[h] *9*	$15/2^-$		BCDEF	Jπ: 509.6γ E2 to $11/2^-$; band assignment.
1493 *3*	$1/2^+$		I	Jπ: L(^{3}He,d)=0 from 0^+ .
1576.58[d] *17*	$15/2^{(+)}$		B DEF	Jπ: 782.4γ Q, ΔJ=2 to $11/2^+$, 420.4γ to $13/2^+$; band assignment.
1583 *3*	$3/2^+,5/2^+$		I	Jπ: L(^{3}He,d)=2 from 0^+ .
1602.46[a] *22*	$(15/2^+)$		D FG	Jπ: 629.9γ (Q), ΔJ=(2) to $11/2^+$. ($13/2^+$) proposed in (^{7}Li,6nγ) is inconsistent.
1607.07? *16*	$(15/2^+)$		F	Jπ: 291.6γ (M1+E2) to $13/2^+$.
1623 *6*			I	
1632.56 *22*	$(13/2^-)$		F	Jπ: 689.1γ, (M1+E2) to $11/2^-$.
1657.1 *3*	$(3/2)^+$		A I	XREF: A(?). Jπ: L(^{3}He,d)=2 from 0^+; probable ε feeding (ΔJ=0,1) from $1/2^{(+)}$ in ^{123}Xe.
1690.39[b] *16*	$15/2^+$		DEFG	Jπ: 374.9γ M1+E2, ΔJ=1 to $13/2^+$, 718.0γ Q, ΔJ=2 to $11/2^+$; band assignment.
1718 *3*	$3/2^+,5/2^+$		I	Jπ: L(^{3}He,d)=2 from 0^+.
1744 *10*			I	
1791.4[g] *3*	$(15/2^+)$		B DEF	Jπ: 711.1γ E2, ΔJ=2 to $11/2^{(+)}$; band assignment.
1808 *10*			I	
1816.0? *3*			F	
1864.91 *13*	$1/2^+$		A I	Jπ: L(^{3}He,d)=0 from 0^+.
1871.25[e] *16*	$17/2^+$		B DEF	Jπ: 715.2γ E2, ΔJ=2 to $13/2^+$, 294.6γ to $15/2^{(+)}$; band assignment.

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Adopted Levels, Gammas (continued)

^{123}I Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	$T_{1/2}$	XREF	Comments
1929 *10*	(+)		I	L(^{3}He,d)=(0+2) from 0$^+$.
1934.16 *15*	(1/2,3/2,5/2)$^+$		A	J$^{\pi}$: 691.5γ M1,E2 to 1/2$^+$, 1934.2γ to 5/2$^+$.
1956.10 *15*	3/2$^+$		A I	J$^{\pi}$: L(^{3}He,d)=2 from 0$^+$; allowed ε feeding from 1/2$^{(+)}$ parent in ^{123}Xe.
1983 *10*	3/2$^+$,5/2$^+$		I	J$^{\pi}$: L(^{3}He,d)=2 from 0$^+$.
2000.6? *3*	(+)	0.4 ns *1*	F	J$^{\pi}$: 310.2γ (M1,E2) to 15/2$^+$. $T_{1/2}$: from generalized centroid-shift in (α,2nγ) (1988Ko16).
2012 *10*			I	
2016.12[a] *19*	(17/2$^+$)		D FG	J$^{\pi}$: 700.6γ Q, ΔJ=2 to 13/2$^+$, 413.6γ D, ΔJ=1 to (15/2$^+$).
2039.67[h] *14*	19/2$^-$		BCDEF	J$^{\pi}$: 586.7γ E2, ΔJ=2 to 15/2$^-$; band assignment.
2048 *10*	1/2$^+$		I	J$^{\pi}$: L(^{3}He,d)=0 from 0$^+$.
2062.52 *12*	(1/2,3/2,5/2)$^+$		A	J$^{\pi}$: 909.0γ M1 to (3/2)$^+$.
2082.06[c] *21*	17/2$^{(+)}$		DEFG	J$^{\pi}$: 766.6γ Q, ΔJ=2 to 13/2$^+$, 391.7γ D, ΔJ=1 to 15/2$^+$; band assignment.
2083 *10*			I	
2110 *10*			I	
2140 *10*	(+)		I	J$^{\pi}$: L(^{3}He,d)=(0+2) from 0$^+$.
2152.43 *21*	(1/2$^+$,3/2)		A	J$^{\pi}$: possible 2151.7γ to 5/2$^+$; ε feeding (ΔJ=0,1) from 1/2$^{(+)}$ parent in ^{123}Xe.
2201.35 *22*	(1/2$^+$,3/2)		A	J$^{\pi}$: 2201.2γ to 5/2$^+$; probable ε feeding (ΔJ=0,1) from 1/2$^{(+)}$ parent in ^{123}Xe.
2215 *10*			I	
2250.06 *18*	(3/2)$^+$		A I	J$^{\pi}$: L(^{3}He,d)=2 from 0$^+$; ε feeding (ΔJ=0,1) from 1/2$^{(+)}$ parent in ^{123}Xe.
2262.1 *4*			F	
2265.61 *22*	(17/2$^-$)		F	J$^{\pi}$: 812.6γ D+Q to 15/2$^-$; band assignment.
2283.0[f] *6*	(17/2$^+$)		D F	XREF: F(?). J$^{\pi}$: 845.6γ to 13/2$^{(+)}$; band assignment.
2285.55 *21*	1/2$^+$		A I	XREF: I(2276). J$^{\pi}$: L(^{3}He,d)=0 from 0$^+$.
2319.6 *11*			F	
2322.7 *3*	(1/2,3/2)		A i	XREF: i(2325). J$^{\pi}$: probable ε feeding (ΔJ=0,1) from 1/2$^{(+)}$ parent in ^{123}Xe.
2327.4 *4*	(1/2$^+$,3/2)		A i	XREF: i(2325). J$^{\pi}$: 2327.3γ to 5/2$^+$; probable ε feeding from 1/2$^{(+)}$ parent in ^{123}Xe.
2339.1? *4*			F	
2360 *10*			I	
2361.85[a] *21*	(19/2$^+$)		DEFG	J$^{\pi}$: 671.5γ Q, ΔJ=2 to 15/2$^+$, 345.7γ D, ΔJ=1 to (17/2$^+$).
2367.81 *22*	(1/2$^+$,3/2$^+$)		A	J$^{\pi}$: probable allowed ε feeding from 1/2$^{(+)}$ parent in ^{123}Xe.
2369.47 *25*			F	
2389.4 *3*	(3/2)$^+$		A I	XREF: I(2385). J$^{\pi}$: L(^{3}He,d)=2 from 0$^+$; ε feeding (ΔJ=0,1) from 1/2$^{(+)}$ parent in ^{123}Xe.
2421 *10*	(3/2$^+$,5/2$^+$)		I	J$^{\pi}$: L(^{3}He,d)=(2) from 0$^+$.
2439.9 *4*			F	
2455.5 *5*	(1/2$^+$)		A I	XREF: A(?). J$^{\pi}$: L(^{3}He,d)=(0) from 0$^+$.
2466.40[d] *21*	19/2$^{(+)}$		B D F	J$^{\pi}$: 889.7γ Q, ΔJ=2 to 15/2$^{(+)}$, 595.4γ to 17/2$^+$; band assignment.
2477 *10*	3/2$^+$,5/2$^+$		I	J$^{\pi}$: L(^{3}He,d)=2 from 0$^+$.
2481.6? *4*			F	
2500.9[b] *3*	19/2$^{(+)}$		D FG	J$^{\pi}$: 810.5γ Q, ΔJ=2 to 15/2$^+$, 418.9γ D, ΔJ=1 to 17/2$^{(+)}$; band assignment.
2515 *10*	1/2$^+$		I	J$^{\pi}$: L(^{3}He,d)=0 from 0$^+$.

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Adopted Levels, Gammas (continued)

^{123}I Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$	XREF	Comments
2542 *10*	3/2+,5/2+		I	Jπ: L(^{3}He,d)=2 from 0+.
2560.3? *5*	(1/2+,3/2)		A	Jπ: possible 2560.4γ to 5/2+; probable ε feeding (ΔJ=0,1) from 1/2(+) parent in ^{123}Xe.
2567.3 *3*			F	
2580.0? *5*	(1/2+,3/2,5/2+)		A	Jπ: possible 2430.8γ to 1/2+, possible 2580.3γ to 5/2+.
2613.69[h] *24*	23/2−		BCDEF	Jπ: 574.1γ E2, ΔJ=2 to 19/2−; band assignment.
2648.0[g] *3*	(19/2+)		B D F	Jπ: 856.5γ Q, ΔJ=2 to (15/2+); band assignment.
2659.9[a] *3*	(21/2+)	26.6 ns *20*	DEFG	μ=+10.9 *9* (2014StZZ) Jπ: 298.1γ (M1), ΔJ=1 to (19/2+). Other: (19/2−) proposed by 2011Mo28 in (^{7}Li,6nγ). $T_{1/2}$: weighted average of 24 ns *3* in (^{7}Li,6nγ) (2011Mo28), 28 ns *2* in (α,2nγ) (1977Ha36) and 26.3 ns *21* in (^{6}Li,3nγ) (1982Sh20). Note apparent error in authors' value of $T_{1/2}$=24.3 ns *20* in figure 3 (1982Sh20). μ: from TDPAD, quoted in the 2014StZZ compilation, from a conference proceeding abstract (Proceeding of the 6th Hyperfine Interaction Conference in Groningen, page NP14, 1983).
2672?			G	E(level): this level is proposed by 2011Mo28 in (^{7}Li,6nγ), based on a 399γ-310γ cascade to 2362 level.
2711.92[e] *21*	21/2(+)		B DEF	Jπ: 840.7γ Q, ΔJ=2 to 17/2+, 245.4γ D, ΔJ=1 to 19/2(+); band assignment.
2732 *10*			I	
2766 *10*	(1/2+)		I	Jπ: L(^{3}He,d)=(0) from 0+.
2790.3 *4*			F	
2807 *10*	3/2+,5/2+		I	Jπ: L(^{3}He,d)=2 from 0+.
2846 *10*			I	
2876.5[@] *3*	(21/2+)		B D	Jπ: 1005.3γ Q, ΔJ=2 to 17/2+; band assignment.
2880 *10*	1/2+		I	Jπ: L(^{3}He,d)=0 from 0+.
2936.8[c] *4*	21/2(+)		D G	Jπ: 854.8γ Q, ΔJ=2 to 17/2(+), 435.8γ D, ΔJ=1 to 19/2(+); band assignment.
2947.7? *4*	(21/2−)		F	Jπ: 908.0γ (D+Q) to 19/2−; band assignment.
2963 *10*	3/2+,5/2+		I	Jπ: L(^{3}He,d)=2 from 0+.
3001 *10*			I	
3032 *10*			I	
3037?			G	
3059 *10*	1/2+		I	Jπ: L(^{3}He,d)=0 from 0+.
3071?			G	E(level): this level is proposed by 2011Mo28 in (^{7}Li,6nγ), based on a 399γ-310γ cascade to 2362 level.
3083.82[d] *23*	23/2(+)		B D	Jπ: 617.4γ Q, ΔJ=2 to 19/2(+), 371.9γ D, ΔJ=1 to 21/2(+); band assignment.
3145 *10*			I	
3178 *10*	1/2+		I	Jπ: L(^{3}He,d)=0 from 0+.
3200.3[&] *3*	(23/2+)		B D	Jπ: 323.9γ D, ΔJ=1 to (21/2+), 488.5γ D, ΔJ=1 to 21/2(+); band assignment.
3207 *10*	1/2+		I	Jπ: L(^{3}He,d)=0 from 0+.
3255 *10*			I	
3286 *10*			I	
3309 *10*	(1/2+)		I	Jπ: L(^{3}He,d)=(0) from 0+.
3324.21[e] *24*	(25/2+)		B D	Jπ: 612.3γ Q, ΔJ=2 to 21/2(+), 123.8γ D, ΔJ=1 to (23/2+); band assignment.
3337.3[g] *5*	23/2+		B D	Jπ: 689.3γ to (19/2+); band assignment.
3393.2[b] *5*	23/2(+)		D G	Jπ: 892.3γ Q, ΔJ=2 to 19/2(+), 456.3γ D, ΔJ=1 to 21/2(+); band assignment.

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Adopted Levels, Gammas (continued)

^{123}I Levels (continued)

E(level)†	Jπ‡	XREF	Comments
3409?		F	
3460.9? *15*		G	
3490.8@ *3*	(25/2+)	B D	Jπ: 290.5γ D, ΔJ=1 to (23/2+), 407.0γ D, ΔJ=1 to 23/2(+); band assignment.
3512.0h *3*	(27/2−)	BCDEF	Jπ: 898.4γ Q, ΔJ=2 to 23/2−; band assignment.
3688		D	
3697?		F	
3716.6d *3*	(27/2+)	B D	Jπ: 632.7γ Q, ΔJ=2 to 23/2(+), 392.4γ D, ΔJ=1 to (25/2+); band assignment.
3861.9c *6*	(25/2+)	D	Jπ: 468.6γ D, ΔJ=1 to 23/2(+), 925.3γ to 21/2(+); band assignment.
3904.6& *4*	(27/2+)	B D	Jπ: 704.3γ Q, ΔJ=2 to (23/2+), 413.8γ D, ΔJ=1 to (25/2+); band assignment.
3916.9? *18*		G	
4054.8e *3*	(29/2+)	B D	Jπ: 730.6γ Q, ΔJ=2 to (25/2+), 338.2γ D, ΔJ=1 to (27/2+); band assignment.
4250.9@ *4*	(29/2+)	B D	Jπ: 346.3γ D, ΔJ=1 to (27/2+); band assignment.
4326.3h *4*	(31/2−)	BCD	Jπ: 814.3γ Q, ΔJ=2 to (27/2−); band assignment.
4542.4d *3*	(31/2+)	B D	Jπ: 825.8γ Q, ΔJ=2 to (27/2+), 487.6γ to (29/2+); band assignment.
4606.2? *16*		D	
4700.6& *5*	(31/2+)	B D	Jπ: 796.0γ Q, ΔJ=2 to (27/2+); band assignment.
4901.2e *3*	(33/2+)	B D	Jπ: 846.3γ Q, ΔJ=2 to (29/2+), 358.7γ D, ΔJ=1 to (31/2+); band assignment.
5000.8h *4*	(35/2−)	BCD	Jπ: 674.6γ Q, ΔJ=2 to (31/2−); band assignment.
5488.7d *4*	(35/2+)	B	Jπ: band assignment.
5591.7h *4*	(39/2−)	BCD	Jπ: 590.9γ Q, ΔJ=2 to (35/2−); band assignment.
5818.5e *4*	(37/2+)	B D	Jπ: 917.3γ Q, ΔJ=2 to (33/2+), 329.8γ D, ΔJ=1 to (35/2+); band assignment.
5945.1 *4*	(37/2+)	B	Jπ: 1043.8γ Q, ΔJ=2 to (33/2+), 456.3γ to (35/2+).
6092.9? *11*		C	E(level): this level perhaps decays to 5002 and 2614 levels as tentatively proposed by 1997Ba56 in (^{18}O,p4nγ), but the γ rays have not been observed.
6423.6 *4*	(41/2−)	BCD	Jπ: 831.9γ D, ΔJ=1 to (39/2−).
6651.4 *5*	(41/2+)	B	Jπ: 706.2γ Q, ΔJ=2 to (37/2+).
6776.5h *4*	(43/2−)	BCD	Jπ: 1184.9γ Q, ΔJ=2 to (39/2−), 352.9γ to (41/2−); band assignment.
6785.3? *9*		C	
6937.4e *5*	(41/2+)	B	Jπ: 1118.8γ Q, ΔJ=2 to (37/2+); band assignment.
7031.1 *7*	(43/2−)	BCD	Jπ: 606.6γ to (41/2−).
7177.8i *4*	(43/2+)	BCD	Jπ: 754.6γ E1, ΔJ=1 to (41/2−); band assignment.
7549.7? *10*		C	
7635.6 *6*	(45/2)	B	Jπ: 859.2γ D, ΔJ=1 to (43/2−).
7661.1 *8*	(45/2)	B	Jπ: 884.6γ D, ΔJ=1 to (43/2−).
7697.3i *5*	(47/2+)	B	Jπ: 519.5γ Q, ΔJ=2 to (43/2+); band assignment.
7767.0h *5*	(47/2−)	B D	E(level): The order of the 991γ-801γ cascade in (^{18}O,p4nγ) is reversed in (^{48}Ca,p4nγ), resulting in the level at 7766, instead of a level at 7579 in (^{18}O,p4nγ), with the former being adopted. Jπ: 990.5γ Q, ΔJ=2 to (43/2−); band assignment in (^{48}Ca,p4nγ). (45/2−) proposed in (^{14}N,α3nγ) based on Mult(990.5γ)=D from γγ(ADO) data. The former is adopted considering more complete level scheme in (^{48}Ca,p4nγ).
7885.7? *11*		C	
7908.3 *9*	(45/2)	B	Jπ: 877.2γ D, ΔJ=1 to (43/2−).
8023.8? *11*		C	
8315.0? *12*		C	
8389.5i *5*	(49/2+)	B	Jπ: 692.2γ M1, ΔJ=1 to (47/2+); band assignment.
8568.2h *5*	(49/2−)	BC	Jπ: 801.2γ M1, ΔJ=1 to (47/2−); band assignment.
8985.5? *12*		C	
9137.2i *5*	(51/2+)	B	Jπ: 1439.9γ Q, ΔJ=2 to (47/2+), 747.7γ D, ΔJ=1 to (49/2+); band assignment.
9285.4i *5*	(53/2+)	B	Jπ: 895.9γ Q, ΔJ=2 to (49/2+), 148.2γ D, ΔJ=1 to (51/2+); band assignment.
9372.1h *5*	(51/2−)	B	Jπ: 803.8γ M1, ΔJ=1 to (49/2−); band assignment.

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Adopted Levels, Gammas (continued)

^{123}I Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$	XREF	Comments
9723.5[h] *5*	(55/2$^-$)		B	Jπ: 438.1γ E1, ΔJ=1 to (53/2$^+$), 351.4γ Q, ΔJ=2 to (51/2$^-$); band assignment.
10368.9 *6*	(57/2$^+$)		B	Jπ: 1083.5γ Q, ΔJ=2 to (53/2$^+$); band assignment.
10495.5[i] *6*	(55/2$^+$)		B	Jπ: 1210.1γ D, ΔJ=1 to (53/2$^+$); band assignment.
10670.4 *6*	(57/2)		B	Jπ: 946.9γ D, ΔJ=1 to (55/2$^-$).
10754.1[i] *6*	(57/2$^+$)		B	Jπ: 1468.7γ Q, ΔJ=2 to (53/2$^+$), 258.6γ D, ΔJ=1 to (55/2$^+$); band assignment.
10837.3[h] *6*	(59/2$^-$)		B	Jπ: 1113.8γ Q, ΔJ=2 to (55/2$^-$); band assignment.
11057.6 *8*	(57/2)		B	Jπ: 1334.1γ D, ΔJ=1 to (55/2$^-$).
0.0+x[k]	(55/2$^-$)		B	E(level): x estimated at 11250 keV (2012Si21). Jπ: band head; proposed in (^{48}Ca,p4nγ).
11511.8[i] *6*	(61/2$^+$)		B	Jπ: 757.7γ Q, ΔJ=2 to (57/2$^+$), 674.5γ to (59/2$^-$); band assignment.
11831.5 *8*	(59/2)		B	Jπ: 1161.1γ D, ΔJ=1 to (57/2).
12033.6 *9*	(61/2)		B	Jπ: 1196.3γ D, ΔJ=1 to (59/2$^-$).
12107 *20*	1/2$^+$	51 keV *5*	H	Jπ: L(p,p′)=0 from 0$^+$.
12265 *20*	(3/2)$^+$[#]	33 keV *5*	H	Jπ: L(p,p′)=2 from 0$^+$; IAR of 159-keV, 3/2$^+$ state in ^{123}Te.
12313.4 *9*	(61/2)		B	Jπ: 1476.1γ D, ΔJ=1 to (59/2$^-$).
12441.0 *9*	(61/2)		B	Jπ: 1603.7γ D, ΔJ=1 to (59/2$^-$).
12470.5 *7*	(63/2)		B	Jπ: 958.7γ D, ΔJ=1 to (61/2$^+$).
12631.7 *11*	(63/2)		B	Jπ: 1196.3γ D, ΔJ=1 to (61/2).
12755.9 *9*	63/2		B	Jπ: 1196.3γ D, ΔJ=1 to (59/2$^-$).
12772.9 *9*	(63/2)		B	Jπ: 1261.1γ D, ΔJ=1 to (61/2$^+$).
12916.7 *9*	(63/2)		B	Jπ: 1404.9γ D, ΔJ=1 to (61/2$^+$).
0.0+y[l]	(59/2$^+$)		B	E(level): y estimated at 13000 keV (2012Si21). Jπ: band head; proposed in (^{48}Ca,p4nγ).
13090.8 *9*			B	
13193.7 *9*			B	
0.0+z[j]	(61/2$^+$)		B	E(level): z estimated at 13300 keV (2012Si21). Jπ: band head; proposed in (^{48}Ca,p4nγ).
13538 *20*	(3/2$^+$,5/2$^+$)[#]		H	Jπ: L(p,p′)=(2) from 0$^+$.
13668 *20*	(3/2$^+$,5/2$^+$)[#]		H	Jπ: L(p,p′)=(2) from 0$^+$.
13866 *20*	(1/2)[#]	36 keV *5*	H	Jπ: L(p,p′)=(0,1) from 0$^+$.
13974 *20*	(3/2)$^-$[#]	38 keV *5*	H	Jπ: L(p,p′)=1 from 0$^+$; IAS of 1887-keV (3/2)$^-$ level in ^{123}Te.
14072 *20*	(3/2$^-$)[#]	32 keV *7*	H	Jπ: L(p,p′)=(1) from 0$^+$; IAS of 1978-keV (3/2)$^-$ level in ^{123}Te.
14122 *20*	(7/2)$^-$[#]	37 keV *6*	H	Jπ: L(p,p′)=3 from 0$^+$.
14173 *20*	(3/2$^-$)[#]	50 keV *10*	H	Jπ: L(p,p′)=(1) from 0$^+$.
14468? *20*	(1/2$^-$,3/2$^-$)[#]		H	Jπ: L(p,p′)=(1) from 0$^+$.
14658? *20*			H	
14828 *20*	(5/2$^-$,7/2$^-$)[#]		H	Jπ: L(p,p′)=(3) from 0$^+$.
14994 *20*			H	
15798 *20*			H	
1233.0+x[k] *10*	(59/2$^-$)		B	
1240.0+y[l] *10*	(63/2$^+$)		B	
1255.0+z[j] *10*	(65/2$^+$)		B	
2554.0+x[k] *15*	(63/2$^-$)		B	
2585.0+y[l] *15*	(67/2$^+$)		B	
2618.0+z[j] *15*	(69/2$^+$)		B	
3976.0+x[k] *18*	(67/2$^-$)		B	
4048.0+y[l] *18*	(71/2$^+$)		B	
4080.0+z[j] *18*	(73/2$^+$)		B	

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Adopted Levels, Gammas (continued)

^{123}I Levels (continued)

E(level)[†]	Jπ[‡]	XREF	E(level)[†]	Jπ[‡]	XREF
5505.0+x[k] *20*	(71/2⁻)	B	10762+x[k] *3*	(83/2⁻)	B
5637.0+y[l] *20*	(75/2⁺)	B	11055+z[j] *3*	(89/2⁺)	B
5651.0+z[j] *20*	(77/2⁺)	B	11152+y[l] *3*	(87/2⁺)	B
7149.0+x[k] *23*	(75/2⁻)	B	12678+x[k] *3*	(87/2⁻)	B
7333.0+z[j] *23*	(81/2⁺)	B	13065+z[j] *3*	(93/2⁺)	B
7352.0+y[l] *23*	(79/2⁺)	B	13212+y[l] *3*	(91/2⁺)	B
8905.1+x[k] *25*	(79/2⁻)	B	14674+x[k] *3*	(91/2⁻)	B
9138.1+z[j] *25*	(85/2⁺)	B	15156+z[j] *3*	(97/2⁺)	B
9201.1+y[l] *25*	(83/2⁺)	B			

[†] For a least-squares fit to γ-ray energies for levels connected by γ transitions, unless otherwise noted.
[‡] From band assignments for high-spin states where no arguments are given.
[#] Angular distribution of outgoing p in (p,p′).
[@] Band(A): Band based on (21/2⁺), α=+1/2 (2009Zh19, 2012Si04).
[&] Band(a): Band Based on (23/2⁺), α=−1/2 (2009Zh19, 2012Si04).
[a] Band(B): Dipole band based on (15/2⁺) (1993Go04, 2006Wa05).
[b] Band(c): π9/2[404] band, α=−1/2.
[c] Band(C): π9/2[404] band, α=+1/2.
[d] Band(D): π7/2[404] oblate band based on 7/2⁺, α=−1/2 (2006Wa05).
[e] Band(d): π7/2[404] oblate band based on 9/2⁺, α=+1/2 (2006Wa05).
[f] Band(E): π5/2[413] band, α=+1/2 (2006Wa05).
[g] Band(e): π5/2[413] band, α=−1/2 (2006Wa05).
[h] Band(F): Negative-parity band based on 1/2[550] orbital of $1h_{11/2}$ (1993Go04, 2006Wa05).
[i] Band(G): Band based on (43/2⁺).
[j] Band(H): Band based on (61/2⁺) (2012Si21).
[k] Band(I): Band based on (55/2⁻) (2012Si21).
[l] Band(J): Band based on (59/2⁺) (2012Si21).

Adopted Levels, Gammas (continued)

$\gamma(^{123}I)$

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	δ	α[‡]	Comments
138.33	$7/2^+$	138.35 *5*	100	0.0	$5/2^+$	M1+E2	−0.15 *5*	0.306 *6*	E_γ: weighted average of 138.1 *2* from ^{123}Xe ε decay, 138.2 *2* from (^{48}Ca,p4nγ), 138.2 *5* from (^{14}N,α3nγ), 138.4 *3* from (^{6}Li,3nγ), and 138.38 *5* from (α,2nγ). Mult.: D+Q from $\gamma(\theta)$ in (^{6}Li,3nγ) and (α,2nγ); magnetic and electric nature from ce data in ^{123}Xe ε decay. ΔJ=1 from $\gamma\gamma$(ADO) in (^{14}N,α3nγ) and angular intensity ratio in (^{48}Ca,p4nγ). δ: from $\gamma(\theta)$ in (^{6}Li,3nγ).
148.94	$1/2^+$	148.99 *20*	100	0.0	$5/2^+$	E2		0.430	B(E2)(W.u.)=63.1 *10* E_γ: weighted average of 148.9 *2* from ^{123}Xe ε decay and 149.07 *20* from (α,2nγ). Mult.: from ce data in ^{123}Xe ε decay.
178.04	$3/2^+$	39.9 *3*	0.020 *7*	138.33	$7/2^+$	(E2)		51.3 *17*	B(E2)(W.u.)=74 *+42−32* E_γ,I_γ: from energies and intensities of conversion electrons in ^{123}Xe ε decay. Mult.: M1,E2 from ce data in ^{123}Xe ε decay, ΔJ=2 required by the decay scheme,
		178.05 *20*	100 *5*	0.0	$5/2^+$	M1(+E2)	<0.2	0.151 *3*	B(M1)(W.u.)=0.0092 *8*; BE2WLT 8.6 E_γ: weighted average of 178.1 *2* from ^{123}Xe ε decay and 178.00 *20* from (α,2nγ). I_γ: from ^{123}Xe ε decay. Mult.,δ: from ce data in ^{123}Xe ε decay.
302.2?		302.2[&] *3*	100	0.0	$5/2^+$				E_γ: from (α,2nγ).
330.30	$3/2^+$	192.3 *3*	0.97 *17*	138.33	$7/2^+$	[E2]		0.178	B(E2)(W.u.)=13 *+11−6* E_γ,I_γ: from ^{123}Xe ε decay.
		330.2 *2*	100 *6*	0.0	$5/2^+$	(M1)		0.0291	B(M1)(W.u.)=0.014 *+7−4* E_γ: weighted average of 330.2 *2* from ^{123}Xe ε decay and 330.1 *3* from (α,2nγ). I_γ: from ^{123}Xe ε decay. Mult.: M1,E2 from ce data in ^{123}Xe ε decay; ΔJ=1 from level scheme.
474.20	$7/2^+$	474.17 *11*	100	0.0	$5/2^+$	M1+E2	−0.9 *4*	0.0109 *5*	E_γ: weighted average of 474.3 *2* from (^{48}Ca,p4nγ), 474.3 *5* from (^{14}N,α3nγ), 474.3 *3* from (^{6}Li,3nγ), and 474.11 *11* from (α,2nγ). Mult.,δ: mixing ratio from $\gamma(\theta)$ in (^{6}Li,3nγ), M1 from ce data and $\gamma(\theta)$ in (α,2nγ). ΔJ=1 from $\gamma\gamma$(ADO) in (^{14}N,α3nγ) and angular intensity ratio in (^{48}Ca,p4nγ).
552.30	$9/2^+$	413.97 *5*	100 *9*	138.33	$7/2^+$	M1+E2	−0.40 *10*	0.01616 *25*	E_γ: weighted average of 413.9 *2* from (^{48}Ca,p4nγ), 413.8 *5* from (^{14}N,α3nγ), 414.0 *3* from (^{6}Li,3nγ), and 413.98 *5* from (α,2nγ).

Adopted Levels, Gammas (continued)

$\gamma(^{123}I)$ (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.†	δ	α ‡	Comments
									I_γ: from (α,2nγ). Other: 100 *10* from (^{6}Li,3nγ) and (^{14}N,α3nγ). Mult.,δ: mixing ratio from $\gamma(\theta)$ in (^{6}Li,3nγ), M1 from ce data and $\gamma(\theta)$ in (α,2nγ). ΔJ=1 from $\gamma\gamma$(ADO) in (^{14}N,α3nγ).
552.30	9/2$^+$	552.28 *12*	70 *9*	0.0	5/2$^+$	E2		0.00651	E_γ: weighted average of 552.1 *2* from (^{48}Ca,p4nγ), 552.3 *5* from (^{14}N,α3nγ), 552.4 *3* from (^{6}Li,3nγ), and 552.32 *12* from (α,2nγ). I_γ: unweighted average of 88 *8* from (^{14}N,α3nγ), 57 *6* from (^{6}Li,3nγ), and 64 *5* from (α,2nγ). Mult.: from ce data and $\gamma(\theta)$ in (α,2nγ), $\gamma\gamma$(ADO) in (^{14}N,α3nγ), angular intensity ratio in (^{48}Ca,p4nγ), $\gamma(\theta)$ in (^{6}Li,3nγ).
641.27	9/2$^+$	167.08 *20*	1.4 *3*	474.20	7/2$^+$				E_γ,I_γ: from (α,2nγ) only. Intensity normalized to I(641.27γ)=100.
		502.92 *10*	102 *14*	138.33	7/2$^+$	M1+E2	−0.33 *10*	0.00993 *17*	B(M1)(W.u.)=0.00039 *+51−17*; B(E2)(W.u.)=0.12 *+30−8*
									E_γ: weighted average of 502.8 *5* from (^{14}N,α3nγ), 503.1 *3* from (^{6}Li,3nγ), and 502.90 *10* from (α,2nγ). I_γ: unweighted average of 135 *12* from (^{14}N,α3nγ), 112 *11* from (^{6}Li,3nγ), 86 *4* from (α,2nγ), and 74 *8* from (^{7}Li,6nγ). All intensities are normalized to I(641.27γ)=100. Mult.,δ: mixing ratio from $\gamma(\theta)$ in (^{6}Li,3nγ), M1 from ce data and $\gamma(\theta)$ in (α,2nγ). ΔJ=1 from $\gamma\gamma$(ADO) in (^{14}N,α3nγ).
		641.27 *10*	100 *7*	0.0	5/2$^+$	E2		0.00439	B(E2)(W.u.)=0.35 *+43−14*
									E_γ: weighted average of 641.3 *5* from (^{14}N,α3nγ), 641.3 *3* from (^{6}Li,3nγ), and 641.26 *10* from (α,2nγ). I_γ: from (α,2nγ). Others: 100 *12* from (^{14}N,α3nγ), 100 *11* from (^{6}Li,3nγ), and 100 *11* from (^{7}Li,6nγ). Mult.: from ce data and $\gamma(\theta)$ in (α,2nγ), $\gamma\gamma$(ADO) in (^{14}N,α3nγ), and $\gamma(\theta)$ in (^{6}Li,3nγ).
671.00	9/2$^+$	118.73 *20*	0.9 *2*	552.30	9/2$^+$				E_γ: weighted average of 118.8 *2* from (^{48}Ca,p4nγ), 119.0 *10* from (^{14}N,α3nγ), and 118.64 *20* from (α,2nγ). I_γ: from (α,2nγ). Other: <2.6 from (^{14}N,α3nγ).
		196.7 *2*	3.9 *7*	474.20	7/2$^+$	(M1)		0.1143	E_γ: weighted average of 196.6 *2* from (^{48}Ca,p4nγ), 196.8 *5* from (^{14}N,α3nγ), and 196.8 *3* from (α,2nγ). I_γ: weighted average of 5.1 *13* from (^{14}N,α3nγ) and 3.6 *7* from (α,2nγ). Mult.: D, ΔJ=1 from $\gamma\gamma$(ADO) in (^{14}N,α3nγ) and angular intensity ratio in (^{48}Ca,p4nγ); magnetic nature from level scheme.
		532.60 *20*	29 *3*	138.33	7/2$^+$	(M1)		0.00877	E_γ: weighted average of 532.7 *2* from (^{48}Ca,p4nγ), 532.3 *5* from (^{14}N,α3nγ), 532.6 *3* from (^{6}Li,3nγ), and 532.55 *20* from (α,2nγ). I_γ: weighted average of 32 *3* from (^{14}N,α3nγ), 30 *3* from (^{6}Li,3nγ), and 23 *4* from (α,2nγ). Mult.: D, ΔJ=1 from $\gamma\gamma$(ADO) in (^{14}N,α3nγ); D also from $\gamma(\theta)$ in (α,2nγ) and (^{6}Li,3nγ); magnetic nature from level scheme.
		671.01 *6*	100 *5*	0.0	5/2$^+$	E2		0.00391	E_γ: weighted average of 670.9 *2* from (^{48}Ca,p4nγ), 670.8 *5* from

Adopted Levels, Gammas (continued)

γ(^{123}I) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.†	δ	α‡	Comments
									(^{14}N,α3nγ), 671.1 *3* from (^{6}Li,3nγ), and 671.02 *6* from (α,2nγ). I_γ: from (^{14}N,α3nγ). Others: 100 *24* from (^{6}Li,3nγ) and 100 *10* from (α,2nγ). Mult.: from ce data and γ(θ) in (α,2nγ), γγ(ADO) in (^{14}N,α3nγ), angular intensity ratio in (^{48}Ca,p4nγ), γ(θ) in (^{6}Li,3nγ).
794.08	11/2$^+$	241.73 *20*	7.8 *14*	552.30	9/2$^+$	(M1)		0.0658	E_γ: weighted average of 241.8 *2* from (^{48}Ca,p4nγ), 241.5 *5* from (^{14}N,α3nγ), and 241.69 *20* from (α,2nγ). I_γ: from (α,2nγ). Other: 43 *7* from (^{14}N,α3nγ) is discrepant. This γ is not seen in (^{6}Li,3nγ), probably very weak compared to 655.8γ seen in that study. Mult.: D, ΔJ=1 from γγ(ADO) in (^{14}N,α3nγ) and angular intensity ratio in (^{48}Ca,p4nγ); magnetic nature from level scheme.
		655.75 *10*	100 *7*	138.33	7/2$^+$	E2		0.00415	E_γ: weighted average of 655.7 *6* from (^{48}Ca,p4nγ), 655.8 *5* from (^{14}N,α3nγ), 655.9 *3* from (^{6}Li,3nγ), and 655.73 *10* from (α,2nγ). I_γ: from (α,2nγ). Other: 100 *14* from (^{14}N,α3nγ). Mult.: from ce data and γ(θ) in (α,2nγ), γγ(ADO) in (^{14}N,α3nγ), angular intensity ratio in (^{48}Ca,p4nγ), and γ(θ) in (^{6}Li,3nγ).
943.46	11/2$^-$	149.3& *2*		794.08	11/2$^+$	[E1]		0.0663	E_γ: from (^{48}Ca,p4nγ) only.
		272.45 *5*	100 *5*	671.00	9/2$^+$	E1		0.01279	B(E1)(W.u.)=5.5×10^{-5} *+59−20* E_γ: weighted average of 272.3 *2* from (^{48}Ca,p4nγ), 272.3 *5* from (^{14}N,α3nγ), 272.6 *3* from (^{6}Li,3nγ), and 272.46 *5* from (α,2nγ). I_γ: from (α,2nγ). Others: 100 *6* from (^{14}N,α3nγ) and 100 *10* from (^{6}Li,3nγ). Mult.: from ce data and γ(θ) in (α,2nγ), γγ(ADO) in (^{14}N,α3nγ) (ΔJ=1), angular intensity ratio and γ(pol) in (^{48}Ca,p4nγ), γ(θ) in (^{6}Li,3nγ).
		391.23 *20*	22 *3*	552.30	9/2$^+$	(E1)		0.00505	B(E1)(W.u.)=4.1×10^{-6} *+54−18* E_γ: weighted average of 391.1 *4* from (^{48}Ca,p4nγ), 391.3 *5* from (^{14}N,α3nγ), 391.5 *3* from (^{6}Li,3nγ), and 391.14 *20* from (α,2nγ). I_γ: weighted average of 26 *4* from (^{14}N,α3nγ), 28 *7* from (^{6}Li,3nγ), and 19 *3* from (α,2nγ). Mult.: D, ΔJ=1 from γγ(ADO) in (^{14}N,α3nγ) and angular intensity ratio in (^{48}Ca,p4nγ); electric nature from level scheme.
972.42	11/2$^+$	331.16 *5*	100	641.27	9/2$^+$	M1+E2	+0.25 *4*	0.0289	E_γ: weighted average of 330.8 *5* from (^{14}N,α3nγ), 331.2 *3* from (^{6}Li,3nγ), and 331.16 *5* from (α,2nγ). Mult.,δ: mixing ratio from γ(θ) in (^{6}Li,3nγ), ΔJ=1 from γγ(ADO) in (^{14}N,α3nγ); magnetic and electric nature from ce data in (α,2nγ).
1011.07	(3/2)$^+$	680.5 *2*	46 *3*	330.30	3/2$^+$	M1		0.00485	
		833.3 *3*	8.9 *11*	178.04	3/2$^+$				
		862.2 *3*	7.8 *11*	148.94	1/2$^+$				

Adopted Levels, Gammas (continued)

γ(^{123}I) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.†	δ	α‡	Comments
1011.07	$(3/2)^+$	1011.3 *5*	100 *11*	0.0	$5/2^+$				
1048.71	$1/2^+$	718.5 *2*	7.0 *6*	330.30	$3/2^+$	(M1)		0.00427	Mult.: D,E2 from ce data in ^{123}Xe ε decay; M1 required by level scheme.
		870.7 *3*	11.6 *14*	178.04	$3/2^+$	M1(+E2)		0.0024 *4*	
		899.6 *4*	100 *10*	148.94	$1/2^+$	M1		0.00252	
		1048.9 *3*	5.6 *6*	0.0	$5/2^+$	[E2]		1.38×10^{-3}	
1080.22	$11/2^{(+)}$	409.1 *6*	5.0 *10*	671.00	$9/2^+$	(D)			E_γ: weighted average of 409.2 *6* from (^{48}Ca,p4nγ), 409.0 *10* from (^{14}N,α3nγ), and 409 *1* from (α,2nγ). Mult.: from γγ(ADO) in (^{14}N,α3nγ). I_γ: from (α,2nγ). Other: <13 from (^{14}N,α3nγ).
		528.0 *6*	5.0 *10*	552.30	$9/2^+$				E_γ: weighted average of 528.0 *6* from (^{48}Ca,p4nγ), 527.8 *10* from (^{14}N,α3nγ), and 528 *1* from (α,2nγ). I_γ: from (α,2nγ). Other: <19 from (^{14}N,α3nγ).
		606.00 *20*	100 *10*	474.20	$7/2^+$	Q			E_γ: weighted average of 605.8 *6* from (^{48}Ca,p4nγ), 605.8 *5* from (^{14}N,α3nγ), 606.2 *3* from (^{6}Li,3nγ), and 606.00 *20* from (α,2nγ). I_γ: from (α,2nγ). Other: 100 *13* from (^{14}N,α3nγ). Mult.: from γγ(ADO) in (^{14}N,α3nγ), angular intensity ratio in (^{48}Ca,p4nγ), γ(θ) in (α,2nγ) and (^{6}Li,3nγ).
1113.12	$(1/2,3/2)^+$	782.9 *2*	28 *3*	330.30	$3/2^+$	M1,E2		0.0031 *4*	
		934.9 *3*	20 *2*	178.04	$3/2^+$	M1,E2		0.0020 *3*	
		964.0 *3*	34 *3*	148.94	$1/2^+$	M1,E2		0.00191 *25*	
		1113.1 *3*	100 *9*	0.0	$5/2^+$	E2(+M1)		0.00139 *17*	
1153.4?	$(3/2)^+$	823.5& *3*	15 *5*	330.30	$3/2^+$				
		973.8&	60	178.04	$3/2^+$				
		1004.2& *3*	75 *10*	148.94	$1/2^+$				
		1153.8& *3*	100 *10*	0.0	$5/2^+$				
1156.11	$13/2^+$	362.1 *2*	12.8 *13*	794.08	$11/2^+$	M1+E2	−0.43 *10*	0.0229	E_γ: weighted average of 361.9 *4* from (^{48}Ca,p4nγ), 362.3 *5* from (^{14}N,α3nγ), 362.3 *3* from (^{6}Li,3nγ), and 362.1 *2* from (α,2nγ). I_γ: weighted average of 16.0 *20* from (^{14}N,α3nγ), 11.6 *12* from (^{6}Li,3nγ), and 13.3 *24* from (α,2nγ). Other: 5.6 *3* from (^{48}Ca,p4nγ) is discrepant. Mult.: mixing ratio from γ(θ) in (^{6}Li,3nγ), ΔJ=1 from γγ(ADO) in (^{14}N,α3nγ) and angular intensity ratio in (^{48}Ca,p4nγ); magnetic and electric nature from ce data in (α,2nγ).

Adopted Levels, Gammas (continued)

γ(^{123}I) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	δ	α[‡]	Comments
1156.11	13/2$^+$	603.85 *20*	100 *5*	552.30	9/2$^+$	(E2)		0.00513	E_γ: weighted average of 603.7 *2* from (^{48}Ca,p4nγ), 603.8 *5* from (^{14}N,α3nγ), 604.1 *3* from (^{6}Li,3nγ), and 603.90 *20* from (α,2nγ). I_γ: from (^{48}Ca,p4nγ). Others: 100 *8* from (^{14}N,α3nγ), 100 *11* from (^{6}Li,3nγ), and 100 *13* from (α,2nγ). Mult.: Q, ΔJ=2 from γγ(ADO) in (^{14}N,α3nγ), γ(θ) in (α,2nγ) and (^{6}Li,3nγ); electric nature required by level scheme.
1189.9?	(1/2$^+$,3/2,5/2$^+$)	859.7[&] *3*	60 *7*	330.30	3/2$^+$				
		1041.0[&] *3*	100 *13*	148.94	1/2$^+$				
		1189.9[&] *3*	73 *7*	0.0	5/2$^+$				
1242.38	1/2$^+$	912.0 *4*	3.0 *4*	330.30	3/2$^+$	M1		0.00244	
		1064.3 *4*	23.7 *26*	178.04	3/2$^+$	M1,E2		0.00153 *20*	
		1093.4 *3*	100 *9*	148.94	1/2$^+$	(M1)		0.00162	Mult.: M1,E2 from ce data in ^{123}Xe ε decay; M1 from level scheme.
		1242.0[@] *4*	4[@] *4*	0.0	5/2$^+$				
1310.12	(3/2)$^+$	979.4 *3*	100 *12*	330.30	3/2$^+$	M1(+E2)		0.00184 *24*	
		1132.2 *3*	21 *2*	178.04	3/2$^+$				
		1161.3 *3*	36 *4*	148.94	1/2$^+$				
		1310.3 *3*	47 *4*	0.0	5/2$^+$				
1315.52	13/2$^+$	343.12 *10*	100 *6*	972.42	11/2$^+$	M1+E2	+0.20 *3*	0.0264	E_γ: weighted average of 343.3 *5* from (^{14}N,α3nγ), 343.2 *3* from (^{6}Li,3nγ), and 343.10 *10* from (α,2nγ). I_γ: from (α,2nγ). Others: 100 *7* from (^{14}N,α3nγ), 100 *11* from (^{6}Li,3nγ), and 100 *11* from (^{7}Li,6nγ). Mult.,δ: mixing ratio from γ(θ) in (^{6}Li,3nγ), M1+E2 with δ≈=+0.2 from ce data in (α,2nγ). ΔJ=1 from γγ(ADO) in (^{14}N,α3nγ).
		674.2 *2*	31 *4*	641.27	9/2$^+$	Q			E_γ: weighted average of 674.3 *5* from (^{14}N,α3nγ), 674.3 *3* from (^{6}Li,3nγ), and 674.2 *2* from (α,2nγ). I_γ: weighted average of 32 *7* from (^{14}N,α3nγ), 38 *5* from (^{6}Li,3nγ), 31 *6* from (α,2nγ), and 25 *4* from (^{7}Li,6nγ). Mult.: from γγ(ADO) in (^{14}N,α3nγ) (ΔJ=2), γ(θ) in (α,2nγ) and (^{6}Li,3nγ).

$^{123}_{53}I_{70}$-12

Adopted Levels, Gammas (continued)

γ(^{123}I) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	δ	α[‡]	Comments
1390.82	(1/2,3/2)$^+$	1060.7 *4*	100 *13*	330.30	3/2$^+$	M1		1.73×10^{-3}	
		1242.0[@] *4*	58[@] *13*	148.94	1/2$^+$				
		1390.9 *3*	15.0 *13*	0.0	5/2$^+$				
1437.4	13/2$^{(+)}$	357.3 *3*	20 *4*	1080.22	11/2$^{(+)}$				E_γ: weighted average of 356.8 *10* from (^{14}N,α3nγ) and 357.3 *3* from (α,2nγ). I_γ: from (α,2nγ). Other: <75 from (^{14}N,α3nγ).
		643[&] *1*	10 *2*	794.08	11/2$^+$				E_γ,I_γ: from (α,2nγ) only.
		766.2 *5*	100 *15*	671.00	9/2$^+$	Q			E_γ: weighted average of 765.5 *5* from (^{14}N,α3nγ) and 766.5 *3* from (α,2nγ). I_γ: from (α,2nγ). Other: 100 *25* from (^{14}N,α3nγ). Mult.: from γ(θ) in (α,2nγ).
1453.00	15/2$^-$	509.55 *5*	100	943.46	11/2$^-$	E2		0.00812	E_γ: weighted average of 509.5 *2* from (^{48}Ca,p4nγ), 509.2 *2* from (^{18}O,p4nγ), 509.5 *5* from (^{14}N,α3nγ), 510 *1* from (^{6}Li,3nγ), and 509.57 *5* from (α,2nγ). Mult.: from ce and γ(θ) in (α,2nγ), ΔJ=2 from γγ(ADO) and angular intensity ratio in (^{48}Ca,p4nγ).
1576.58	15/2$^{(+)}$	420.4 *3*	7.5 *5*	1156.11	13/2$^+$				E_γ: weighted average of 420.5 *6* from (^{48}Ca,p4nγ), 420.3 *10* from (^{14}N,α3nγ), and 420.4 *3* from (α,2nγ). I_γ: weighted average of 7.4 *5* from (^{48}Ca,p4nγ) and 8.3 *17* from (α,2nγ).
		782.4 *2*	100 *5*	794.08	11/2$^+$	Q			E_γ: weighted average of 782.4 *2* from (^{48}Ca,p4nγ), 782.5 *5* from (^{14}N,α3nγ), 782.5 *3* from (^{6}Li,3nγ), and 782.4 *2* from (α,2nγ). I_γ: from (^{48}Ca,p4nγ). Others: 100 *14* from (^{14}N,α3nγ) and 100 *14* from (α,2nγ). Mult.: from γ(θ) in (α,2nγ) and (^{6}Li,3nγ), ΔJ=2 from γγ(ADO) and angular intensity ratio in (^{48}Ca,p4nγ).
1602.46	(15/2$^+$)	629.9 *3*	100 *11*	972.42	11/2$^+$	(Q)			E_γ: weighted average of 629.8 *5* from (^{14}N,α3nγ) and 630.0 *3* from (α,2nγ). Other: 629.8 from (^{7}Li,6nγ). I_γ: from (^{7}Li,6nγ). Mult.: from γγ(ADO) in (^{14}N,α3nγ) and γ(θ) in (α,2nγ).
		961.1[&]	21 *2*	641.27	9/2$^+$	[M3]			E_γ,I_γ: from (^{7}Li,6nγ) only.
1607.07?	(15/2$^+$)	291.55 *10*	100	1315.52	13/2$^+$	(M1+E2)		0.0421 *21*	E_γ,Mult.: from (α,2nγ), with Mult from ce data and γ(θ).
1632.56	(13/2$^-$)	689.1 *2*	100	943.46	11/2$^-$	(M1+E2)		0.0042 *6*	E_γ,Mult.: from (α,2nγ), with Mult from ce data and γ(θ).
1657.1	(3/2)$^+$	1326.8[&] *3*	7.4 *19*	330.30	3/2$^+$				
		1508.4[&] *3*	37 *4*	148.94	1/2$^+$				

Adopted Levels, Gammas (continued)

$\gamma(^{123}I)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	δ	α[‡]	Comments
1657.1	$(3/2)^+$	1656.8[&] *4*	100 *11*	0.0	$5/2^+$				
1690.39	$15/2^+$	374.86 *20*	100 *9*	1315.52	$13/2^+$	M1+E2	+0.15 *3*	0.0210	E_γ: weighted average of 374.8 *5* from (^{14}N,α3nγ), 375.0 *3* from (^{6}Li,3nγ), and 374.81 *20* from (α,2nγ). I_γ: from (^{7}Li,6nγ). Others: 100 *10* from (^{14}N,α3nγ), 100 *11* from (^{6}Li,3nγ), and 100 *13* from (α,2nγ). Mult.,δ: mixing ratio from $\gamma(\theta)$ in (^{6}Li,3nγ), M1+E2 with $\delta\approx$=+0.2 from ce data in (α,2nγ). ΔJ=1 from $\gamma\gamma$(ADO) in (^{14}N,α3nγ).
		718.0 *2*	36 *4*	972.42	$11/2^+$	Q			E_γ: weighted average of 717.8 *5* from (^{14}N,α3nγ), 718.1 *3* from (^{6}Li,3nγ), and 717.9 *2* from (α,2nγ). I_γ: unweighted average of 45 *5* from (^{14}N,α3nγ), 25.5 *21* from (^{6}Li,3nγ), 35 *13* from (α,2nγ), and 37 *4* from (^{7}Li,6nγ). Mult.: from $\gamma\gamma$(ADO) (ΔJ=2) in (^{14}N,α3nγ) and $\gamma(\theta)$ in (^{6}Li,3nγ).
1791.4	$(15/2^+)$	711.1 *2*	100	1080.22	$11/2^{(+)}$	E2		0.00338	E_γ: weighted average of 711.2 *4* from (^{48}Ca,p4nγ), 711.2 *5* from (^{14}N,α3nγ), 711.3 *3* from (^{6}Li,3nγ), and 711.0 *2* from (α,2nγ). Mult.: Q, ΔJ=2 from $\gamma\gamma$(ADO) in (^{14}N,α3nγ), supported by $\gamma(\theta)$ in (^{6}Li,3nγ) and (α,2nγ); M1,E2 from ce data in (α,2nγ).
1816.0?		208.96 *20*	100	1607.07?	$(15/2^+)$				E_γ: from (α,2nγ) only.
1864.91	$1/2^+$	474.2 *2*	16.8 *24*	1390.82	$(1/2,3/2)^+$	M1,E2		0.0108 *9*	
		816.3 *3*	12.0 *16*	1048.71	$1/2^+$	(M1)		0.00316	
		853.5 *3*	4.8 *8*	1011.07	$(3/2)^+$				
		1534.9 *3*	50 *5*	330.30	$3/2^+$				
		1686.8 *3*	100 *12*	178.04	$3/2^+$				
		1715.9 *3*	31 *4*	148.94	$1/2^+$				
		1864.7 *3*	10.4 *16*	0.0	$5/2^+$	[E2]		0.000672 *10*	
1871.25	$17/2^+$	294.6 *3*	5.4 *12*	1576.58	$15/2^{(+)}$				E_γ: weighted average of 294.4 *6* from (^{48}Ca,p4nγ), 294.5 *10* from (^{14}N,α3nγ), and 294.7 *3* from (α,2nγ). I_γ: weighted average of 4.3 *20* from (^{48}Ca,p4nγ) and 5.8 *12* from (α,2nγ). Other: <3.6 in (^{14}N,α3nγ).
		715.17 *10*	100 *5*	1156.11	$13/2^+$	E2		0.00334	E_γ: weighted average of 714.9 *2* from (^{48}Ca,p4nγ), 715.3 *5* from (^{14}N,α3nγ), 715.4 *3* from (^{6}Li,3nγ), and 715.20 *10* from (α,2nγ). I_γ: from (^{48}Ca,p4nγ). Others: 100 *7* from (^{14}N,α3nγ) and 100 *17* from (α,2nγ). Mult.: from ce and $\gamma(\theta)$ data in (α,2nγ), ΔJ=2 from $\gamma\gamma$(ADO) in (^{14}N,α3nγ) and angular intensity ratio in (^{48}Ca,p4nγ).

Adopted Levels, Gammas (continued)

γ(^{123}I) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	α[‡]	Comments
1934.16	(1/2,3/2,5/2)$^+$	691.5 *3*	51 *7*	1242.38	1/2$^+$	M1,E2	0.0041 *6*	
		1603.9 *3*	78 *7*	330.30	3/2$^+$			
		1756.1 *3*	42 *5*	178.04	3/2$^+$			
		1785.4 *3*	13 *2*	148.94	1/2$^+$			
		1934.2 *3*	100 *11*	0.0	5/2$^+$			
1956.10	3/2$^+$	802.7 *3*	1.6 *4*	1153.4?	(3/2)$^+$			
		842.7 *3*	3.1 *4*	1113.12	(1/2,3/2)$^+$			
		1625.9 *3*	47 *4*	330.30	3/2$^+$			
		1778.2 *3*	7.8 *8*	178.04	3/2$^+$			
		1807.3 *3*	100 *10*	148.94	1/2$^+$			
		1955.9 *3*	7.8 *12*	0.0	5/2$^+$			
2000.6?	($^+$)	310.17 *20*	100	1690.39	15/2$^+$	(M1,E2)	0.0352 *11*	E_γ,Mult.: from (α,2nγ), with Mult from ce and γ(θ) data.
2016.12	(17/2$^+$)	413.6 *2*	100 *9*	1602.46	(15/2$^+$)	(M1+E2)	0.0156 *9*	E_γ: weighted average of 413.5 *5* from (^{14}N,α3nγ) and 413.6 *2* from (α,2nγ). Other: 413.7 from (^{7}Li,6nγ). I_γ: from (^{7}Li,6nγ). Others: 100 *17* from (α,2nγ), 100 *22* from (^{14}N,α3nγ). Mult.: from ce and γ(θ) data in (α,2nγ), D (ΔJ=1) from γγ(ADO) in (^{14}N,α3nγ).
		700.6 *2*	54 *4*	1315.52	13/2$^+$	(E2)	0.00351	E_γ: weighted average of 700.8 *5* from (^{14}N,α3nγ) and 700.6 *2* from (α,2nγ). Other: 700.4 from (^{7}Li,6nγ). I_γ: weighted average of 52 *4* from (^{7}Li,6nγ), 56 *11* from (^{14}N,α3nγ) and 75 *17* from (α,2nγ). Mult.: (M1,E2) from ce and γ(θ) data in (α,2nγ), Q (ΔJ=2) from γγ(ADO) in (^{14}N,α3nγ).
2039.67	19/2$^-$	586.68 *11*	100	1453.00	15/2$^-$	E2	0.00554	E_γ: weighted average of 586.6 *2* from (^{48}Ca,p4nγ), 586.6 *2* from (^{18}O,p4nγ), 586.8 *5* from (^{14}N,α3nγ), 586.8 *3* from (^{6}Li,3nγ), and 586.71 *11* from (α,2nγ). Mult.: from ce and γ(θ) data in (α,2nγ), ΔJ=2 from γγ(ADO) in (^{14}N,α3nγ), γγ(DCO) in (^{18}O,p4nγ) and angular intensity ratio in (^{48}Ca,p4nγ).
2062.52	(1/2,3/2,5/2)$^+$	671.7 *2*	7.7 *15*	1390.82	(1/2,3/2)$^+$			
		752.4 *2*	9.2 *15*	1310.12	(3/2)$^+$			
		820.1 *3*	9.2 *15*	1242.38	1/2$^+$			
		909.0 *4*	13.8 *15*	1153.4?	(3/2)$^+$	M1	0.00246	
		949.5 *3*	4.6 *8*	1113.12	(1/2,3/2)$^+$			
		1013.5 *5*	18.5 *23*	1048.71	1/2$^+$			
		1732.2 *3*	22 *3*	330.30	3/2$^+$			
		1884.5 *3*	100 *12*	178.04	3/2$^+$			
		1913.5 *4*	11.5 *15*	148.94	1/2$^+$			
		2062.6 *4*	7.7 *15*	0.0	5/2$^+$			
2082.06	17/2$^{(+)}$	391.65 *20*	100 *13*	1690.39	15/2$^+$	D		E_γ: weighted average of 391.8 *5* from (^{14}N,α3nγ), 391.5 *3* from (^{6}Li,3nγ), and 391.70 *20* from (α,2nγ).

Adopted Levels, Gammas (continued)

γ(^{123}I) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult. †	Comments
							Mult.: ΔJ=1 from γγ(ADO) in (^{14}N,α3nγ).
							I_γ: from (^{14}N,α3nγ). Others: 100 *45* from (^{6}Li,3nγ) and 100 *20* from (α,2nγ).
2082.06	17/2$^{(+)}$	766.6 *3*	46 *7*	1315.52	13/2$^+$	Q	E_γ: weighted average of 766.8 *5* from (^{14}N,α3nγ), 766.6 *3* from (^{6}Li,3nγ), and 766.5 *3* from (α,2nγ).
							I_γ: weighted average of 44 *6* from (^{14}N,α3nγ) and 70 *20* from (α,2nγ). Other: 13.2 *13* from (^{6}Li,3nγ) seems discrepant.
							Mult.: ΔJ=2 from γγ(ADO) in (^{14}N,α3nγ), supported by γ(θ) in (α,2nγ) for a doublet and γ(θ) in (^{6}Li,3nγ).
2152.43	(1/2$^+$,3/2)	1822.3 *3*	66 *8*	330.30	3/2$^+$		
		1974.3 *3*	74 *11*	178.04	3/2$^+$		
		2003.3 *4*	100 *13*	148.94	1/2$^+$		
		2151.7#& *5*	<11	0.0	5/2$^+$		
2201.35	(1/2$^+$,3/2)	1871.1 *3*	100 *17*	330.30	3/2$^+$		
		2052.4 *4*	75 *8*	148.94	1/2$^+$		
		2201.2 *4*	75 *17*	0.0	5/2$^+$		
2250.06	(3/2)$^+$	1201.5 *3*	56 *6*	1048.71	1/2$^+$		
		1919.8 *4*	15 *3*	330.30	3/2$^+$		
		2071.9 *4*	100 *12*	178.04	3/2$^+$		
		2101.3 *4*	94 *12*	148.94	1/2$^+$		
		2249.6 *4*	7.4 *15*	0.0	5/2$^+$		
2262.1		629.5 *3*	100	1632.56	(13/2$^-$)		E_γ: from (α,2nγ) only.
2265.61	(17/2$^-$)	812.6 *2*	100	1453.00	15/2$^-$	D+Q	E_γ,Mult.: from (α,2nγ), with Mult from γ(θ).
2283.0	(17/2$^+$)	845.6 *5*	100	1437.4	13/2$^{(+)}$		E_γ: weighted average of 845.8 *5* from (^{14}N,α3nγ) and 845 *1* from (α,2nγ).
2285.55	1/2$^+$	1237.1 *4*	100 *15*	1048.71	1/2$^+$		
		1274.6 *3*	45 *5*	1011.07	(3/2)$^+$		
		2107.0 *5*	20 *5*	178.04	3/2$^+$		
		2136.4 *4*	25 *5*	148.94	1/2$^+$		
2319.6		687 *1*	100	1632.56	(13/2$^-$)		E_γ: from (α,2nγ) only.
2322.7	(1/2,3/2)	1992.5 *4*	69 *8*	330.30	3/2$^+$		
		2144.6 *4*	54 *8*	178.04	3/2$^+$		
		2173.5 *5*	100 *15*	148.94	1/2$^+$		
2327.4	(1/2$^+$,3/2)	2151.7#& *5*	<51	178.04	3/2$^+$		
		2178.5 *5*	100 *13*	148.94	1/2$^+$		
		2327.3 *5*	88 *13*	0.0	5/2$^+$		
2339.1?		338.5 *3*	100	2000.6?	(+)		E_γ: from (α,2nγ) only.
2361.85	(19/2$^+$)	345.68 *20*	53 *7*	2016.12	(17/2$^+$)	D	E_γ: weighted average of 345.8 *5* from (^{14}N,α3nγ) and 345.66 *20* from (α,2nγ). Other: 345.8 from (^{7}Li,6nγ).
							I_γ: weighted average of 38 *8* from (^{14}N,α3nγ), 67 *13* from (α,2nγ), and 57 *5* from (^{7}Li,6nγ).
							Mult.: D (ΔJ=1) from γγ(ADO) in (^{14}N,α3nγ), supported by γ(θ) in (α,2nγ).
		671.5 *2*	100 *11*	1690.39	15/2$^+$	(E2)	E_γ: weighted average of 671.8 *5* from (^{14}N,α3nγ), 671.2 *3* from (^{6}Li,3nγ), and

Adopted Levels, Gammas (continued)

γ(^{123}I) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	α[‡]	Comments
								671.6 *2* from (α,2nγ). Other: 671.4 from (^{7}Li,6nγ). I_γ: from (^{7}Li,6nγ). Others: 100 *15* form (^{14}N,α3nγ), 100 *20* from (α,2nγ). Mult.: from γγ(ADO) (ΔJ=2) in (^{14}N,α3nγ), γ(θ) in (α,2nγ) and (^{6}Li,3nγ); M1,E2 from ce data in (α,2nγ) for a doublet.
2367.81	(1/2$^+$,3/2$^+$)	2037.6 *4*	100 *12*	330.30	3/2$^+$			
		2189.8 *4*	8 *2*	178.04	3/2$^+$			
		2218.8 *4*	14 *2*	148.94	1/2$^+$			
		2367.6 *5*	4 *1*	0.0	5/2$^+$			
2369.47		329.8 *2*	100	2039.67	19/2$^-$			E_γ: from (α,2nγ) only.
2389.4	(3/2)$^+$	2058.9 *4*	100 *13*	330.30	3/2$^+$			
		2211.7 *4*	53 *13*	178.04	3/2$^+$			
		2389.1 *5*	7 *2*	0.0	5/2$^+$			
2439.9		423.8 *3*	100	2016.12	(17/2$^+$)			E_γ: from (α,2nγ) only.
2455.5	(1/2$^+$)	2125.3[&] *4*	67 *17*	330.30	3/2$^+$			
		2277.0[&] *5*	50 *13*	178.04	3/2$^+$			
		2306.5[&] *5*	67 *17*	148.94	1/2$^+$			
		2455.5[&] *5*	100 *17*	0.0	5/2$^+$			
2466.40	19/2$^{(+)}$	595.4 *4*	16.5 *8*	1871.25	17/2$^+$			E_γ: weighted average of 595.3 *4* from (^{48}Ca,p4nγ) and 596.0 *10* from (^{14}N,α3nγ). I_γ: from (^{48}Ca,p4nγ). Other: <14.3 from (^{14}N,α3nγ).
		889.7 *2*	100 *6*	1576.58	15/2$^{(+)}$	Q		E_γ: weighted average of 889.7 *2* from (^{48}Ca,p4nγ), 889.8 *5* from (^{14}N,α3nγ), and 889.6 *2* from (α,2nγ). I_γ: from (^{48}Ca,p4nγ). Other: 100 *14* from (^{14}N,α3nγ). Mult.: ΔJ=2 from γγ(ADO) in (^{14}N,α3nγ) and angular intensity ratio in (^{48}Ca,p4nγ), supported by γ(θ) in (α,2nγ).
2481.6?		399.5 *3*	100	2082.06	17/2$^{(+)}$			E_γ: from (α,2nγ) only.
2500.9	19/2$^{(+)}$	418.9 *3*	100 *11*	2082.06	17/2$^{(+)}$	D	0.0152 *9*	E_γ: weighted average of 418.8 *5* from (^{14}N,α3nγ) and 419.0 *3* from (α,2nγ). I_γ: from (^{14}N,α3nγ). Other: 100 *20* from (α,2nγ). Mult.: ΔJ=1 from γγ(ADO) in (^{14}N,α3nγ).
		810.5 *3*	58 *10*	1690.39	15/2$^+$	Q		E_γ: weighted average of 810.5 *5* from (^{14}N,α3nγ) and 810.5 *3* from (α,2nγ). I_γ: weighted average of 67 *11* from (^{14}N,α3nγ) and 50 *10* from (α,2nγ). Mult.: ΔJ=2 from γγ(ADO) in (^{14}N,α3nγ).
2560.3?	(1/2$^+$,3/2)	2411.3[&] *5*	33 *10*	148.94	1/2$^+$			
		2560.4[&] *5*	100 *17*	0.0	5/2$^+$			
2567.3		696.0 *3*	75 *15*	1871.25	17/2$^+$			E_γ: from (α,2nγ) only.
		990.7 *3*	100 *20*	1576.58	15/2$^{(+)}$			E_γ: from (α,2nγ) only.

Adopted Levels, Gammas (continued)

γ(^{123}I) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	α[‡]	Comments
2580.0?	(1/2$^+$,3/2,5/2$^+$)	2430.8[&] *5*	100 *30*	148.94	1/2$^+$			
		2580.3[&] *5*	100 *30*	0.0	5/2$^+$			
2613.69	23/2$^-$	574.08 *20*	100	2039.67	19/2$^-$	E2	0.00587	E_γ: weighted average of 574.1 *2* from (^{48}Ca,p4nγ), 574.0 *2* from (^{18}O,p4nγ), 574.3 *5* from (^{14}N,α3nγ), 574.1 *3* from (^{6}Li,3nγ), and 574.08 *20* from (α,2nγ). Mult.: from ce an γ(θ) data in (α,2nγ), ΔJ=2 from γγ(ADO) in (^{14}N,α3nγ), γγ(DCO) in (^{18}O,p4nγ), and angular intensity ratio in (^{48}Ca,p4nγ).
2648.0	(19/2$^+$)	856.5 *2*	100	1791.4	(15/2$^+$)	Q		E_γ: weighted average of 856.8 *4* from (^{48}Ca,p4nγ), 856.8 *5* from (^{14}N,α3nγ), and 856.3 *2* from (α,2nγ). Mult.: from γγ(ADO) in (^{14}N,α3nγ) and γ(θ) in (α,2nγ).
2659.9	(21/2$^+$)	298.07 *20*	100	2361.85	(19/2$^+$)	(M1)	0.0380	B(M1)(W.u.)=3.01×10^{-5} *+25−22* E_γ: weighted average of 297.8 *5* from (^{14}N,α3nγ), 298.2 *3* from (^{6}Li,3nγ), and 298.06 *20* from (α,2nγ). Other: 298.2 from (^{7}Li,6nγ). Mult.: (M1,E2) from ce and γ(θ) data in (α,2nγ), D (ΔJ=1) from γγ(ADO) in (^{14}N,α3nγ).
2672?		310[&]		2361.85	(19/2$^+$)			E_γ: from (^{7}Li,6nγ) only, probably corresponds to 310.17γ from 2001 level seen in (α,2nγ). This γ is not seen in other studies.
2711.92	21/2$^{(+)}$	245.4 *4*	8.5 *4*	2466.40	19/2$^{(+)}$	D		E_γ: weighted average of 245.4 *4* from (^{48}Ca,p4nγ) and 245.5 *10* from (^{14}N,α3nγ). I_γ: other: <5.3 from (^{14}N,α3nγ). Mult.: ΔJ=1 from angular intensity ratio in (^{48}Ca,p4nγ).
		840.7 *2*	100 *6*	1871.25	17/2$^+$	Q		E_γ: weighted average of 840.7 *2* from (^{48}Ca,p4nγ), 840.8 *5* from (^{14}N,α3nγ), 840.6 *3* from (^{6}Li,3nγ), and 840.6 *2* from (α,2nγ). I_γ: other: 100 *8* from (^{14}N,α3nγ). Mult.: ΔJ=2 from γγ(ADO) in (^{14}N,α3nγ) and angular intensity ratio in (^{48}Ca,p4nγ), supported by γ(θ) in (α,2nγ) and (^{6}Li,3nγ).
2790.3		919.0 *3*	100	1871.25	17/2$^+$			E_γ: from (α,2nγ) only.
2876.5	(21/2$^+$)	1005.3 *4*	100	1871.25	17/2$^+$	Q		
2936.8	21/2$^{(+)}$	435.8 *5*	100 *14*	2500.9	19/2$^{(+)}$	D		E_γ,I_γ,Mult.: from (^{14}N,α3nγ), with Mult (ΔJ=1) from γγ(ADO).
		854.8 *5*	86 *14*	2082.06	17/2$^{(+)}$	Q		E_γ,I_γ,Mult.: from (^{14}N,α3nγ), with Mult (ΔJ=2) from γγ(ADO).
2947.7?	(21/2$^-$)	908.0 *3*	100	2039.67	19/2$^-$	(D+Q)		E_γ,Mult.: from (α,2nγ) only, with Mult from γ(θ).
3037?		377[&]		2659.9	(21/2$^+$)			E_γ: from (^{7}Li,6nγ) only.
3071?		399[&]		2672?				E_γ: from (^{7}Li,6nγ) only, probably corresponds to 399.5γ from 2482 level seen in (α,2nγ). This γ is not seen in other studies.
3083.82	23/2$^{(+)}$	371.9 *3*	60 *3*	2711.92	21/2$^{(+)}$	D		E_γ: weighted average of 372.0 *2* from (^{48}Ca,p4nγ) and 371.3 *5* from (^{14}N,α3nγ). I_γ: weighted average of 60 *3* from (^{48}Ca,p4nγ) and 63 *13* from (^{14}N,α3nγ).

Adopted Levels, Gammas (continued)

γ(^{123}I) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.†	Comments
							I_γ: weighted average of 60 *3* from (^{48}Ca,p4nγ) and 63 *13* from (^{14}N,α3nγ). Mult.: ΔJ=1 from $\gamma\gamma$(ADO) in (^{14}N,α3nγ) and angular intensity ratio in (^{48}Ca,p4nγ).
3083.82	23/2$^{(+)}$	617.4 *2*	100 *5*	2466.40	19/2$^{(+)}$	Q	E_γ: weighted average of 617.4 *2* from (^{48}Ca,p4nγ) and 617.3 *5* from (^{14}N,α3nγ). I_γ: other: 100 *13* from (^{14}N,α3nγ). Mult.: ΔJ=2 from $\gamma\gamma$(ADO) in (^{14}N,α3nγ) and angular intensity ratio in (^{48}Ca,p4nγ).
3200.3	(23/2$^+$)	323.9 *4*	55 *4*	2876.5	(21/2$^+$)	D	
		488.5 *4*	100 *6*	2711.92	21/2$^{(+)}$	D	
		551.8 *6*	40 *4*	2648.0	(19/2$^+$)		
		735&		2466.40	19/2$^{(+)}$		E_γ: from (^{14}N,α3nγ) only.
3324.21	(25/2$^+$)	123.8 *4*	6.8 *5*	3200.3	(23/2$^+$)	D	
		240.5 *4*	8.8 *5*	3083.82	23/2$^{(+)}$		E_γ: weighted average of 240.3 *4* from (^{48}Ca,p4nγ) and 240.8 *5* from (^{14}N,α3nγ). I_γ: other: 25 *5* from (^{14}N,α3nγ).
		612.3 *2*	100 *5*	2711.92	21/2$^{(+)}$	Q	E_γ: weighted average of 612.3 *2* from (^{48}Ca,p4nγ) and 612.3 *5* from (^{14}N,α3nγ). I_γ: other: 100 *10* from (^{14}N,α3nγ). Mult.: from angular intensity ratio in (^{48}Ca,p4nγ) and $\gamma\gamma$(ADO) in (^{14}N,α3nγ).
3337.3	23/2$^+$	689.3 *4*	100	2648.0	(19/2$^+$)		E_γ: weighted average of 689.3 *4* from (^{48}Ca,p4nγ) and 689.3 *10* from (^{14}N,α3nγ).
3393.2	23/2$^{(+)}$	456.3 *5*	100 *17*	2936.8	21/2$^{(+)}$	D	E_γ,I_γ,Mult.: from (^{14}N,α3nγ), with Mult (ΔJ=1) from $\gamma\gamma$(ADO).
		892.3 *5*	67 *17*	2500.9	19/2$^{(+)}$	Q	E_γ,I_γ,Mult.: from (^{14}N,α3nγ), with Mult (ΔJ=2) from $\gamma\gamma$(ADO).
3409?		943& *1*	100	2466.40	19/2$^{(+)}$		E_γ: from (α,2nγ) only.
3460.9?		424&		3037?			E_γ: from (^{7}Li,6nγ) only.
3490.8	(25/2$^+$)	290.5 *4*	96 *5*	3200.3	(23/2$^+$)	D	
		407.0 *4*	78 *3*	3083.82	23/2$^{(+)}$	D	
		614.4 *4*	100 *7*	2876.5	(21/2$^+$)		
		778		2711.92	21/2$^{(+)}$		E_γ: from (^{14}N,α3nγ) only.
3512.0	(27/2$^-$)	898.4 *2*	100	2613.69	23/2$^-$	Q	E_γ: weighted average of 898.3 *2* from (^{48}Ca,p4nγ), 898.5 *2* from (^{18}O,p4nγ), 898.3 *5* from (^{14}N,α3nγ), 898.3 *3* from (^{6}Li,3nγ), and 898.5 *3* from (α,2nγ). Mult.: ΔJ=2 from angular intensity ratio in (^{48}Ca,p4nγ), $\gamma\gamma$(ADO) in (^{14}N,α3nγ), $\gamma\gamma$(DCO) in (^{18}O,p4nγ), $\gamma(\theta)$ in (α,2nγ) and (^{6}Li,3nγ).
3688		976		2711.92	21/2$^{(+)}$		E_γ: from (^{14}N,α3nγ) only.
3697?		985& *1*	100	2711.92	21/2$^{(+)}$		E_γ: from (α,2nγ) only.
3716.6	(27/2$^+$)	225.7 *4*	35 *2*	3490.8	(25/2$^+$)	D	E_γ: other: 226 from (^{14}N,α3nγ).
		392.4 *2*	100 *5*	3324.21	(25/2$^+$)	D	E_γ: other: 392.0 *10* from (^{14}N,α3nγ).
		632.7 *4*	67 *3*	3083.82	23/2$^{(+)}$	Q	E_γ: other: 632.8 *5* from (^{14}N,α3nγ). Mult.: ΔJ=2 from angular intensity ratio in (^{48}Ca,p4nγ) and $\gamma\gamma$(ADO) in (^{14}N,α3nγ).
3861.9	(25/2$^+$)	468.6 *5*	100 *25*	3393.2	23/2$^{(+)}$	D	E_γ,I_γ,Mult.: from (^{14}N,α3nγ), with Mult (ΔJ=1) from $\gamma\gamma$(ADO).
		925.3 *10*	<75	2936.8	21/2$^{(+)}$		E_γ,I_γ,Mult.: from (^{14}N,α3nγ).
3904.6	(27/2$^+$)	413.8 *6*	24.6 *24*	3490.8	(25/2$^+$)	D	E_γ: other: 413 from (^{14}N,α3nγ).
		580.5 *4*	71 *5*	3324.21	(25/2$^+$)		E_γ: other: 579 from (^{14}N,α3nγ).
		704.3 *4*	100 *6*	3200.3	(23/2$^+$)	Q	E_γ: other: 704 from (^{14}N,α3nγ).
		820		3083.82	23/2$^{(+)}$		E_γ: from (^{14}N,α3nγ) only.

Adopted Levels, Gammas (continued)

γ(^{123}I) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	Comments
3916.9?		456[&]		3460.9?			E_γ: from (^{7}Li,6nγ) only.
4054.8	(29/2$^+$)	338.2 *4*	16.8 *9*	3716.6	(27/2$^+$)	D	
		730.6 *2*	100 *5*	3324.21	(25/2$^+$)	Q	E_γ: other: 730.8 *5* from (^{14}N,α3nγ).
4250.9	(29/2$^+$)	346.3 *4*	64 *3*	3904.6	(27/2$^+$)	D	E_γ: other: 347 from (^{14}N,α3nγ).
		534.4 *4*	100 *5*	3716.6	(27/2$^+$)		E_γ: other: 534 from (^{14}N,α3nγ).
		760.1 *4*	54 *3*	3490.8	(25/2$^+$)		E_γ: other: 760 from (^{14}N,α3nγ).
4326.3	(31/2$^-$)	814.3 *2*	100	3512.0	(27/2$^-$)	Q	E_γ: weighted average of 814.1 *2* from (^{48}Ca,p4nγ), 814.5 *2* from (^{18}O,p4nγ), and 814.5 *5* from (^{14}N,α3nγ). Mult.: ΔJ=2 from angular intensity ratio in (^{48}Ca,p4nγ), $\gamma\gamma$(DCO) in (^{18}O,p4nγ), and $\gamma\gamma$(ADO) in (^{14}N,α3nγ).
4542.4	(31/2$^+$)	487.6 *4*	48.4 *23*	4054.8	(29/2$^+$)		
		825.8 *2*	100 *6*	3716.6	(27/2$^+$)	Q	E_γ: other: 825.8 *5* from (^{14}N,α3nγ).
4606.2?		918[&]		3688			E_γ: from (^{14}N,α3nγ) only.
4700.6	(31/2$^+$)	796.0 *4*	100	3904.6	(27/2$^+$)	Q	E_γ: other: 796 from (^{14}N,α3nγ).
4901.2	(33/2$^+$)	358.7 *6*	9 *5*	4542.4	(31/2$^+$)	D	
		846.3 *2*	100 *5*	4054.8	(29/2$^+$)	Q	E_γ: other: 846.3 *5* from (^{14}N,α3nγ).
5000.8	(35/2$^-$)	674.6 *2*	100	4326.3	(31/2$^-$)	Q	E_γ: weighted average of 674.5 *2* from (^{48}Ca,p4nγ), 674.6 *2* from (^{18}O,p4nγ), and 674.5 *5* from (^{14}N,α3nγ). Mult.: ΔJ=2 from angular intensity ratio in (^{48}Ca,p4nγ), $\gamma\gamma$(DCO) in (^{18}O,p4nγ), and $\gamma\gamma$(ADO) in (^{14}N,α3nγ).
5488.7	(35/2$^+$)	946.2 *4*	100	4542.4	(31/2$^+$)		
5591.7	(39/2$^-$)	590.9 *2*	100	5000.8	(35/2$^-$)	Q	E_γ: weighted average of 590.8 *2* from (^{48}Ca,p4nγ), 590.9 *2* from (^{18}O,p4nγ), and 590.8 *5* from (^{14}N,α3nγ). Mult.: ΔJ=2 from angular intensity ratio in (^{48}Ca,p4nγ), $\gamma\gamma$(DCO) in (^{18}O,p4nγ), and $\gamma\gamma$(ADO) in (^{14}N,α3nγ).
5818.5	(37/2$^+$)	329.8 *4*	16.8 *9*	5488.7	(35/2$^+$)	D	
		917.3 *2*	100 *5*	4901.2	(33/2$^+$)	Q	E_γ: other: 917.5 *5* from (^{14}N,α3nγ).
5945.1	(37/2$^+$)	456.3 *4*	76 *4*	5488.7	(35/2$^+$)		
		1043.8 *4*	100 *5*	4901.2	(33/2$^+$)	Q	E_γ: other: 1044.0 *10* placed from a level at 6863 in (^{14}N,α3nγ), which is replaced by the placement here adopted from (^{48}Ca,p4nγ).
6423.6	(41/2$^-$)	831.9 *2*	100	5591.7	(39/2$^-$)	D	E_γ: weighted average of 831.6 *2* from (^{48}Ca,p4nγ), 832.1 *2* from (^{18}O,p4nγ), and 831.8 *5* from (^{14}N,α3nγ). Mult.: ΔJ=1 from angular intensity ratio in (^{48}Ca,p4nγ) and $\gamma\gamma$(ADO) in (^{14}N,α3nγ).
6651.4	(41/2$^+$)	706.2 *4*	100	5945.1	(37/2$^+$)	Q	
6776.5	(43/2$^-$)	352.9 *2*	101 *5*	6423.6	(41/2$^-$)	(D+Q)	E_γ: weighted average of 353.1 *2* from (^{48}Ca,p4nγ), 352.7 *2* from (^{18}O,p4nγ), and 352.8 *5* from (^{14}N,α3nγ). I_γ: weighted average of 93 *5* from (^{48}Ca,p4nγ), 110 *5* from (^{18}O,p4nγ), and 80 *30* from (^{14}N,α3nγ). All intensities are normalized to I(1184.9γ)=100. Mult.: from $\gamma\gamma$(DCO) in (^{18}O,p4nγ).
		1184.9 *2*	100 *4*	5591.7	(39/2$^-$)	Q	E_γ: weighted average of 1184.7 *2* from (^{48}Ca,p4nγ), 1185.0 *2* from (^{18}O,p4nγ), and

Adopted Levels, Gammas (continued)

γ(^{123}I) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	α[‡]	Comments
								1184.8 *5* from (^{14}N,α3nγ).
								I_γ: from (^{48}Ca,p4nγ). Others: 100 *8* from (^{18}O,p4nγ) and 100 *30* from (^{14}N,α3nγ).
								Mult.: ΔJ=2 from angular intensity ratio in (^{48}Ca,p4nγ), γγ(DCO) in (^{18}O,p4nγ), and γγ(ADO) in (^{14}N,α3nγ).
6785.3?		691.5[&] *5*	100	6092.9?				E_γ: weak γ from (^{18}O,p4nγ) only. This γ could be the same as 519.5γ (Mult=M1) placed from 8389, (49/2$^+$) level in (^{48}Ca,p4nγ) in a 692.2γ-519.5γ cascade, while the cascade in (^{18}O,p4nγ) is 519.5γ-245.8γ-691.5γ to a level at 6092.
6937.4	(41/2$^+$)	1118.8 *4*	100	5818.5	(37/2$^+$)	Q		
7031.1	(43/2$^-$)	245.8 *5*	<25	6785.3?				E_γ,I_γ: weak transition from (^{18}O,p4nγ) only.
		606.6 *9*	100 *13*	6423.6	(41/2$^-$)	(D+Q)		E_γ: unweighted average of 608.3 *4* from (^{48}Ca,p4nγ), 605.6 *5* from (^{18}O,p4nγ), and 606.0 *10* from (^{14}N,α3nγ).
								I_γ,Mult.: from (^{18}O,p4nγ), with Mult from γγ(DCO).
7177.8	(43/2$^+$)	240.3 *4*	71 *3*	6937.4	(41/2$^+$)			
		526.3 *4*	99 *5*	6651.4	(41/2$^+$)			
		754.6 *4*	100 *6*	6423.6	(41/2$^-$)	E1	1.13×10^{-3}	E_γ: weighted average of 754.3 *4* from (^{48}Ca,p4nγ), 755.1 *5* from (^{18}O,p4nγ), and 755.0 *10* from (^{14}N,α3nγ).
7549.7?		519.5[&] *5*	100	7031.1	(43/2$^-$)	(D+Q)		E_γ,Mult.: from (^{18}O,p4nγ) only, with Mult from γγ(DCO). This γ could be the same as 519.5γ (Mult=Q) placed from 7697, (47/2$^+$) level in (^{48}Ca,p4nγ) in a 692.2γ-519.5γ cascade, while the cascade in (^{18}O,p4nγ) is 519.5γ-245.8γ-691.5γ to a level at 6092.
7635.6	(45/2)	604.0 *6*		7031.1	(43/2$^-$)			
		859.2 *4*	100	6776.5	(43/2$^-$)	D		
7661.1	(45/2)	884.6 *6*	100	6776.5	(43/2$^-$)	D		
7697.3	(47/2$^+$)	(61.5)		7635.6	(45/2)			
		519.5 *2*	100	7177.8	(43/2$^+$)	Q		E_γ,Mult.: from (^{48}Ca,p4nγ), with Mult (ΔJ=2) from angular intensity ratio. See also 519.5γ from 7550 level, reported in (^{18}O,p4nγ).
7767.0	(47/2$^-$)	990.5 *2*	100	6776.5	(43/2$^-$)	Q		E_γ,Mult.: from (^{48}Ca,p4nγ), with Mult (ΔJ=2) from angular intensity ratio. Other: Eγ=990.8 *5*, Mult=D from γγ(ADO) in (^{14}N,α3nγ); Eγ=990.8 *5*, Mult=D from γγ(DCO) in (^{18}O,p4nγ) but placed from a 8570 level based on a 991γ-801γ cascade to 6777 level. Note that the order of the cascade is reversed in (^{48}Ca,p4nγ), resulting in the level at 7766, instead of a level at 7579 in (^{18}O,p4nγ), with the former being adopted.
7885.7?		336.0[&] *5*	100	7549.7?				E_γ: weak γ from (^{18}O,p4nγ) only.
7908.3	(45/2)	877.2 *6*	100	7031.1	(43/2$^-$)	D		
8023.8?		474.1[&] *5*	100	7549.7?		(D)		E_γ,Mult.: from (^{18}O,p4nγ) only, with Mult from γγ(DCO).
8315.0?		291.2[&] *5*	100	8023.8?				E_γ: weak γ from (^{18}O,p4nγ) only.
8389.5	(49/2$^+$)	692.2 *2*	100	7697.3	(47/2$^+$)	M1	0.00466	E_γ,Mult.: from (^{48}Ca,p4nγ), with Mult (ΔJ=1) from angular intensity

Adopted Levels, Gammas (continued)

$\gamma(^{123}I)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	α[‡]	Comments
								ratio and γ(pol). See also 691.5γ from 6784 level, reported in (^{18}O,p4nγ).
8568.2	(49/2$^-$)	801.2 *2*	100	7767.0	(47/2$^-$)	M1	0.00330	E_γ,Mult.: from (^{48}Ca,p4nγ), with Mult (ΔJ=1) from angular intensity ratio and γ(pol). Other: Eγ=802.1 *5* with Mult=D from $\gamma\gamma$(DCO) in (^{18}O,p4nγ), placed from a level at 7579 based on a 991γ-801γ cascade to 677 level. The order of the cascade is reversed in (^{48}Ca,p4nγ), resulting in the level at 7766, instead of a level at 7579 in (^{18}O,p4nγ).
8985.5?		961.7[&] *5*	100	8023.8?				E_γ: weak γ from (^{18}O,p4nγ) only.
9137.2	(51/2$^+$)	747.7 *2*	100 *5*	8389.5	(49/2$^+$)	D		
		1439.9 *4*	23.9 *22*	7697.3	(47/2$^+$)	Q		
9285.4	(53/2$^+$)	148.2 *2*	100 *6*	9137.2	(51/2$^+$)	D		
		895.9 *4*	83 *6*	8389.5	(49/2$^+$)	Q		
9372.1	(51/2$^-$)	803.8 *2*	100	8568.2	(49/2$^-$)	M1	0.00328	
9723.5	(55/2$^-$)	351.4 *2*	76 *4*	9372.1	(51/2$^-$)	Q		
		438.1 *2*	100 *5*	9285.4	(53/2$^+$)	E1	0.00383	
10368.9	(57/2$^+$)	1083.5 *4*	100	9285.4	(53/2$^+$)	Q		
10495.5	(55/2$^+$)	1210.1 *4*	100	9285.4	(53/2$^+$)	D		
10670.4	(57/2)	946.9 *4*	100	9723.5	(55/2$^-$)	D		
10754.1	(57/2$^+$)	258.6 *4*	50.6 *19*	10495.5	(55/2$^+$)	D		
		1030.6 *6*	21.5 *19*	9723.5	(55/2$^-$)			
		1468.7 *4*	100 *5*	9285.4	(53/2$^+$)	Q		
10837.3	(59/2$^-$)	1113.8 *4*	100	9723.5	(55/2$^-$)	Q		
11057.6	(57/2)	1334.1 *6*	100	9723.5	(55/2$^-$)	D		
11511.8	(61/2$^+$)	674.5 *6*	5.6 *10*	10837.3	(59/2$^-$)			
		757.7 *2*	100 *4*	10754.1	(57/2$^+$)	Q		
11831.5	(59/2)	1161.1 *4*	100	10670.4	(57/2)	D		
12033.6	(61/2)	1196.3 *6*	100	10837.3	(59/2$^-$)	D		
12313.4	(61/2)	1476.1 *6*	100	10837.3	(59/2$^-$)	D		
12441.0	(61/2)	1603.7 *6*	100	10837.3	(59/2$^-$)	D		
12470.5	(63/2)	958.7 *4*	100	11511.8	(61/2$^+$)	D		
12631.7	(63/2)	598.1 *6*	100	12033.6	(61/2)	D		
12755.9	63/2	1244.1 *6*	100	11511.8	(61/2$^+$)	D		
12772.9	(63/2)	1261.1 *6*	100	11511.8	(61/2$^+$)	D		
12916.7	(63/2)	1404.9 *6*	100	11511.8	(61/2$^+$)	D		
13090.8		1579.0 *6*	100	11511.8	(61/2$^+$)			
13193.7		1681.9 *6*	100	11511.8	(61/2$^+$)			
1233.0+x	(59/2$^-$)	1233		0.0+x	(55/2$^-$)			
1240.0+y	(63/2$^+$)	1240		0.0+y	(59/2$^+$)			
1255.0+z	(65/2$^+$)	1255		0.0+z	(61/2$^+$)			
2554.0+x	(63/2$^-$)	1321		1233.0+x	(59/2$^-$)			
2585.0+y	(67/2$^+$)	1345		1240.0+y	(63/2$^+$)			
2618.0+z	(69/2$^+$)	1363		1255.0+z	(65/2$^+$)			

$^{123}_{53}I_{70}$-22

Adopted Levels, Gammas (continued)

$\gamma(^{123}I)$ (continued)

E_i(level)	J_i^π	E_γ †	E_f	J_f^π	E_i(level)	J_i^π	E_γ †	E_f	J_f^π
3976.0+x	$(67/2^-)$	1422	2554.0+x	$(63/2^-)$	9138.1+z	$(85/2^+)$	1805	7333.0+z	$(81/2^+)$
4048.0+y	$(71/2^+)$	1463	2585.0+y	$(67/2^+)$	9201.1+y	$(83/2^+)$	1849	7352.0+y	$(79/2^+)$
4080.0+z	$(73/2^+)$	1462	2618.0+z	$(69/2^+)$	10762+x	$(83/2^-)$	1857	8905.1+x	$(79/2^-)$
5505.0+x	$(71/2^-)$	1529	3976.0+x	$(67/2^-)$	11055+z	$(89/2^+)$	1917	9138.1+z	$(85/2^+)$
5637.0+y	$(75/2^+)$	1589	4048.0+y	$(71/2^+)$	11152+y	$(87/2^+)$	1951	9201.1+y	$(83/2^+)$
5651.0+z	$(77/2^+)$	1571	4080.0+z	$(73/2^+)$	12678+x	$(87/2^-)$	1916	10762+x	$(83/2^-)$
7149.0+x	$(75/2^-)$	1644	5505.0+x	$(71/2^-)$	13065+z	$(93/2^+)$	2010	11055+z	$(89/2^+)$
7333.0+z	$(81/2^+)$	1682	5651.0+z	$(77/2^+)$	13212+y	$(91/2^+)$	2060	11152+y	$(87/2^+)$
7352.0+y	$(79/2^+)$	1715	5637.0+y	$(75/2^+)$	14674+x	$(91/2^-)$	1996	12678+x	$(87/2^-)$
8905.1+x	$(79/2^-)$	1756	7149.0+x	$(75/2^-)$	15156+z	$(97/2^+)$	2091	13065+z	$(93/2^+)$

† From ^{123}Xe ε decay with Mult from ce data up to 2580 level, and from (^{48}Ca,p4nγ) with Mult (ΔJ=1 for D and ΔJ=2 for Q) from angular intensity ratio (and γ(pol) if available) above 2580 level, unless otherwise noted. Data are also available in (α,2nγ), (^{6}Li,3nγ), (^{14}N,α3nγ) and (^{18}O,p4nγ).

‡ Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

Multiply placed.

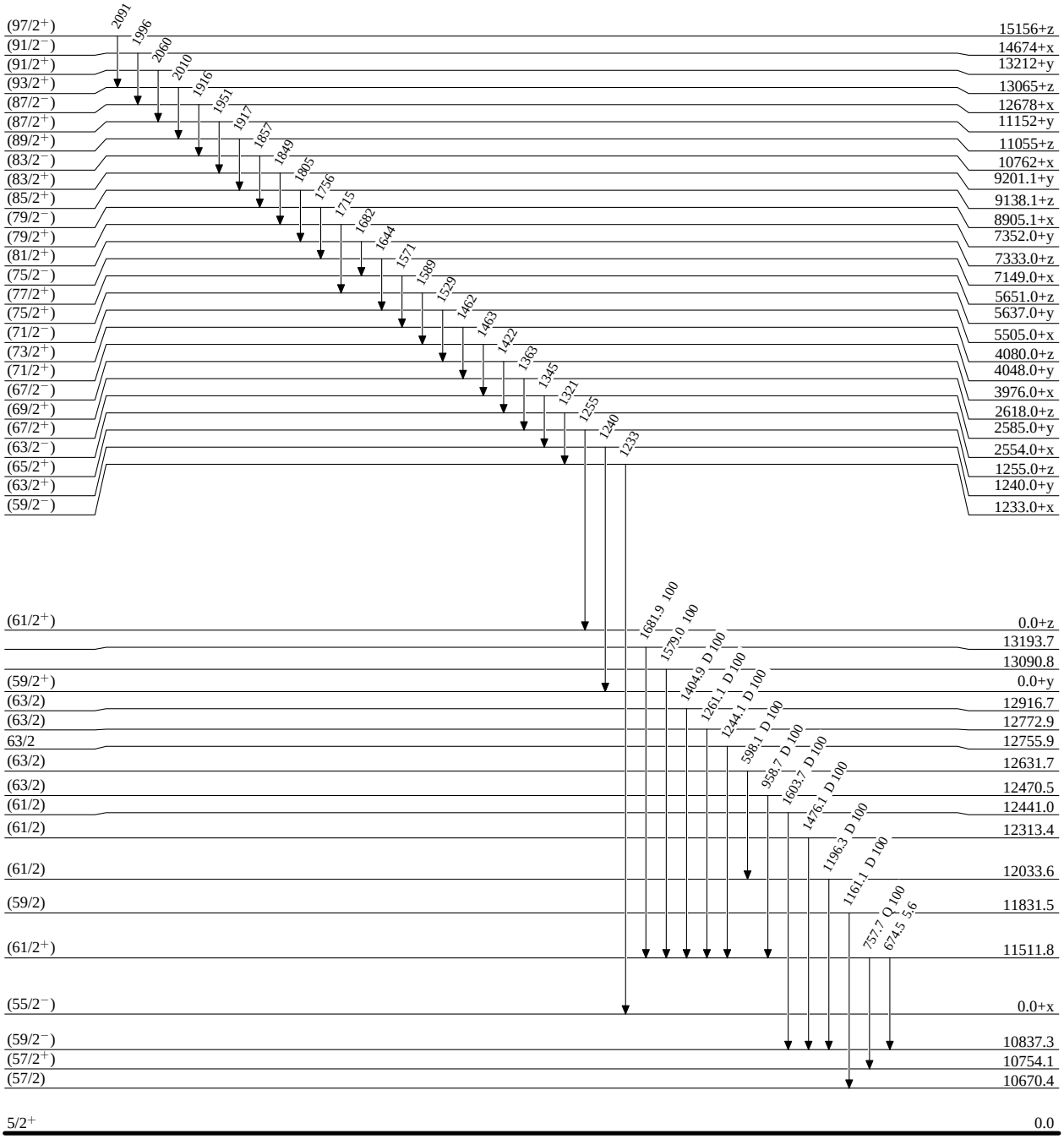
@ Multiply placed with intensity suitably divided.

& Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



13.2230 h *19*

$^{123}_{53}I_{70}$

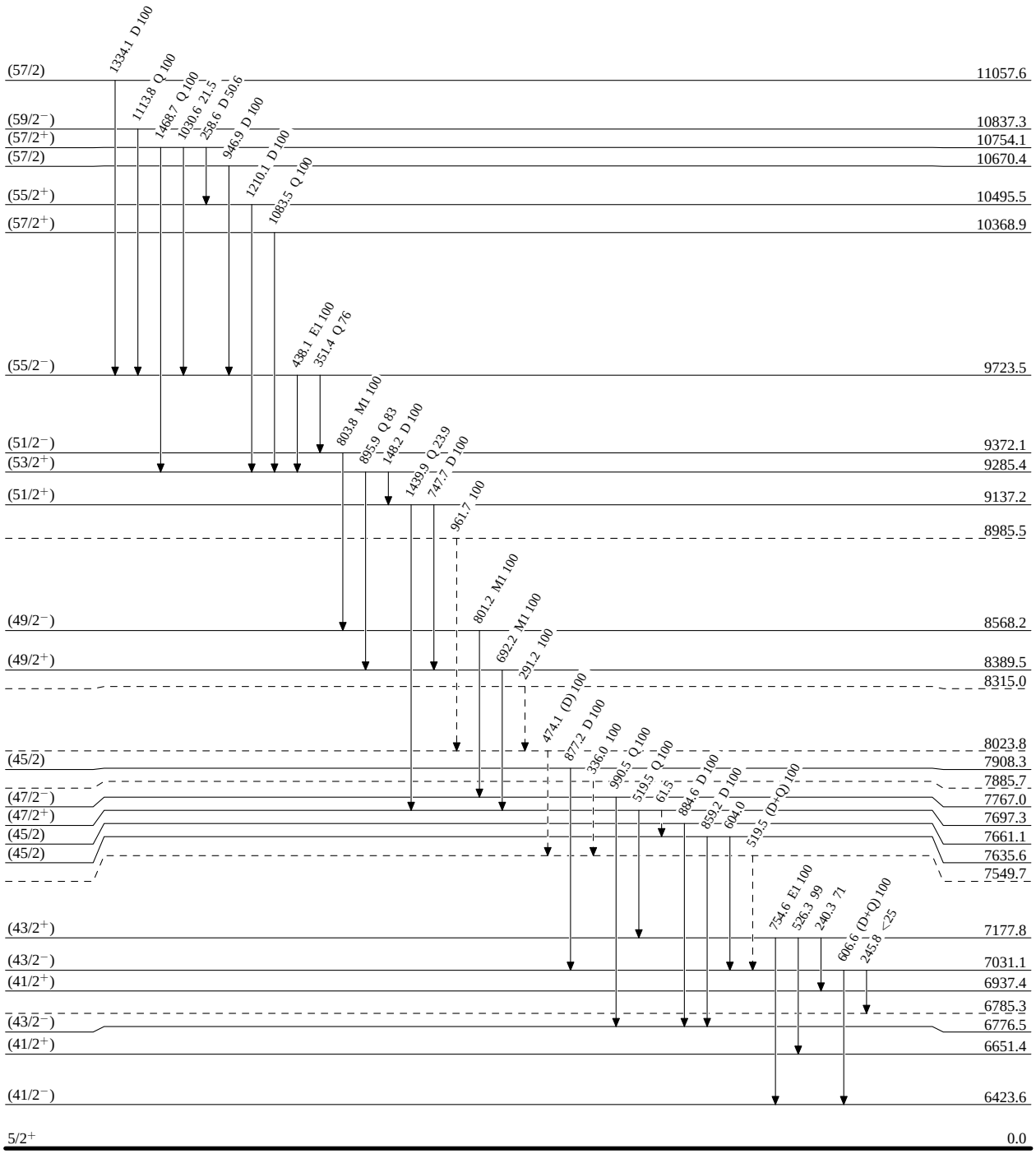
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



13.2230 h *19*

$^{123}_{53}I_{70}$

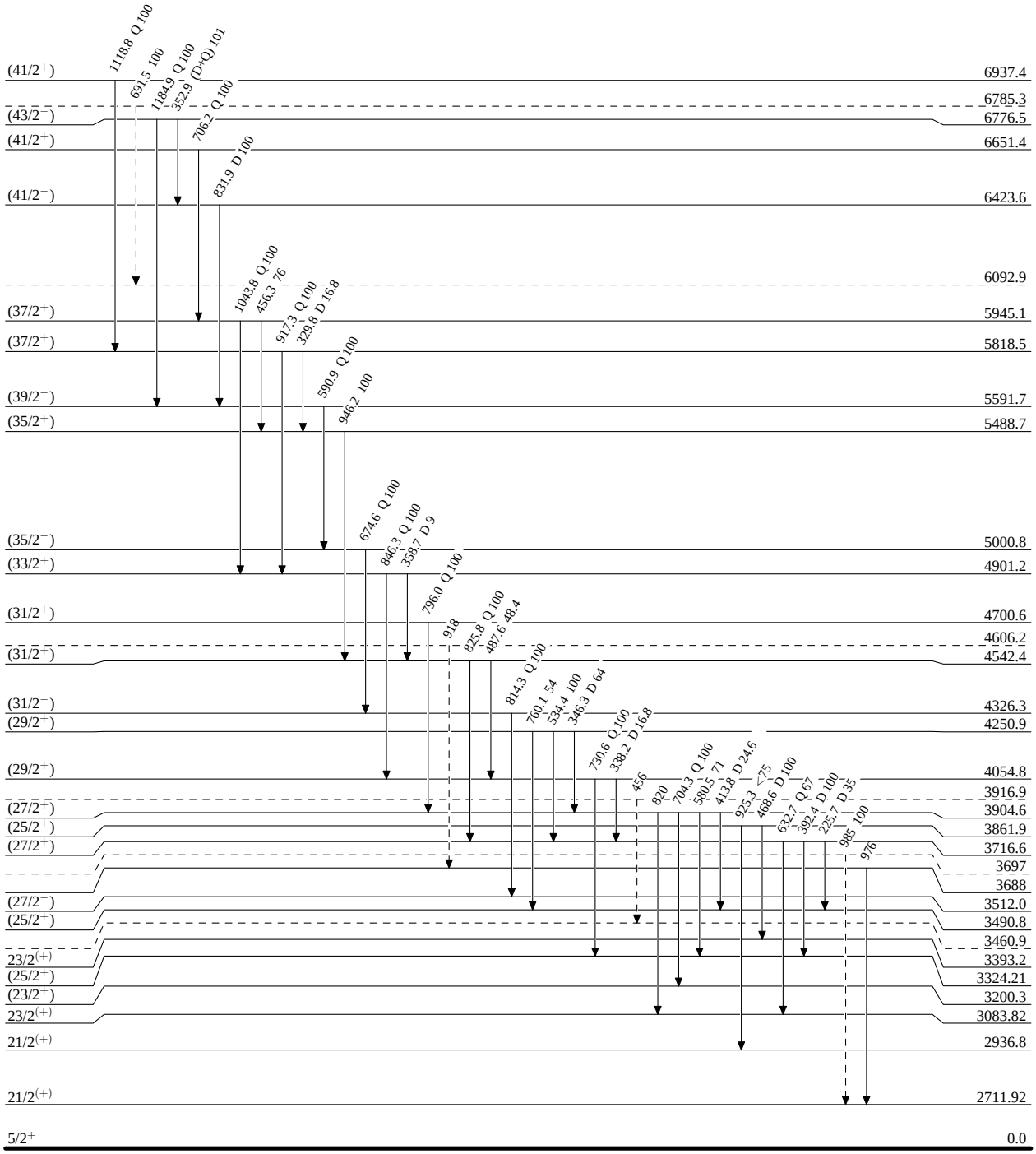
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



13.2230 h *19*

$^{123}_{53}I_{70}$

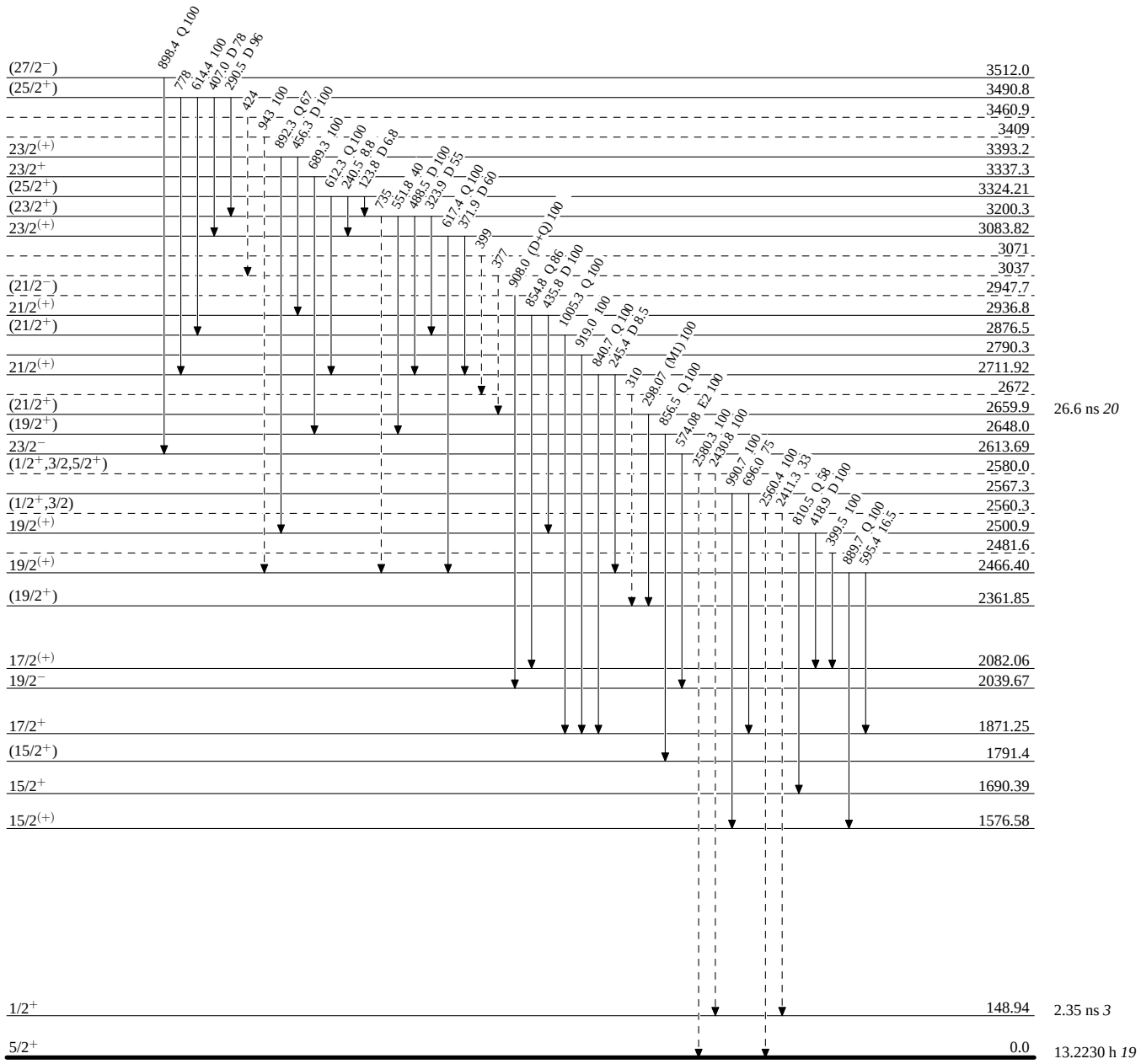
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{123}_{53}I_{70}$

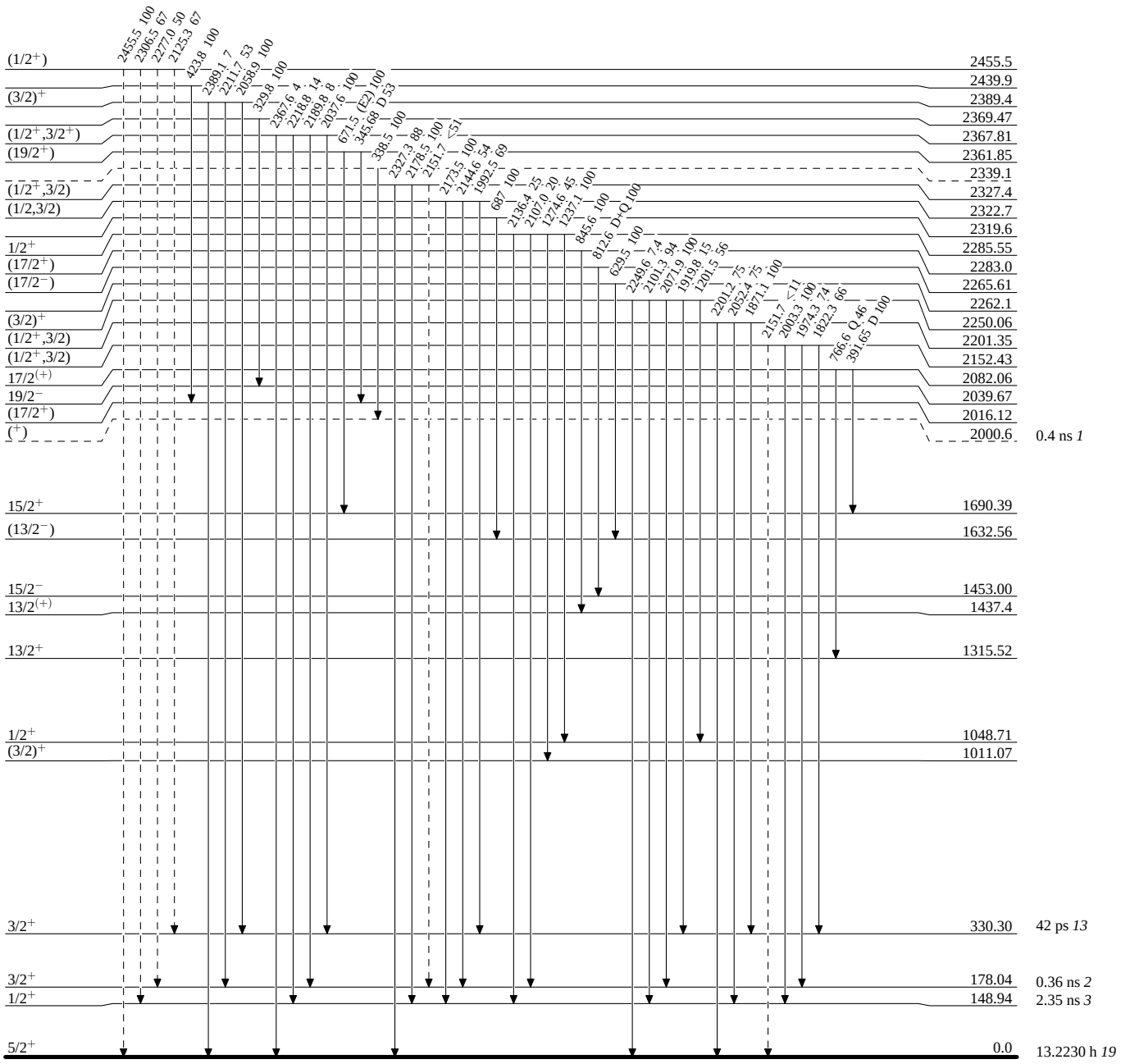
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{123}_{53}I_{70}$

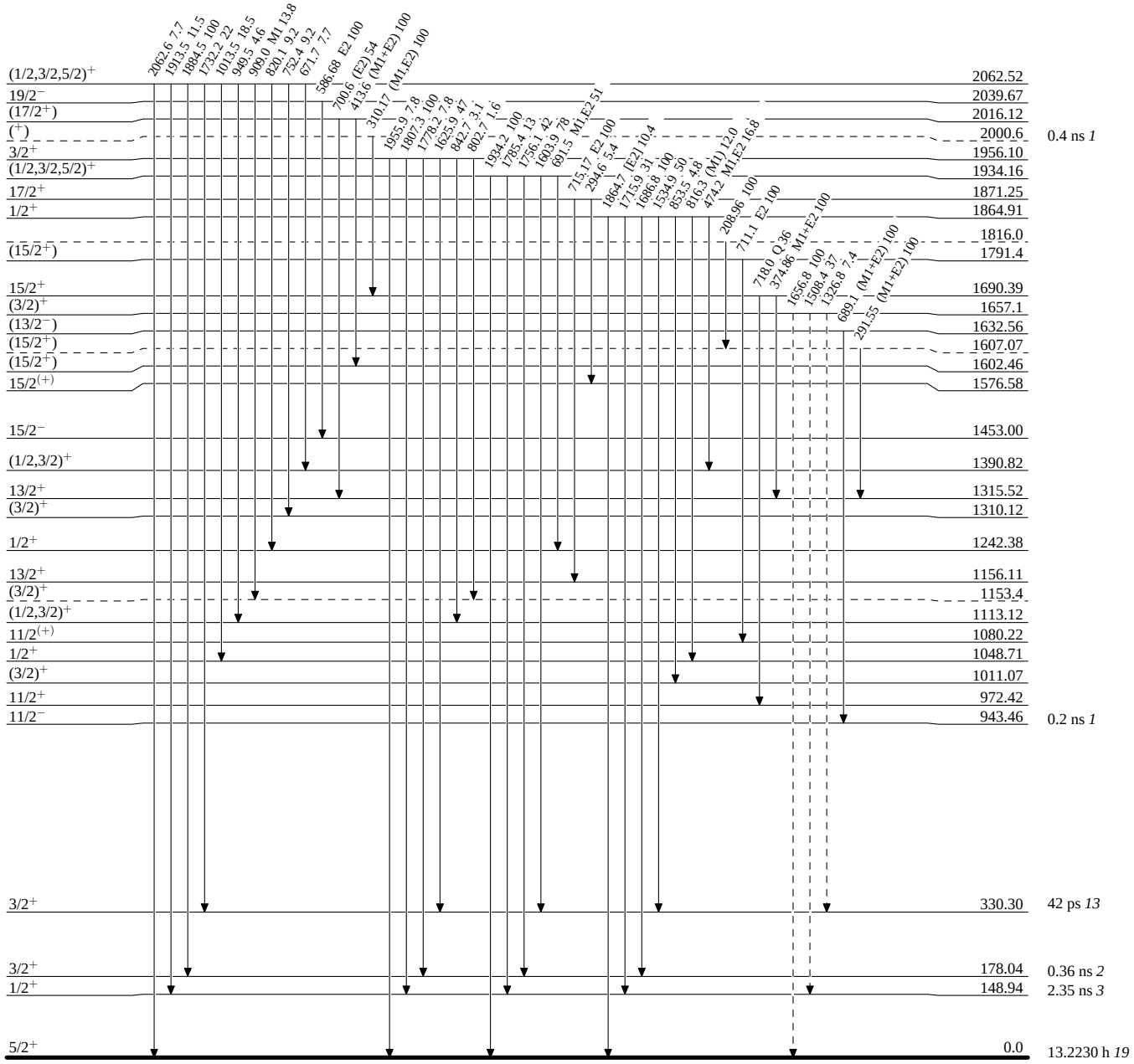
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

- - - - - - ► γ Decay (Uncertain)



$^{123}_{53}I_{70}$

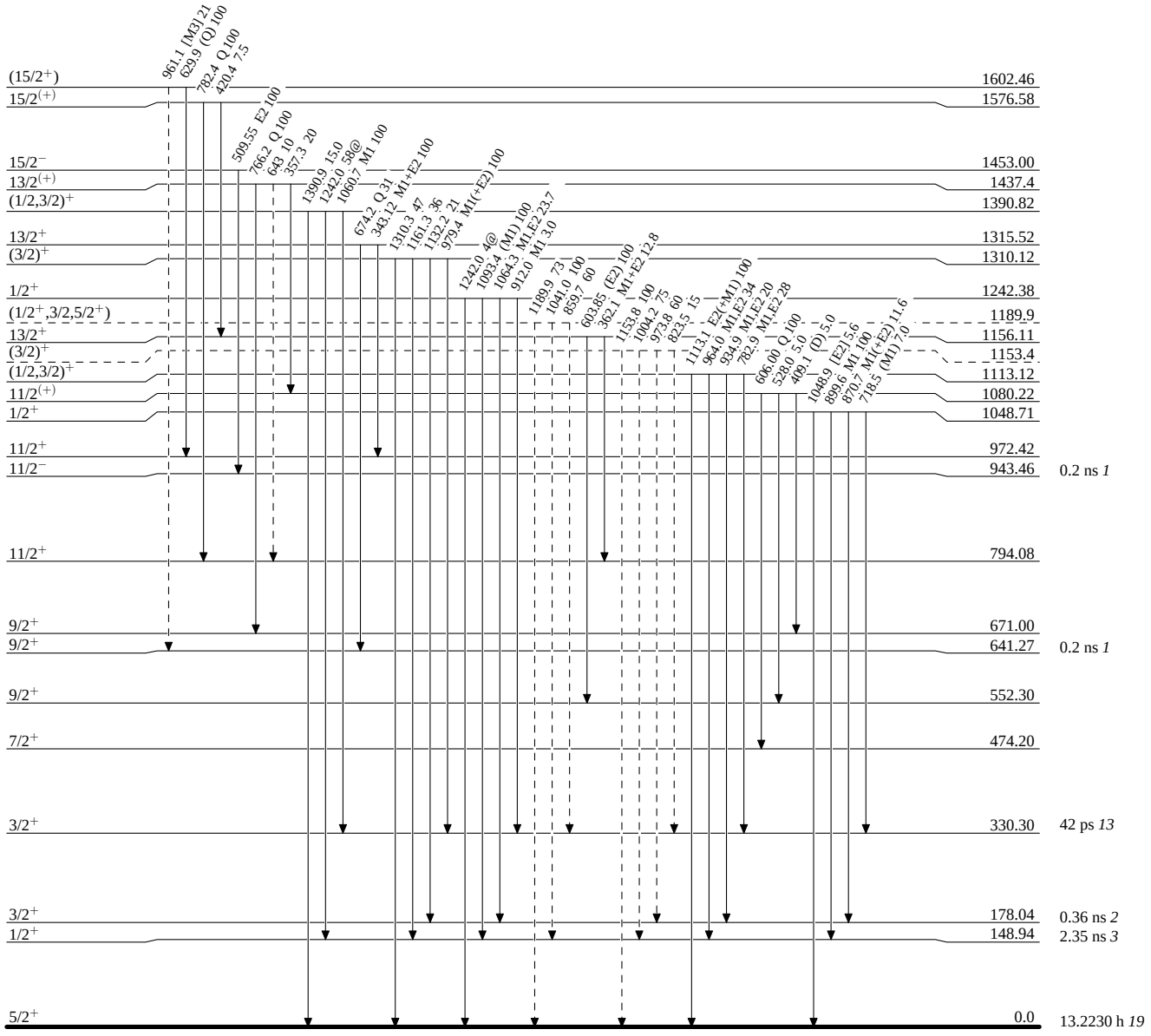
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided

- - - - - - ► γ Decay (Uncertain)



$^{123}_{53}I_{70}$

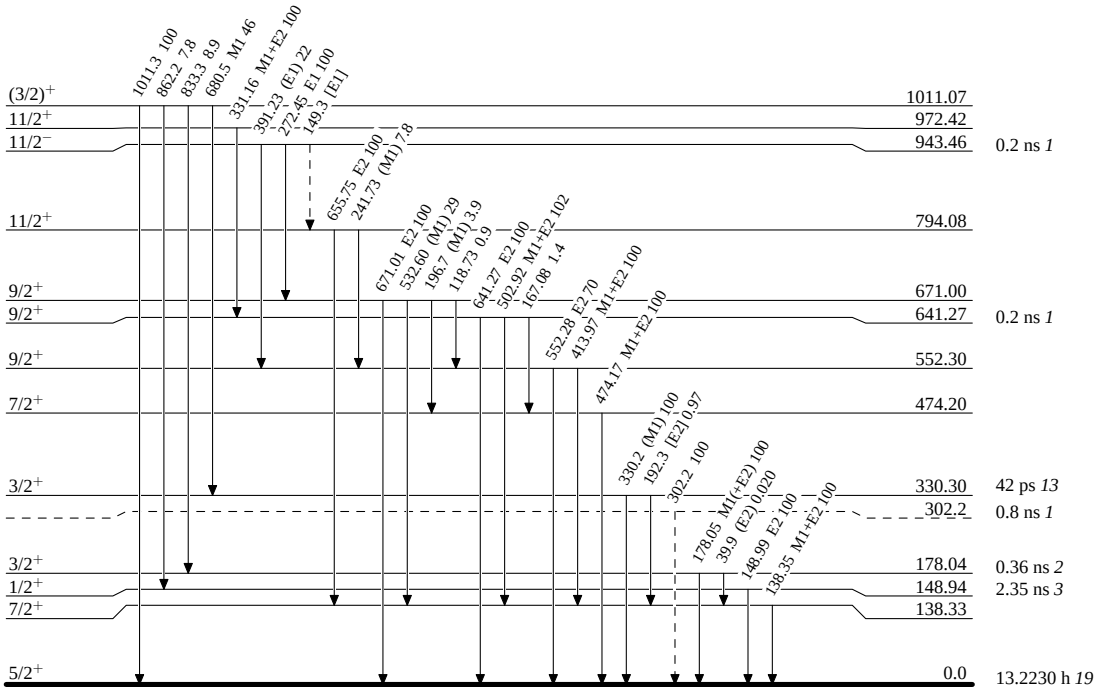
Adopted Levels, Gammas

Legend

Level Scheme (continued)

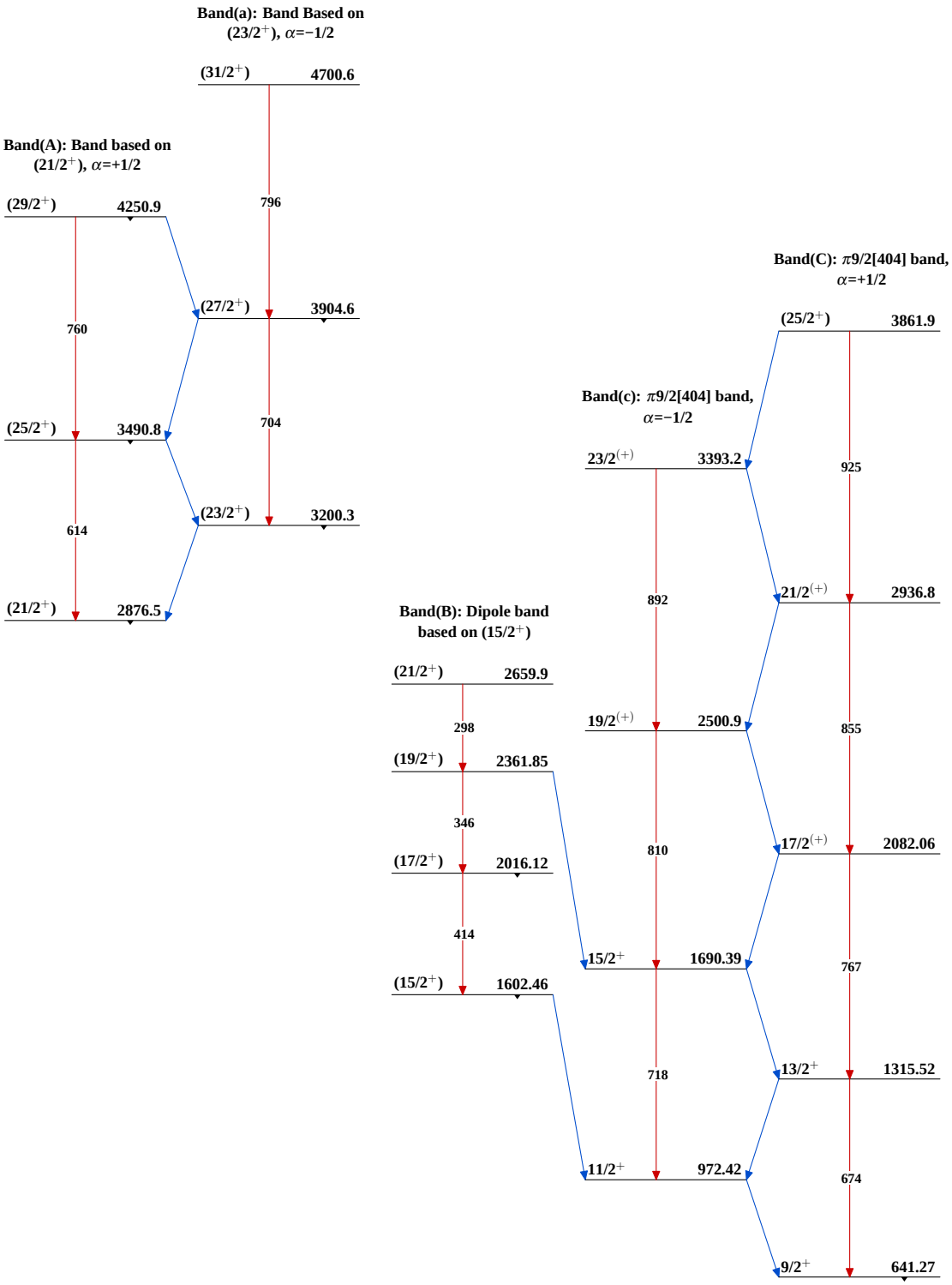
Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided

γ Decay (Uncertain)



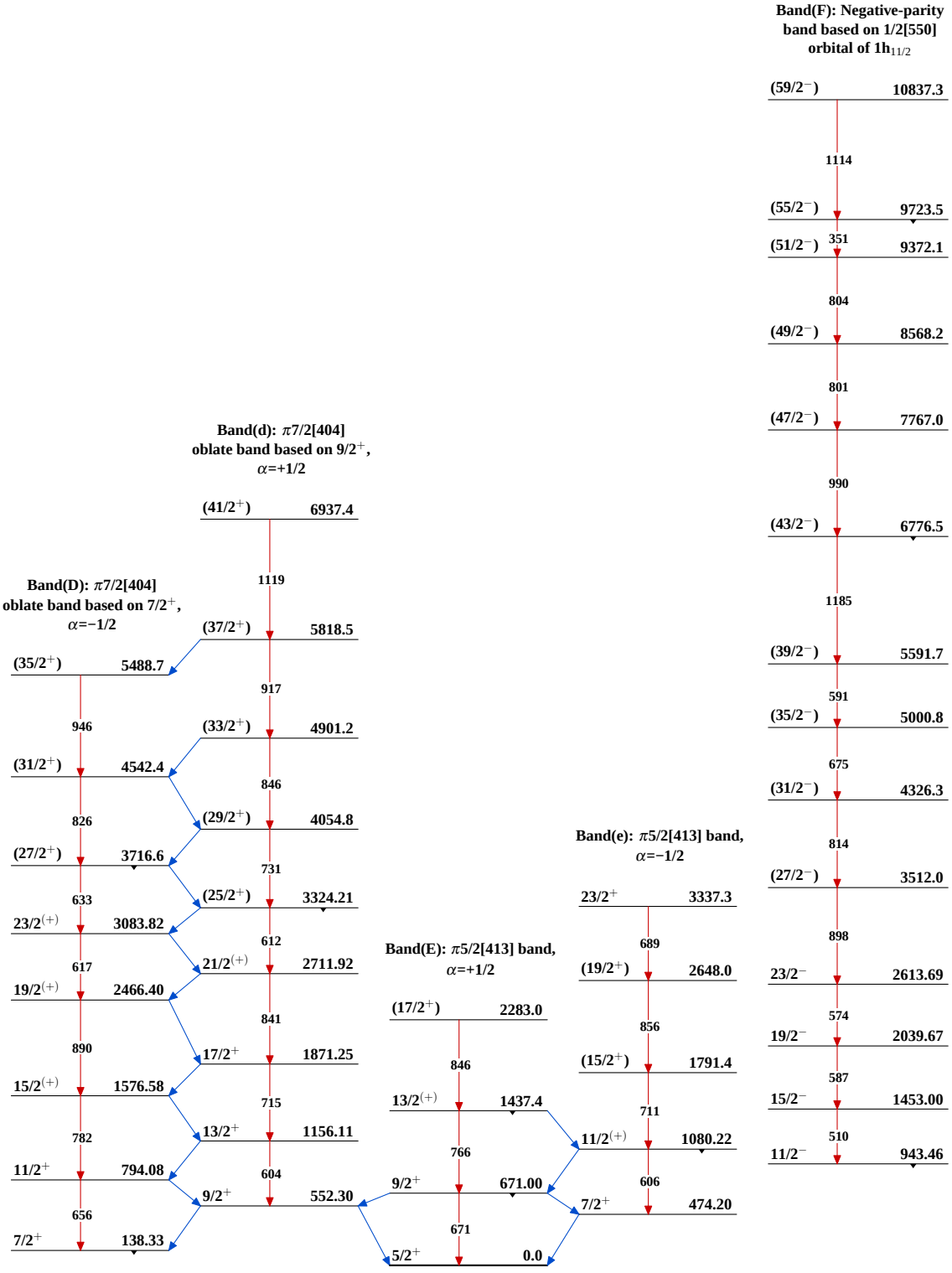
$^{123}_{53}I_{70}$

Adopted Levels, Gammas



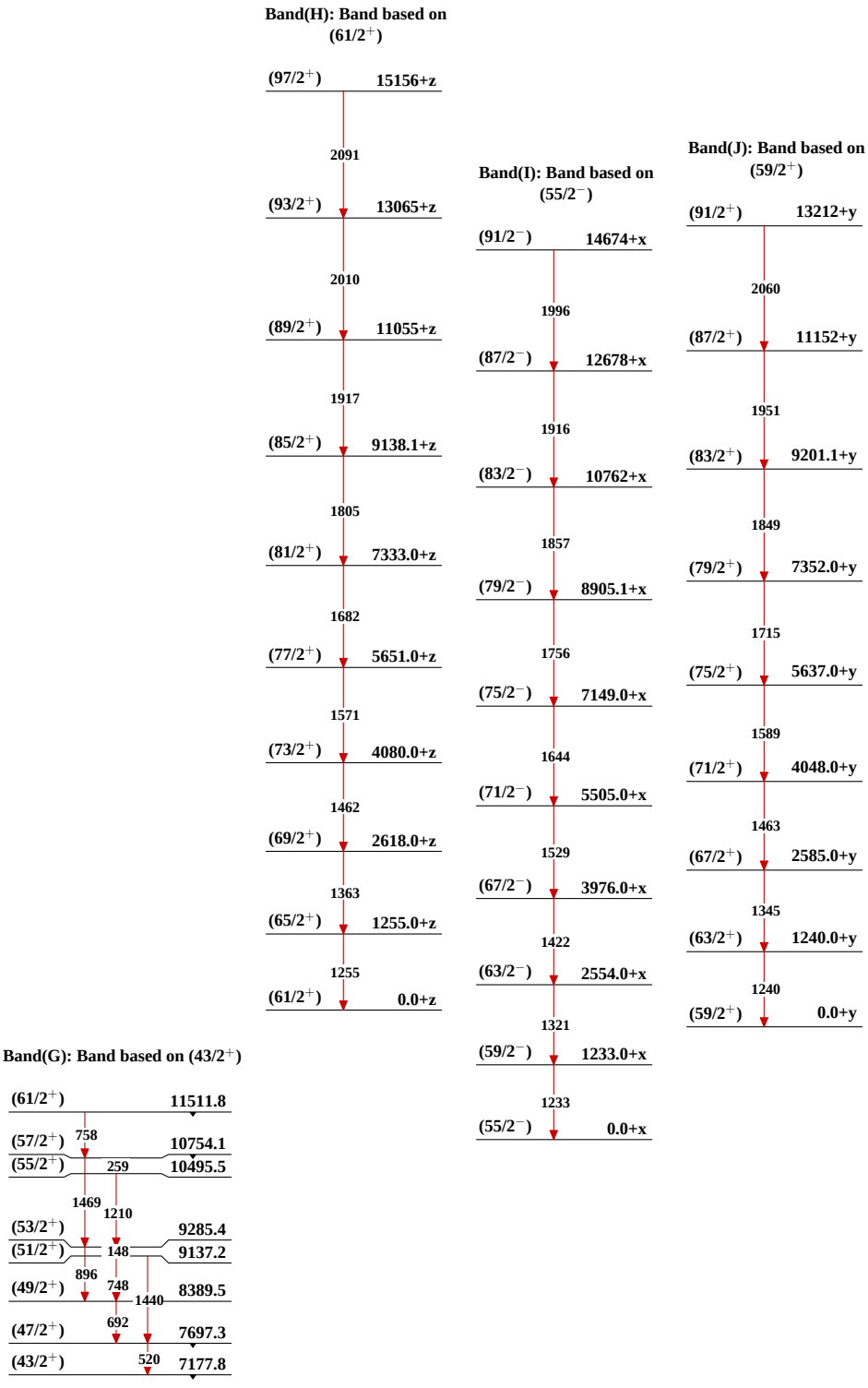
$^{123}_{53}I_{70}$

Adopted Levels, Gammas (continued)



$^{123}_{53}I_{70}$

Adopted Levels, Gammas (continued)



^{123}Xe ε decay 1971St08,1971Ho02

Parent: ^{123}Xe: E=0.0; $J^{\pi}=1/2^{(+)}$; $T_{1/2}$=2.050 h *14*; Q(ε)=2694 *10*; %ε+%$β^+$ decay=100

^{123}Xe-J^{π},$T_{1/2}$: From Adopted Levels of ^{123}Xe.

^{123}Xe-Q(ε): From 2021Wa16.

1971St08: source of ^{123}Xe was produced from Ce(p,5pxn) with E=600 MeV proton beam from the synchro-cyclotron at the ISOLDE facility at CERN and separated by an on-line mass separator. γ rays were detected with Ge(Li) detectors and a Si(Li) detector for E<50 keV; conversion electrons were detected with a Si(Li) detector and a double-focusing magnetic spectrometer for low-energy part of the electron spectrum. Measured Eγ, Iγ, E(ce), I(ce), γγ-coin, γ-ce-coin. Deduced levels, J, π, ε-decay branching ratios, log *ft*, γ-ray conversion coefficients, multipolarities. Comparisons with available data. Systematics of neighboring I isotopes.

1971Ho02: ^{123}Xe source was produced at the ISOLDE facility at CERN. γ rays were detected with a plastic scintillation detector and conversion electrons were detected with an electron-electron coincidence β-spectrometer. Measured γ-ce(t). Deduced $T_{1/2}$, transition strengths. Systematics of neighboring I isotopes.

1981Bo25: source of ^{123}Xe was produced at JINR. Conversion electrons were detected with a β-spectrometer (FWHM≈2.5 keV) with a Si(Li) detector. Measured E(ce), I(ce). Deduced levels, J, π, γ-ray conversion coefficients, multipolarities.

1968Gf01: ^{123}Xe source was produced via ^{122}Te(α,3n) with α beam from the Gottinger Synchro-cyclotron. γ rays were detected with Ge(Li) and NaI(Tl) detectors and conversion electrons were detected with a Si(Li) detector. Measured Eγ, Iγ, E(ce), I(ce), γγ-coin. Deduced levels, J, π, ε-decay branching ratios, log *ft*, γ-ray conversion coefficients, multipolarities. Eγ and Iγ values with no uncertainties of 57 γ transitions are reported.

1970Sc21: measured γγ(t) at CERN. Deduced $T_{1/2}$ of 149 level.

Others: 2021Ze01, 1982BeYR, 1974Jo16, 1971ShZY, 1971Ch43, 1970Sc21, 1969Bu07, 1969ChZK, 1967DaZY, 1965An05.

The decay scheme is that proposed by 1971St08.

^{123}I Levels

E(level)†	J^{π}‡	$T_{1/2}$#	Comments
0.0	$5/2^+$	13.2230 h *19*	$T_{1/2}$: From Adopted Levels.
138.07 *15*	$7/2^+$		
148.91 *10*	$1/2^+$	2.35 ns *3*	$T_{1/2}$: weighted average of 2.34 ns *3* from (β^+)(ce of 148.9γ)(t) (1971Ch43); 2.44 ns *9* from ($\gamma^{\pm}$)(148.9γ)(t), (899γ)(148.9γ)(t) (1970Sc21); 2.35 ns *8* from (600-800γ)(ce of 148.9γ)(t) (1971Ho02).
178.00 *10*	$3/2^+$	0.36 ns *2*	$T_{1/2}$: from (600-800γ)(ce(L) of 178.1γ)(t) (1971Ho02).
330.26 *10*	$3/2^+$	42 ps *13*	$T_{1/2}$: From (600-800γ)(ce(K) of 330.2γ)(t) (1971Ho02).
1011.04 *14*	$(3/2)^+$		
1048.68 *13*	$1/2^+$		
1113.09 *13*	$(1/2,3/2)^+$		
1153.4? *3*	$(3/2)^+$		
1189.93? *18*	$(1/2^+,3/2,5/2^+)$		
1242.35 *16*	$1/2^+$		
1310.09 *14*	$(3/2)^+$		
1390.80 *14*	$(1/2,3/2)^+$		
1657.11? *20*	$(3/2)^+$		
1864.88 *13*	$1/2^+$		
1934.14 *15*	$(1/2,3/2,5/2)^+$		
1956.07 *15*	$3/2^+$		
2062.49 *12*	$(1/2,3/2,5/2)^+$		
2152.40 *21*	$(1/2^+,3/2)$		
2201.32 *22*	$(1/2^+,3/2)$		
2250.03 *18*	$(3/2)^+$		
2285.52 *21*	$1/2^+$		
2322.6 *3*	(1/2,3/2)		
2327.4 *4*	$(1/2^+,3/2)$		
2367.78 *22*	$(1/2^+,3/2^+)$		
2389.4 *3*	$(3/2)^+$		
2455.40? *24*	$(1/2^+)$		

Continued on next page (footnotes at end of table)

^{123}Xe ε decay 1971St08,1971Ho02 (continued)

^{123}I Levels (continued)

E(level)[†]	Jπ[‡]
2560.3? *4*	(1/2+,3/2)
2580.0? *4*	(1/2+,3/2,5/2+)

† From a least-squares fit to γ-ray energies.
‡ From Adopted Levels.
# From γγ(t) and γ-ce(t) in this study for excited states. Values are adopted in Adopted Levels.

ε,β+ radiations

E(decay)	E(level)	Iβ+ [‡]	Iε[‡]	Log *ft*	I(ε+β+)[†‡]
(114[#] *10*)	2580.0?		0.0098 *21*	6.3 *2*	0.0098 *21*
(134[#] *10*)	2560.3?		0.020 *3*	6.2 *1*	0.020 *3*
(239[#] *10*)	2455.40?		0.042 *5*	6.45 *7*	0.042 *5*
(305 *10*)	2389.4		0.118 *14*	6.24 *6*	0.118 *14*
(326 *10*)	2367.78		0.31 *3*	5.89 *6*	0.31 *3*
(367 *10*)	2327.4		0.078 *9*	6.60 *6*	0.078 *9*
(371 *10*)	2322.6		0.142 *13*	6.35 *5*	0.142 *13*
(409 *10*)	2285.52		0.187 *18*	6.32 *5*	0.187 *18*
(444 *10*)	2250.03		0.45 *3*	6.02 *4*	0.45 *3*
(493 *10*)	2201.32		0.147 *15*	6.60 *5*	0.147 *15*
(542 *10*)	2152.40		0.45 *4*	6.20 *5*	0.45 *4*
(632 *10*)	2062.49		1.31 *9*	5.88 *4*	1.31 *9*
(738 *10*)	1956.07		2.10 *14*	5.81 *4*	2.10 *14*
(760 *10*)	1934.14		0.63 *4*	6.36 *3*	0.63 *4*
(829 *10*)	1864.88		1.38 *9*	6.10 *3*	1.38 *9*
(1037[#] *10*)	1657.11?		0.191 *16*	7.16 *4*	0.191 *16*
(1303 *10*)	1390.80		1.20 *15*	6.57 *6*	1.20 *15*
(1384 *10*)	1310.09	0.0012 *2*	0.52 *4*	6.98 *4*	0.52 *4*
(1452 *10*)	1242.35	0.016 *2*	3.5 *3*	6.20 *4*	3.5 *3*
(1504[#] *10*)	1189.93?	0.00121 *14*	0.171 *13*	7.54 *4*	0.172 *13*
(1541[#] *10*)	1153.4?	0.00128 *20*	0.136 *19*	7.66 *6*	0.137 *19*
(1581 *10*)	1113.09	0.035 *3*	2.78 *17*	6.37 *3*	2.81 *17*
(1645 *10*)	1048.68	0.050 *6*	2.7 *3*	6.43 *5*	2.7 *3*
(1683 *10*)	1011.04	0.015 *2*	0.63 *6*	7.07 *5*	0.64 *6*
(2364 *10*)	330.26	1.1 *1*	4.0 *5*	6.57 *6*	5.1 *6*
(2516 *10*)	178.00	3.9 *3*	10.2 *7*	6.22 *3*	14.1 *9*
(2545 *10*)	148.91	18.0 *4*	43.6 *7*	5.60 *1*	61.6 *9*

† Deduced by the evaluator from γ+ce intensity imbalance at each level.
‡ Absolute intensity per 100 decays.
# Existence of this branch is questionable.

^{123}Xe ε decay 1971St08,1971Ho02 (continued)

$\gamma(^{123}I)$

Iγ normalization: From ΣI(γ+ce to g.s.)=100.

E_γ †	I_γ †@	E_i(level)	J_i^π	E_f	J_f^π	Mult.#	δ	α&	Comments
39.9 *3*	0.006 *2*	178.00	$3/2^+$	138.07	$7/2^+$	(E2)		51.3 *17*	%Iγ=0.0029 *10* B(E2)(W.u.)=71 *25* E_γ: from energies of conversion electrons (1971St08). I_γ: deduced from I(ceL) and I(ceM) and assumption that mult=E2 (1971St08). Mult.: L/M=3.5 *15* gives M1 or E2 (1971St08). ΔJ=2 from the decay scheme,
138.1 *2*	0.50 *5*	138.07	$7/2^+$	0.0	$5/2^+$	M1+E2	−0.15 *5*	0.307 *7*	%Iγ=0.245 *25* Mult.: α(K)exp=0.26 *4*, α(L)exp=0.041 *7* (1971St08). δ: from Adopted Gammas. Other: 0.30 *+15−30* from ce data in 1971St08. α: Calculated with δ=−0.15 *5* from ^{120}Sn(^{6}Li,3nγ).
148.9 *2*	100	148.91	$1/2^+$	0.0	$5/2^+$	E2		0.431	%Iγ=49.1 *6* B(E2)(W.u.)=63.1 *11* E_γ: other: 148.7 (1968Gf01). I_γ: %Iγ=48.0 *10* from direct measurement in 1974Jo16. Mult.: α(K)exp=0.32 *2*, α(L)exp=0.080 *10*, α(M)exp=0.021 *5* (1971St08), α(M)exp=0.0175 *15* (1981Bo25), α(K)exp=0.294, α(L+M)(exp)=0.096 (1968Gf01). I(ceK)=100.0 *34*, I(ceM)=5.46 *30* (1981Bo25).
178.1 *2*	30.5 *15*	178.00	$3/2^+$	0.0	$5/2^+$	M1(+E2)	<0.2	0.151 *3*	%Iγ=15.0 *7* B(M1)(W.u.)=0.0046 *5*; B(E2)(W.u.)=103 *10* E_γ,I_γ: other: Eγ=178.0, Iγ=32.2 (1968Gf01). Mult.: α(K)exp=0.145 *20*, α(L)=0.017 *3*, α(M)=0.004 *1* (1971St08), α(L)exp=0.0175 *19*, α(M)exp=0.0038 *7* (1981Bo25), α(K)exp=0.137, α(L+M)exp=0.03 (1968Gf01). δ: Deduced by the evaluator from ce data using BrIccMixing, adopted in Adopted Gammas. I(ceL)=1.70 *5*, I(ceM)=0.365 *22* (1981Bo25).
192.3 *3*	0.17 *3*	330.26	$3/2^+$	138.07	$7/2^+$	[E2]		0.178	%Iγ=0.083 *15* B(E2)(W.u.)=13 *5*
330.2 *2*	17.5 *10*	330.26	$3/2^+$	0.0	$5/2^+$	(M1)		0.0291	%Iγ=8.6 *5* B(M1)(W.u.)=0.0070 *23*; B(E2)(W.u.)=45 *15* E_γ,I_γ: other: Eγ=330.3, Iγ=17.2 (1968Gf01). Mult.: M1,E2 from α(K)exp=0.029 *5*, α(L)exp=0.004 *1* (1971St08), α(K)exp=0.027 *4*, α(L)exp=0.0032 *6*, α(M)exp=0.00070 *12* (1981Bo25), α(K)exp=0.032, α(L+M)exp=0.003 (1968Gf01); ΔJ=(1) from level scheme. I(ceK)=1.50 *5*, I(ceL)=0.174 *10*, I(ceM)=0.039 *6* (1981Bo25).
474.2 *2*	0.21 *3*	1864.88	$1/2^+$	1390.80	$(1/2,3/2)^+$	M1,E2		0.0108 *9*	%Iγ=0.103 *15*

^{123}Xe ε decay 1971St08,1971Ho02 (continued)

γ(^{123}I) (continued)

E_γ [†]	I_γ [†@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	α[&]	Comments
								E_γ,I_γ: other: Eγ=474.9, Iγ=0.22 (1968Gf01). Mult.: α(K)exp=0.0114 *30* (1981Bo25). I(ceK)=0.0075 *16* (1981Bo25).
671.7 *2*	0.10 *2*	2062.49	(1/2,3/2,5/2)$^+$	1390.80	(1/2,3/2)$^+$			%Iγ=0.049 *10*
680.5 *2*	0.41 *3*	1011.04	(3/2)$^+$	330.26	3/2$^+$	M1	0.00485	%Iγ=0.201 *15* E_γ,I_γ: other: Eγ=679.6, Iγ=0.31 (1968Gf01). Mult.: α(K)exp=0.0061 *23* (1981Bo25). I(ceK)=0.0079 *29* (1981Bo25).
691.5 *3*	0.23 *3*	1934.14	(1/2,3/2,5/2)$^+$	1242.35	1/2$^+$	M1,E2	0.0041 *6*	%Iγ=0.113 *15* Mult.: α(K)exp=0.0051 *32* (1981Bo25). I(ceK)=0.0037 *24* (1981Bo25).
718.5 *2*	0.35 *3*	1048.68	1/2$^+$	330.26	3/2$^+$	(M1)	0.00427	%Iγ=0.172 *15* E_γ,I_γ: other: Eγ=718.0, Iγ=0.43 (1968Gf01). Mult.: D,E2 from α(K)exp=0.0045 *35* (1981Bo25); (M1) required from level scheme. I(ceK)=0.005 *4* (1981Bo25).
[x]728.3 *2*	0.25 *3*							%Iγ=0.123 *15* E_γ,I_γ: other: Eγ=727.3, Iγ=0.30 (1968Gf01). α(K)exp=0.010 *8*, I(ceK)=0.008 *6* (1981Bo25).
752.4 *2*	0.12 *2*	2062.49	(1/2,3/2,5/2)$^+$	1310.09	(3/2)$^+$			%Iγ=0.059 *10* E_γ,I_γ: other: Eγ=751.3, Iγ=0.18 (1968Gf01).
782.9 *2*	0.91 *9*	1113.09	(1/2,3/2)$^+$	330.26	3/2$^+$	M1,E2	0.0031 *4*	%Iγ=0.45 *5* E_γ,I_γ: other: Eγ=782.6, Iγ=1.30 (1968Gf01). Mult.: α(K)exp=0.0029 *7* (1981Bo25). I(ceK)=0.0082 *14* (1981Bo25).
802.7 *3*	0.04 *1*	1956.07	3/2$^+$	1153.4?	(3/2)$^+$			%Iγ=0.020 *5*
816.3 *3*	0.15 *2*	1864.88	1/2$^+$	1048.68	1/2$^+$	(M1)		%Iγ=0.074 *10* Mult.: M1,Q from α(K)exp=0.013 *11* (1981Bo25); M1 from level scheme. I(ceK)=0.006 *5* (1981Bo25).
820.1 *3*	0.12 *2*	2062.49	(1/2,3/2,5/2)$^+$	1242.35	1/2$^+$			%Iγ=0.059 *10*
823.5[c] *3*	0.03 *1*	1153.4?	(3/2)$^+$	330.26	3/2$^+$			%Iγ=0.015 *5*
833.3 *3*	0.08 *1*	1011.04	(3/2)$^+$	178.00	3/2$^+$			%Iγ=0.039 *5*
842.7 *3*	0.08 *1*	1956.07	3/2$^+$	1113.09	(1/2,3/2)$^+$			E_γ,I_γ: other: Eγ=832.8, Iγ=0.14 (1968Gf01). %Iγ=0.039 *5*
853.5 *3*	0.06 *1*	1864.88	1/2$^+$	1011.04	(3/2)$^+$			%Iγ=0.029 *5*
859.7[c] *3*	0.09 *1*	1189.93?	(1/2$^+$,3/2,5/2$^+$)	330.26	3/2$^+$			%Iγ=0.044 *5* E_γ,I_γ: other: Eγ=859.9, Iγ=0.15 (1968Gf01).
862.2 *3*	0.07 *1*	1011.04	(3/2)$^+$	148.91	1/2$^+$			%Iγ=0.034 *5*
870.7 *3*	0.58 *7*	1048.68	1/2$^+$	178.00	3/2$^+$	M1(+E2)	0.0024 *4*	%Iγ=0.28 *4* E_γ,I_γ: other: Eγ=870.3, Iγ=0.60 (1968Gf01). Mult.: α(K)exp=0.0040 *19* (1981Bo25). I(ceK)=0.0073 *32* (1981Bo25).
899.6 *4*	5.0 *5*	1048.68	1/2$^+$	148.91	1/2$^+$	M1	0.00252	%Iγ=2.45 *24*

^{123}Xe ε decay 1971St08,1971Ho02 (continued)

γ(^{123}I) (continued)

E_γ [†]	I_γ [†@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	α[&]	Comments
								E_γ,I_γ: other: Eγ=898.9, Iγ=5.16 (1968Gf01). Mult.: α(K)exp=0.0026 *4*,α(L)exp=0.00045 *18* (1981Bo25). I(ceK)=0.0403 *23*, I(ceL)=0.0072 *22* (1981Bo25).
909.0 *4*	0.18 *2*	2062.49	(1/2,3/2,5/2)$^+$	1153.4?	(3/2)$^+$	M1	0.00246	%Iγ=0.088 *10* E_γ,I_γ: other: Eγ=909.0, Iγ=0.30 (1968Gf01). Mult.: α(K)exp=0.0037 *15* (1981Bo25). I(ceK)=0.0021 *8* (1981Bo25).
912.0 *4*	0.17 *2*	1242.35	1/2$^+$	330.26	3/2$^+$	M1	0.00244	%Iγ=0.083 *10* Mult.: α(K)exp=0.0034 *13* (1981Bo25). I(ceK)=0.0018 *7* (1981Bo25).
934.9 *3*	0.64 *7*	1113.09	(1/2,3/2)$^+$	178.00	3/2$^+$	M1,E2	0.0020 *3*	%Iγ=0.31 *4* E_γ,I_γ: other: Eγ=934.5, Iγ=0.82 (1968Gf01). Mult.: α(K)exp=0.0032 *18* (1981Bo25). I(ceK)=0.0064 *16* (1981Bo25).
[x]943.5 *3*	0.10 *2*							%Iγ=0.049 *10*
949.5 *3*	0.06 *1*	2062.49	(1/2,3/2,5/2)$^+$	1113.09	(1/2,3/2)$^+$			%Iγ=0.029 *5*
964.0 *3*	1.10 *10*	1113.09	(1/2,3/2)$^+$	148.91	1/2$^+$	M1,E2	0.00191 *25*	%Iγ=0.54 *5* E_γ,I_γ: other: Eγ=963.1, Iγ=1.28 (1968Gf01). Mult.: α(K)exp=0.0019 *5* (1981Bo25). I(ceK)=0.0066 *14* (1981Bo25).
973.8[c]	0.12	1153.4?	(3/2)$^+$	178.00	3/2$^+$			%Iγ=0.0589 *7* E_γ,I_γ: from 1968Gf01 only.
979.4 *3*	0.58 *7*	1310.09	(3/2)$^+$	330.26	3/2$^+$	M1(+E2)	0.00184 *24*	%Iγ=0.28 *4* E_γ,I_γ: other: Eγ=977.8, Iγ=0.78 (1968Gf01). Mult.: α(K)exp=0.0020 *5* (1981Bo25). I(ceK)=0.0037 *7* (1981Bo25).
1004.2[c] *3*	0.15 *2*	1153.4?	(3/2)$^+$	148.91	1/2$^+$			%Iγ=0.074 *10* E_γ,I_γ: other: Eγ=1003.2, Iγ=0.21 (1968Gf01).
1011.3 *5*	0.90 *10*	1011.04	(3/2)$^+$	0.0	5/2$^+$			%Iγ=0.44 *5* E_γ,I_γ: other: Eγ=1010.5, Iγ=1.44 (1968Gf01).
1013.5 *5*	0.24 *3*	2062.49	(1/2,3/2,5/2)$^+$	1048.68	1/2$^+$			%Iγ=0.118 *15*
1041.0[c] *3*	0.15 *2*	1189.93?	(1/2$^+$,3/2,5/2$^+$)	148.91	1/2$^+$			%Iγ=0.074 *10*
1048.9 *3*	0.28 *3*	1048.68	1/2$^+$	0.0	5/2$^+$			%Iγ=0.137 *15* E_γ,I_γ: other: Eγ=1048.0, Iγ=0.35 (1968Gf01).
1060.7 *4*	1.60 *20*	1390.80	(1/2,3/2)$^+$	330.26	3/2$^+$	M1	1.73×10^{-3}	%Iγ=0.79 *10* E_γ,I_γ: other: Eγ=1060.7, Iγ=2.88 (1968Gf01). Mult.: α(K)exp=0.0020 *5* (1981Bo25). I(ceK)=0.0099 *20* (1981Bo25).
1064.3 *4*	1.35 *15*	1242.35	1/2$^+$	178.00	3/2$^+$	M1,E2	0.00153 *20*	%Iγ=0.66 *8* Mult.: α(K)exp=0.0015 *4* (1981Bo25). I(ceK)=0.0064 *13* (1981Bo25).
1093.4 *3*	5.7 *5*	1242.35	1/2$^+$	148.91	1/2$^+$	(M1)	0.00162	%Iγ=2.80 *24* E_γ,I_γ: other: Eγ=1092.6, Iγ=5.23 (1968Gf01).

^{123}Xe ε decay 1971St08,1971Ho02 (continued)

γ(^{123}I) (continued)

E_γ [†]	I_γ [†@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	α[&]	Comments
1113.1 *3*	3.2 *3*	1113.09	(1/2,3/2)$^+$	0.0	5/2$^+$	E2(+M1)	0.00139 *17*	Mult.: M1,E2 from α(K)exp=0.00122 *21* (1981Bo25); M1 from level scheme. I(ceK)=0.0217 *27* (1981Bo25). %Iγ=1.57 *15* E_γ,I_γ: other: Eγ=1112.0, Iγ=2.84 (1968Gf01).
1132.2 *3*	0.12 *1*	1310.09	(3/2)$^+$	178.00	3/2$^+$			Mult.: α(K)exp=0.0011*217* (1981Bo25). I(ceK)=0.0113 *11* (1981Bo25). %Iγ=0.059 *5*
1153.8[c] *3*	0.20 *2*	1153.4?	(3/2)$^+$	0.0	5/2$^+$			%Iγ=0.098 *10* E_γ,I_γ: other: Eγ=1152.5, Iγ=0.22 (1968Gf01).
1161.3 *3*	0.21 *2*	1310.09	(3/2)$^+$	148.91	1/2$^+$			%Iγ=0.103 *10* E_γ,I_γ: other: Eγ=1159.7, Iγ=0.18 (1968Gf01).
1189.9[c] *3*	0.11 *1*	1189.93?	(1/2$^+$,3/2,5/2$^+$)	0.0	5/2$^+$			%Iγ=0.054 *5*
1201.5 *3*	0.19 *2*	2250.03	(3/2)$^+$	1048.68	1/2$^+$			%Iγ=0.093 *10* E_γ,I_γ: other: Eγ=1199.8, Iγ=0.15 (1968Gf01).
1237.1 *4*	0.20 *3*	2285.52	1/2$^+$	1048.68	1/2$^+$			%Iγ=0.098 *15* E_γ,I_γ: other: Eγ=1236.7, Iγ=0.24 (1968Gf01).
1242.0[b] *4*	0.23[b‡] *20*	1242.35	1/2$^+$	0.0	5/2$^+$			%Iγ=0.11 *10*
1242.0[b] *4*	0.92[b‡] *20*	1390.80	(1/2,3/2)$^+$	148.91	1/2$^+$			%Iγ=0.45 *10* E_γ,I_γ: other: Eγ=1240.6, Iγ=0.98 (1968Gf01).
[x]1264.7 *4*	0.06 *1*							%Iγ=0.029 *5*
1274.6 *3*	0.09 *1*	2285.52	1/2$^+$	1011.04	(3/2)$^+$			%Iγ=0.044 *5*
[x]1296.3 *3*	0.06 *1*							%Iγ=0.029 *5*
1310.3 *3*	0.27 *2*	1310.09	(3/2)$^+$	0.0	5/2$^+$			%Iγ=0.133 *10* E_γ,I_γ: other: Eγ=1308.1, Iγ=0.26 (1968Gf01).
1326.8[c] *3*	0.020 *5*	1657.11?	(3/2)$^+$	330.26	3/2$^+$			%Iγ=0.0098 *25*
[x]1334.3 *3*	0.05 *1*							%Iγ=0.025 *5*
1390.9 *3*	0.24 *2*	1390.80	(1/2,3/2)$^+$	0.0	5/2$^+$			%Iγ=0.118 *10* E_γ,I_γ: other: Eγ=1390.3, Iγ=0.16 (1968Gf01).
1508.4[c] *3*	0.10 *1*	1657.11?	(3/2)$^+$	148.91	1/2$^+$			%Iγ=0.049 *5*
1534.9 *3*	0.62 *6*	1864.88	1/2$^+$	330.26	3/2$^+$			%Iγ=0.30 *3* E_γ,I_γ: other: Eγ=1534.0, Iγ=0.51 (1968Gf01).
1603.9 *3*	0.35 *3*	1934.14	(1/2,3/2,5/2)$^+$	330.26	3/2$^+$			%Iγ=0.172 *15* E_γ,I_γ: other: Eγ=1602.7, Iγ=0.26 (1968Gf01).
1625.9 *3*	1.20 *10*	1956.07	3/2$^+$	330.26	3/2$^+$			%Iγ=0.59 *5* E_γ,I_γ: other: Eγ=1624.6, Iγ=1.05 (1968Gf01).
1656.8[c] *4*	0.27 *3*	1657.11?	(3/2)$^+$	0.0	5/2$^+$			%Iγ=0.133 *15* E_γ,I_γ: other: Eγ=1655.4, Iγ=0.15 (1968Gf01).
1686.8 *3*	1.25 *15*	1864.88	1/2$^+$	178.00	3/2$^+$			%Iγ=0.61 *8* E_γ,I_γ: other: Eγ=1685.8, Iγ=1.13 (1968Gf01).
1715.9 *3*	0.39 *5*	1864.88	1/2$^+$	148.91	1/2$^+$			%Iγ=0.191 *25* E_γ,I_γ: other: Eγ=1714.6, Iγ=0.34 (1968Gf01).

$^{123}_{53}I_{70}$-40

γ(^{123}I) (continued)

E_γ †	I_γ †@	E_i(level)	J_i^π	E_f	J_f^π	Comments
1732.2 *3*	0.29 *4*	2062.49	(1/2,3/2,5/2)$^+$	330.26	3/2$^+$	%Iγ=0.142 *20* E_γ,I_γ: other: Eγ=1730.4, Iγ=0.26 (1968Gf01).
1756.1 *3*	0.19 *2*	1934.14	(1/2,3/2,5/2)$^+$	178.00	3/2$^+$	%Iγ=0.093 *10* E_γ,I_γ: other: Eγ=1754.5, Iγ=0.15 (1968Gf01).
1778.2 *3*	0.20 *2*	1956.07	3/2$^+$	178.00	3/2$^+$	%Iγ=0.098 *10* E_γ,I_γ: other: Eγ=1777.2, Iγ=0.15 (1968Gf01).
1785.4 *3*	0.06 *1*	1934.14	(1/2,3/2,5/2)$^+$	148.91	1/2$^+$	%Iγ=0.029 *5*
1807.3 *3*	2.55 *25*	1956.07	3/2$^+$	148.91	1/2$^+$	%Iγ=1.25 *13* E_γ,I_γ: other: Eγ=1806.7, Iγ=2.15 (1968Gf01).
1822.3 *3*	0.25 *3*	2152.40	(1/2$^+$,3/2)	330.26	3/2$^+$	%Iγ=0.123 *15* E_γ,I_γ: other: Eγ=1820.8, Iγ=0.20 (1968Gf01).
1864.7 *3*	0.13 *2*	1864.88	1/2$^+$	0.0	5/2$^+$	%Iγ=0.064 *10* E_γ,I_γ: other: Eγ=1864.9, Iγ=0.07 (1968Gf01).
1871.1 *3*	0.12 *2*	2201.32	(1/2$^+$,3/2)	330.26	3/2$^+$	%Iγ=0.059 *10*
1884.5 *3*	1.30 *15*	2062.49	(1/2,3/2,5/2)$^+$	178.00	3/2$^+$	%Iγ=0.64 *8* E_γ,I_γ: other: Eγ=1883.3, Iγ=1.02 (1968Gf01).
1913.5 *4*	0.15 *2*	2062.49	(1/2,3/2,5/2)$^+$	148.91	1/2$^+$	%Iγ=0.074 *10* E_γ,I_γ: other: Eγ=1910.4, Iγ=0.07 (1968Gf01).
1919.8 *4*	0.05 *1*	2250.03	(3/2)$^+$	330.26	3/2$^+$	%Iγ=0.025 *5*
1934.2 *3*	0.45 *5*	1934.14	(1/2,3/2,5/2)$^+$	0.0	5/2$^+$	%Iγ=0.221 *25* E_γ,I_γ: other: Eγ=1933.2, Iγ=0.40 (1968Gf01).
1955.9 *3*	0.20 *3*	1956.07	3/2$^+$	0.0	5/2$^+$	%Iγ=0.098 *15* E_γ,I_γ: other: Eγ=1954.5, Iγ=0.20 (1968Gf01).
1974.3 *3*	0.28 *4*	2152.40	(1/2$^+$,3/2)	178.00	3/2$^+$	%Iγ=0.137 *20* E_γ,I_γ: other: Eγ=1973.0, Iγ=0.28 (1968Gf01).
1992.5 *4*	0.09 *1*	2322.6	(1/2,3/2)	330.26	3/2$^+$	%Iγ=0.044 *5*
2003.3 *4*	0.38 *5*	2152.40	(1/2$^+$,3/2)	148.91	1/2$^+$	%Iγ=0.186 *25* E_γ,I_γ: other: Eγ=2002.8, Iγ=0.35 (1968Gf01).
2037.6 *4*	0.50 *6*	2367.78	(1/2$^+$,3/2$^+$)	330.26	3/2$^+$	%Iγ=0.25 *3* E_γ,I_γ: other: Eγ=2037.3, Iγ=0.51 (1968Gf01).
2052.4 *4*	0.09 *1*	2201.32	(1/2$^+$,3/2)	148.91	1/2$^+$	%Iγ=0.044 *5*
2058.9 *4*	0.15 *2*	2389.4	(3/2)$^+$	330.26	3/2$^+$	%Iγ=0.074 *10* E_γ,I_γ: other: Eγ=2059.0, Iγ=0.18 (1968Gf01).
2062.6 *4*	0.10 *2*	2062.49	(1/2,3/2,5/2)$^+$	0.0	5/2$^+$	%Iγ=0.049 *10*
2071.9 *4*	0.34 *4*	2250.03	(3/2)$^+$	178.00	3/2$^+$	%Iγ=0.167 *20* E_γ,I_γ: other: Eγ=2070.9, Iγ=0.38 (1968Gf01).
2101.3 *4*	0.32 *4*	2250.03	(3/2)$^+$	148.91	1/2$^+$	%Iγ=0.157 *20* E_γ,I_γ: other: Eγ=2099.8, Iγ=0.32 (1968Gf01).
2107.0 *5*	0.04 *1*	2285.52	1/2$^+$	178.00	3/2$^+$	%Iγ=0.020 *5*
2125.3[c] *4*	0.020 *5*	2455.40?	(1/2$^+$)	330.26	3/2$^+$	%Iγ=0.0098 *25*
2136.4 *4*	0.05 *1*	2285.52	1/2$^+$	148.91	1/2$^+$	%Iγ=0.025 *5*
2144.6 *4*	0.07 *1*	2322.6	(1/2,3/2)	178.00	3/2$^+$	%Iγ=0.034 *5*
2151.7[ac] *5*	0.03[a] *1*	2152.40	(1/2$^+$,3/2)	0.0	5/2$^+$	%Iγ=0.015 *5*

^{123}Xe ε decay 1971St08,1971Ho02 (continued)

γ(^{123}I) (continued)

E_γ †	I_γ †@	E_i(level)	J_i^π	E_f	J_f^π	Comments
2151.7[ac] *5*	0.03[a] *1*	2327.4	(1/2$^+$,3/2)	178.00	3/2$^+$	%Iγ=0.015 *5*
2173.5 *5*	0.13 *2*	2322.6	(1/2,3/2)	148.91	1/2$^+$	%Iγ=0.064 *10* E_γ,I_γ: other: Eγ=2173.5, Iγ=0.17 (1968Gf01).
2178.5 *5*	0.08 *1*	2327.4	(1/2$^+$,3/2)	148.91	1/2$^+$	%Iγ=0.039 *5*
2189.8 *4*	0.04 *1*	2367.78	(1/2$^+$,3/2$^+$)	178.00	3/2$^+$	%Iγ=0.020 *5*
2201.2 *4*	0.09 *2*	2201.32	(1/2$^+$,3/2)	0.0	5/2$^+$	%Iγ=0.044 *10*
2211.7 *4*	0.08 *2*	2389.4	(3/2)$^+$	178.00	3/2$^+$	%Iγ=0.039 *10*
2218.8 *4*	0.07 *1*	2367.78	(1/2$^+$,3/2$^+$)	148.91	1/2$^+$	%Iγ=0.034 *5*
2249.6 *4*	0.025 *5*	2250.03	(3/2)$^+$	0.0	5/2$^+$	%Iγ=0.0123 *25*
2277.0[c] *5*	0.015 *4*	2455.40?	(1/2$^+$)	178.00	3/2$^+$	%Iγ=0.0074 *20*
[x]2280.8 *5*	0.015 *4*					%Iγ=0.0074 *20*
2306.5[c] *5*	0.020 *5*	2455.40?	(1/2$^+$)	148.91	1/2$^+$	%Iγ=0.0098 *25*
2327.3 *5*	0.07 *1*	2327.4	(1/2$^+$,3/2)	0.0	5/2$^+$	%Iγ=0.034 *5* E_γ,I_γ: other: Eγ=2326.1, Iγ=0.05 (1968Gf01).
2367.6 *5*	0.020 *4*	2367.78	(1/2$^+$,3/2$^+$)	0.0	5/2$^+$	%Iγ=0.0098 *20*
2389.1 *5*	0.010 *3*	2389.4	(3/2)$^+$	0.0	5/2$^+$	%Iγ=0.0049 *15*
2411.3[c] *5*	0.010 *3*	2560.3?	(1/2$^+$,3/2)	148.91	1/2$^+$	%Iγ=0.0049 *15*
[x]2419.6 *5*	0.010 *3*					%Iγ=0.0049 *15*
2430.8[c] *5*	0.010 *3*	2580.0?	(1/2$^+$,3/2,5/2$^+$)	148.91	1/2$^+$	%Iγ=0.0049 *15*
2455.5[c] *5*	0.030 *5*	2455.40?	(1/2$^+$)	0.0	5/2$^+$	%Iγ=0.0147 *25*
2560.4[c] *5*	0.030 *5*	2560.3?	(1/2$^+$,3/2)	0.0	5/2$^+$	%Iγ=0.0147 *25* E_γ,I_γ: other: Eγ=2559.1, Iγ=0.03 (1968Gf01).
2580.3[c] *5*	0.010 *3*	2580.0?	(1/2$^+$,3/2,5/2$^+$)	0.0	5/2$^+$	%Iγ=0.0049 *15*

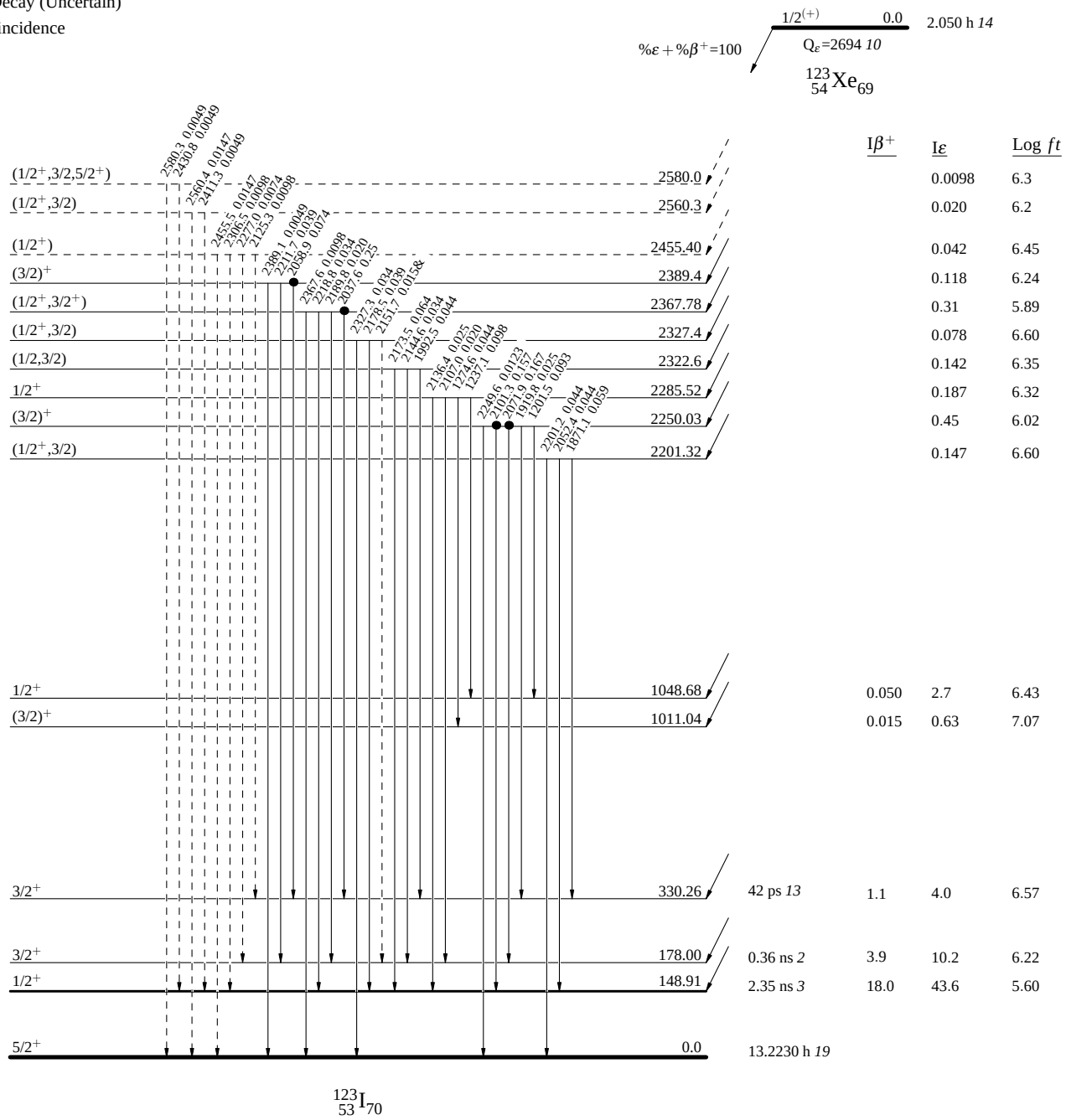
† From 1971St08, unless otherwise noted.
‡ From γγ-coin. Uncertainty assigned by evaluators. Iγ=1.15 *20* for the doubly-placed 1241γ (1971St08).
# From Adopted Gammas, supported by ce data given in comments from this study. Conversion coefficients from 1971St08 are obtained by assuming Mult=E2 for 148.9γ (α(K)theo=0.325 quoted in 1971St08), for which α(K)exp=0.32 *2* is also determined by 1971St08 with a separate measurement of γ-ce coincidence. Conversion coefficients from 1981Bo25 are obtained using I(ce) values from their work and Iγ values from 1971St08 and are normalized to α(K)exp=0.32 *2* from 1971St08 for 148.9γ. Assignments for unplaced transitions are from ce data in 1981Bo25.
@ For absolute intensity per 100 decays, multiply by 0.491 *6*.
& Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
[a] Multiply placed with undivided intensity.
[b] Multiply placed with intensity suitably divided.
[c] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

^{123}Xe ε decay 1971St08,1971Ho02

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
& Multiply placed: undivided intensity given

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)
- Coincidence

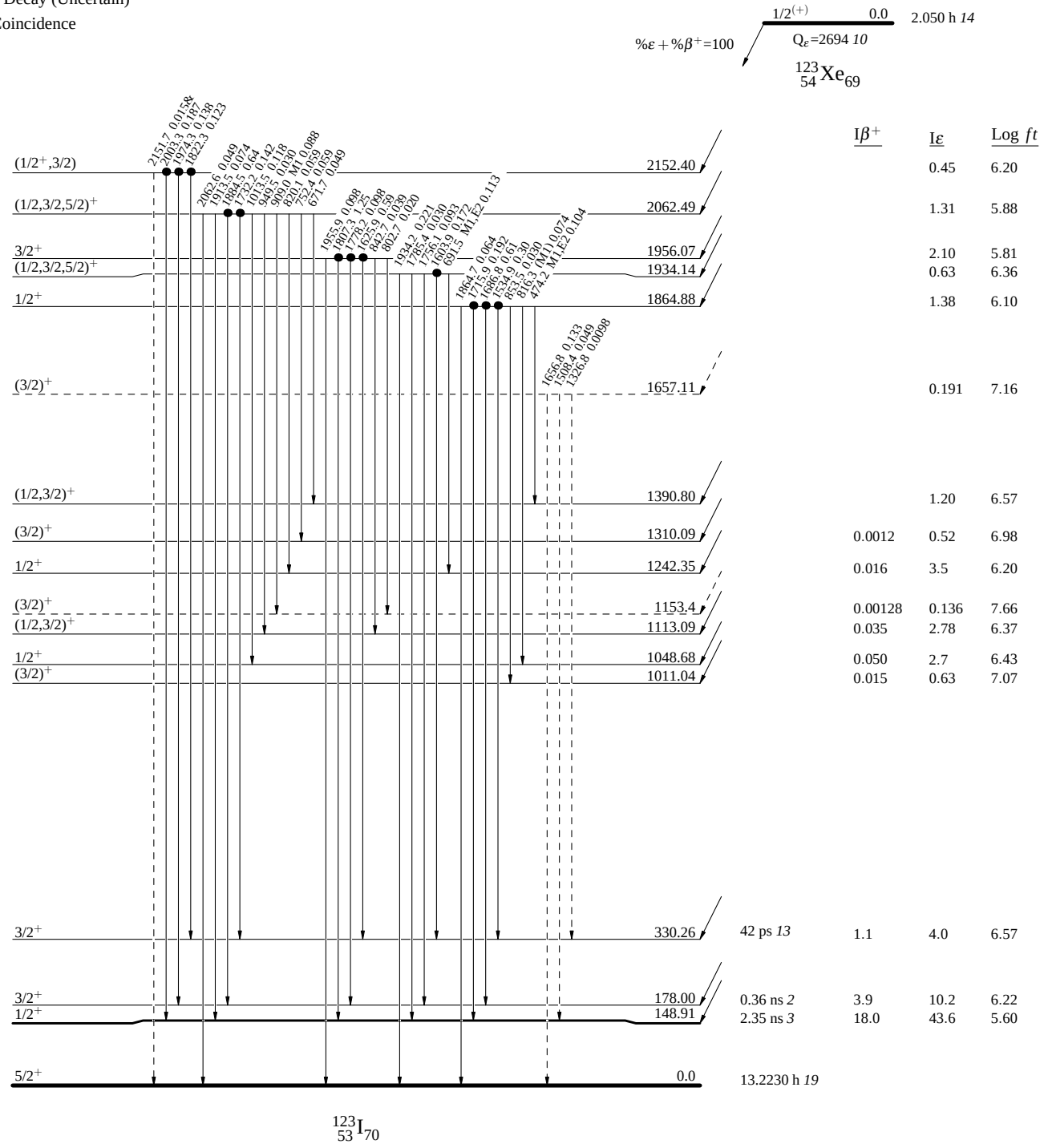


^{123}Xe ε decay 1971St08,1971Ho02

Decay Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
& Multiply placed: undivided intensity given

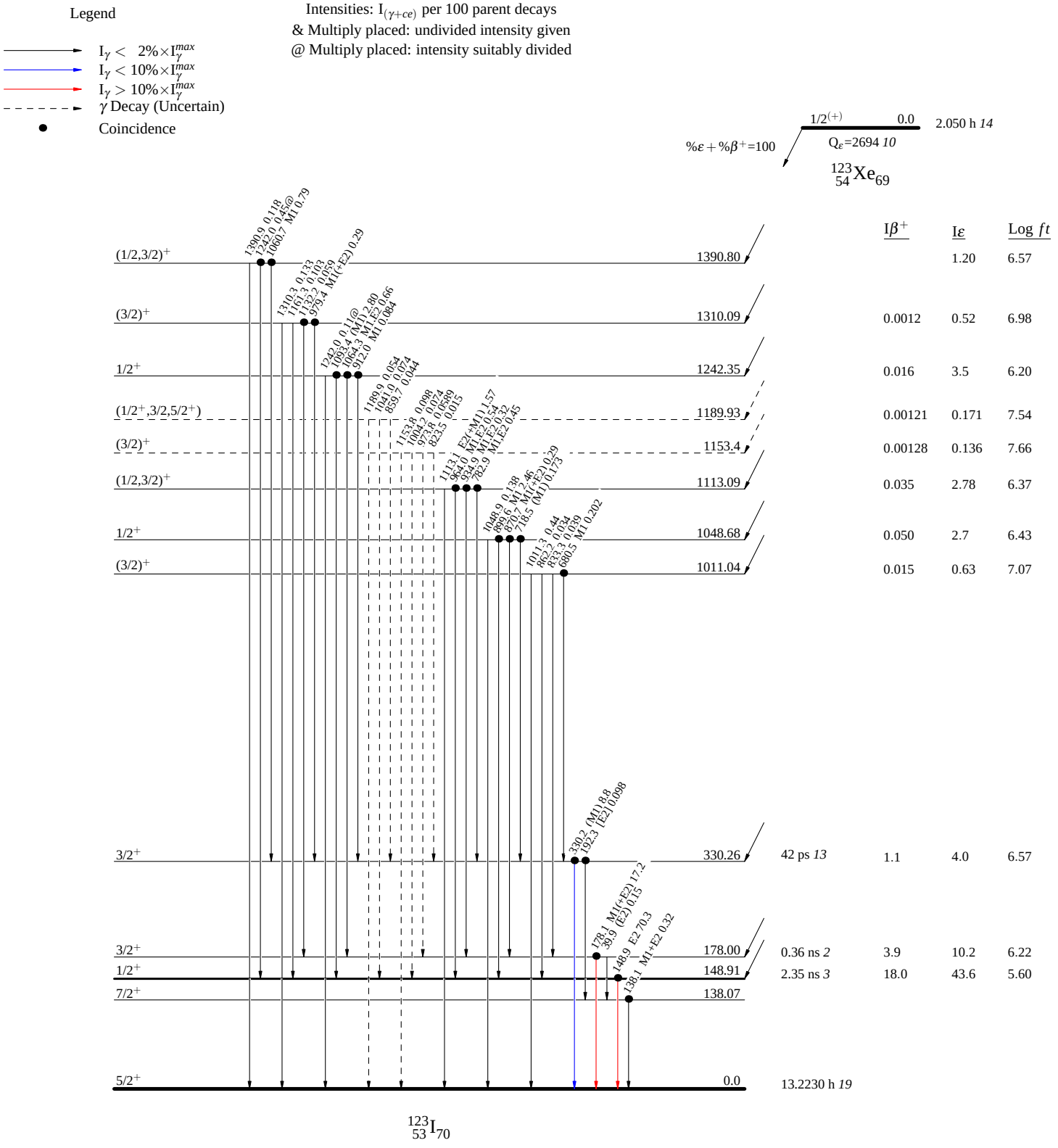
Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)
- Coincidence



^{123}Xe ε decay 1971St08,1971Ho02

Decay Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided



^{80}Se(^{48}Ca,p4nγ) 2012Si04,2012Si21

2012Si04, 2012Si21: E=207 MeV ^{48}Ca beam was produced from the ATLAS accelerator at Argonne National Laboratory. Target was 0.6 mg/cm^2 thick ^{80}Se. γ rays were detected with the Gammasphere spectrometer consisting of 101 Compton-suppressed Ge detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma\gamma$-coin, $\gamma\gamma\gamma\gamma$-coin, $\gamma\gamma(\theta)$. Deduced levels, J, π, band structures, γ-ray multipolarities. Comparison with cranked Nilsson-Strutinsky calculations.

All data up to 13193 level are from 2012Si04 and data above that (highly deformed bands with unresolved level energies) are from 2012Si21.

^{123}I Levels

Level scheme and band assignments are mainly from 2012Si04, based on and extended from those in (^{14}N,α3nγ) (2006Wa05 and 2009Zh19) and those in (α,2nγ) (1993Go04).

E(level)†	Jπ&	E(level)†	Jπ&	E(level)†	Jπ&	E(level)†	Jπ&
0.0	5/2$^+$	3904.2[c] 4	27/2$^+$	9284.6[f] 5	53/2$^+$	1255+z[h]	(65/2$^+$)
138.2[d] 2	7/2$^+$	4054.3[e] 4	29/2$^+$	9371.3[g] 5	51/2$^-$	2554+x[i]	(63/2$^-$)
474.3[a] 2	7/2$^+$	4250.5[b] 4	29/2$^+$	9722.7[g] 5	55/2$^-$	2585+y[j]	(67/2$^+$)
552.1[e] 2	9/2$^+$	4325.8[g] 5	31/2$^-$	10368.1 7	57/2$^+$	2618+z[h]	(69/2$^+$)
670.9 2	9/2$^+$	4541.9[d] 4	31/2$^+$	10494.7[f] 6	55/2$^+$	3976+x[i]	(67/2$^-$)
793.9[d] 2	11/2$^+$	4700.2[c] 6	31/2$^+$	10669.6 7	57/2	4048+y[j]	(71/2$^+$)
943.2[g] 2	11/2$^-$	4900.6[e] 4	33/2$^+$	10753.3[f] 6	57/2$^+$	4080+z[h]	(73/2$^+$)
1080.1[a] 4	11/2$^+$	5000.3[g] 5	35/2$^-$	10836.5[g] 6	59/2$^-$	5505+x[i]	(71/2$^-$)
1155.8[e] 2	13/2$^+$	5488.1[d] 4	35/2$^+$	11056.8 8	57/2	5637+y[j]	(75/2$^+$)
1452.7[g] 3	15/2$^-$	5591.1[g] 5	39/2$^-$	x‡[i]	(55/2$^-$)	5651+z[h]	(77/2$^+$)
1576.3[d] 3	15/2$^+$	5817.9[e] 4	37/2$^+$	11511.0[f] 6	61/2$^+$	7149+x[i]	(75/2$^-$)
1791.3[a] 5	15/2$^+$	5944.4 5	37/2$^+$	11830.7 8	59/2	7333+z[h]	(81/2$^+$)
1870.7[e] 3	17/2$^+$	6422.7 5	41/2$^-$	12032.8 9	61/2	7352+y[j]	(79/2$^+$)
2039.3[g] 4	19/2$^-$	6650.7 5	41/2$^+$	12312.6 9	61/2	8905+x[i]	(79/2$^-$)
2466.0[d] 3	19/2$^+$	6775.8[g] 5	43/2$^-$	12440.2 9	61/2	9138+z[h]	(85/2$^+$)
2613.4[g] 4	23/2$^-$	6936.7[e] 5	41/2$^+$	12469.7 7	63/2	9201+y[j]	(83/2$^+$)
2648.1[a] 5	19/2$^+$	7031.0 6	43/2	12630.9 11	63/2	10762+x[i]	(83/2$^-$)
2711.4[e] 3	21/2$^+$	7177.0[f] 5	43/2$^+$	12755.1 9	63/2	11055+z[h]	(89/2$^+$)
2876.0[b] 4	21/2$^+$	7635.0 6	45/2	12772.1 9	63/2	11152+y[j]	(87/2$^+$)
3083.4[d] 3	23/2$^+$	7660.4 8	45/2	12915.9 9	63/2	12678+x[i]	(87/2$^-$)
3199.9[c] 4	23/2$^+$	7696.5[f] 5	47/2$^+$	y#[j]	(59/2$^+$)	13065+z[h]	(93/2$^+$)
3323.7[e] 3	25/2$^+$	7766.3[g] 5	47/2$^-$	13090.0 9		13212+y[j]	(91/2$^+$)
3337.4[a] 7	23/2$^+$	7908.2 9	45/2	13192.9 9		14674+x[i]	(91/2$^-$)
3490.4[b] 4	25/2$^+$	8388.7[f] 5	49/2$^+$	z@[h]	(61/2$^+$)	15156+z[h]	(97/2$^+$)
3511.7[g] 4	27/2$^-$	8567.5[g] 5	49/2$^-$	1233+x[i]	(59/2$^-$)		
3716.1[d] 3	27/2$^+$	9136.4[f] 5	51/2$^+$	1240+y[j]	(63/2$^+$)		

† From a least-squares fit to γ-ray energies.
‡ x estimated at 11250 keV (2012Si21).
# y estimated at 13000 keV (2012Si21).
@ z estimated at 13300 keV (2012Si21).
& As proposed in 2012Si04 based on $\gamma\gamma(\theta)$, band structures and assignments for low-lying states for levels up 12915.9 level and from 2012Si21 for levels based on E(level)=x, y and z assiged by comparisons with high-spin bands in neighboring nuclei ^{120}Te (2012Na01), ^{125}I (2011Si18), and ^{125}Xe (2011Al02). When considered in Adopted Levels, assignments of spin and/or parity will be placed inside parenthesis by the evaluator if there is no firm evidence.
[a] Band(A): Band based on 7/2$^+$.

Continued on next page (footnotes at end of table)

^{80}Se(^{48}Ca,p4nγ) 2012Si04,2012Si21 (continued)

^{123}I Levels (continued)

[b] Band(B): Band based on $21/2^+,\alpha=+1/2$.
[c] Band(b): Band based on $23/2^+,\alpha=-1/2$.
[d] Band(C): Band based on $7/2^+,\alpha=-1/2$.
[e] Band(c): Band based on $9/2^+,\alpha=+1/2$.
[f] Seq.(G): Sequence based on $43/2^+$.
[g] Seq.(H): Sequence based on $11/2^-$.
[h] Band(D): Band based on $(61/2^+)$.
[i] Band(E): Band based on $(55/2^-)$.
[j] Band(F): Band based on $(59/2^+)$.

$\gamma(^{123}I)$

Intensity ratio is defined as $R_\theta=I\gamma_{fb}/I\gamma_{90^\circ}$, with $I\gamma_{fb}$ and $I\gamma_{90^\circ}$ the total coincidence intensity (gating on γ rays at all angles) observed at forward and backward (fb) angles, and at 90°, respectively. Typical values are ≈1.4 and ≈0.6 for stretched quadrupole (Q) and dipole (D) transitions, respectively (2012Si04).
Note that there are different normalizations for quoted relative Iγ values. Refer to the Iγ footnote for details.

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	Comments
(61.5)		7696.5	$47/2^+$	7635.0	45/2		E_γ,Mult.: According to e-mail replies of April 5 and 7, 2012 from one of the authors (A. K. Singh), this γ ray was not observed directly, its existence was inferred from $\gamma\gamma$ coin data. Also the assignment of E1 multipolarity shown in table I of 2012Si04 is an error in the paper; its multipolarity remains unknown.
118.8 *2*		670.9	$9/2^+$	552.1	$9/2^+$		
123.8 *4*	5.6 *4*	3323.7	$25/2^+$	3199.9	$23/2^+$	D	R_θ=0.53 *7*.
138.2 *2*		138.2	$7/2^+$	0.0	$5/2^+$	D	R_θ=0.68 *4*.
148.2 *2*	21.0 *12*	9284.6	$53/2^+$	9136.4	$51/2^+$	D	R_θ=0.62 *4*.
149.3 *2*		943.2	$11/2^-$	793.9	$11/2^+$		
196.6 *2*		670.9	$9/2^+$	474.3	$7/2^+$	D	R_θ=0.61 *8*.
225.7 *4*	7.6 *5*	3716.1	$27/2^+$	3490.4	$25/2^+$	D	R_θ=0.60 *6*.
240.3[a] *4*	7.2[a@] *4*	3323.7	$25/2^+$	3083.4	$23/2^+$		
240.3[a] *4*	11.6[a@] *4*	7177.0	$43/2^+$	6936.7	$41/2^+$		
241.8 *2*		793.9	$11/2^+$	552.1	$9/2^+$	D	R_θ=0.60 *4*.
245.4 *4*	7.8 *4*	2711.4	$21/2^+$	2466.0	$19/2^+$	D	R_θ=0.64 *6*.
258.6 *4*	8.0 *3*	10753.3	$57/2^+$	10494.7	$55/2^+$	D	R_θ=0.74 *12*.
272.3 *2*		943.2	$11/2^-$	670.9	$9/2^+$	E1	R_θ=0.74 *6*. POL=+0.15 *4*.
290.5 *4*	8.5 *4*	3490.4	$25/2^+$	3199.9	$23/2^+$	D	R_θ=0.75 *5*.
294.4 *6*	4.3 *20*	1870.7	$17/2^+$	1576.3	$15/2^+$		
323.9 *4*	6.2 *4*	3199.9	$23/2^+$	2876.0	$21/2^+$	D	R_θ=0.56 *8*.
329.8 *4*	5.7 *3*	5817.9	$37/2^+$	5488.1	$35/2^+$	D	R_θ=0.51 *7*.
338.2 *4*	7.8 *4*	4054.3	$29/2^+$	3716.1	$27/2^+$	D	R_θ=0.42 *4*.
346.3 *4*	9.6 *5*	4250.5	$29/2^+$	3904.2	$27/2^+$	D	R_θ=0.53 *6*.
351.4 *2*	20.1[#] *10*	9722.7	$55/2^-$	9371.3	$51/2^-$	Q	R_θ=1.53 *23*.
353.1 *2*	26.4[#@] *13*	6775.8	$43/2^-$	6422.7	$41/2^-$		
358.7 *6*	3.7 *20*	4900.6	$33/2^+$	4541.9	$31/2^+$	D	R_θ=0.48 *17*.
361.9 *4*	6.1 *3*	1155.8	$13/2^+$	793.9	$11/2^+$	D	R_θ=0.57 *9*.
372.0 *2*	24.1 *12*	3083.4	$23/2^+$	2711.4	$21/2^+$	D	R_θ=0.53 *4*.
391.1 *4*	46.1 *25*	943.2	$11/2^-$	552.1	$9/2^+$	D	R_θ=0.80 *4*.
392.4 *2*	21.5 *10*	3716.1	$27/2^+$	3323.7	$25/2^+$	D	R_θ=0.75 *5*.
407.0 *4*	6.9 *3*	3490.4	$25/2^+$	3083.4	$23/2^+$	D	R_θ=0.64 *8*.

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^{80}Se(^{48}Ca,p4nγ) 2012Si04,2012Si21 (continued)

$\gamma(^{123}I)$ (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	Comments
409.2 *6*	4.2 *5*	1080.1	11/2$^+$	670.9	9/2$^+$		
413.8 *6*	4.2 *4*	3904.2	27/2$^+$	3490.4	25/2$^+$	D	R_θ=0.61 *6*.
413.9 *2*		552.1	9/2$^+$	138.2	7/2$^+$		
420.5 *6*	4.5 *3*	1576.3	15/2$^+$	1155.8	13/2$^+$		
438.1 *2*	26.6[#] *14*	9722.7	55/2$^-$	9284.6	53/2$^+$	E1	R_θ=0.80 *6*. POL=+0.12 *5*.
456.3 *4*	8.1 *4*	5944.4	37/2$^+$	5488.1	35/2$^+$		
474.3 *2*		474.3	7/2$^+$	0.0	5/2$^+$	D	R_θ=0.43 *9*.
487.6 *4*	10.8 *5*	4541.9	31/2$^+$	4054.3	29/2$^+$		
488.5 *4*	11.3 *7*	3199.9	23/2$^+$	2711.4	21/2$^+$	D	R_θ=0.63 *7*.
509.5 *2*	100[#] *5*	1452.7	15/2$^-$	943.2	11/2$^-$	Q	R_θ=1.30 *4*.
519.5 *2*	71 *4*	7696.5	47/2$^+$	7177.0	43/2$^+$	Q	R_θ=1.54 *6*.
526.3 *4*	16.2 *8*	7177.0	43/2$^+$	6650.7	41/2$^+$		
528.0 *6*	[@]	1080.1	11/2$^+$	552.1	9/2$^+$		
532.7 *2*		670.9	9/2$^+$	138.2	7/2$^+$		
534.4 *4*	15.1 *8*	4250.5	29/2$^+$	3716.1	27/2$^+$		
551.8 *6*	4.5 *4*	3199.9	23/2$^+$	2648.1	19/2$^+$		
552.1 *2*		552.1	9/2$^+$	0.0	5/2$^+$	Q	R_θ=1.37 *6*.
574.1 *2*	92[#] *5*	2613.4	23/2$^-$	2039.3	19/2$^-$	Q	R_θ=1.42 *4*.
580.5 *4*	12.1 *8*	3904.2	27/2$^+$	3323.7	25/2$^+$		
586.6 *2*	95[#] *5*	2039.3	19/2$^-$	1452.7	15/2$^-$	Q	R_θ=1.36 *6*.
590.8 *2*	79[#] *4*	5591.1	39/2$^-$	5000.3	35/2$^-$	Q	R_θ=1.40 *5*.
595.3 *4*	8.6 *4*	2466.0	19/2$^+$	1870.7	17/2$^+$		
598.1 *6*	3.6 *3*	12630.9	63/2	12032.8	61/2	D	R_θ=0.49 *13*.
603.7 *2*	109 *5*	1155.8	13/2$^+$	552.1	9/2$^+$		
604.0 *6*	[@]	7635.0	45/2	7031.0	43/2		
605.8 *6*		1080.1	11/2$^+$	474.3	7/2$^+$	Q	R_θ=1.23 *5*.
608.3 *4*	8.0 *5*	7031.0	43/2	6422.7	41/2$^-$		
612.3 *2*	82 *4*	3323.7	25/2$^+$	2711.4	21/2$^+$	Q	R_θ=1.36 *7*.
614.4 *4*	8.9 *6*	3490.4	25/2$^+$	2876.0	21/2$^+$		
617.4 *2*	40.1 *21*	3083.4	23/2$^+$	2466.0	19/2$^+$	Q	R_θ=1.70 *23*.
632.7 *4*	14.3 *7*	3716.1	27/2$^+$	3083.4	23/2$^+$	Q	R_θ=1.12 *20*.
655.7 *6*		793.9	11/2$^+$	138.2	7/2$^+$	Q	R_θ=1.31 *13*.
670.9 *2*		670.9	9/2$^+$	0.0	5/2$^+$	Q	R_θ=1.17 *8*.
674.5[a] *2*	84[a#] *4*	5000.3	35/2$^-$	4325.8	31/2$^-$	Q	R_θ=1.44 *6*.
674.5[a] *6*	1.8[a] *3*	11511.0	61/2$^+$	10836.5	59/2$^-$		
689.3 *4*	8.9 *7*	3337.4	23/2$^+$	2648.1	19/2$^+$		
692.2 *2*	73 *4*	8388.7	49/2$^+$	7696.5	47/2$^+$	M1	R_θ=0.60 *7*. POL=−0.04 *2*.
704.3 *4*	17.1 *10*	3904.2	27/2$^+$	3199.9	23/2$^+$	Q	R_θ=1.41 *13*.
706.2 *4*	18.3 *8*	6650.7	41/2$^+$	5944.4	37/2$^+$	Q	R_θ=1.44 *10*.
711.2 *4*	9.7 *5*	1791.3	15/2$^+$	1080.1	11/2$^+$		
714.9 *2*	100 *5*	1870.7	17/2$^+$	1155.8	13/2$^+$	Q	R_θ=1.30 *5*.
730.6 *2*	46.5 *24*	4054.3	29/2$^+$	3323.7	25/2$^+$	Q	R_θ=1.70 *19*.
747.7 *2*	41.0 *22*	9136.4	51/2$^+$	8388.7	49/2$^+$	D	R_θ=0.68 *10*.
754.3 *4*	16.3 *9*	7177.0	43/2$^+$	6422.7	41/2$^-$	E1	R_θ=0.62 *7*. POL=+0.10 *3*.
757.7 *2*	31.9 *14*	11511.0	61/2$^+$	10753.3	57/2$^+$	Q	R_θ=1.38 *6*.
760.1 *4*	8.2 *5*	4250.5	29/2$^+$	3490.4	25/2$^+$		
782.4 *2*	61 *3*	1576.3	15/2$^+$	793.9	11/2$^+$	Q	R_θ=1.56 *11*.
796.0 *4*	9.8 *6*	4700.2	31/2$^+$	3904.2	27/2$^+$	Q	R_θ=1.50 *13*.
801.2 *2*	30.8[#] *16*	8567.5	49/2$^-$	7766.3	47/2$^-$	M1	R_θ=0.53 *15*. POL=−0.09 *3* for 801.2+803.8.
803.8 *2*	21.1[#] *9*	9371.3	51/2$^-$	8567.5	49/2$^-$	M1	R_θ=0.64 *8*. POL=−0.09 *3* for 801.2+803.8.
814.1 *2*	89[#] *5*	4325.8	31/2$^-$	3511.7	27/2$^-$	Q	R_θ=1.38 *4*.
825.8 *2*	22.3 *13*	4541.9	31/2$^+$	3716.1	27/2$^+$	Q	R_θ=1.12 *10*.
831.6 *2*	49.2[#] *23*	6422.7	41/2$^-$	5591.1	39/2$^-$	D	R_θ=0.51 *4*.

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^{80}Se(^{48}Ca,p4nγ) 2012Si04,2012Si21 (continued)

$\gamma(^{123}I)$ (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	Comments
840.7 *2*	92 *5*	2711.4	$21/2^+$	1870.7	$17/2^+$	Q	R_θ=1.20 *6*.
846.3 *2*	41.7 *22*	4900.6	$33/2^+$	4054.3	$29/2^+$	Q	R_θ=1.50 *10*.
856.8 *4*	9.3 *10*	2648.1	$19/2^+$	1791.3	$15/2^+$		
859.2 *4*	15.8 *8*	7635.0	45/2	6775.8	$43/2^-$	D	R_θ=0.60 *9*.
877.2 *6*	3.8 *3*	7908.2	45/2	7031.0	43/2	D	R_θ=0.49 *6*.
884.6 *6*	4.0 *4*	7660.4	45/2	6775.8	$43/2^-$	D	R_θ=0.58 *8*.
889.7 *2*	52 *3*	2466.0	$19/2^+$	1576.3	$15/2^+$	Q	R_θ=1.40 *7*.
895.9 *4*	17.4 *12*	9284.6	$53/2^+$	8388.7	$49/2^+$	Q	R_θ=1.69 *21*.
898.3 *2*	89[#] *4*	3511.7	$27/2^-$	2613.4	$23/2^-$	Q	R_θ=1.58 *10*.
917.3 *2*	34.0 *18*	5817.9	$37/2^+$	4900.6	$33/2^+$	Q	R_θ=1.60 *12*.
946.2 *4*	9.8 *5*	5488.1	$35/2^+$	4541.9	$31/2^+$		
946.9 *4*	7.9 *6*	10669.6	57/2	9722.7	$55/2^-$	D	R_θ=0.64 *6*.
958.7 *4*	7.2 *4*	12469.7	63/2	11511.0	$61/2^+$	D	R_θ=0.43 *8*.
990.5 *2*	31.5[#] *15*	7766.3	$47/2^-$	6775.8	$43/2^-$	Q	R_θ=1.42 *10*.
1005.3 *4*	8.4 *4*	2876.0	$21/2^+$	1870.7	$17/2^+$	Q	R_θ=1.24 *8*.
1030.6 *6*	3.4 *3*	10753.3	$57/2^+$	9722.7	$55/2^-$		
1043.8 *4*	10.6 *5*	5944.4	$37/2^+$	4900.6	$33/2^+$	Q	R_θ=1.34 *13*.
1083.5 *4*	11.6 *7*	10368.1	$57/2^+$	9284.6	$53/2^+$	Q	R_θ=1.26 *11*.
1113.8 *4*	17.1[#] *10*	10836.5	$59/2^-$	9722.7	$55/2^-$	Q	R_θ=1.20 *4*.
1118.8 *4*	16.2 *10*	6936.7	$41/2^+$	5817.9	$37/2^+$	Q	R_θ=1.40 *7*.
1161.1 *4*	5.1 *4*	11830.7	59/2	10669.6	57/2	D	R_θ=0.78 *8*.
1184.7 *2*	28.3[#] *12*	6775.8	$43/2^-$	5591.1	$39/2^-$	Q	R_θ=1.48 *6*.
1196.3 *6*	4.4 *5*	12032.8	61/2	10836.5	$59/2^-$	D	R_θ=0.54 *10*.
1210.1 *4*	8.7 *4*	10494.7	$55/2^+$	9284.6	$53/2^+$	D	R_θ=0.74 *8*.
1233		1233+x	$(59/2^-)$	x	$(55/2^-)$		
1240		1240+y	$(63/2^+)$	y	$(59/2^+)$		
1244.1 *6*	3.2 *4*	12755.1	63/2	11511.0	$61/2^+$	D	R_θ=0.71 *23*.
1255		1255+z	$(65/2^+)$	z	$(61/2^+)$		
1261.1 *6*	2.1 *5*	12772.1	63/2	11511.0	$61/2^+$	D	R_θ=0.57 *15*.
1321		2554+x	$(63/2^-)$	1233+x	$(59/2^-)$		
1334.1 *6*	1.8 *5*	11056.8	57/2	9722.7	$55/2^-$	D	R_θ=0.58 *11*.
1345		2585+y	$(67/2^+)$	1240+y	$(63/2^+)$		
1363		2618+z	$(69/2^+)$	1255+z	$(65/2^+)$		
1404.9 *6*	2.3 *10*	12915.9	63/2	11511.0	$61/2^+$	D	R_θ=0.60 *11*.
1422		3976+x	$(67/2^-)$	2554+x	$(63/2^-)$		
1439.9 *4*	9.8 *9*	9136.4	$51/2^+$	7696.5	$47/2^+$	Q	R_θ=1.21 *14*.
1462		4080+z	$(73/2^+)$	2618+z	$(69/2^+)$		
1463		4048+y	$(71/2^+)$	2585+y	$(67/2^+)$		
1468.7 *4*	15.8 *7*	10753.3	$57/2^+$	9284.6	$53/2^+$	Q	R_θ=1.46 *9*.
1476.1 *6*	1.0 *2*	12312.6	61/2	10836.5	$59/2^-$	D	R_θ=0.50 *18*.
1529		5505+x	$(71/2^-)$	3976+x	$(67/2^-)$		
1571		5651+z	$(77/2^+)$	4080+z	$(73/2^+)$		
1579.0 *6*	1.5 *3*	13090.0		11511.0	$61/2^+$		
1589		5637+y	$(75/2^+)$	4048+y	$(71/2^+)$		
1603.7 *6*	1.1 *2*	12440.2	61/2	10836.5	$59/2^-$	D	R_θ=0.49 *16*.
1644		7149+x	$(75/2^-)$	5505+x	$(71/2^-)$		
1681.9 *6*	1.2 *2*	13192.9		11511.0	$61/2^+$		
1682		7333+z	$(81/2^+)$	5651+z	$(77/2^+)$		
1715		7352+y	$(79/2^+)$	5637+y	$(75/2^+)$		
1756		8905+x	$(79/2^-)$	7149+x	$(75/2^-)$		
1805		9138+z	$(85/2^+)$	7333+z	$(81/2^+)$		
1849		9201+y	$(83/2^+)$	7352+y	$(79/2^+)$		
1857		10762+x	$(83/2^-)$	8905+x	$(79/2^-)$		
1916		12678+x	$(87/2^-)$	10762+x	$(83/2^-)$		
1917		11055+z	$(89/2^+)$	9138+z	$(85/2^+)$		

Continued on next page (footnotes at end of table)

^{80}Se(^{48}Ca,p4nγ) 2012Si04,2012Si21 (continued)

$\gamma(^{123}I)$ (continued)

E_γ [†]	E_i(level)	J_i^π	E_f	J_f^π
1951	11152+y	(87/2$^+$)	9201+y	(83/2$^+$)
1996	14674+x	(91/2$^-$)	12678+x	(87/2$^-$)
2010	13065+z	(93/2$^+$)	11055+z	(89/2$^+$)
2060	13212+y	(91/2$^+$)	11152+y	(87/2$^+$)
2091	15156+z	(97/2$^+$)	13065+z	(93/2$^+$)

† From a general statement in 2012Si04 that the uncertainties are 0.2 to 0.6 keV depending on intensity, the evaluator has assigned $\Delta E\gamma$ as follows if Iγ is given: 0.2 keV for I$\gamma\geq$20, 0.4 keV for Iγ=5-20, and 0.6 keV for Iγ<5. Uncertainty of 0.2 keV is assigned for transitions lower down in the level scheme up to 1 MeV excitation where no Iγ values are listed in 2012Si04. $\Delta E\gamma$=1 keV is assumed for transitions from 2012Si21.

‡ Normalized to I(714.9γ)=100 *5* (for γ rays from positive-parity states), unless otherwise noted.

Normalized to I(509.5γ)=100 *5* (for γ rays from negative-parity states).

@ Measurement of intensity or intensity ratio not possible due to the presence of a γ-ray of overlapping energy.

& From $\gamma\gamma(\theta)$ data in 2012Si04. Electric or magnetic nature of the transition has been determined from an unpublished work of the linear polarization measurements for some transitions as indicated in 2012Si04, with the POL values from an email reply of March 23, 2012 from one of the author of 2012Si04-A. K. Singh, to the XUNDL compiler B. Singh. Note that authors' assignments of M1 or E1 and E2 are replaced (by the evaluator) with D and Q, respectively, where there is no experimental data for electric or magnetic nature of the transition.

a Multiply placed with intensity suitably divided.

^{80}Se(^{48}Ca,p4nγ) 2012Si04,2012Si21

Level Scheme

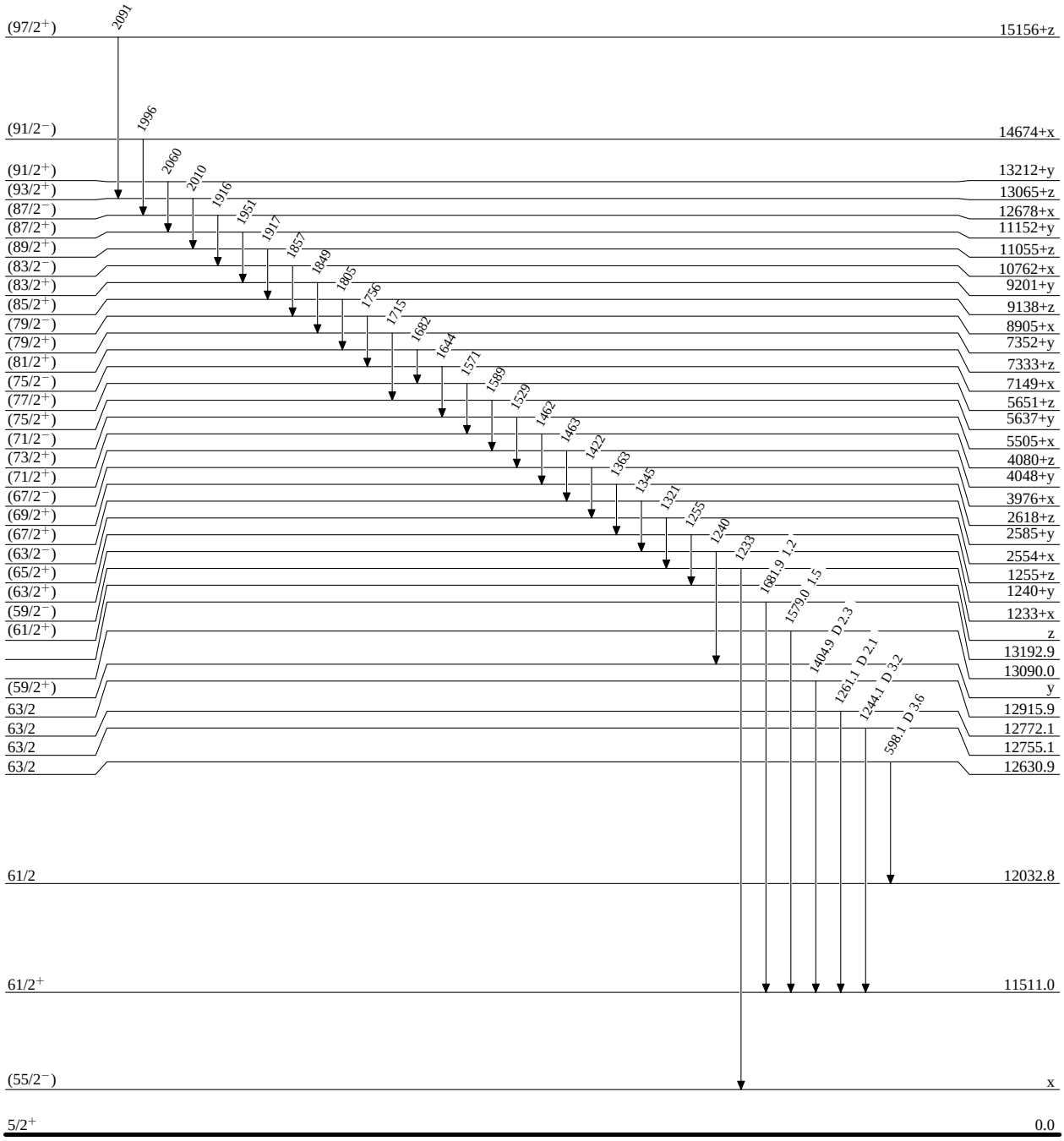
Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

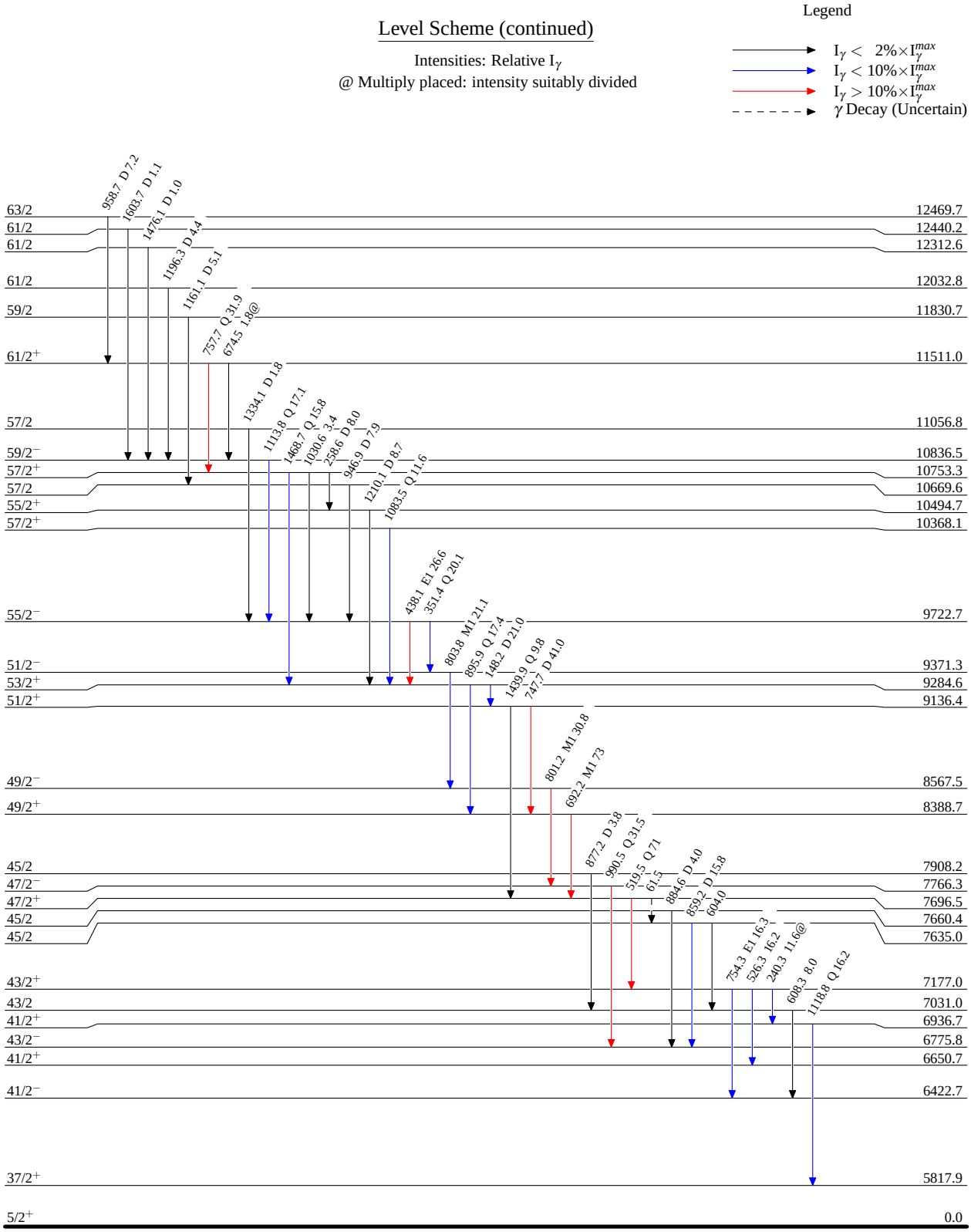


$^{123}_{53}I_{70}$

^{80}Se(^{48}Ca,p4nγ) 2012Si04,2012Si21

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided



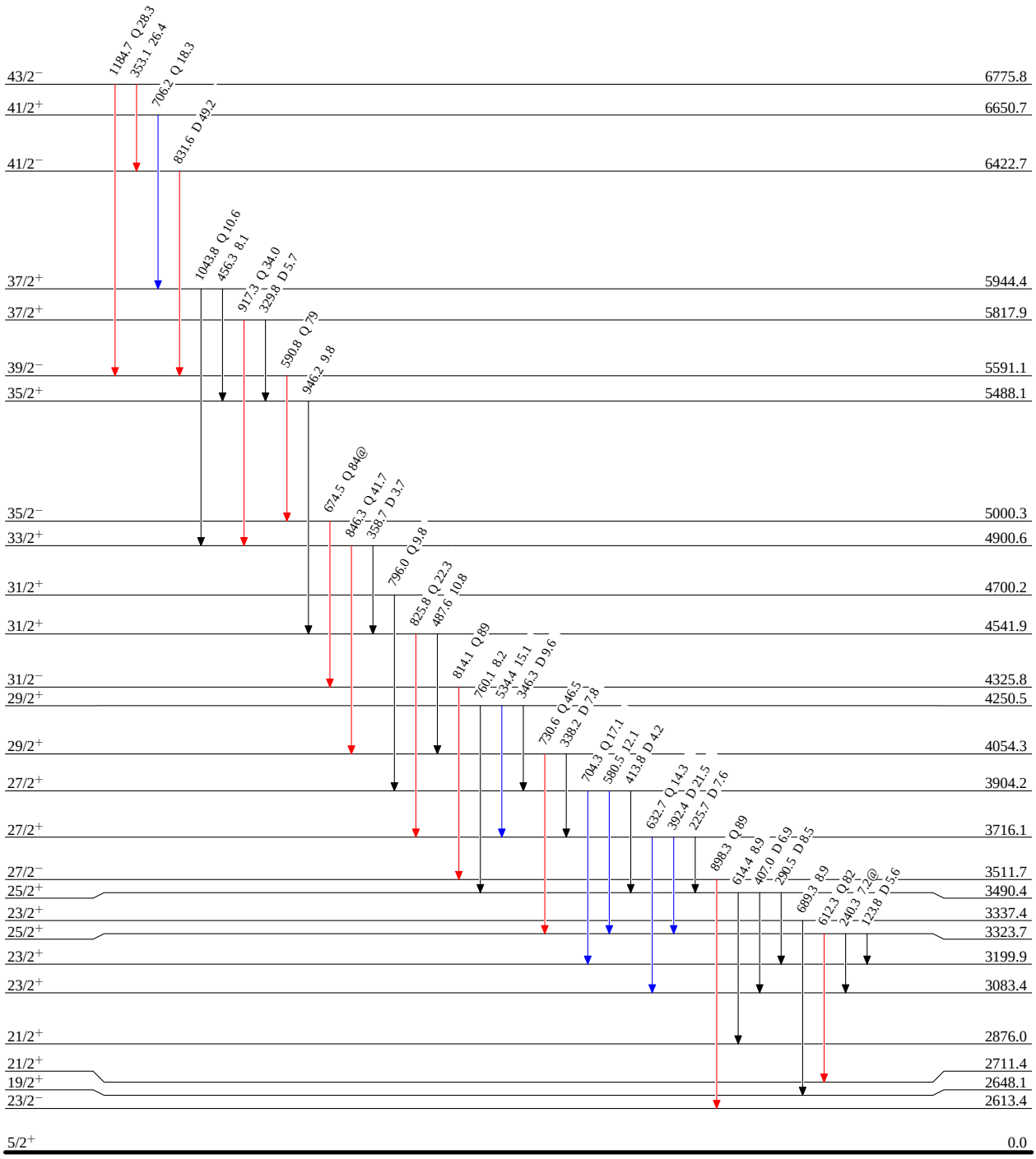
$^{123}_{53}I_{70}$

^{80}Se(^{48}Ca,p4nγ) 2012Si04,2012Si21

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



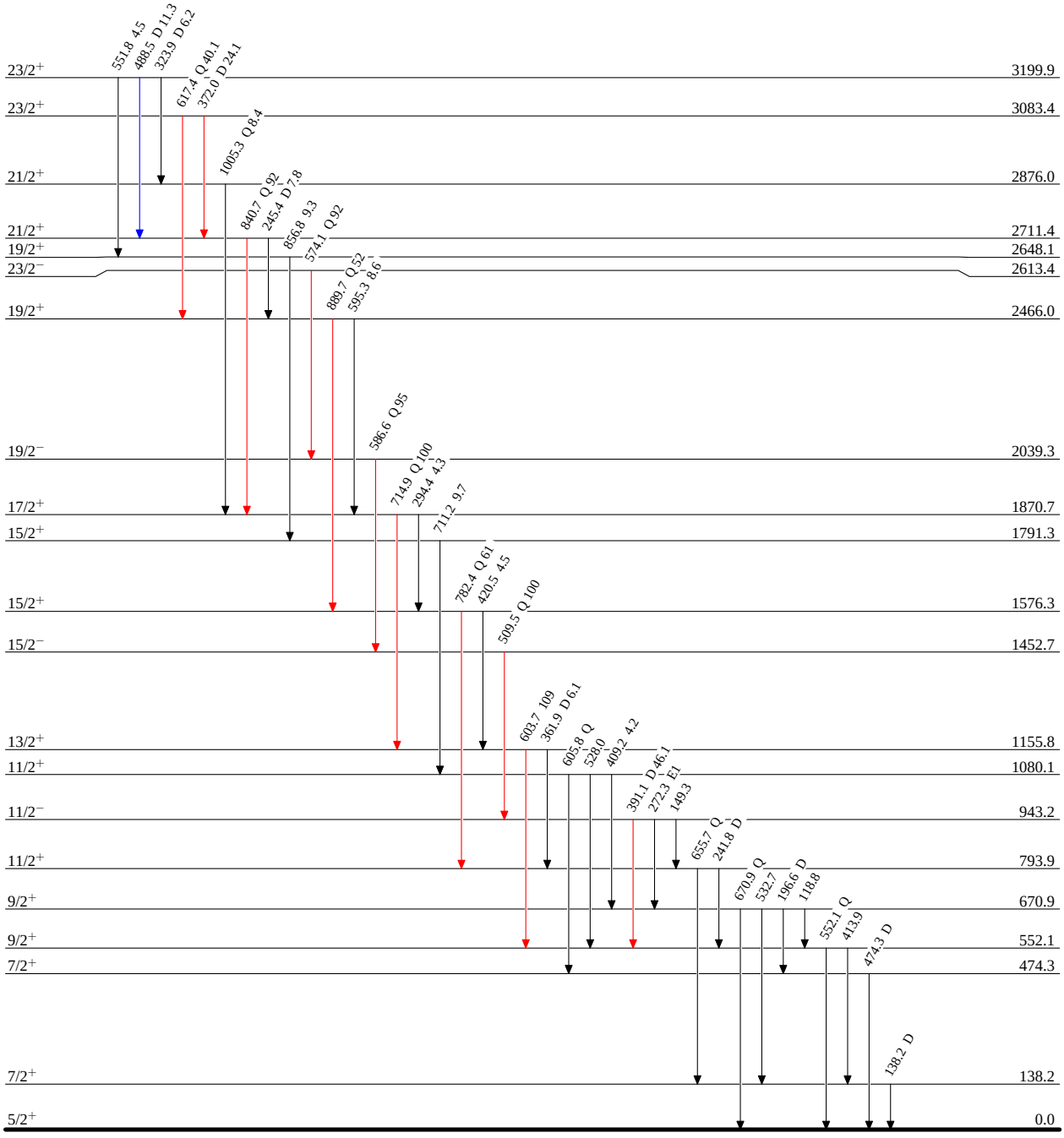
$^{123}_{53}I_{70}$

^{80}Se(^{48}Ca,p4nγ) 2012Si04,2012Si21

Level Scheme (continued)

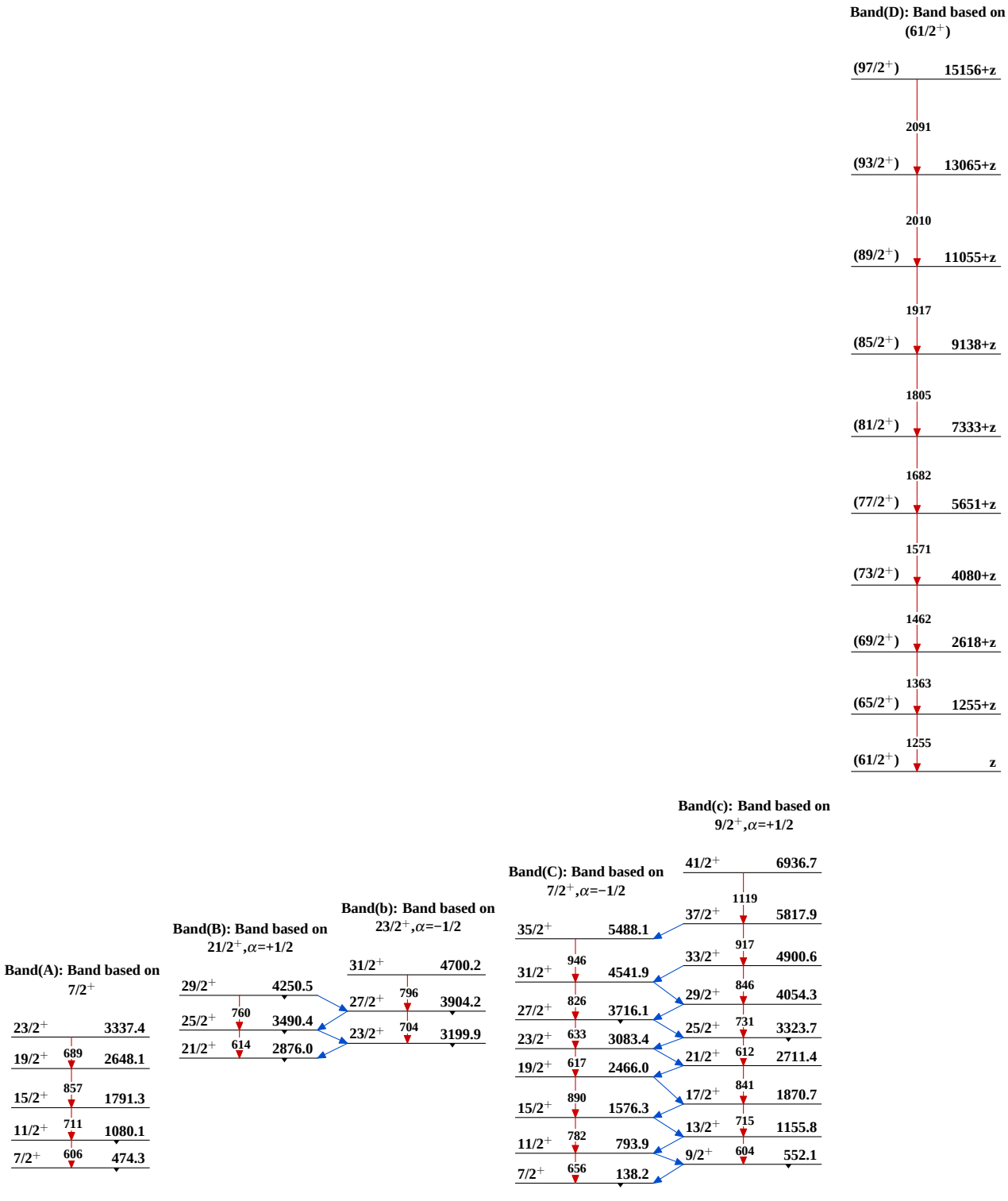
Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



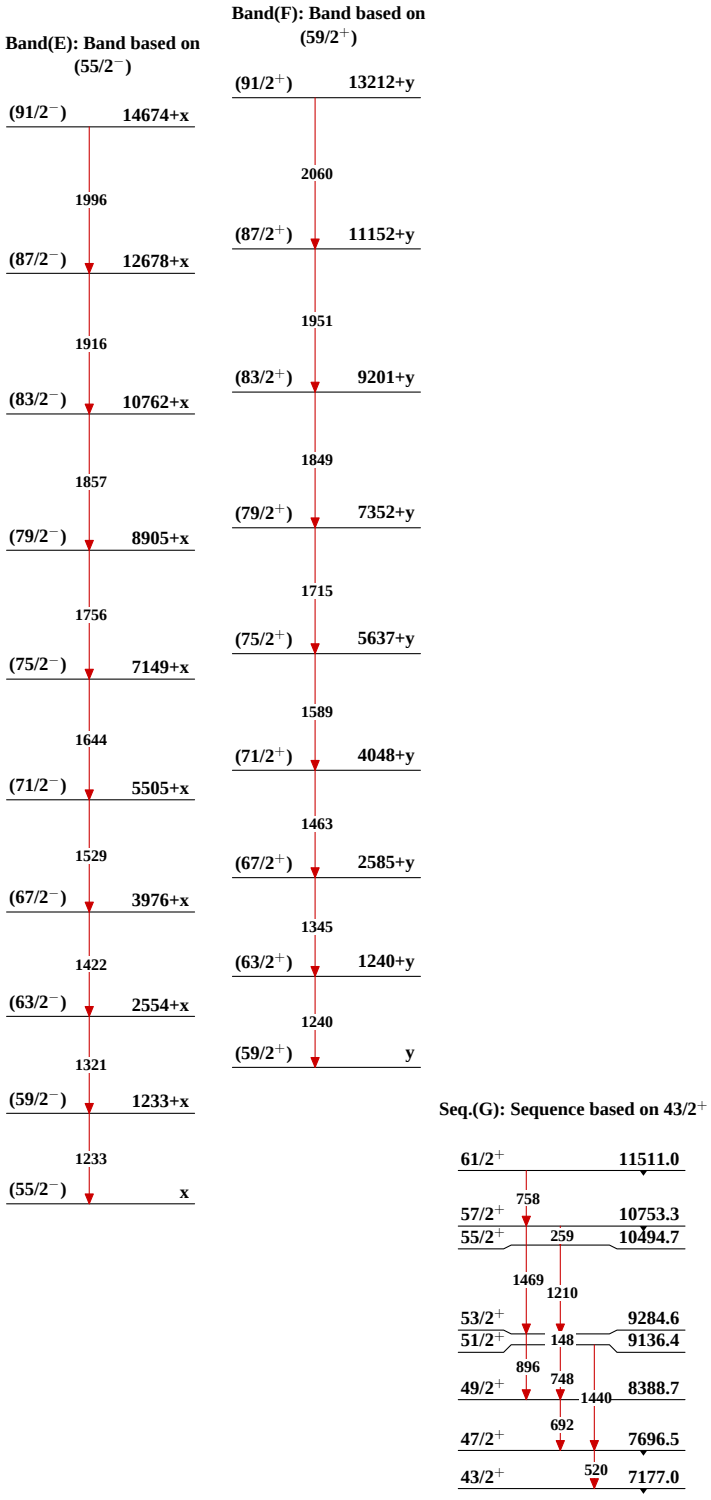
$^{123}_{53}I_{70}$

^{80}Se(^{48}Ca,p4nγ) 2012Si04,2012Si21



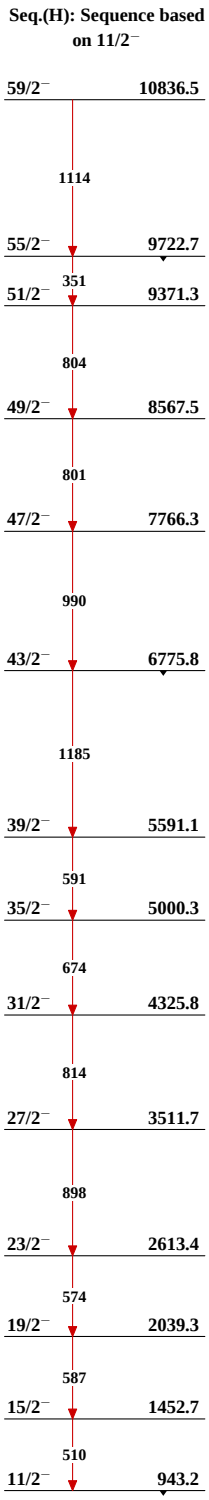
$^{123}_{53}I_{70}$

^{80}Se(^{48}Ca,p4nγ) 2012Si04,2012Si21 (continued)



$^{123}_{53}I_{70}$

^{80}Se(^{48}Ca,p4nγ) 2012Si04,2012Si21 (continued)



$^{123}_{53}I_{70}$

^{110}Pd(^{18}O,p4nγ) 1997Ba56

1997Ba56 (also 1997Bb12): E=75 MeV ^{18}O beam was produced from the XTU tandem accelerator of the Laboratori Nazionali di Legnaro. γ rays were detected with the GASP array consisting of 40 large-volume Compton-suppressed Ge detectors and an inner ball of 80 BGO counters and charged particles were detected with a spectrometer consisting of 40 E-ΔE silicon-detector telescopes. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma$(DCO), particle-$\gamma\gamma$-coin. Deduced levels, J, π, band structure, γ-ray multipolarities. Comparisons with total Routhian surface (TRS) cranking calculations.

^{123}I Levels

E(level)[†]	Jπ[@]	E(level)[†]	Jπ[@]	E(level)[†]	Jπ[@]	E(level)[†]	Jπ[@]
0.0	5/2$^+$	2613.4[&] *8*	23/2$^-$	6424.1 *9*	(41/2$^-$)	7579.0[#&] *10*	(45/2)
138.4 *4*	7/2$^+$	3511.9[&] *8*	(27/2$^-$)	6776.9[&] *9*	(43/2$^-$)	7885.2 *13*	
671.1 *4*	9/2$^+$	4326.4[&] *8*	(31/2$^-$)	6783.9 *11*		8023.3 *13*	
943.6[&] *7*	11/2$^-$	5001.0[&] *9*	(35/2$^-$)	7029.7 *10*	(43/2$^-$)	8314.5 *14*	
1452.8[&] *7*	15/2$^-$	5591.9[&] *9*	(39/2$^-$)	7179.2 *10*		8569.8[&] *11*	(47/2)
2039.4[&] *7*	19/2$^-$	6092.4[‡] *13*		7549.2 *11*		8985.0 *14*	

[†] From a least-squares fit to γ-ray energies.
[‡] This level perhaps decays to 5002 and 2614 levels. But the γ rays have not been observed.
[#] The order of 991γ-802γ cascade is reversed in Adopted Gammas, resulting in a level at 7766 instead of 7579 in 1997Ba56.
[@] Proposed by 1997Ba56, based on $\gamma\gamma$(DCO), band assignments and known assignments for low-lying states. Parenthesis are added by the evaluator due to lack of firm experimental evidence.
[&] Seq.(A): Sequence based on 943.6, 11/2$^-$. Configuration=1h$_{11/2}$.

γ(^{123}I)

E$_\gamma$[†]	I$_\gamma$[†]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[@]	Comments
138.4[‡]		138.4	7/2$^+$	0.0	5/2$^+$		
245.8 *5*	<2	7029.7	(43/2$^-$)	6783.9			
272.5[‡]		943.6	11/2$^-$	671.1	9/2$^+$		
291.2 *5*	2.8 *5*	8314.5		8023.3			
336.0 *5*	<2	7885.2		7549.2			
352.7 *2*	11.3 *5*	6776.9	(43/2$^-$)	6424.1	(41/2$^-$)	(D+Q)	Mult.: DCO=0.66 *7*.
474.1 *5*	3.4 *3*	8023.3		7549.2		(D)	Mult.: DCO=0.66 *33*.
509.2 *2*		1452.8	15/2$^-$	943.6	11/2$^-$	Q	Mult.: DCO=1.01 *4*.
519.5 *5*	6.9 *5*	7549.2		7029.7	(43/2$^-$)	(D+Q)	Mult.: DCO=0.72 *19*.
532.7[‡]		671.1	9/2$^+$	138.4	7/2$^+$		
574.0 *2*	95.7 *14*	2613.4	23/2$^-$	2039.4	19/2$^-$	Q	Mult.: DCO=1.12 *4*.
586.6 *2*	100.0 *11*	2039.4	19/2$^-$	1452.8	15/2$^-$	Q	Mult.: DCO=0.99 *3*.
590.9 *2*	42.4 *8*	5591.9	(39/2$^-$)	5001.0	(35/2$^-$)	Q	Mult.: DCO=1.23 *3*.
605.6 *5*	8.0 *10*	7029.7	(43/2$^-$)	6424.1	(41/2$^-$)	(D+Q)	Mult.: DCO=0.77 *17*.
671.1[‡]		671.1	9/2$^+$	0.0	5/2$^+$		
674.6 *2*	55.0 *11*	5001.0	(35/2$^-$)	4326.4	(31/2$^-$)	Q	Mult.: DCO=1.05 *6*.
691.5 *5*	<2	6783.9		6092.4			
755.1 *5*	<2	7179.2		6424.1	(41/2$^-$)		
802.1[#] *5*	8.3 *5*	7579.0	(45/2)	6776.9	(43/2$^-$)	D	Mult.: DCO=0.37 *14*.
814.5 *2*	65.1 *9*	4326.4	(31/2$^-$)	3511.9	(27/2$^-$)	Q	Mult.: DCO=1.07 *4*.
832.1 *2*	21.7 *5*	6424.1	(41/2$^-$)	5591.9	(39/2$^-$)	(D+Q)	Mult.: DCO=0.54 *5*.
898.5 *2*	79.1 *16*	3511.9	(27/2$^-$)	2613.4	23/2$^-$	Q	Mult.: DCO=1.13 *4*.
961.7 *5*	<2	8985.0		8023.3			
990.8[#] *5*	7.5 *5*	8569.8	(47/2)	7579.0	(45/2)	D	Mult.: DCO=0.65 *16*.
1185.0 *2*	10.3 *8*	6776.9	(43/2$^-$)	5591.9	(39/2$^-$)	Q	Mult.: DCO=1.17 *25*.

Continued on next page (footnotes at end of table)

^{110}Pd(^{18}O,p4nγ) 1997Ba56 (continued)

$\gamma(^{123}I)$ (continued)

† From 1997Ba56, unless otherwise noted. The Eγ uncertainties are 0.2 keV for strong transitions to 0.5 keV for weak transitions from a general statement in 1997Ba56. Based on that, the evaluator has assigned 0.2 keV for Iγ>10 and 0.5 keV for Iγ<10. Values of Iγ are normalized to Iγ(586.6)=100.0 *11*.

‡ Rounded values from Adopted Gammas.

The order of 991γ-802γ cascade is reversed in Adopted Gammas, resulting in a level at 7766 instead of 7579 in 1997Ba56.

@ From $\gamma\gamma$(DCO) in 1997Ba56. Typical DCO ratios are ≈0.5 for stretched dipole (ΔJ=1) and ≈1.0 for stretched quadrupole (ΔJ=2), with gates on stretched quadrupole transitions.

^{110}Pd(^{18}O,p4nγ) 1997Ba56

Level Scheme

Intensities: Relative I_γ

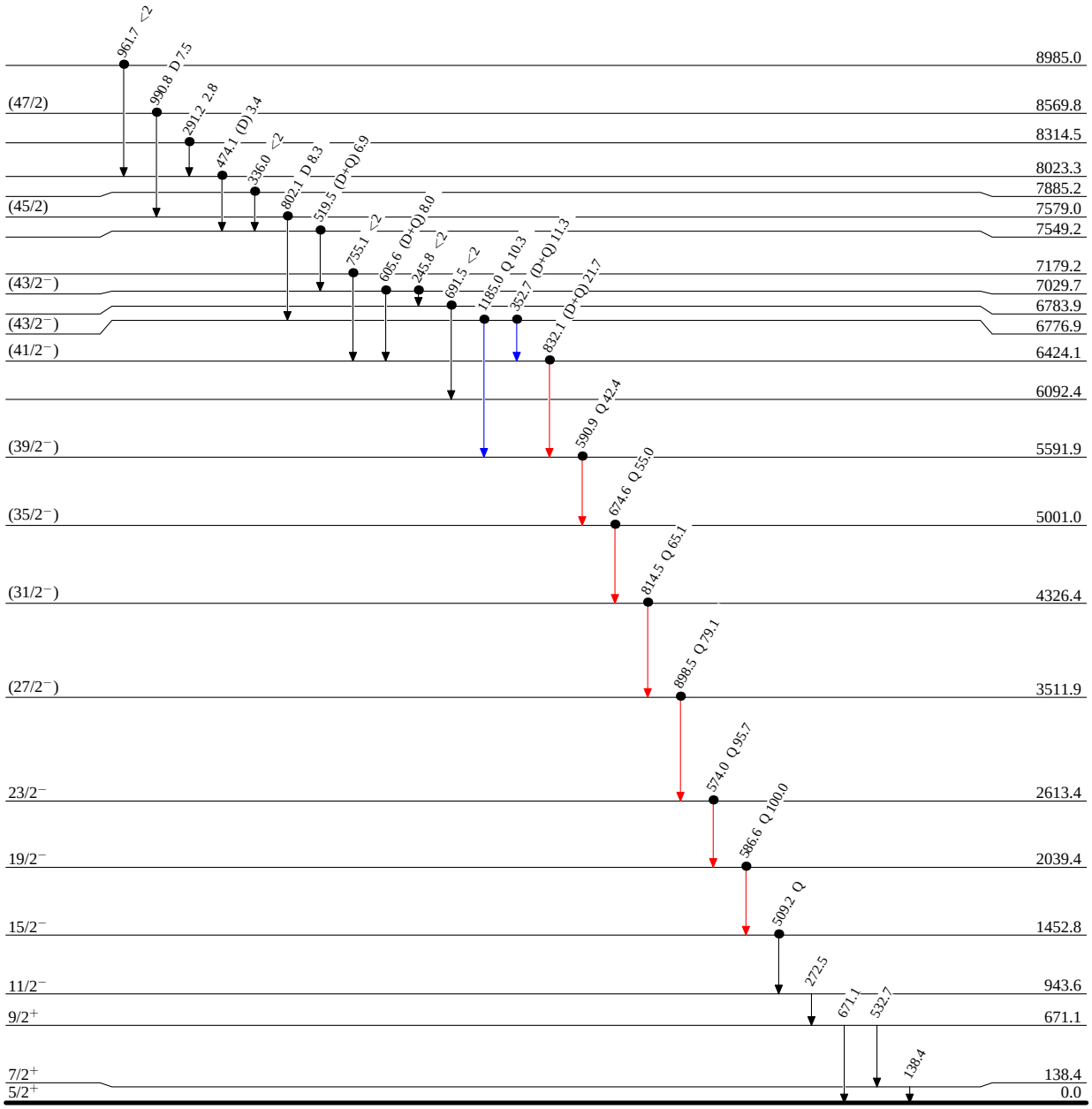
Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

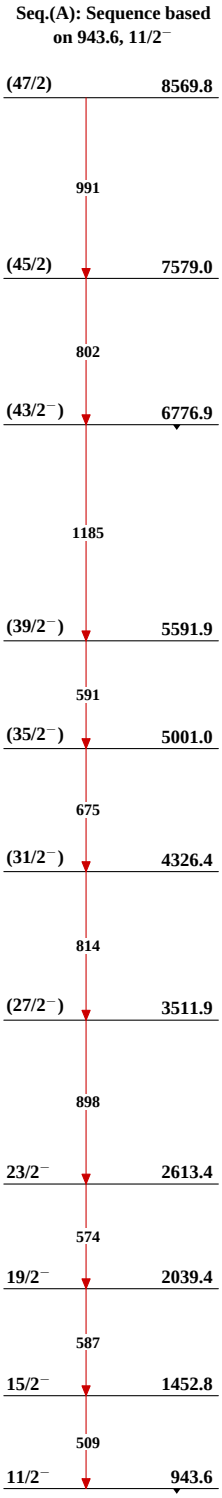
$I_\gamma > 10\% \times I_\gamma^{max}$

Coincidence



$^{123}_{53}I_{70}$

^{110}Pd(^{18}O,p4nγ) 1997Ba56



$^{123}_{53}I_{70}$

^{116}Cd(^{14}N,α3nγ) 2006Wa05

2006Wa05 (also 2004Wa16, 2009Zh19): E=65 MeV ^{14}N beam was produced from the FN tandem accelerator at the Niels Bohr Institute. Target was 0.82 mg/cm^2 ^{116}Cd foil on a 1 mg/cm^2 Au backing. γ rays were detected with the NORDBALL detector array consisting of 19 anti-Compton HPGe detectors and a low energy photon spectrometer (LEPS) detector. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma$(ADO). Deduced levels, J, π, band structures, configurations. Comparisons with theoretical calculations.

All data are from 2006Wa05, unless otherwise stated.

^{123}I Levels

E(level)†	J$^\pi$@	E(level)†	J$^\pi$@	E(level)†	J$^\pi$@	E(level)†	J$^\pi$@
0.0[c]	5/2$^+$	1602.3[g] 7	(15/2$^+$)	2876.4‡[i] 9	21/2$^+$	4326.8[b] 12	31/2$^-$
138.4[a] 3	7/2$^+$	1690.1[f] 6	15/2$^+$	2936.7[e] 8	21/2$^+$	4542.3[h] 10	(31/2$^+$)
474.2[d] 4	7/2$^+$	1791.1[d] 7	15/2$^+$	3083.6[h] 7	23/2$^+$	4606.2‡ 16	29/2$^+$
552.2[&] 4	9/2$^+$	1871.3[&] 6	17/2$^+$	3200.4‡[i] 8	23/2$^+$	4699.7‡[i] 13	(31/2$^+$)
641.2[e] 4	9/2$^+$	2016.0[g] 7	(17/2$^+$)	3324.5[h] 8	25/2$^+$	4901.6[h] 11	(33/2$^+$)
670.9[c] 3	9/2$^+$	2039.7[b] 9	19/2$^-$	3337.2[d] 14	(23/2$^+$)	5001.3[b] 13	35/2$^-$
793.9[a] 5	11/2$^+$	2082.0[e] 7	17/2$^+$	3393.1[f] 8	23/2$^+$	5592.1[b] 14	39/2$^-$
943.4[b] 5	11/2$^-$	2282.3[c] 8	(17/2$^+$)	3490.5‡[i] 8	25/2$^+$	5819.1[h] 12	(37/2$^+$)
972.2[f] 6	11/2$^+$	2361.9[g] 7	(19/2$^+$)	3512.3[b] 11	27/2$^-$	6424.0[b] 15	41/2$^-$
1079.9[d] 5	11/2$^+$	2466.4[a] 7	19/2$^+$	3688.2‡ 12	25/2$^+$	6776.8[b] 15	43/2$^-$
1156.1[&] 5	13/2$^+$	2500.8[f] 7	19/2$^+$	3716.5[h] 8	27/2$^+$	6863.1[#h] 16	(41/2$^+$)
1315.3[e] 6	13/2$^+$	2614.0[b] 10	23/2$^-$	3861.7[e] 9	25/2$^+$	7030.0 18	
1436.5[c] 6	(13/2$^+$)	2647.9[d] 9	19/2$^+$	3903.7‡[i] 9	(27/2$^+$)	7179.0 18	
1452.9[b] 7	15/2$^-$	2659.7[g] 9	(21/2$^+$)	4055.3[h] 9	29/2$^+$	7767.6[b] 16	45/2$^-$
1576.5[a] 6	15/2$^+$	2712.2[&] 7	21/2$^+$	4250.6‡[i] 10	(29/2$^+$)		

† From a least-squares fit to γ-ray energies, assuming $\Delta E\gamma$=1 keV when not stated for fitting purpose only.

‡ Level from 2009Zh19.

1044.0γ is placed from the 5945 level in Adopted Gammas, instead of a level at 6863 proposed by 2006Wa05.

@ As proposed in 2006Wa05 and 2009Zh19, based on measured $\gamma\gamma$(ADO), band assignments and known assignments for low-lying states. When considered in Adopted Levels, assignments of spin and/or parity will be placed inside parenthesis by the evaluator if there is no firm evidence.

& Band(A): π7/2[404] oblate band, α=+1/2.

a Band(a): π7/2[404] oblate band, α=−1/2.

b Band(B): π1/2[550] band.

c Band(C): π5/2[413] band, α=+1/2.

d Band(c): π5/2[413] band, α=−1/2.

e Band(D): π9/2[404] band, α=+1/2.

f Band(d): π9/2[404] band, α=−1/2.

g Band(E): Dipole band based on (15/2$^+$).

h Band(F): $\pi g_{7/2}\otimes\nu h^2_{11/2}$.

i Band(G): Possible $\pi g_{7/2}\otimes\nu h^2_{11/2}$. Possible chiral partner of $\pi g_{7/2}\otimes\nu h^2_{11/2}$ band based on 3084, 23/2$^+$.

^{116}Cd(^{14}N,α3nγ) 2006Wa05 (continued)

$\gamma(^{123}I)$

R(ADO)=Iγ(37°)/Iγ(79°), with Iγ the total coincidence intensity observed at each angle. Measured values of R(ADO) are given under comments. Typical values of ≈1.4 and ≈0.7 correspond to ΔJ=2, stretched quadrupole and ΔJ=1, dipole, respectively (2006Wa05).

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	Comments
119.0 *10*	<2	670.9	9/2$^+$	552.2	9/2$^+$		
124†		3324.5	25/2$^+$	3200.4	23/2$^+$		
138.2 *5*	83 *6*	138.4	7/2$^+$	0.0	5/2$^+$	D	R(ADO)=0.89 *13*.
196.8 *5*	4 *1*	670.9	9/2$^+$	474.2	7/2$^+$	D	R(ADO)=0.90 *22*.
226†		3716.5	27/2$^+$	3490.5	25/2$^+$		
240.8 *5*	5 *1*	3324.5	25/2$^+$	3083.6	23/2$^+$		
241.5 *5*	6 *1*	793.9	11/2$^+$	552.2	9/2$^+$	D	R(ADO)=0.67 *22*.
245.5 *10*	<2	2712.2	21/2$^+$	2466.4	19/2$^+$		
272.3 *5*	81 *5*	943.4	11/2$^-$	670.9	9/2$^+$	D	R(ADO)=0.77 *10*.
290†		3490.5	25/2$^+$	3200.4	23/2$^+$		
294.5 *10*	<2	1871.3	17/2$^+$	1576.5	15/2$^+$		
297.8 *5*	8 *2*	2659.7	(21/2$^+$)	2361.9	(19/2$^+$)	D	R(ADO)=0.97 *20*.
324†		3200.4	23/2$^+$	2876.4	21/2$^+$		
330.8 *5*	27 *2*	972.2	11/2$^+$	641.2	9/2$^+$	D	R(ADO)=0.93 *15*.
343.3 *5*	28 *2*	1315.3	13/2$^+$	972.2	11/2$^+$	D	R(ADO)=0.89 *12*.
345.8 *5*	5 *1*	2361.9	(19/2$^+$)	2016.0	(17/2$^+$)	D	R(ADO)=0.90 *19*.
347†		4250.6	(29/2$^+$)	3903.7	(27/2$^+$)		
352.8 *5*	5 *2*	6776.8	43/2$^-$	6424.0	41/2$^-$		
356.8 *10*	<3	1436.5	(13/2$^+$)	1079.9	11/2$^+$		
362.3 *5*	8 *1*	1156.1	13/2$^+$	793.9	11/2$^+$	D	R(ADO)=0.74 *18*.
371.3 *5*	5 *1*	3083.6	23/2$^+$	2712.2	21/2$^+$	D	R(ADO)=0.72 *19*.
374.8 *5*	20 *2*	1690.1	15/2$^+$	1315.3	13/2$^+$	D	R(ADO)=0.88 *16*.
391.3 *5*	21 *3*	943.4	11/2$^-$	552.2	9/2$^+$	D	R(ADO)=0.77 *15*.
391.8 *5*	16 *2*	2082.0	17/2$^+$	1690.1	15/2$^+$	D	R(ADO)=0.92 *11*.
392.0 *10*	<3	3716.5	27/2$^+$	3324.5	25/2$^+$		
407†		3490.5	25/2$^+$	3083.6	23/2$^+$		
409.0 *10*	<2	1079.9	11/2$^+$	670.9	9/2$^+$	(D)	R(ADO)=0.56 *18*.
413†		3903.7	(27/2$^+$)	3490.5	25/2$^+$		
413.5 *5*	9 *2*	2016.0	(17/2$^+$)	1602.3	(15/2$^+$)	D	R(ADO)=0.86 *17*.
413.8 *5*	40 *4*	552.2	9/2$^+$	138.4	7/2$^+$	D	R(ADO)=0.59 *10*.
418.8 *5*	9 *1*	2500.8	19/2$^+$	2082.0	17/2$^+$	D	R(ADO)=0.93 *12*.
420.3 *10*	<3	1576.5	15/2$^+$	1156.1	13/2$^+$		
435.8 *5*	7 *1*	2936.7	21/2$^+$	2500.8	19/2$^+$	D	R(ADO)=0.92 *17*.
456.3 *5*	6 *1*	3393.1	23/2$^+$	2936.7	21/2$^+$	D	R(ADO)=0.84 *20*.
468.6 *5*	4 *1*	3861.7	25/2$^+$	3393.1	23/2$^+$	D	R(ADO)=0.75 *23*.
474.3 *5*	22 *2*	474.2	7/2$^+$	0.0	5/2$^+$	D	R(ADO)=0.52 *10*.
488†		3200.4	23/2$^+$	2712.2	21/2$^+$		
502.8 *5*	23 *2*	641.2	9/2$^+$	138.4	7/2$^+$	D	R(ADO)=0.65 *12*.
509.5 *5*		1452.9	15/2$^-$	943.4	11/2$^-$		
527.8 *10*	<3	1079.9	11/2$^+$	552.2	9/2$^+$		
532.3 *5*	25 *2*	670.9	9/2$^+$	138.4	7/2$^+$	D	R(ADO)=0.67 *15*.
534†		4250.6	(29/2$^+$)	3716.5	27/2$^+$		
552.3 *5*	35 *3*	552.2	9/2$^+$	0.0	5/2$^+$	Q	R(ADO)=1.32 *24*.
574.3 *5*	90 *3*	2614.0	23/2$^-$	2039.7	19/2$^-$	Q	R(ADO)=1.32 *18*.
579†		3903.7	(27/2$^+$)	3324.5	25/2$^+$		
586.8 *5*	100 *3*	2039.7	19/2$^-$	1452.9	15/2$^-$	Q	R(ADO)=1.38 *17*.
590.8 *5*	37 *3*	5592.1	39/2$^-$	5001.3	35/2$^-$	Q	R(ADO)=1.27 *22*.

Continued on next page (footnotes at end of table)

^{116}Cd(^{14}N,α3nγ) 2006Wa05 (continued)

$\gamma(^{123}I)$ (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
596.0 *10*	<2	2466.4	19/2$^+$	1871.3	17/2$^+$		
603.8 *5*	50 *4*	1156.1	13/2$^+$	552.2	9/2$^+$	Q	R(ADO)=1.31 *20*.
605.8 *5*	16 *2*	1079.9	11/2$^+$	474.2	7/2$^+$	Q	R(ADO)=1.27 *21*.
606.0 *10*	<1	7030.0		6424.0	41/2$^-$		
612.3 *5*	20 *2*	3324.5	25/2$^+$	2712.2	21/2$^+$	Q	R(ADO)=1.27 *18*.
614[†]		3490.5	25/2$^+$	2876.4	21/2$^+$		
617.3 *5*	8 *1*	3083.6	23/2$^+$	2466.4	19/2$^+$	Q	R(ADO)=1.27 *20*.
629.8 *5*	6 *1*	1602.3	(15/2$^+$)	972.2	11/2$^+$	(Q)	R(ADO)=1.18 *20*.
632.8 *5*	5 *1*	3716.5	27/2$^+$	3083.6	23/2$^+$	Q	R(ADO)=1.33 *23*.
641.3 *5*	17 *2*	641.2	9/2$^+$	0.0	5/2$^+$	Q	R(ADO)=1.22 *22*.
655.8 *5*	14 *2*	793.9	11/2$^+$	138.4	7/2$^+$	Q	R(ADO)=1.28 *20*.
670.8 *5*	78 *4*	670.9	9/2$^+$	0.0	5/2$^+$	Q	R(ADO)=1.33 *19*.
671.8 *5*	13 *2*	2361.9	(19/2$^+$)	1690.1	15/2$^+$	Q	R(ADO)=1.20 *22*.
674.3 *5*	9 *2*	1315.3	13/2$^+$	641.2	9/2$^+$	Q	R(ADO)=1.38 *17*.
674.5 *5*	50 *4*	5001.3	35/2$^-$	4326.8	31/2$^-$	Q	R(ADO)=1.33 *20*.
689.3 *10*	<2	3337.2	(23/2$^+$)	2647.9	19/2$^+$		
700.8 *5*	5 *1*	2016.0	(17/2$^+$)	1315.3	13/2$^+$	Q	R(ADO)=1.33 *21*.
704[†]		3903.7	(27/2$^+$)	3200.4	23/2$^+$		
711.2 *5*	12 *2*	1791.1	15/2$^+$	1079.9	11/2$^+$	Q	R(ADO)=1.31 *24*.
715.3 *5*	55 *4*	1871.3	17/2$^+$	1156.1	13/2$^+$	Q	R(ADO)=1.26 *19*.
717.8 *5*	9 *1*	1690.1	15/2$^+$	972.2	11/2$^+$	Q	R(ADO)=1.26 *18*.
730.8 *5*	11 *2*	4055.3	29/2$^+$	3324.5	25/2$^+$	Q	R(ADO)=1.39 *21*.
735[†]		3200.4	23/2$^+$	2466.4	19/2$^+$		
755.0 *10*	<1	7179.0		6424.0	41/2$^-$		
760[†]		4250.6	(29/2$^+$)	3490.5	25/2$^+$		
765.5 *5*	4 *1*	1436.5	(13/2$^+$)	670.9	9/2$^+$		
766.8 *5*	7 *1*	2082.0	17/2$^+$	1315.3	13/2$^+$	Q	R(ADO)=1.25 *16*.
778[†]		3490.5	25/2$^+$	2712.2	21/2$^+$		
782.5 *5*	14 *2*	1576.5	15/2$^+$	793.9	11/2$^+$	Q	R(ADO)=1.29 *20*.
796[†]		4699.7	(31/2$^+$)	3903.7	(27/2$^+$)		
810.5 *5*	6 *1*	2500.8	19/2$^+$	1690.1	15/2$^+$	Q	R(ADO)=1.40 *20*.
814.5 *5*	60 *3*	4326.8	31/2$^-$	3512.3	27/2$^-$	Q	R(ADO)=1.37 *22*.
820[†]		3903.7	(27/2$^+$)	3083.6	23/2$^+$		
825.8 *5*	5 *1*	4542.3	(31/2$^+$)	3716.5	27/2$^+$		
831.8 *5*	20 *3*	6424.0	41/2$^-$	5592.1	39/2$^-$	D	R(ADO)=0.60 *17*.
840.8 *5*	38 *3*	2712.2	21/2$^+$	1871.3	17/2$^+$	Q	R(ADO)=1.27 *20*.
845.8 *5*	5 *1*	2282.3	(17/2$^+$)	1436.5	(13/2$^+$)		
846.3 *5*	7 *2*	4901.6	(33/2$^+$)	4055.3	29/2$^+$		
854.8 *5*	6 *1*	2936.7	21/2$^+$	2082.0	17/2$^+$	Q	R(ADO)=1.43 *17*.
856.8 *5*	8 *1*	2647.9	19/2$^+$	1791.1	15/2$^+$	Q	R(ADO)=1.4 *3*.
889.8 *5*	14 *2*	2466.4	19/2$^+$	1576.5	15/2$^+$	Q	R(ADO)=1.32 *22*.
892.3 *5*	4 *1*	3393.1	23/2$^+$	2500.8	19/2$^+$	Q	R(ADO)=1.24 *11*.
898.3 *5*	87 *4*	3512.3	27/2$^-$	2614.0	23/2$^-$	Q	R(ADO)=1.31 *20*.
917.5 *5*	4 *1*	5819.1	(37/2$^+$)	4901.6	(33/2$^+$)		
918[†]		4606.2	29/2$^+$	3688.2	25/2$^+$		
925.3 *10*	<3	3861.7	25/2$^+$	2936.7	21/2$^+$		
976[†]		3688.2	25/2$^+$	2712.2	21/2$^+$		
990.8 *5*	6 *2*	7767.6	45/2$^-$	6776.8	43/2$^-$	D	R(ADO)=0.72 *14*.
1005[†]		2876.4	21/2$^+$	1871.3	17/2$^+$		
1044.0 *10*	<2	6863.1	(41/2$^+$)	5819.1	(37/2$^+$)		E_γ: this γ is placed from the 5945 level in Adopted Gammas.
1184.8 *5*	6 *2*	6776.8	43/2$^-$	5592.1	39/2$^-$	Q	R(ADO)=1.35 *24*.

Continued on next page (footnotes at end of table)

^{116}Cd(^{14}N,α3nγ) 2006Wa05 (continued)

$\gamma(^{123}I)$ (continued)

† From 2009Zh19, intensity is not available.
‡ Deduced by the evaluator based on measured R(ADO) ratios. Typical values of ≈1.4 and ≈0.7 correspond to ΔJ=2, stretched quadrupole (Q) and ΔJ=1, dipole (D), respectively (2006Wa05).

^{116}Cd(^{14}N,α3nγ) 2006Wa05

Level Scheme

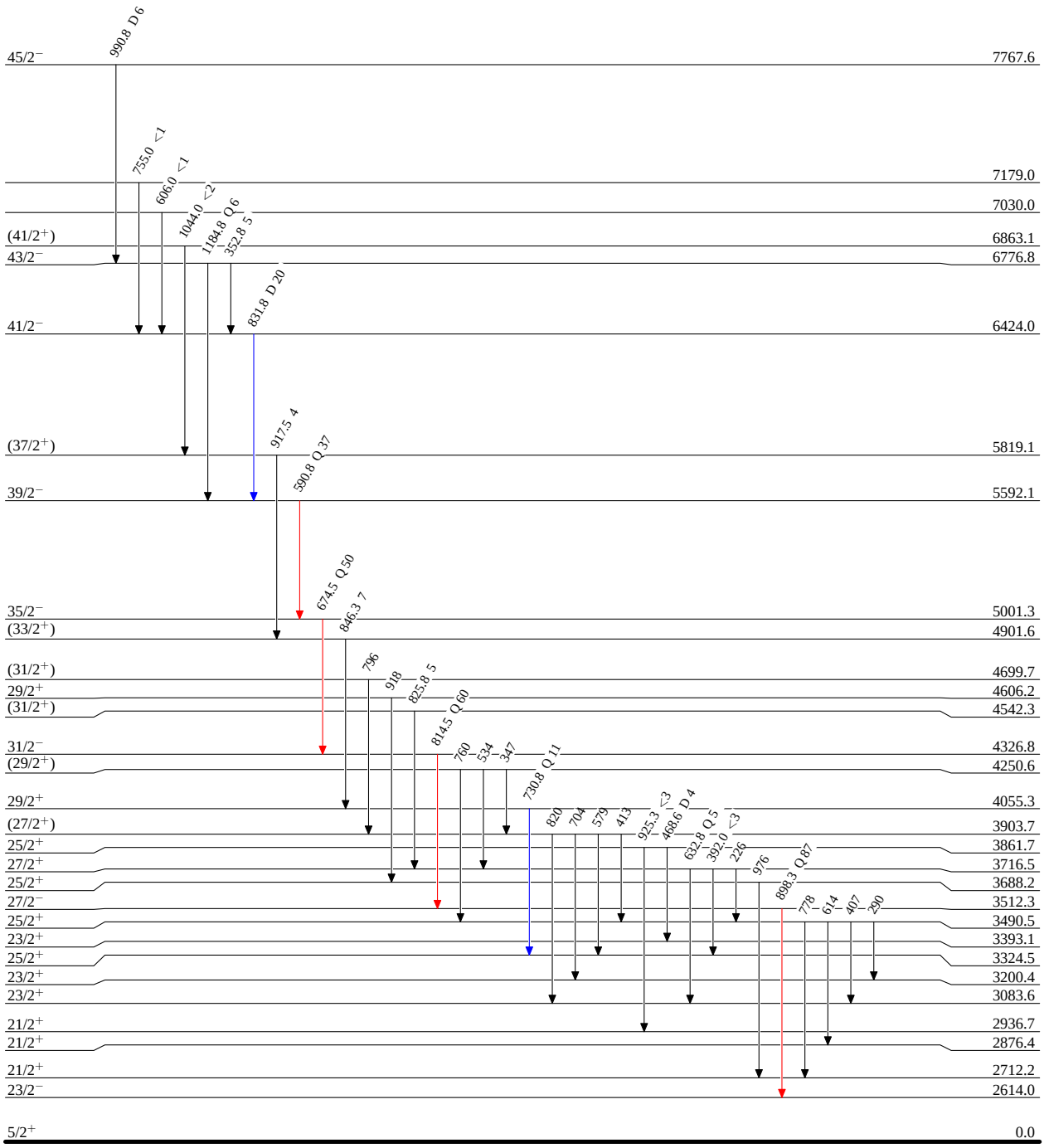
Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$



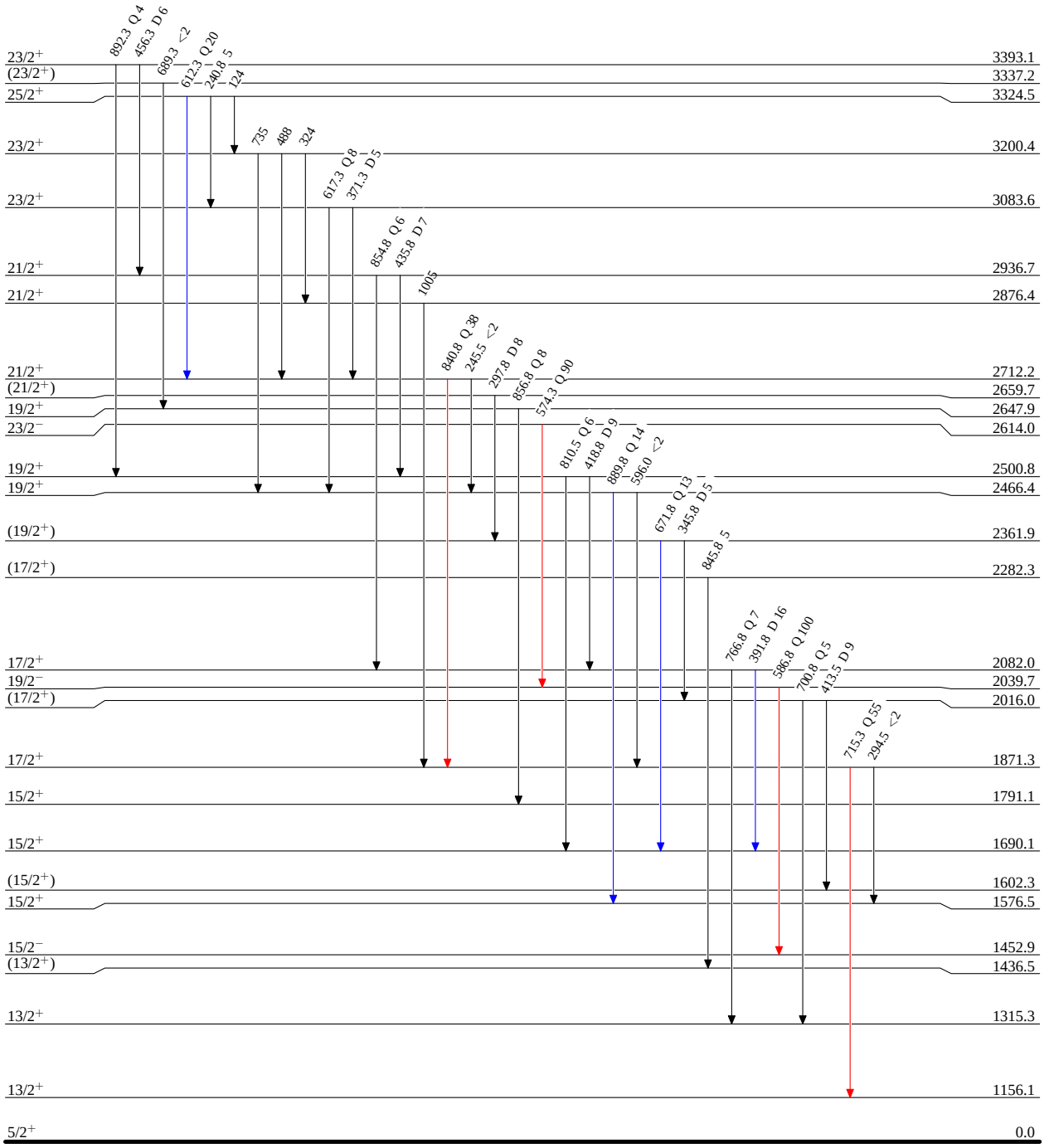
$^{123}_{53}I_{70}$

^{116}Cd(^{14}N,α3nγ) 2006Wa05

Level Scheme (continued)

Intensities: Relative I_γ

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



$^{123}_{53}I_{70}$

^{116}Cd(^{14}N,α3nγ) 2006Wa05

Level Scheme (continued)

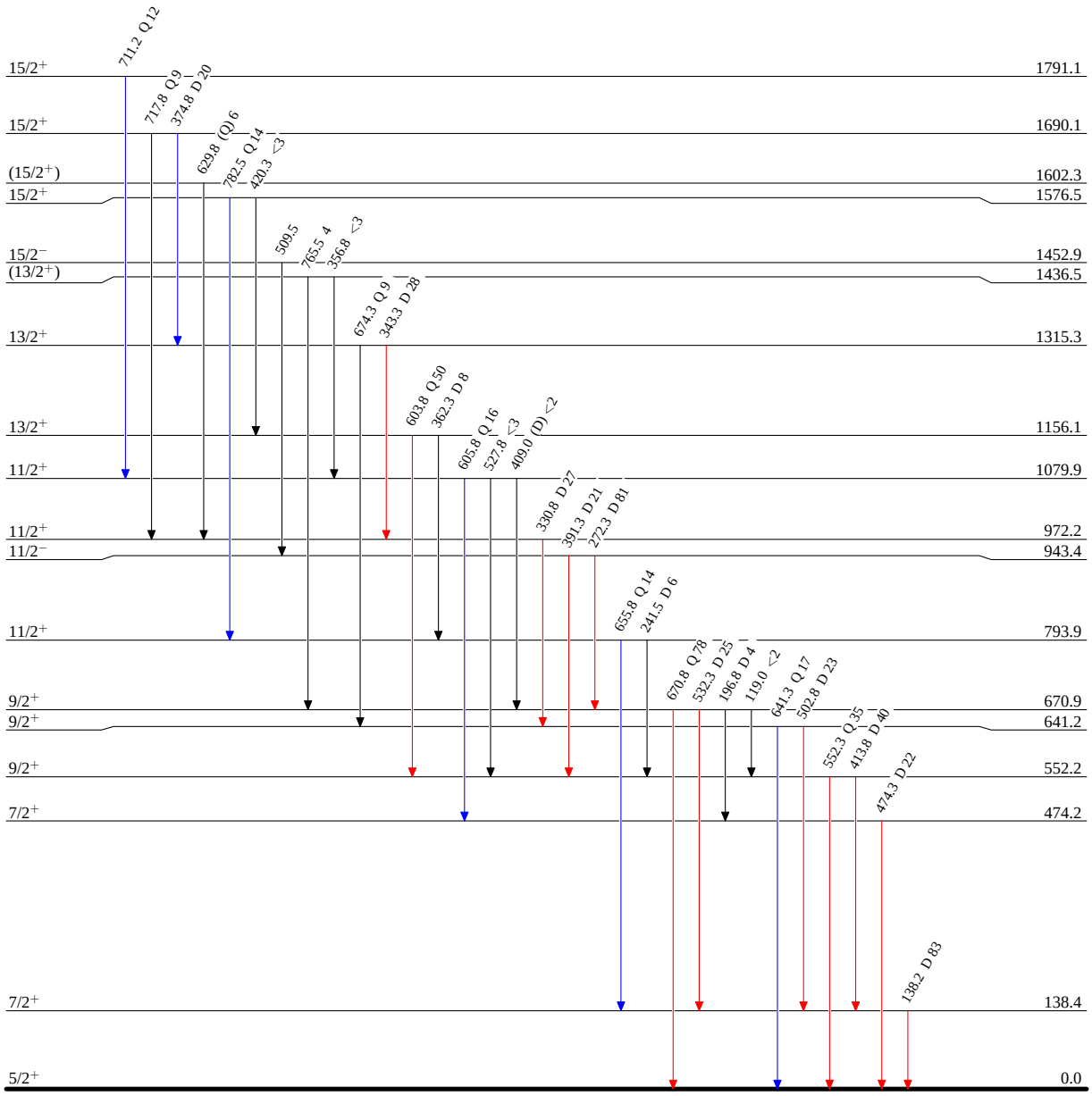
Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

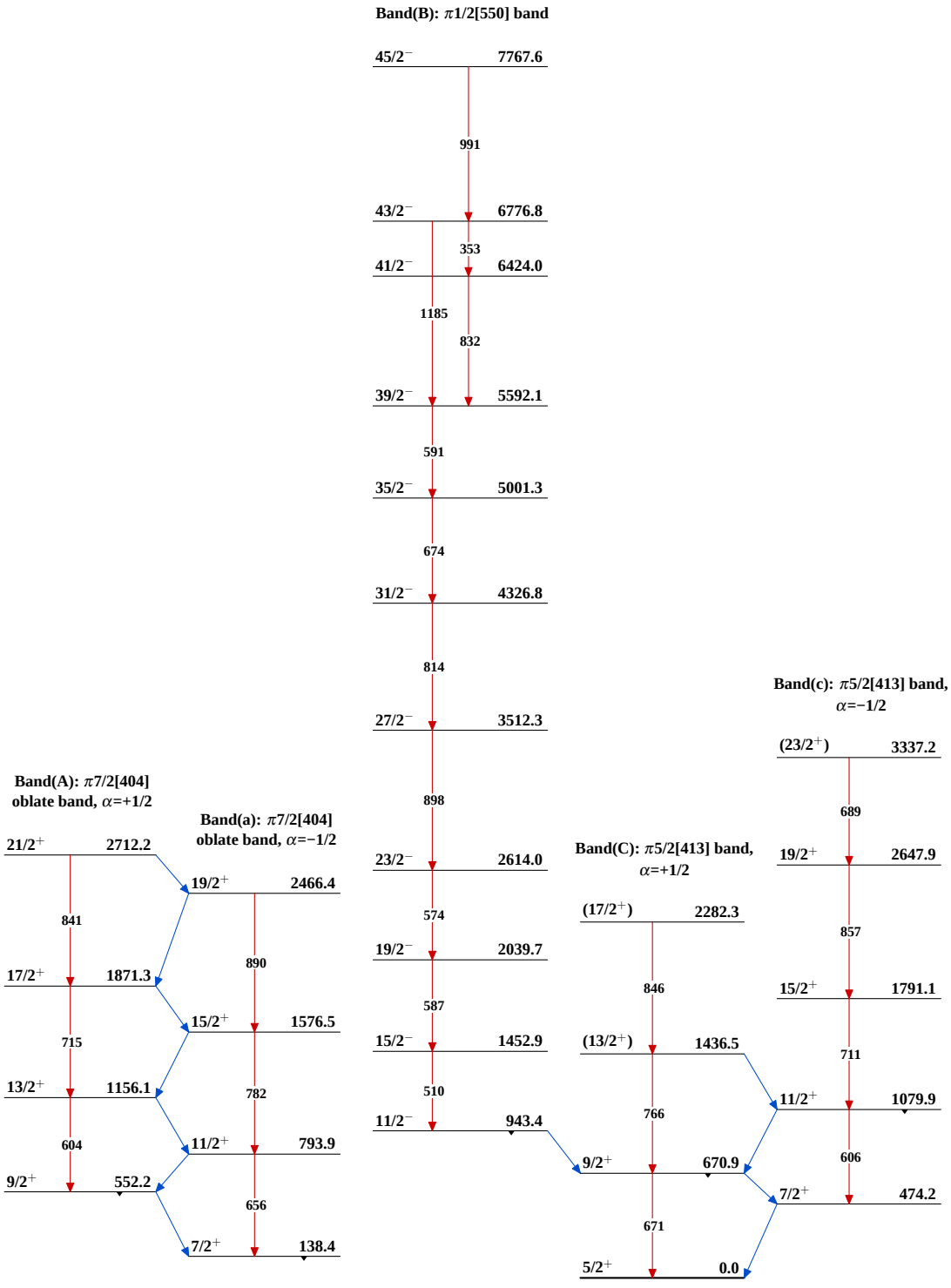
$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$



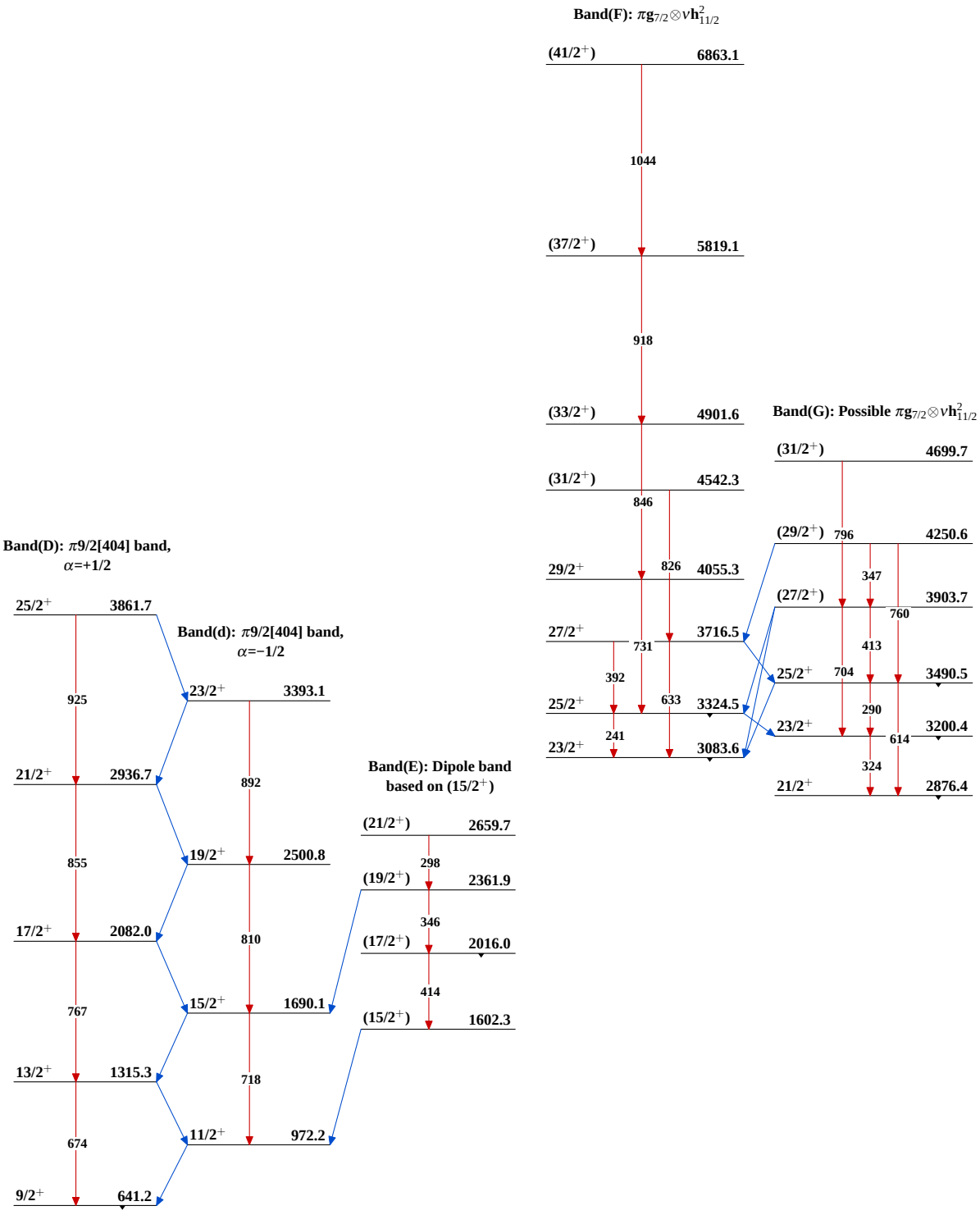
$^{123}_{53}I_{70}$

^{116}Cd(^{14}N,α3nγ) 2006Wa05



$^{123}_{53}I_{70}$

^{116}Cd(^{14}N,α3nγ) 2006Wa05 (continued)



$^{123}_{53}I_{70}$

^{120}Sn(^{6}Li,3nγ) 1982Sh20

1982Sh20: E=32 MeV ^{6}Li beam was produced from the Stony Brook FN tandem Van de Graaff accelerator. Target was isotopically enriched ^{120}Sn. γ rays were detected with Ge(Li) detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma(\theta)$, γ(t). Deduced levels, J, π, isomer $T_{1/2}$, band structures, γ-ray multipolarities, mixing ratios, branching ratios. Systematics of neighboring nuclei. Comparisons with theoretical calculations. See also 1977Fo03 and 1977Go04 of the same laboratory.

All data are from 1982Sh20, unless otherwise noted.

^{123}I Levels

E(level)†	Jπ‡	E(level)†	Jπ‡	$T_{1/2}$
0.0@	5/2$^+$	1453.8[a] *11*	15/2$^-$	
138.37[b] *19*	7/2$^+$	1576.7[b] *5*	15/2$^{(+)}$	
474.3& *3*	7/2$^+$	1690.7[c] *4*	15/2$^+$	
552.36@ *21*	9/2$^+$	1791.8& *6*	(15/2$^+$)	
641.39[c] *24*	9/2$^+$	1871.9@ *5*	17/2$^+$	
671.08 *22*	9/2$^+$	2040.6[a] *11*	19/2$^-$	
794.2[b] *3*	11/2$^+$	2082.3[c] *4*	17/2$^{(+)}$	
943.8[a] *3*	11/2$^-$	2361.9 *5*	(19/2$^+$)	
972.6[c] *4*	11/2$^+$	2614.7[a] *12*	23/2$^-$	
1080.5& *5*	11/2$^{(+)}$	2660.1 *6*	(21/2$^+$)	26.3# ns *21*
1156.5@ *3*	13/2$^+$	2712.5@ *6*	21/2$^{(+)}$	
1315.7[c] *4*	13/2$^+$	3513.0[a] *12*	(27/2$^-$)	

† From a least-squares fit to γ-ray energies.

‡ From Adopted Levels. The assignments by 1982Sh20 based on $\gamma(\theta)$ are the same except that some assignments are placed inside parentheses when considered in Adopted Levels due to lack of firm evidence.

From mean lifetime=38 ns *3* from 298.2γ(t), 671.2γ(t) and 503.1γ(t) in 1982Sh20. Note apparent error in the value of $T_{1/2}$=24.3 ns *20* quoted in figure 3 (1982Sh20).

@ Band(A): $2d_{5/2}$ band (decoupled).

& Band(B): $2d_{5/2}$ band (nonaligned).

[a] Band(C): $1h_{11/2}$ band.

[b] Band(D): $1g_{7/2}$ band.

[c] Band(E): 9/2[404] Nilsson state.

$\gamma(^{123}I)$

E$_\gamma$†	I$_\gamma$†	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.‡	δ‡	Comments
138.4 *3*	102 *10*	138.37	7/2$^+$	0.0	5/2$^+$	D+Q	−0.15 *5*	A_2=−0.25 *2*.
272.6 *3*	100 *10*	943.8	11/2$^-$	671.08	9/2$^+$	D		A_2=−0.16 *3*, A_4=−0.03 *3*.
298.2 *3*	11 *1*	2660.1	(21/2$^+$)	2361.9	(19/2$^+$)	(D,Q)		A_2=+0.24 *12*, A_4=+0.06 *16*. Mult.: not given in 1982Sh20, proposed by the evaluator from $\gamma(\theta)$.
331.2 *3*	117 *12*	972.6	11/2$^+$	641.39	9/2$^+$	D+Q	+0.25 *4*	A_2=+0.12 *4*, A_4=−0.01 *4*.
343.2 *3*	45 *5*	1315.7	13/2$^+$	972.6	11/2$^+$	D+Q	+0.20 *3*	A_2=+0.06 *3*, A_4=0.00 *3*.
362.3 *3*	10 *1*	1156.5	13/2$^+$	794.2	11/2$^+$	D+Q	−0.43 *10*	A_2=−0.73 *9*, A_4=−0.03 *12*.
375.0 *3*	47 *5*	1690.7	15/2$^+$	1315.7	13/2$^+$	D+Q	+0.15 *3*	A_2=0.0 *4*, A_4=+0.06 *4*.
391.5@ *3*	28@ *7*	943.8	11/2$^-$	552.36	9/2$^+$			A_2=−0.08 *3*, A_4=+0.01 *4* for doublet.
391.5@ *3*	38@ *17*	2082.3	17/2$^{(+)}$	1690.7	15/2$^+$			A_2=−0.08 *3*, A_4=+0.01 *4* for doublet.
414.0 *3*	89 *9*	552.36	9/2$^+$	138.37	7/2$^+$	D+Q	−0.40 *10*	A_2=−0.49 *3*, A_4=−0.03 *3*.
474.3 *3*	59 *6*	474.3	7/2$^+$	0.0	5/2$^+$	D+Q	−0.9 *4*	A_2=−0.50 *3*, A_4=−0.03 *3*.
503.1 *3*	64 *6*	641.39	9/2$^+$	138.37	7/2$^+$	D+Q	−0.33 *10*	A_2=−0.46 *6*, A_4=0.00 *7*.

Continued on next page (footnotes at end of table)

^{120}Sn(^{6}Li,3nγ) 1982Sh20 (continued)

$\gamma(^{123}I)$ (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
510 *1*		1453.8	$15/2^-$	943.8	$11/2^-$		
532.6 *3*	31 *3*	671.08	$9/2^+$	138.37	$7/2^+$	D	A_2=−0.25 *4*, A_4=+0.09 *5*.
552.4 *3*	51 *5*	552.36	$9/2^+$	0.0	$5/2^+$	Q	A_2=0.33 *5*, A_4=−0.05 *6*.
574.1 *3*	41 *4*	2614.7	$23/2^-$	2040.6	$19/2^-$	Q	A_2=+0.28 *8*, A_4=−0.06 *10*.
586.8 *3*	63 *7*	2040.6	$19/2^-$	1453.8	$15/2^-$	Q	A_2=+0.34 *4*, A_4=−0.06 *5*.
604.1 *3*	86 *9*	1156.5	$13/2^+$	552.36	$9/2^+$	Q	A_2=+0.30 *5*, A_4=−0.02 *5*.
606.2 *3*	36 *4*	1080.5	$11/2^{(+)}$	474.3	$7/2^+$	Q	A_2=+0.24 *4*, A_4=−0.03 *5*.
641.3 *3*	57 *6*	641.39	$9/2^+$	0.0	$5/2^+$	Q	A_2=+0.28 *6*, A_4=−0.05 *6*.
655.9 *3*	69 *7*	794.2	$11/2^+$	138.37	$7/2^+$	Q	A_2=+0.32 *3*, A_4=−0.04 *4*.
671.1[#] *3*	104 *25*	671.08	$9/2^+$	0.0	$5/2^+$	Q	A_2=+0.16 *4*, A_4=−0.03 *4*.
671.2 *3*	126 *13*	2361.9	$(19/2^+)$	1690.7	$15/2^+$		A_2=+0.16 *4*, A_4=−0.03 *4* for doublet.
674.3 *3*	17 *2*	1315.7	$13/2^+$	641.39	$9/2^+$	Q	A_2=+0.16 *10*,A_4=−0.03 *13*.
711.3 *3*	25 *3*	1791.8	$(15/2^+)$	1080.5	$11/2^{(+)}$	(Q)	A_2=+0.38 *5*, A_4=−0.04 *7*.
715.4[#] *3*	65 *7*	1871.9	$17/2^+$	1156.5	$13/2^+$	Q	A_2=+0.34 *4*, A_4=−0.07 *4*.
718.1 *3*	12 *1*	1690.7	$15/2^+$	972.6	$11/2^+$	Q	A_2=+0.28 *10*, A_4=+0.03 *13*.
766.6 *3*	5.0 *5*	2082.3	$17/2^{(+)}$	1315.7	$13/2^+$	(Q)	A_2=+0.37 *6*, A_4=−0.10 *8*.
782.5 *3*	38 *4*	1576.7	$15/2^{(+)}$	794.2	$11/2^+$	Q	A_2=+0.29 *44*, A_4=−0.10 *5*.
840.6 *3*	35 *4*	2712.5	$21/2^{(+)}$	1871.9	$17/2^+$	(Q)	A_2=+0.24 *5*, A_4=−0.09 *6*.
898.3 *3*	14 *1*	3513.0	$(27/2^-)$	2614.7	$23/2^-$	Q	A_2=+0.18 *12*, A_4=−0.14 *12*.

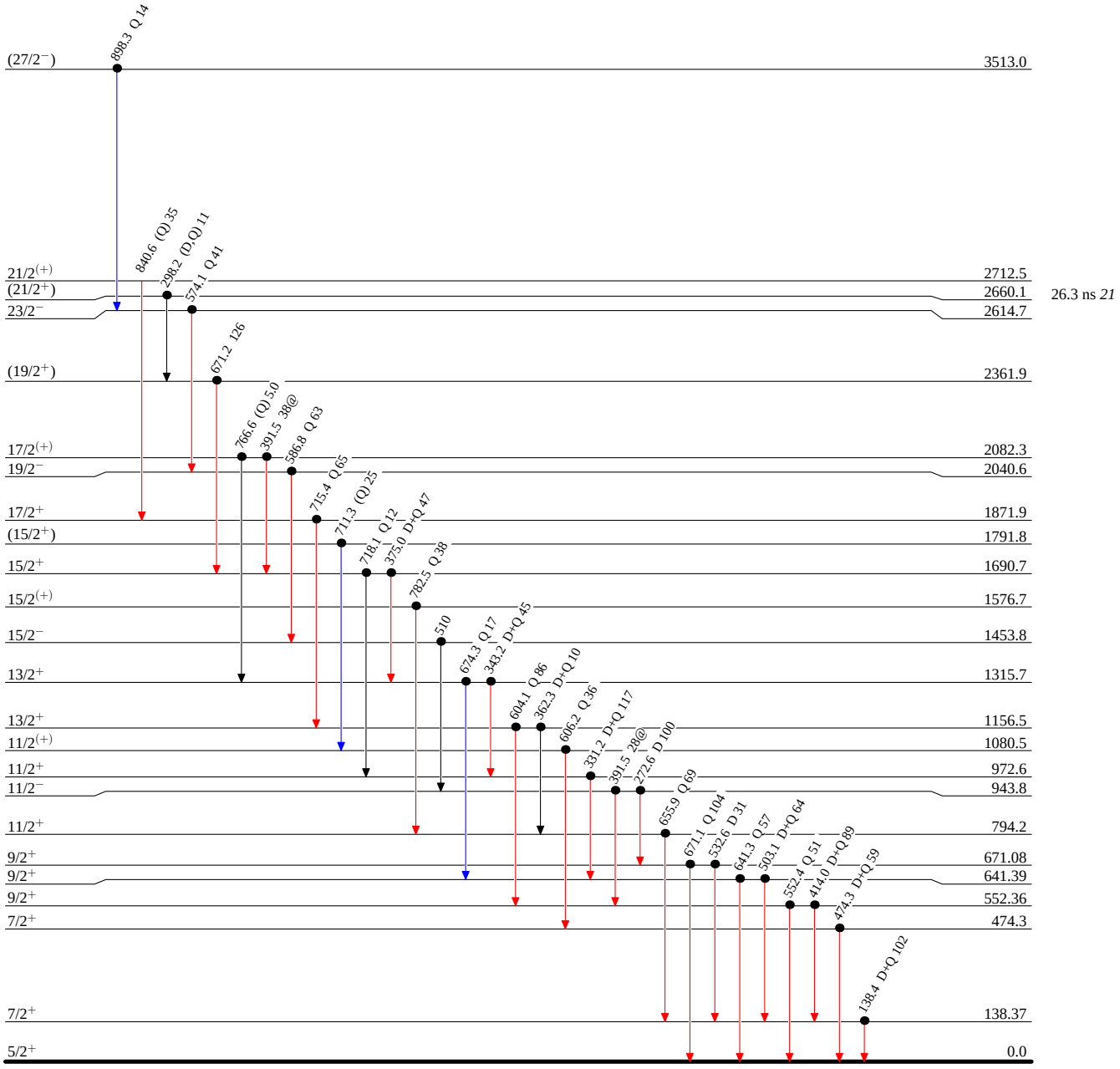
[†] From 1982Sh20. Intensities are normalized to I(272.6γ)=100.
[‡] From $\gamma(\theta)$ in 1982Sh20, unless noted otherwise.
[#] Doublet, evidence and Iγ from $\gamma\gamma$.
[@] Multiply placed with intensity suitably divided.

^{120}Sn(^{6}Li,3nγ) 1982Sh20

Level Scheme

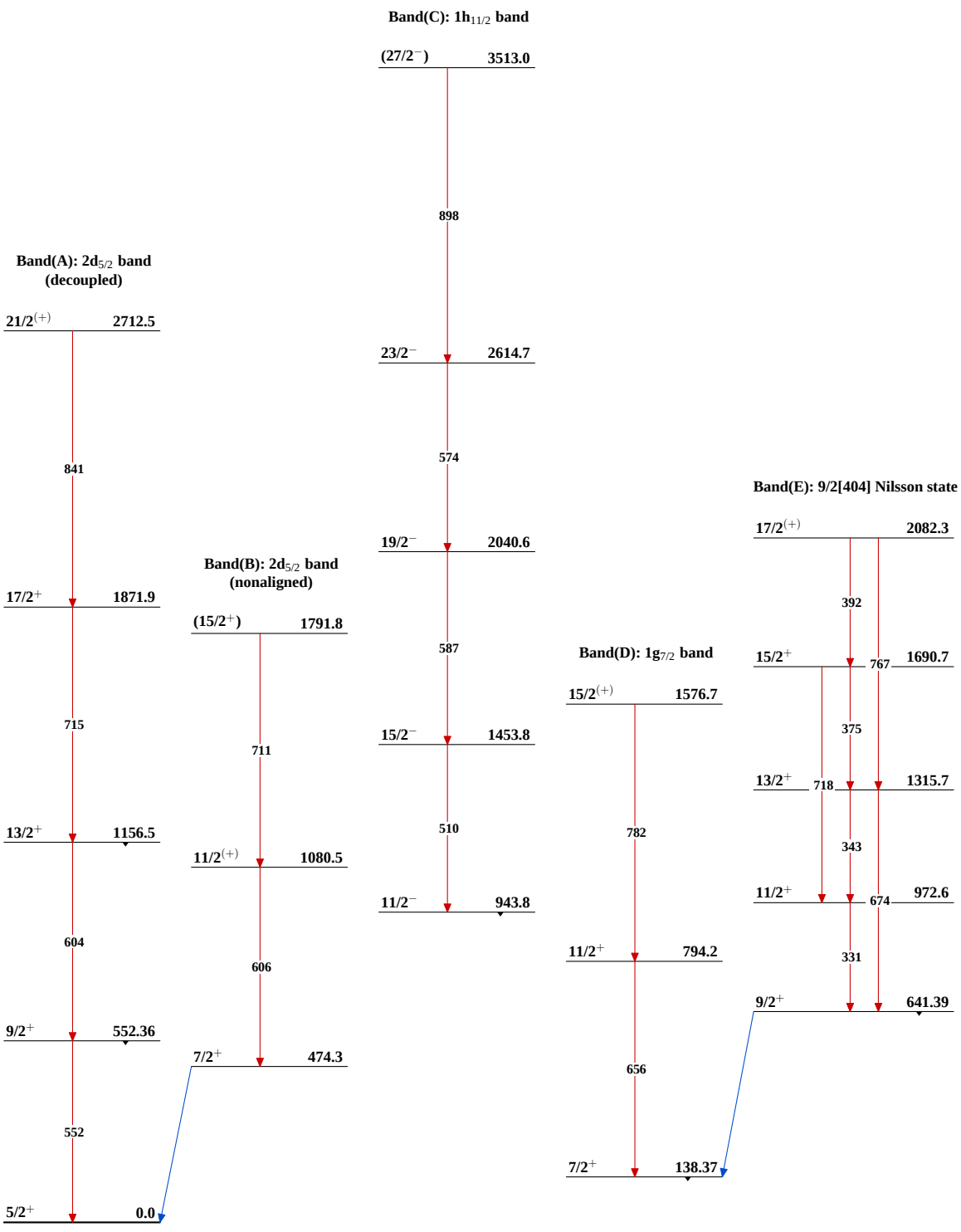
Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
Coincidence



$^{123}_{53}I_{70}$

^{120}Sn(^{6}Li,3nγ) 1982Sh20



$^{123}_{53}I_{70}$

^{122}Sn(^{7}Li,6nγ) 2011Mo28

2011Mo28: E=54 MeV ^{7}Li beam was produced from 14-UD Pelletron heavy-ion accelerator in the Australian National University. Target was 3.5 mg/cm^2 self-supporting foil of ^{122}Sn. γ rays were detected with the CAESAR array consisting of 6 Compton-suppressed HPGe detectors and two LEPS detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, γ(t). Deduced levels, J, π, isomer $T_{1/2}$, band structures. Systematics of neighboring nuclei.

All data are from 2011Mo28, unless otherwise noted.

^{123}I Levels

E(level)[†]	J$^\pi$[‡]	E(level)[†]	J$^\pi$[‡]	$T_{1/2}$[&]	E(level)[†]	J$^\pi$[‡]
0.0[a]	5/2$^+$	2015.9[b] 4	15/2$^+$[#]		3036.9[c] 12	(21/2$^-$)[@]
138.40[a] 25	7/2$^+$	2081.4[a] 7	17/2$^+$		3070.7[b] 15	21/2$^+$[#]
641.10[a] 25	9/2$^+$	2361.7[b] 4	17/2$^+$[#]		3392.4[a] 11	23/2$^+$
972.4[a] 4	11/2$^+$	2500.4[a] 8	19/2$^+$		3460.9[c] 15	(23/2$^-$)[@]
1315.5[a] 4	13/2$^+$	2659.9[c] 5	(19/2$^-$)[@]	24 ns 3	3916.9[c] 18	(25/2$^-$)[@]
1602.2[b] 4	13/2$^+$[#]	2671.7[b] 11	19/2$^+$[#]			
1690.3[a] 4	15/2$^+$	2936.4[a] 10	21/2$^+$			

[†] From a least-squares fit to γ-ray energies, assuming $\Delta E\gamma$=0.3 keV for values quoted to nearest tenth keV and $\Delta E\gamma$=1 keV for those quoted to keV.

[‡] Proposed by 2011Mo28 based on band structures and adopted assignments for low-lying states.

[#] Based on J^π(1602)=13/2$^+$ proposed by 2011Mo28, while adopted J^π(1602)=(15/2$^+$). These assignments are not adopted in Adopted Levels.

[@] Based on J^π(2660)=(19/2$^-$) proposed by 2011Mo28, while adopted J^π(2660)=(21/2$^+$). These assignments are not adopted in Adopted Levels.

[&] From γ(t).

[a] Band(A): Band 1, $\pi g_{9/2}$.

[b] Band(B): Band 2.

[c] Band(C): Band 3.

γ(^{123}I)

E$_\gamma$	I$_\gamma$[†]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	E$_\gamma$	I$_\gamma$[†]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$
138.4	47 5	138.40	7/2$^+$	0.0	5/2$^+$	456		3392.4	23/2$^+$	2936.4	21/2$^+$
298.2		2659.9	(19/2$^-$)	2361.7	17/2$^+$	456		3916.9	(25/2$^-$)	3460.9	(23/2$^-$)
310		2671.7	19/2$^+$	2361.7	17/2$^+$	502.7	49 5	641.10	9/2$^+$	138.40	7/2$^+$
331.3	100	972.4	11/2$^+$	641.10	9/2$^+$	629.8	19 2	1602.2	13/2$^+$	972.4	11/2$^+$
343.1	56 6	1315.5	13/2$^+$	972.4	11/2$^+$	641.1	66 7	641.10	9/2$^+$	0.0	5/2$^+$
345.8	43 4	2361.7	17/2$^+$	2015.9	15/2$^+$	671.4	76 8	2361.7	17/2$^+$	1690.3	15/2$^+$
374.8	57 5	1690.3	15/2$^+$	1315.5	13/2$^+$	674.4	14 2	1315.5	13/2$^+$	641.10	9/2$^+$
377		3036.9	(21/2$^-$)	2659.9	(19/2$^-$)	700.4	12 1	2015.9	15/2$^+$	1315.5	13/2$^+$
391		2081.4	17/2$^+$	1690.3	15/2$^+$	717.9	21 2	1690.3	15/2$^+$	972.4	11/2$^+$
399		3070.7	21/2$^+$	2671.7	19/2$^+$	766		2081.4	17/2$^+$	1315.5	13/2$^+$
413.7	23 2	2015.9	15/2$^+$	1602.2	13/2$^+$	810		2500.4	19/2$^+$	1690.3	15/2$^+$
419		2500.4	19/2$^+$	2081.4	17/2$^+$	855		2936.4	21/2$^+$	2081.4	17/2$^+$
424		3460.9	(23/2$^-$)	3036.9	(21/2$^-$)	892		3392.4	23/2$^+$	2500.4	19/2$^+$
436		2936.4	21/2$^+$	2500.4	19/2$^+$	961.1	4.0 4	1602.2	13/2$^+$	641.10	9/2$^+$

[†] Intensities are normalized to I(331.3γ)=100.

^{122}Sn(^{7}Li,6nγ) 2011Mo28

Level Scheme

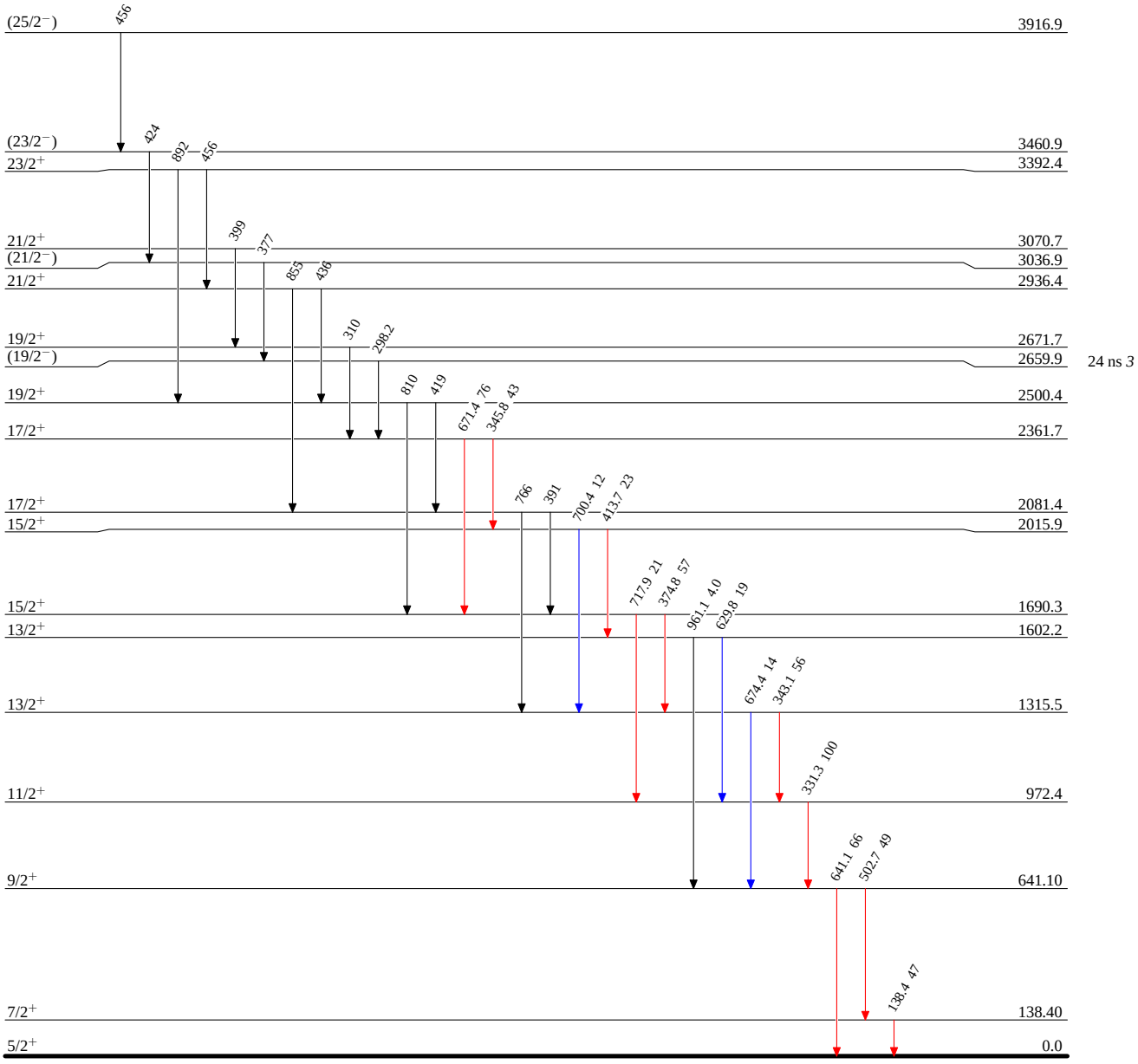
Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

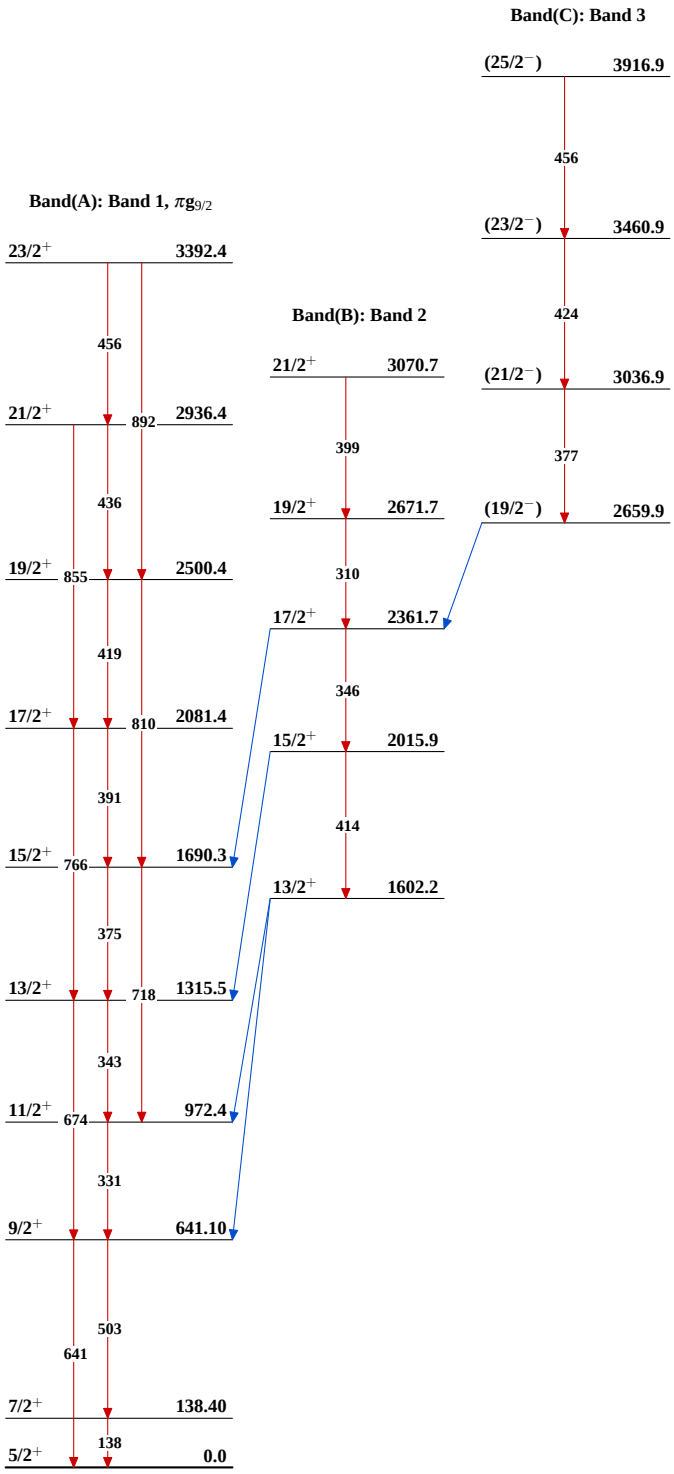
$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$



$^{123}_{53}I_{70}$

^{122}Sn(^{7}Li,6nγ) 2011Mo28



$^{123}_{53}I_{70}$

^{121}Sb(α,2nγ) 1993Go04,1977Ha36

1993Go04: E=30 MeV alpha beam was produced from the Variable-Energy Cyclotron Centre, Calcutta. Target was ≈3 mg/cm^2 enriched ^{121}Sb. γ rays were detected with two HPGe detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma(\theta)$. Deduced levels, J, π, band structures, γ-ray multipolarities, mixing ratios.

1977Ha36: E=19.8-27 MeV alpha beams were produced from the Rossendorf cyclotron U-120 at GDR. Target was ≈10 mg/cm^2 95% enriched ^{121}Sb metallic powder on a 0.5 mg/cm^2 lavsan backing. γ rays were detected with Ge(Li) detectors; conversion electrons were selected with a broad-range electron spectrometer and detected with a Si(Li) detector. Measured Eγ, Iγ, excitation functions, $\gamma\gamma$-coin, $\gamma\gamma$(t), $\gamma(\theta)$, E(ce), I(ce). Deduced levels, J, π, isomer $T_{1/2}$, band structures, conversion coefficients, γ-ray multipolarities. Systematics of neighboring odd-mass I isotopes. Comparisons with theoretical calculations.

1988Ko16: E=27 MeV alpha beam was produced from the Rossendorf cyclotron. Target was ≈20 mg/cm^2 98.5% enriched Sb_2O_4. γ rays were detected with a Ge(Li) detector. Measured Eγ, Iγ, γ(t). Deduced $T_{1/2}$, transition strengths. Comparisons with theoretical calculations.

Others (measured cross sections): 2011Ud01, 2006Ha01, 1994Bh12, 1991Si15, 1990Is01, 1982Ca10, 1981Ve17.

^{123}I Levels

Band assignments and configurations are from 1993Go04.

E(level)†	Jπ‡	$T_{1/2}$#	E(level)†	Jπ‡	$T_{1/2}$#	E(level)†	Jπ‡	$T_{1/2}$#
0.0@	5/2$^+$		1453.04[a] *9*	15/2$^-$		2339.0? *4*		
138.38[b] *5*	7/2$^+$		1576.58[b] *18*	15/2$^{(+)}$		2361.85 *21*	(19/2$^+$)	
149.07 *20*	1/2$^+$		1602.50 *22*	(15/2$^+$)		2369.56 *25*		
178.00 *20*	3/2$^+$	0.3 ns *1*	1607.06? *16*	(15/2$^+$)		2439.9 *4*		
302.20? *10*		0.8 ns *1*	1632.58 *22*	(13/2$^-$)		2466.2[b] *3*	19/2$^{(+)}$	
330.1 *3*	3/2$^+$		1690.30[c] *16*	15/2$^+$		2481.5? *4*		
474.14& *9*	7/2$^+$		1791.1& *3*	(15/2$^+$)		2500.9[c] *3*	19/2$^{(+)}$	
552.35@ *6*	9/2$^+$		1816.0 *3*			2567.3 *3*		
641.26[c] *7*	9/2$^+$	0.2 ns *1*	1871.38@ *17*	17/2$^+$		2613.84[a] *25*	23/2$^-$	
671.01 *6*	9/2$^+$		2000.5? *3*	($^+$)	0.4 ns *1*	2647.4& *4*	(19/2$^+$)	
794.11[b] *10*	11/2$^+$		2016.13 *19*	(17/2$^+$)		2659.9 *3*	(21/2$^+$)	28 ns *2*
943.47[a] *7*	11/2$^-$	0.2 ns *1*	2039.76[a] *14*	19/2$^-$		2712.0@ *3*	21/2$^{(+)}$	
972.42[c] *9*	11/2$^+$		2081.98[c] *21*	17/2$^{(+)}$		2790.4 *4*		
1080.13& *19*	11/2$^{(+)}$		2262.1 *4*			2947.8 *4*	(21/2$^-$)	
1156.19@ *15*	13/2$^+$		2265.65 *22*	(17/2$^-$)		3409?		
1315.51[c] *12*	13/2$^+$		2282.4? *11*	(17/2$^+$)		3512.3[a] *4*	(27/2$^-$)	
1437.42 *18*	13/2$^{(+)}$		2319.6 *11*			3697?		

† From a least-squares fit to γ-ray energies.

‡ From Adopted Levels. The assignments from this dataset are mostly from 1977Ha36 based on $\gamma(\theta)$ and ce data, and they are the same as the adopted assignments, except that parentheses will be added there if there is no firm experimental evidence.

From generalized centroid-shift method (1988Ko16).

@ Band(A): $\pi 2d_{5/2}$ decoupled band.

& Band(B): $\pi 2d_{5/2}$ nonaligned band.

[a] Band(C): $\pi 1h_{11/2}$ band.

[b] Band(D): $\pi 1g_{7/2}$ band.

[c] Band(E): π9/2[404] band.

^{121}Sb(α,2nγ) 1993Go04,1977Ha36 (continued)

$\gamma(^{123}I)$

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [&]	δ [a]	α [b]	Comments
118.64 *20*	1.0 *2*	671.01	9/2$^+$	552.35	9/2$^+$				E_γ: weighted average of 118.63 *20* from 1977Ha36 and 119 *1* from 1993Go04. I_γ: from 1977Ha36 (27 MeV) and 1993Go04.
138.38 *5*	212 *18*	138.38	7/2$^+$	0.0	5/2$^+$	M1+E2	−0.15 *5*	0.306 *6*	E_γ: weighted average of 138.37 *5* from 1977Ha36 and 138.4 *1* from 1993Go04. I_γ: unweighted average of 244 *12* from 1977Ha36 (22 MeV), 182 *9* from 1977Ha36 (27 MeV), and 210 *11* from 1993Go04. Mult.: from Adopted Gammas. D+Q from A_2=−0.25 *2*, A_4=−0.04 *3* (1977Ha36); A_2=−0.28 *1*, A_4=−0.03 *1* (1993Go04); M1 with α(K)exp=0.26 *1* is assumed by 1977Ha36 for normalization of their measured conversion coefficients.
149.07 *20*	4.7 *13*	149.07	1/2$^+$	0.0	5/2$^+$				E_γ: from 1977Ha36. I_γ: weighted average of 7.0 *14* (22 MeV) and 4.0 *8* (27 MeV) from 1977Ha36. A_2=+0.31 *5* (1977Ha36).
167.08 *20*	1.0 *2*	641.26	9/2$^+$	474.14	7/2$^+$				E_γ,I_γ: from 1977Ha36 (27 MeV). Other: Iγ<2 from 1977Ha36 (22 MeV).
178.00 *20*	13 *6*	178.00	3/2$^+$	0.0	5/2$^+$				E_γ: from 1977Ha36. I_γ: unweighted average of 18 *3* from 1977Ha36 (22 MeV) and 7.0 *14* from 1977Ha36 (27 MeV). A_2=−0.05 *4*, A_4=−0.22 *11* (1977Ha36).
196.8 *3*	4.0[@] *8*	671.01	9/2$^+$	474.14	7/2$^+$				E_γ: weighted average of 196.6 *3* from 1977Ha36 and 197.0 *3* from 1993Go04. I_γ: from 1993Go04. Other: <3 from 1977Ha36 (27 MeV).
208.96 *20*	2.6 *5*	1816.0		1607.06?	(15/2$^+$)				E_γ: weighted average of 208.94 *20* from 1977Ha36 and 209.0 *3* from 1993Go04. I_γ: weighted average of 3.0 *6* from 1977Ha36 (22 MeV), 4.0 *8* from 1977Ha36 (27 MeV), and 2.0 *4* from 1993Go04. A_2=−0.58 *4* (1977Ha36).
241.69 *20*	5.8 *10*	794.11	11/2$^+$	552.35	9/2$^+$				E_γ: weighted average of 241.69 *20* from 1977Ha36 and 241.7 *3* from 1993Go04. I_γ: weighted average of 6.0 *12* from 1977Ha36 (22 MeV), 5.0 *10* from 1977Ha36 (27 MeV), and 7.0 *14* from 1993Go04. A_2=−0.26 *6* (1977Ha36).
272.46 *5*	100 *5*	943.47	11/2$^-$	671.01	9/2$^+$	E1		0.01279	E_γ: weighted average of 272.47 *5* from 1977Ha36 and 272.4 *1* from 1993Go04. Mult.: α(K)exp=0.009 *1*, A_2=−0.18 *2*, A_4=−0.03 *5* (1977Ha36), A_2=−0.19 *2*, A_4=−0.02 *5* (1993Go04).
291.55 *10*	3.7 *6*	1607.06?	(15/2$^+$)	1315.51	13/2$^+$	(M1+E2)		0.0421 *21*	E_γ: weighted average of 291.55 *20* from 1977Ha36 and 291.4 *3* from 1993Go04. I_γ: weighted average of 3.0 *6* from 1977Ha36 (22 MeV), 5.0

^{121}Sb(α,2nγ) 1993Go04,1977Ha36 (continued)

$\gamma(^{123}I)$ (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [&]	δ [a]	α [b]	Comments
									10 from 1977Ha36 (27 MeV), and 4.0 *8* from 1993Go04. Mult.: α(K)exp=0.046 *9*, A_2=−0.43 *5* (1977Ha36).
294.7[#] *3*	3.0[#] *6*	1871.38	17/2$^+$	1576.58	15/2$^{(+)}$				
298.06 *20*	10 *2*	2659.9	(21/2$^+$)	2361.85	(19/2$^+$)	(M1,E2)		0.0395 *17*	E_γ: weighted average of 298.12 *20* from 1977Ha36 and 298.0 *2* from 1993Go04. I_γ: weighted average of 8.0 *16* from 1977Ha36 (22 MeV), 13.0 *25* from 1977Ha36 (27 MeV), and 13.0 *25* from 1993Go04. Mult.: α(K)exp=0.032 *6*, A_2=+0.01 *4*, A_4=+0.06 *10* (1977Ha36).
302.2[d] *3*	7.5 *25*	302.20?		0.0	5/2$^+$				E_γ: from 1977Ha36. I_γ: unweighted average of 10.0 *20* from 1977Ha36 (22 MeV) and 5.0 *10* from 1977Ha36 (27 MeV).
310.17 *20*	10 *2*	2000.5?	(+)	1690.30	15/2$^+$	(M1,E2)		0.0352 *11*	E_γ: weighted average of 310.24 *20* from 1977Ha36 and 310.1 *2* from 1993Go04. I_γ: weighted average of 12.0 *23* from 1977Ha36 (22 MeV), 8.0 *16* from 1977Ha36 (27 MeV), and 13.0 *25* from 1993Go04. Mult.: α(K)exp=0.025 *4*, A_2=+0.11 *3*, A_4=+0.00 *7* (1977Ha36).
329.8[#] *2*	10[#] *2*	2369.56		2039.76	19/2$^-$				
330.1 *3*	19 *11*	330.1	3/2$^+$	0.0	5/2$^+$				E_γ: from 1977Ha36. I_γ: unweighted average of 30 *4* from 1977Ha36 (22 MeV) and 8.0 *16* from 1977Ha36 (27 MeV).
331.16 *5*	101 *5*	972.42	11/2$^+$	641.26	9/2$^+$	M1+E2	≈+0.2	≈0.0289	E_γ: weighted average of 331.17 *5* from 1977Ha36 and 331.1 *1* from 1993Go04. I_γ: weighted average of 95 *5* from 1977Ha36 (22 MeV), 98 *5* from 1977Ha36 (27 MeV), and 113 *6* from 1993Go04. Mult.: α(K)exp=0.026 *2*, A_2=+0.08 *2*, A_4=−0.03 *4* (1977Ha36), A_2=0.08 *2*, A_4=+0.03 *4* (1993Go04).
338.5 *3*	4.0 *8*	2339.0?		2000.5?	(+)				E_γ: weighted average of 338.4 *3* from 1977Ha36 and 338.6 *3* from 1993Go04. I_γ: weighted average of 4.0 *8* from 1977Ha36 (27 MeV) and 4.0 *8* from 1993Go04.
343.10 *10*	49 *3*	1315.51	13/2$^+$	972.42	11/2$^+$	M1+E2	≈+0.2	≈0.0264	E_γ: weighted average of 343.11 *20* from 1977Ha36 and 343.1 *1* from 1993Go04. I_γ: weighted average of 47 *3* from 1977Ha36 (22 MeV), 47 *3* from 1977Ha36 (27 MeV), and 53 *3* from 1993Go04. Mult.: α(K)exp=0.024 *2*, A_2=+0.05 *2*, A_4=−0.05 *6* (1977Ha36), A_2=+0.07 *3*, A_4=+0.05 *4* (1993Go04).
345.66 *20*	10 *2*	2361.85	(19/2$^+$)	2016.13	(17/2$^+$)	(D)			E_γ: weighted average of 345.62 *20* from 1977Ha36 and 345.7 *2* from 1993Go04. I_γ: weighted average of 9.0 *18* from 1977Ha36 (22 MeV), 10.0 *20* from 1977Ha36 (27 MeV), and 11.0 *22* from 1993Go04. Mult.: A_2=−0.26 *3*, A_4=−0.19 *10* (1977Ha36).
357.3[#] *3*	4.0[#] *8*	1437.42	13/2$^{(+)}$	1080.13	11/2$^{(+)}$				
362.1 *2*	11 *2*	1156.19	13/2$^+$	794.11	11/2$^+$	(M1)		0.0230	E_γ: weighted average of 362.2 *3* from 1977Ha36 and 362.1 *2*

^{121}Sb(α,2nγ) 1993Go04,1977Ha36 (continued)

$\gamma(^{123}I)$ (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	δ [a]	α [b]	Comments
									from 1993Go04. I_γ: weighted average of 12.0 *23* from 1977Ha36 (22 MeV), 11.0 *22* from 1977Ha36 (27 MeV), and 10.0 *20* from 1993Go04. Mult.: M1,E2 from α(K)exp=0.025 *8*, M1 favored by A_2=−0.64 *4*, A_4=+0.02 *12* (1977Ha36).
374.81 *20*	31 *4*	1690.30	15/2$^+$	1315.51	13/2$^+$	M1+E2	≈+0.2	≈0.0210	E_γ: weighted average of 374.82 *20* from 1977Ha36 (27 MeV) and 374.8 *2* from 1993Go04. I_γ: weighted average of 25 *4* from 1977Ha36 (22 MeV), 32 *4* from 1977Ha36 (27 MeV), and 37 *4* from 1993Go04. Mult.: α(K)exp=0.023 *3*, A_2=+0.03 *2*, A_4=+0.07 *7* (1977Ha36), A_2=+0.08 *4*, A_4=+0.06 *6* (1993Go04).
391.14 *20*	19 *3*	943.47	11/2$^-$	552.35	9/2$^+$				E_γ: weighted average of 391.17 *20* from 1977Ha36 (27 MeV) and 391.1 *2* from 1993Go04. I_γ: weighted average of 17 *3* from 1977Ha36 (22 MeV), 17 *3* from 1977Ha36 (27 MeV), and 25 *4* from 1993Go04. A_2=−0.11 *4*, A_4=−0.04 *7* (1977Ha36), A_2=−0.11 *6*, A_4=+0.09 *7* (1993Go04), for a doublet with 391.7γ from 2082 level.
391.70 *20*	10 *2*	2081.98	17/2$^{(+)}$	1690.30	15/2$^+$				E_γ: weighted average of 391.80 *20* from 1977Ha36 and 391.6 *2* from 1993Go04. I_γ: weighted average of 8.0 *16* from 1977Ha36 (22 MeV), 12.0 *23* from 1977Ha36 (27 MeV), and 14 *3* from 1993Go04. Mult.: A_2=−0.11 *4*, A_4=−0.04 *7* for 391.8γ + 391.17γ.
399.5 *3*	4.0 *8*	2481.5?		2081.98	17/2$^{(+)}$				E_γ,I_γ: from 1977Ha36. A_2=+0.35 *7* (1977Ha36).
409[#] *1*	2.0[#] *4*	1080.13	11/2$^{(+)}$	671.01	9/2$^+$				
413.6 *2*	12 *2*	2016.13	(17/2$^+$)	1602.50	(15/2$^+$)	(M1+E2)		0.0156 *9*	E_γ: weighted average of 413.7 *3* from 1977Ha36 and 413.6 *2* from 1993Go04. I_γ: weighted average of 11.0 *22* from 1977Ha36 (27 MeV), and 14 *3* from 1993Go04. Other: 110 *6* from 1977Ha36 (22 MeV) for a doublet with 414.0 from 552 level. Mult.: α(K)exp=0.015 *1*, A_2=−0.48 *2*, A_4=−0.02 *3*, for 413.6γ +414.0γ doublet (1977Ha36).
413.98 *5*	94 *8*	552.35	9/2$^+$	138.38	7/2$^+$	M1		0.01638	E_γ: weighted average of 414.00 *5* from 1977Ha36 and 413.9 *1* from 1993Go04. I_γ: unweighted average of 110 *6* from 1977Ha36 (22 MeV), 83 *4* from 1977Ha36 (27 MeV), and 89 *5* from 1993Go04. Mult.: α(K)exp=0.015 *1*, A_2=−0.48 *2*, A_4=−0.02 *3* (1977Ha36), A_2=−0.53 *2*, A_4=−0.01 *4* (1993Go04), for a doublet with 413.6γ from the 2016 level.
419.0[#] *3*	8.0[#] *16*	2500.9	19/2$^{(+)}$	2081.98	17/2$^{(+)}$				A_2=−0.08 *16* from 1993Go04.
420.4[#] *3*	3.0[#] *6*	1576.58	15/2$^{(+)}$	1156.19	13/2$^+$				
423.8[#] *3*	6.0[#] *12*	2439.9		2016.13	(17/2$^+$)				
474.11 *11*	81 *11*	474.14	7/2$^+$	0.0	5/2$^+$	M1		0.01168	E_γ: weighted average of 474.22 *10* from 1977Ha36 and 474.0 *1*

^{121}Sb(α,2nγ) 1993Go04,1977Ha36 (continued)

$\gamma(^{123}I)$ (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	α[b]	Comments
								from 1993Go04. I_γ: unweighted average of 102 *5* from 1977Ha36 (22 MeV), 66 *3* from 1977Ha36 (27 MeV), and 75 *4* from 1993Go04. Mult.: α(K)exp=0.010 *1*, A_2=−0.57 *2*, A_4=−0.05 *4* (1977Ha36), A_2=−0.59 *3*, A_4=−0.05 *4* (1993Go04).
502.90 *10*	61 *3*	641.26	9/2$^+$	138.38	7/2$^+$	M1	0.01010	E_γ: weighted average of 503.00 *10* from 1977Ha36 and 502.8 *1* from 1993Go04. I_γ: weighted average of 64 *3* from 1977Ha36 (22 MeV), 59 *3* from 1977Ha36 (27 MeV), and 61 *3* from 1993Go04. Mult.: α(K)exp=0.0095 *10*, A_2=−0.58 *2*, A_4=−0.04 *4* (1977Ha36), A_2=−0.53 *3*, A_4=−0.08 *5* (1993Go04).
509.57 *5*	100 *5*	1453.04	15/2$^-$	943.47	11/2$^-$	E2	0.00812	E_γ: weighted average of 509.56 *5* from 1977Ha36 and 509.6 *1* from 1993Go04. I_γ: weighted average of 94 *5* from 1977Ha36 (27 MeV) and 105 *5* from 1993Go04. Mult.: α(K)exp=0.0075 *6*, A_2=+0.21 *5*, A_4=−0.05 *11* (1977Ha36).
528[#] *1*	2.0[#] *4*	1080.13	11/2$^{(+)}$	552.35	9/2$^+$			
532.55 *20*	25 *4*	671.01	9/2$^+$	138.38	7/2$^+$	D		E_γ: weighted average of 532.69 *20* from 1977Ha36 and 532.4 *2* from 1993Go04. I_γ: weighted average of 26 *4* from 1977Ha36 (22 MeV), 24 *4* from 1977Ha36 (27 MeV), and 25 *4* from 1993Go04. Mult.: A_2=−0.33 *4* (1977Ha36), A_2=−0.32 *4*, A_4=+0.08 *6* (1993Go04).
552.32 *12*	60 *5*	552.35	9/2$^+$	0.0	5/2$^+$	E2	0.00651	E_γ: weighted average of 552.43 *10* from 1977Ha36 and 552.2 *1* from 1993Go04. I_γ: unweighted average of 62 *3* from 1977Ha36 (22 MeV), 50.0 *25* from 1977Ha36 (27 MeV), and 68 *4* from 1993Go04. Mult.: α(K)exp=0.0058 *6*, A_2=+0.32 *2*, A_4=−0.03 *5* (1977Ha36), A_2=+0.30 *4*, A_4=−0.06 *5* (1993Go04).
574.08 *20*	27 *7*	2613.84	23/2$^-$	2039.76	19/2$^-$	E2	0.00587	E_γ: weighted average of 574.25 *20* from 1977Ha36 and 573.9 *2* from 1993Go04. I_γ: unweighted average of 14 *3* from 1977Ha36 (22 MeV), 27 *4* from 1977Ha36 (27 MeV), and 39 *4* from 1993Go04. Mult.: α(K)exp=0.0061 *15*, A_2=+0.35 *4*, A_4=−0.08 *11* (1977Ha36), A_2=+0.31 *7*, A_4=−0.10 *8* (1993Go04).
586.71 *11*	56 *11*	2039.76	19/2$^-$	1453.04	15/2$^-$	E2	0.00554	E_γ: weighted average of 586.82 *10* from 1977Ha36 and 586.6 *1* from 1993Go04. I_γ: unweighted average of 37 *4* from 1977Ha36 (22 MeV), 55 *3* from 1977Ha36 (27 MeV), and 75 *4* from 1993Go04. Mult.: α(K)exp=0.0058 *12*, A_2=+0.39 *3*, A_4=−0.03 *8* (1977Ha36), A_2=+0.37 *4*, A_4=−0.04 *5* (1993Go04).
603.90 *20*	83 *11*	1156.19	13/2$^+$	552.35	9/2$^+$	Q		E_γ: unweighted average of 604.09 *10* from 1977Ha36 and 603.7 *1* from 1993Go04. I_γ: unweighted average of 72 *4* from 1977Ha36 (22 MeV), 73 *4* from 1977Ha36 (27 MeV), and 104 *5* from 1993Go04. Mult.: A_2=+0.36 *3*, A_4=−0.05 *5* (1977Ha36), A_2=+0.35 *7*, A_4=+0.00 *7* (1993Go04).
606.00 *20*	40 *4*	1080.13	11/2$^{(+)}$	474.14	7/2$^+$	Q	0.0051	E_γ: weighted average of 606.10 *20* from 1977Ha36 and 605.9 *2* from 1993Go04. I_γ: weighted average of 45 *3* from 1977Ha36 (22 MeV), 32 *4* from 1977Ha36

^{121}Sb(α,2nγ) 1993Go04,1977Ha36 (continued)

$\gamma(^{123}I)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	α[b]	Comments
								(27 MeV), and 40 *4* from 1993Go04. Mult.: A_2=+0.35 *5*, A_4=−0.15 *10* (1977Ha36), A_2=+0.33 *8*, A_4=+0.04 *8* (1993Go04).
629.5[#] *3*	3.0[#] *6*	2262.1		1632.58	(13/2$^-$)			
630.0 *3*	18 *3*	1602.50	(15/2$^+$)	972.42	11/2$^+$	(Q)	0.0046	E_γ: weighted average of 630.04 *20* from 1977Ha36 (27 MeV) and 630.1 *2* from 1993Go04. I_γ: weighted average of 16 *3* from 1977Ha36 (27 MeV) and 19 *3* from 1993Go04. Mult.: A_2=+0.28 *3*, A_4=+0.13 *9*.
641.26 *10*	71 *5*	641.26	9/2$^+$	0.0	5/2$^+$	E2	0.00439	E_γ: weighted average of 641.31 *10* from 1977Ha36 and 641.2 *1* from 1993Go04. I_γ: unweighted average of 70 *4* from 1977Ha36 (22 MeV), 63 *3* from 1977Ha36 (27 MeV), and 79 *4* from 1993Go04. Mult.: α(K)exp=0.0035 *6*, A_2=+0.23 *2*, A_4=−0.04 *7* (1977Ha36), A_2=+0.15 *4*, A_4=−0.08 *6* (1993Go04).
643[#d] *1*	2.0[#] *4*	1437.42	13/2$^{(+)}$	794.11	11/2$^+$			
655.73 *10*	74 *5*	794.11	11/2$^+$	138.38	7/2$^+$	E2	0.00415	E_γ: weighted average of 655.76 *10* from 1977Ha36 and 655.7 *1* from from 1993Go04. I_γ: unweighted average of 75 *4* from 1977Ha36 (22 MeV), 64 *3* from 1977Ha36 (27 MeV), and 82 *4* from 1993Go04. Mult.: α(K)exp=0.0034 *6*, A_2=+0.29 *2*, A_4=−0.07 *6* (1977Ha36), A_2=+0.33 *4*, A_4=−0.07 *6* (1993Go04).
671.02 *6*	111 *11*	671.01	9/2$^+$	0.0	5/2$^+$	E2	0.00391	E_γ: weighted average of 671.05 *5* from 1977Ha36 and 670.9 *1* from 1993Go04. I_γ: unweighted average of 117 *6* from 1977Ha36 (22 MeV), 90 *5* from 1977Ha36 (27 MeV), and 125 *6* from 1993Go04. Mult.: α(K)exp=0.0035 *6*, A_2=+0.24 *3*, A_4=−0.02 *8* (1977Ha36), A_2=+0.23 *3*, A_4=−0.03 *4* (1993Go04), for a doublet with 671.6γ from 2362 level.
671.6 *2*	15 *3*	2361.85	(19/2$^+$)	1690.30	15/2$^+$			E_γ: weighted average of 671.5 *3* from 1977Ha36 and 671.7 *2* from 1993Go04. I_γ: from 1977Ha36 (27 MeV) and 1993Go04. Other: 117 *6* from 1977Ha36 (22 MeV) for a doublet with 671.0γ from 671 level. Mult.: α(K)exp=0.0035 *6*, A_2=+0.24 *3*, A_4=−0.02 *8* (1977Ha36), A_2=+0.23 *3*, A_4=−0.03 *4* (1993Go04), for the doublet. Evidence from delayed coincidence (1977Ha36).
674.2 *2*	15 *3*	1315.51	13/2$^+$	641.26	9/2$^+$	Q	0.00390	E_γ: weighted average of 674.3 *3* from 1977Ha36 and 674.2 *2* from 1993Go04. I_γ: weighted average of 14 *3* from 1977Ha36 (22 MeV), 15 *3* from 1977Ha36 (27 MeV), and 17 *3* from 1993Go04. Mult.: A_2=+0.23 *2* (1977Ha36), A_2=+0.32 *11*, A_4=−0.13 *16* (1993Go04).
687[#] *1*	2.0[#] *4*	2319.6		1632.58	(13/2$^-$)			
689.1 *2*	11 *2*	1632.58	(13/2$^-$)	943.47	11/2$^-$	(M1+E2)	0.0042 *6*	E_γ: weighted average of 689.0 *3* from 1977Ha36 and 689.1 *2* from 1993Go04. I_γ: weighted average of 13.0 *25* from 1977Ha36 (22 MeV), 11.0 *22* from

$^{123}_{53}I_{70}$-83

^{121}Sb(α,2nγ) 1993Go04,1977Ha36 (continued)

$\gamma(^{123}I)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	α[b]	Comments
								1977Ha36 (27 MeV), and 10.0 *20* from 1993Go04. Mult.: α(K)exp=0.0050 *20*, A_2=−0.92 *9* (1977Ha36).
696.0[#] *3*	6.0[#] *12*	2567.3		1871.38	17/2$^+$			
700.6 *2*	9 *2*	2016.13	(17/2$^+$)	1315.51	13/2$^+$	(E2)	0.00351	E_γ: weighted average of 700.7 *3* from 1977Ha36 and 700.6 *2* from 1993Go04. I_γ: weighted average of 7.0 *14* from 1977Ha36 (22 MeV), 11.0 *22* from 1977Ha36 (27 MeV), and 11.0 *22* from 1993Go04. Mult.: (M1,E2) from α(K)exp=0.0047 *20*, A_2=+0.18 *9* (1977Ha36); (E2) required by level scheme.
711.0 *2*	21 *3*	1791.1	(15/2$^+$)	1080.13	11/2$^{(+)}$	(E2)	0.00339	E_γ: weighted average of 711.0 *3* from 1977Ha36 and 711.0 *2* from 1993Go04. I_γ: weighted average of 20 *3* from 1977Ha36 (22 MeV), 19 *3* from 1977Ha36 (27 MeV), and 28 *4* from 1993Go04. Mult.: M1,E2 from α(K)exp=0.0043 *15*, E2 preferred by A_2=+0.40 *6*, A_4=+0.01 *9* (1977Ha36).
715.20 *10*	52 *9*	1871.38	17/2$^+$	1156.19	13/2$^+$	E2	0.00334	E_γ: weighted average of 715.20 *10* from 1977Ha36 and 715.2 *1* from 1993Go04. I_γ: unweighted average of 37 *4* from 1977Ha36 (22 MeV), 54 *3* from 1977Ha36 (27 MeV), and 66 *3* from 1993Go04. Mult.: α(K)exp=0.0032 *7*, A_2=+0.35 *6*, A_4=−0.01 *9* (1977Ha36), A_2=+0.40 *7*, A_4=−0.04 *7* (1993Go04).
717.9 *2*	11 *4*	1690.30	15/2$^+$	972.42	11/2$^+$			E_γ: weighted average of 717.9 *3* from 1977Ha36 and 717.9 *2* from 1993Go04. I_γ: unweighted average of 6.0 *12* from 1977Ha36 (22 MeV), 10.0 *20* from 1977Ha36 (27 MeV), and 18 *3* from 1993Go04.
766.5[c] *3*	20[c] *3*	1437.42	13/2$^{(+)}$	671.01	9/2$^+$	Q		E_γ,Mult.: Doublet with 766.5γ from 2082 level. Evidence from coincidence. Mult assignment was done with sum of the doublet peaks (1993Go04). This placement is not reported by 1977Ha36, from which it is instead placed from a tentative level at E=766.5 that is not adopted. I_γ: from 1993Go04. Other: 16 *3* for a 766.5γ placed from a tentative level at E=766.5 in 1977Ha36 (27 MeV); 23 for the double from 1977Ha36 (22 MeV). Mult.: A_2=+0.32 *3*, A_4=−0.17 *8* (1977Ha36), A_2=+0.32 *10*, A_4=−0.06 *13*, for the doublet.
766.5[c] *3*	7[c] *2*	2081.98	17/2$^{(+)}$	1315.51	13/2$^+$	(Q)		E_γ,Mult.: Evidence from coincidence. Mult assignment was done with sum of the doublet peaks (1977Ha36, 1993Go04). I_γ: unweighted average of 5 *1* from 1977Ha36 (27 MeV) and 9.0 *18* from 1993Go04. Other: 23 *4* for the doublet. A_2=+0.32 *3*, A_4=−0.17 *8* (1977Ha36), A_2=+0.32 *10*, A_4=−0.06 *13* (1993Go04), for the doublet.
782.4 *2*	36 *5*	1576.58	15/2$^{(+)}$	794.11	11/2$^+$	Q	0.0027	E_γ: weighted average of 782.5 *3* from 1977Ha36 and 782.4 *2* from 1993Go04. I_γ: unweighted average of 30 *4* from 1977Ha36 (22 MeV), 34 *4* from 1977Ha36 (27 MeV), and 45 *3* from 1993Go04. Mult.: A_2=+0.31 *3*, A_4=−0.00 *9* (1977Ha36), A_2=+0.33 *4*, A_4=+0.00 *6* (1993Go04).
810.5[#] *3*	4.0[#] *8*	2500.9	19/2$^{(+)}$	1690.30	15/2$^+$			

^{121}Sb(α,2nγ) 1993Go04,1977Ha36 (continued)

$\gamma(^{123}I)$ (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	Comments
812.6 *2*	12 *2*	2265.65	(17/2$^-$)	1453.04	15/2$^-$	D+Q	E_γ: weighted average of 812.5 *3* from 1977Ha36 and 812.7 *2* from 1993Go04. I_γ: weighted average of 13.0 *25* from 1977Ha36 (27 MeV) and 11.0 *22* from 1993Go04. Mult.: A_2=−0.87 *22* (1977Ha36).
840.6 *2*	21 *3*	2712.0	21/2$^{(+)}$	1871.38	17/2$^+$	(Q)	E_γ: weighted average of 840.6 *3* from 1977Ha36 and 840.6 *2* from 1993Go04. I_γ: weighted average of 19 *3* from 1977Ha36 (27 MeV), and 24 *4* from 1993Go04. Other: 5 *1* from 1977Ha36 (22 MeV) seems discrepant. Mult.: A_2=+0.33 *4* (1977Ha36), A_2=+0.29 *9*, A_4=+0.09 *13* (1993Go04).
845[#] *1*	10[#] *2*	2282.4?	(17/2$^+$)	1437.42	13/2$^{(+)}$		
856.3[#] *2*	15[#] *3*	2647.4	(19/2$^+$)	1791.1	(15/2$^+$)	(Q)	Mult.: A_2=+0.35 *10* from 1993Go04.
889.6 *2*	12 *3*	2466.2	19/2$^{(+)}$	1576.58	15/2$^{(+)}$	Q	E_γ: weighted average of 889.6 *3* from 1977Ha36 and 889.6 *2* from 1993Go04. I_γ: unweighted average of 7.0 *14* from 1977Ha36 (22 MeV), 11.0 *22* from 1977Ha36 (27 MeV), and 17 *3* from 1993Go04. Mult.: A_2=+0.52 *5* (1977Ha36), A_2=+0.40 *10* (1993Go04).
898.5[#] *3*	[#]	3512.3	(27/2$^-$)	2613.84	23/2$^-$	(Q)	Mult.: A_2=+0.24 *12* from 1993Go04.
908.0 *3*	6.0 *12*	2947.8	(21/2$^-$)	2039.76	19/2$^-$	(D+Q)	E_γ: weighted average of 907.8 *3* from 1977Ha36 and 908.2 *3* from 1993Go04. I_γ: weighted average of 6.0 *12* from 1977Ha36 (27 MeV) and 6.0 *12* from 1993Go04. Mult.: A_2=−1.1 *2* (1977Ha36).
919.0[#] *3*	8.0[#] *16*	2790.4		1871.38	17/2$^+$		
943[#d] *1*	4.0[#] *8*	3409?		2466.2	19/2$^{(+)}$		
985[#d] *1*	4.0[#] *8*	3697?		2712.0	21/2$^{(+)}$		
990.7[#] *3*	8.0[#] *16*	2567.3		1576.58	15/2$^{(+)}$		

[†] From 1977Ha36 and 1993Go04, weighted average taken where available, unless otherwise noted. No uncertainties are given in 1977Ha36 and 1993Go04. From a general statement in 1977Ha36 and 1993Go04 that uncertainties are 0.05-0.3 keV (1977Ha36) and 0.1-0.3 keV (1993Go04), respectively, depending on intensities, the evaluator has assigned uncertainty for each Eγ value as follows: 0.05 keV for Iγ>=80 (1977Ha36 only), 0.1 keV for Iγ>=50, 0.2 keV for Iγ>=10, and 0.3 keV for Iγ<10, except in a few cases from 1993Go04 where energy values are quoted to the nearestkeV for which 1 keV is assigned as uncertainty (by 1993Go04) and in some cases from 1977Ha36 where energy values are quoted to the nearest hundredth keV but Iγ<10 and to the nearest tenth keV, for which 0.20 keV and 0.3 keV is assigned, respectively (by the evaluator).

[‡] From 1977Ha36 (beam energy=27 MeV and 22 MeV) and 1993Go04 (beam energy=30 MeV), weighted (or unweighted) average taken where available, unless otherwise noted. No uncertainties are given in 1977Ha36 and 1993Go04. From a general statement that uncertainties are 5% to 20% 1993Go04 and 1977Ha36, the evaluator has assigned uncertainty for each in both Iγ value as follows: 5% for Iγ>=50, 20% for Iγ<=10, and values linearly varying between 5% and 20% for the others.

[#] From 1993Go04 only.

[@] Influenced or obscured by impurity lines.

[&] From α(K)exp and $\gamma(\theta)$ in 1977Ha36 and $\gamma(\theta)$ in 1993Go04, unless otherwise noted. The α(K)exp are based on relative Iγ and I(ce) data normalized to α(K)exp(138γ)=0.26 *1* for Mult(138γ)=M1 from 1977Ha36 and this normalization is still valid within the uncertainty for adopted Mult=M1+E2 with δ(E2/M1)=−0.15 *5*, for which α(K)=0.262 *4* calculated using the BrIcc code.

$^{123}_{53}I_{70}$-85

^{121}Sb(α,2nγ) 1993Go04,1977Ha36 (continued)

$\gamma(^{123}I)$ (continued)

[a] From $\gamma(\theta)$ in 1993Go04, unless otherwise noted.
[b] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
[c] Multiply placed with intensity suitably divided.
[d] Placement of transition in the level scheme is uncertain.

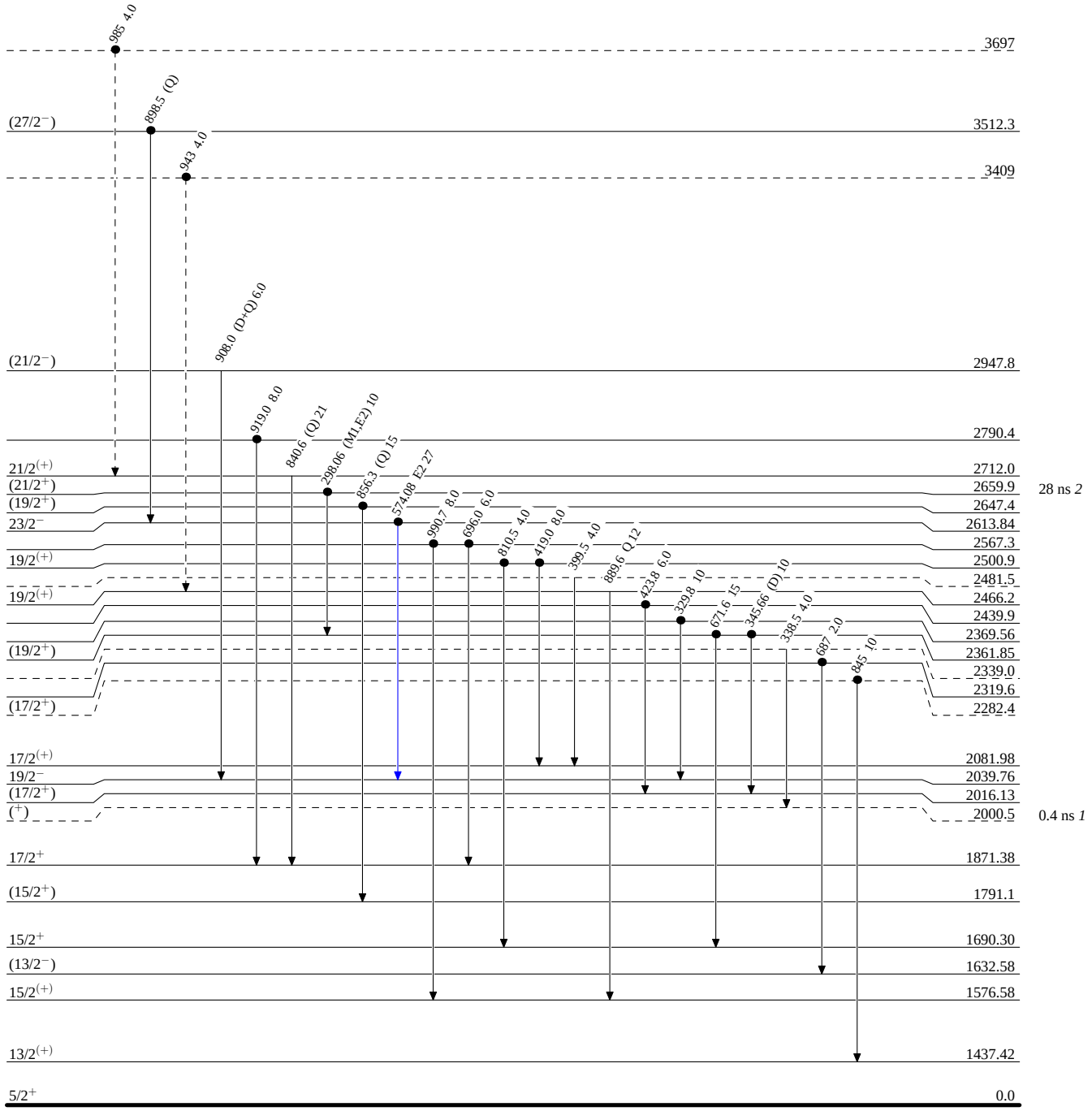
$^{123}_{53}I_{70}$-86

^{121}Sb(α,2nγ) 1993Go04,1977Ha36

Level Scheme

Intensities: Relative I_γ

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)
- Coincidence

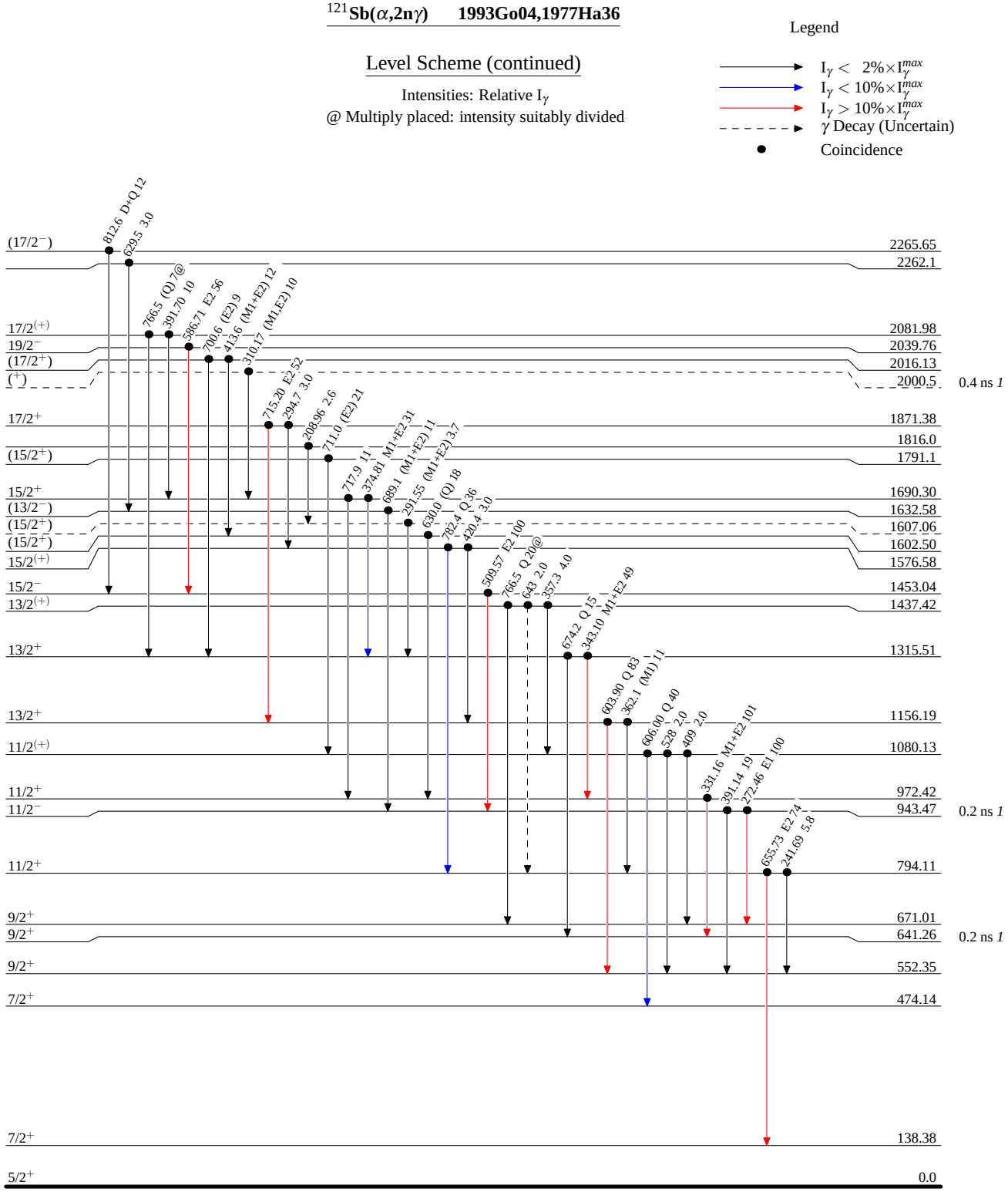


$^{123}_{53}I_{70}$

^{121}Sb(α,2nγ) 1993Go04,1977Ha36

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided



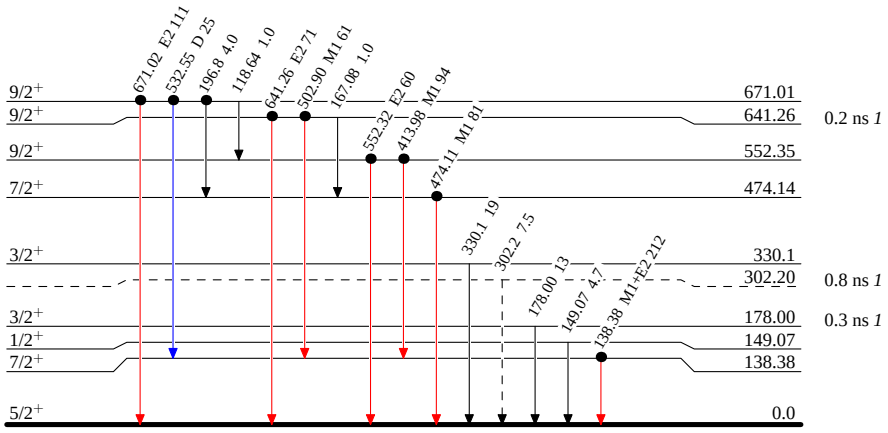
$^{123}_{53}I_{70}$

^{121}Sb(α,2nγ) 1993Go04,1977Ha36

Level Scheme (continued)

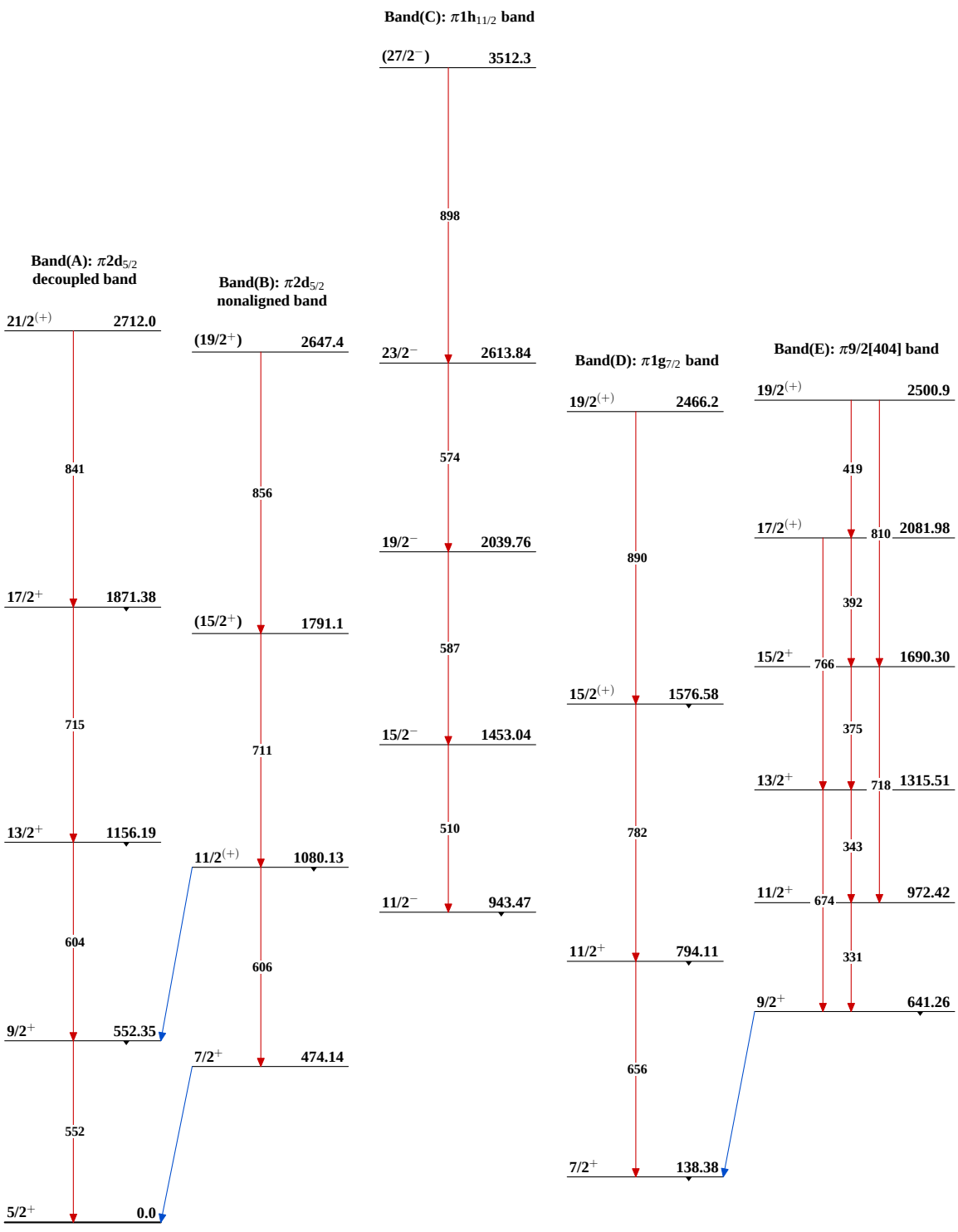
Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)
Coincidence



$^{123}_{53}I_{70}$

^{121}Sb(α,2nγ) 1993Go04,1977Ha36



$^{123}_{53}I_{70}$

^{122}Te(p,p′) IAR 1971Bu09

1971Bu09: E=6.70-7.76, 8.51-11.20 MeV proton beams were produced from an EN tandem Van de Graaff accelerator. Target was 910 μg/cm^2 94.8% enriched ^{122}Te on a 20 μg/cm^2 carbon backing. Scattered protons were detected with Si(Li) and surface-barrier silicon counters (FWHM=40-50 MeV). Measured $\sigma(E_p,\theta)$. Deduced levels, J, π, L-transfers, total resonance widths, proton partial widths, spectroscopic factors from the analysis of the elastic excitation functions using a theoretical multi-level formula. Comparisons with available data.

^{123}I Levels

Widths given under comments are from a theoretical fit to angular distribution of outgoing protons (1971Bu09).

E(level)†	J^π‡	L	C^2S‡	Comments
S(p)+7189 *20*	$1/2^+$	0	0.33	Γ=51 keV *5*; Γ_p=11.2 keV *15* E(level): IAR of g.s., $1/2^+$ in ^{123}Te.
S(p)+7347 *20*	$(3/2)^+$	2	0.25	Γ=33 keV *5*; Γ_p=3.5 keV *6* E(level): IAR of 159-keV, $3/2^+$ state in ^{123}Te.
S(p)+8620 *20*		(2)		E(level): IAR of 1414, $(5/2^+)$ level.
S(p)+8750 *20*		(2)		E(level): IAR of 1558, $(3/2^+)$ level.
S(p)+8948 *20*	(1/2)	(0,1)		Γ=36 keV *5*; Γ_p=3.1 keV *5* E(level): IAR of 1760, $(3/2)^-$ level.
S(p)+9056 *20*	$(3/2)^-$	1	0.03	Γ=38 keV *5*; Γ_p=2.4 keV *4* E(level): IAR of 1887-keV,$(3/2)^-$ level in ^{123}Te; L=1 in ^{122}Te(d,p).
S(p)+9154 *20*	$(3/2^-)$	(1)		Γ=32 keV *7* E(level): IAR of 1978-keV,$(3/2)^-$ level in ^{123}Te; L=1 in ^{122}Te(d,p).
S(p)+9204 *20*	$(7/2)^-$	3	0.054	Γ=37 keV *6*; Γ_p=1.4 keV *4* E(level): IAR of 2051 level.
S(p)+9255 *20*	$(3/2^-)$	(1)		Γ=50 keV *10* E(level): Possible IAR of 2093-keV, (1/2,3/2) state in ^{123}Te.
S(p)+9550? *20*		(1)		
S(p)+9740? *20*				
S(p)+9910 *20*		(3)		
S(p)+10076 *20*				
S(p)+10880 *20*				

† Given as S(p)+ E(p)(c.m.), with S(p)=4918 *3* (2021Wa16).
‡ From a theoretical fit to angular distribution of outgoing protons (1971Bu09).

^{122}Te(^{3}He,d) 1977Li10,1977Sz01,1979Sz05

$J^{\pi}(^{122}Te\ g.s.)=0^{+}$.

1977Li10: E=24 MeV ^{3}He beam was produced from the McMaster University tandem accelerator. Target was 94.8% enriched ^{122}Te on a thin formvar backing. Reaction products were momentum-analyzed with an Enge split-pole magnetic spectrograph (FWHM=25 keV) and detected with nuclear emulsions. Measured $\sigma(E_d,\theta)$, from 5° to 55°. Deduced levels, J, π, L-transfers, spectroscopic factors from DWBA analysis. Comparisons with theoretical calculations. Report 56 levels up to 3309.

1977Sz01: E=19.52 MeV ^{3}He beam was produced from the Pelletron 8UD accelerator of the University of Sao Paulo. Targets were 100-150 $\mu g/cm^2$ enriched (>96%) metallic ^{122}Te on 20 $\mu g/cm^2$ carbon foils. Reaction products were detected with two ΔE-E solid state detector telescopes (FWHM=35 keV). Measured $\sigma(E_d,\theta)$ from 10° to 90°. Deduced levels, J, π, L-transfers, spectroscopic factors from DWBA analysis. Comparisons with theoretical calculations. Report 20 levels up to 2270.

1979Sz05: E=36 MeV ^{3}He beam was produced from the MP Tandem Van de Graaff accelerator of the MPI Heidelberg. Target was ≈100 $\mu g/cm^2$ enriched ^{122}Te on a 15 $\mu g/cm^2$ carbon backing. Reaction products were momentum analyzed with a Q3D magnetic spectrograph (FWHM=13 keV) and detected with a three-wire (ΔE, E, veto) position-sensitive proportional counter. Measured $\sigma(E_d,\theta)$. Deduced levels, J, π, L-transfers, relative spectroscopic factors from DWBA analysis. Report 18 levels up to 1658.

Other: 1978Sz04 (measured mass excess).

^{123}I Levels

Spectroscopic factor here is defined by $(2J+1)C^2S'=(2j+1)/N\times(d\sigma/d\Omega_{exp})/(d\sigma/d\Omega_{DWBA})$, with normalization factor N=4.42 (1977Li10, 1977Sz01, 1979Sz05), J and j the spins of the final level and the transferred particle, respectively.

E(level)[†]	dσ/dΩ(max)[‡]	L[#]	$(2J+1)C^2S'$[#]	Comments
0.0	0.95	2	2.4[&]	Other: $(2J+1)C^2S'$=2.22, dσ/dΩ(25.5°)=0.253 μb/sr (1977Sz01).
144 *3*	0.77	0+4	0.3+4.7	E(level): doublet. 1977Sz01 report an unsolved triplet of 138+148+178; 1979Sz05 report a 138+149 doublet. Other: $(2J+1)C^2S'$=0.16, dσ/dΩ(35.7°)=0.049 μb/sr for J=1/2 (1977Sz01).
175 *4*	0.083	2	0.37[@]	E(level): from 1979Sz05. other: 176 *10* (1977Li10). Other: $(2J+1)C^2S'$=0.20, dσ/dΩ(35.7°)=0.046 μb/sr (1977Sz01).
328 *4*	0.017			E(level): weighted average of 327 *4* (1979Sz05), 332 *10* (1977Li10), and 330 *10* (1977Sz01). Other: dσ/dΩ(35.7°)=0.006 μb/sr (1977Sz01).
941 *4*	0.18	5	4.7	E(level): from 1979Sz05. Others: 942 *10* (1977Li10), 940 *10* (1977Sz01). Other: $(2J+1)C^2S'$=4.2, dσ/dΩ(51.0°)=0.078 μb/sr (1977Sz01).
1010 *3*	0.74	2	1.6[&]	E(level): others: 1010 *6* (1979Sz05), 1010 *10* (1977Sz01). Other: $(2J+1)C^2S'$=1.32, dσ/dΩ(35.7°)=0.233 μb/sr (1977Sz01).
1046 *3*	1.1	0	0.38	E(level): others: 1046 *6* (1979Sz05), 1050 *10* (1977Sz01). Other: $(2J+1)C^2S'$=0.34, dσ/dΩ(46.0°)=0.135 μb/sr (1977Sz01).
1152 *3*	0.43	2	1.5[@]	E(level): others: 1152 *6* (1979Sz05), 1150 *10* (1977Sz01). Other: $(2J+1)C^2S'$=1.1, dσ/dΩ(35.7°)=0.148 μb/sr (1977Sz01).
1241 *6*	0.19	0	0.07	E(level): from 1979Sz05. Others: 1240 *10* (1977Sz01, 1977Li10). Other: $(2J+1)C^2S'$=0.10, dσ/dΩ(41.0°)=0.04 μb/sr (1977Sz01).
1271 *10*	0.040			
1307 *6*	0.066	2	0.18[@]	E(level): from 1979Sz05. Others: 1307 *10* (1977Li10), 1310 *10* (1977Sz01). Other: $(2J+1)C^2S'$=0.16, dσ/dΩ(41.0°)=0.029 μb/sr (1977Sz01).
1335 *6*	0.048	0		E(level): weighted average of 1338 *10* (1977Li10) and 1334 *6* (1979Sz05).
1370 *6*	0.050	2	0.11[&]	E(level): from 1979Sz05. Others: 1368 *10* (1977Li10), 1370 *10* (1977Sz01). L: other: (0) from 1977Sz01. Other: $(2J+1)C^2S'$=0.08, dσ/dΩ(35.7°)=0.029 μb/sr (1977Sz01).
1394 *6*	0.041			E(level): from 1979Sz05. Other: 1394 *10* (1977Li10).
1440 *10*	0.028			
1493 *3*	0.35	0	0.11	E(level): others: 1493 *6* (1979Sz05), 1490 *10* (1977Sz01). L: other: 2 from 1977Sz01.

Continued on next page (footnotes at end of table)

^{122}Te(^{3}He,d) 1977Li10,1977Sz01,1979Sz05 (continued)

^{123}I Levels (continued)

E(level)[†]	dσ/dΩ(max)[‡]	L[#]	(2J+1)C^{2}S′[#]	Comments
				Other: (2J+1)C^{2}S′=0.28, dσ/dΩ(41.0°)=0.045 μb/sr (1977Sz01).
1582 *6*	0.053	2	0.11[&]	E(level): from 1979Sz05. Others: 1583 *10* (1977Li10); 1570+1630 unresolved doublet in 1977Sz01, with dσ/dΩ(46.0°)=0.028 μb/sr.
1623 *6*	0.029			E(level): weighted average of 1629 *10* (1977Li10) and 1635 *6* (1979Sz05).
1657 *6*	0.049	2	0.14[@]	E(level): weighted average of 1653 *10* (1977Li10) and 1658 *6* (1979Sz05).
1714 *10*	0.12	2	0.26[&]	E(level): weighted average of 1718 *10* (1977Li10) and 1710 *10* (1977Sz01). Other: (2J+1)C^{2}S′=0.28, dσ/dΩ(41.0°)=0.049 μb/sr (1977Sz01).
1744 *10*	0.025			
1808 *10*	0.014			
1862 *3*	0.67	0	0.22	E(level): other: 1870 *10* (1977Sz01). Other: (2J+1)C^{2}S′=0.34, dσ/dΩ(41.0°)=0.17 μb/sr (1977Sz01).
1929 *10*	0.14	(0)+(2)	0.03+0.14[&]	E(level): weighted average of 1928 *10* (1977Li10) and 1930 *10* (1977Sz01). L: not reported in 1977Sz01. Other: dσ/dΩ(41.0°)=0.025 μb/sr (1977Sz01).
1951 *10*	0.042	2	0.10[@]	E(level): other: 1950 *10* (1977Sz01). L: other: 0 from 1977Sz01. Other: (2J+1)C^{2}S′=0.08, dσ/dΩ(46.0°)=0.042 μb/sr (1977Sz01).
1983 *10*	0.074	2	0.14[&]	
2012 *10*	0.043			
2048 *10*	0.058	0	0.02	
2083 *10*	0.032			
2110 *10*	0.032			
2140 *10*	0.053	(0)+(2)	0.01+0.07[&]	
2215 *10*	0.035			
2247 *10*	0.043	2	0.10[@]	
2276 *10*	0.16	0	0.09	E(level): weighted average of 2282 *10* (1977Li10) and 2270 *10* (1977Sz01). Other: (2J+1)C^{2}S′=0.10, dσ/dΩ(41.0°)=0.056 μb/sr (1977Sz01).
2325 *10*	0.048			
2360 *10*	0.057			
2385 *10*	0.080	2	0.19[@]	
2421 *10*	0.041	(2)	0.08[&]	
2445 *10*	0.062	(0)	0.05	
2477 *10*	0.074	2	0.14[&]	
2515 *10*	0.068	0	0.04	
2542 *10*	0.093	2	0.23,0.18	
2732 *10*	0.085			
2766 *10*	0.073	(0)	0.04	
2807 *10*	0.087	2	0.18,0.13	
2846 *10*	0.059			
2880 *10*	0.19	0	0.04	
2963 *10*	0.11	2	0.25,0.18	
3001 *10*	0.10			
3032 *10*	0.064			
3059 *10*	0.11	0	0.02	
3145 *10*	0.052			
3178 *10*	0.167	0	0.03	
3207 *10*	0.211	0	0.05	
3255 *10*	0.037			
3286 *10*	0.041			
3309 *10*	0.18	(0)	0.10	

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^{122}Te(^{3}He,d) 1977Li10,1977Sz01,1979Sz05 (continued)

^{123}I Levels (continued)

† From 1977Li10, unless noted otherwise. Uncertainties are 2-3 keV for strong levels, increasing to 10 keV for weak levels from a general statement in 1977Li10. Based on that and the deuteron spectrum in Fig.1 of 1977Li10, the evaluator has assigned 3 keV for levels with $d\sigma/d\Omega$(max)>0.3 mb/sr and 10 keV for the rest.

‡ Maximum differential cross sections from 1977Li10, in units of mb/sr and with an uncertainty of about 15%. Values from 1977Sz01 are given under comments.

From DWBA fit to measured differential cross sections (1977Li10), unless otherwise noted. Uncertainties in spectroscopic factors are ≈15% (1977Li10, 1977Sz01) and DWBA calculations by 1977Li10 assume $1g_{7/2}$ and $1h_{11/2}$ single-particle orbits for L=4 and 5 transfers respectively, unless noted otherwise. Spectroscopic factors from 1977Sz01 are given under comments. L-transfers from 1977Sz01 and 1979Sz05 are mostly the same where available and given under comments if different.

@ Assumed $2d_{3/2}$ for L=2 (1977Li10).

& Assumed $2d_{5/2}$ for L=2 (1977Li10).

Adopted Levels, Gammas

Q(β^-)=−4205 *15*; S(n)=7965 *15*; S(p)=6458 *11*; Q(α)=−491 *12* 2021Wa16
S(2n)=18910 *14*, S(2p)=11283 *28* (2021Wa16).
Mass measurements: −85160 *30* deduced by 1996Os04 from measured Q(ε)=4110 *30* of ^{123}Cs ε decay and known mass excess=−81053 *12* for ^{123}Cs; −85237 *12* (2004Di18, penning trap).
See the dataset of (^{48}Ca,5nγ):SD for data of super-deformed bands (2021Ba03).

^{123}Xe Levels

Band assignments are from 2020Ba12 in (^{48}Ca,5nγ):ND and 1998Sc23 in (^{18}O,5nγ), unless otherwise noted. Assignments are also available from 2001Ga25 in (^{3}He,3nγ). See (^{48}Ca,5nγ):SD for super-deformed bands (2021Ba03).

Cross Reference (XREF) Flags

A	^{123}Cs ε decay	D	^{110}Pd(^{18}O,5nγ)
B	^{80}Se(^{48}Ca,5nγ):Nd	E	^{114}Cd(^{12}C,3nγ),(^{13}C,4nγ)
C	^{80}Se(^{48}Ca,5nγ):SD	F	^{123}Te(^{3}He,3nγ)

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$	XREF	Comments
0.0[g]	1/2$^{(+)}$	2.050 h *14*	AB DEF	%ε+%β^+=100 μ=−0.150 *3* (1990NeZY,2014StZZ) J$^\pi$: spin from Collinear Fast Beam Laser Spectroscopy (1990NeZY); strong β^++ε feeding from 1/2$^{(+)}$ in ^{123}Cs; systematics of odd-mass xenon isotopes favors 1/2$^+$. T$_{1/2}$: weighted average of 2.040 h *9* (2021Ze01), 2.10 h *3* (1969Bu07), and 2.08 h *2* (1965An05). Others: 1.85 h *3* (1960Mo09), 1.85 h *10* (1962Pr09), 1.85 h *5* (1965Bu03), 1.83 h *15* (1967DaZY), and 2.23 h *2* (1974Jo16), are discrepant. μ: from Collinear Fast Beam Laser Spectroscopy (1990NeZY) and 2014StZZ compilation.
97.37[h] *3*	3/2$^{(+)}$	380 ps *30*	AB DEF	J$^\pi$: 97.4γ M1, ΔJ=1 to 1/2$^{(+)}$; strong β^++ε feeding from 1/2$^{(+)}$ in ^{123}Cs; spin=3/2 proposed by 1981Lu01 in (^{3}He,3nγ) and 1982Ze05 in (^{12}C,3nγ) based on $\gamma(\theta)$; systematics of odd-mass xenon isotopes also favors 3/2$^+$. T$_{1/2}$: from ce-γ-coin in ^{123}Cs ε decay (1987Fr10).
180.75 *4*	5/2$^{(+)}$	2.5 ns *2*	AB DEF	J$^\pi$: 180.6γ E2, ΔJ=2 to 1/2$^{(+)}$, 83.4γ M1, ΔJ=1 to 3/2$^{(+)}$. T$_{1/2}$: from ce-γ-coin in ^{123}Cs ε decay (1987Fr10).
185.30 *16*	7/2$^{(-)}$	5.7 μs *3*	B DEF	%IT=100 μ=−0.896 *7*; Q=1.4 *3* (1982Ze05) E(level): the position of this isomeric state is proposed by 1981Lu01 in (^{3}He,3nγ), based on their observation of the 66.8γ from the 252 level in coincidence with the 266.4γ and 515.7γ both feeding the 252 level. It is proposed as 180+x by 1982Ze05 in (^{12}C,3nγ), feeding the 180 level with an unobserved transition of E=x. J$^\pi$: spin=7/2 from analysis of the quadrupole modulation spectra by 1982Ze05 in (^{12}C,3nγ); negative parity proposed in 1981Lu01 based on possible 57γ(M1)−21γ(M1) cascade from 263,(11/2$^-$) level. T$_{1/2}$: weighted average of 5.2 μs *5* (1982Ze05) in (^{12}C,3nγ), 5.6 μs *3* (1981Lu01) and 6.3 μs *5* (1970Ke01) in (^{3}He,3nγ). μ,Q: from TDPAD in 1982Ze05. Value of μ does not include correction for dia-magnetic shielding or Knight shift; value of Q is relative to ^{125}Xe (296,7/2$^+$ level) (1982Ze05). See also 2014StZZ compilation.
206.38[a] *19*	(9/2$^-$)	11.8 ns *14*	B DEF	Q=1.1 *6* (1982Ze05,2016St14) J$^\pi$: 21.1γ to 7/2$^{(-)}$, 57γ M1+E2, ΔJ=1 from (11/2$^-$); systematics of 9/2$^-$ levels in neighboring odd-mass xenon isotopes.

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Adopted Levels, Gammas (continued)

^{123}Xe Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$	XREF	Comments
				$T_{1/2}$: from γ(t) in (^{12}C,3nγ) (1982Ze05). Q: from model-independent ratio of Q(9/2⁻)/Q(7/2⁻)=0.80 *40* from the analysis of the amplitude reduction and phase shift and Q(9/2⁻)=1.4 *3* measured by TDPAD (1982Ze05). But 1.1 *7* is quoted in 1982Ze05.
252.01[o] *5*	(7/2⁺)		AB DEF	Jπ: 71.3γ D+Q, ΔJ=1 to 5/2⁽⁺⁾, 66.7γ to 7/2⁽⁻⁾; band assignment.
263.39[e] *17*	(11/2⁻)	1.5 ns *3*	B DEF	Jπ: proposed as the band head of the $h_{11/2}$ band by 1981Lu01 in (^{3}He,3nγ) based on systematics of observed $h_{11/2}$ bands of neighboring odd-mass xenon isotopes. $T_{1/2}$: from recoil-distance method (1982Ze05).
307.10[g] *7*	5/2⁽⁺⁾		AB D F	Jπ: 307.1γ E2, ΔJ=2 to 1/2⁽⁺⁾.
437.58[h] *14*	7/2⁽⁺⁾		AB DEF	Jπ: 340.2γ E2, ΔJ=2 to 3/2⁽⁺⁾, 130.5γ D+Q, ΔJ=1 to 5/2⁽⁺⁾.
442.58 *9*	(1/2⁺,3/2⁺)		A F	Jπ: 261.8γ M1,E2 to 5/2⁽⁺⁾, 442.6γ to 1/2⁽⁺⁾; possible direct β⁺+ε feeding from 1/2⁽⁺⁾ in ^{123}Cs.
467.04 *13*	(7/2⁺)		EF	Jπ: 286.3γ M1+E2, ΔJ=1 to 5/2⁽⁺⁾, 215.0γ D+Q, ΔJ=0 to (7/2⁺), also 330.2γ D+Q from (9/2⁺).
518.48[n] *14*	(9/2⁺)		B DEF	Jπ: 266.4γ M1+E2, ΔJ=1 to (7/2⁺), 255.2γ D(+Q) to (11/2⁻).
567.7 *5*	(7/2⁻,9/2⁻,11/2⁻)		F	Jπ: 382.4γ to 7/2⁽⁻⁾, 304.5γ to (11/2⁻).
585.75 *12*	(3/2⁺)		A F	Jπ: 488.4γ to 3/2⁽⁺⁾, 333.7γ to (7/2⁺); possible direct β⁺+ε feeding from 1/2⁽⁺⁾ in ^{123}Cs.
596.59 *9*	(1/2⁺,3/2⁺)		A	Jπ: 596.6γ M1,E2 to 1/2⁽⁺⁾; direct β⁺+ε feeding from 1/2⁽⁺⁾ in ^{123}Cs.
611.08 *8*	(1/2⁺,3/2⁺)		A	Jπ: 611.1γ M1,E2 to 1/2⁽⁺⁾; direct β⁺+ε feeding from 1/2⁽⁺⁾ in ^{123}Cs.
614.3 *6*	(3/2⁺,5/2,7/2⁺)		F	Jπ: 516.9γ to 3/2⁽⁺⁾, possible 363.2γ to (7/2⁺).
662.12[a] *20*	(13/2⁻)		B DEF	Jπ: 398.7γ M1+E2, ΔJ=1 to (11/2⁻); probable band assignment.
693.73 *17*	(1/2,3/2)		A	Jπ: 693.8γ to 1/2⁽⁺⁾; possible β⁺+ε feeding from 1/2⁽⁺⁾ in ^{123}Cs.
719.25[e] *20*	(15/2⁻)	12.5 ps *21*	B DEF	Jπ: 455.8γ E2, ΔJ=2 to (11/2⁻); probable band assignment. $T_{1/2}$: from recoil-distance method in (^{12}C,3nγ) (1982Ze05).
731.35 *13*	(9/2⁺)		F	Jπ: 424.4γ Q(+O), ΔJ=2 to 5/2⁽⁺⁾, 264.3γ D+Q, ΔJ=1 to (7/2⁺), 550.6γ to 5/2⁽⁺⁾.
741.47 *6*	(1/2⁺,3/2⁺)		A	Jπ: 434.3γ M1,E2 to 5/2⁽⁺⁾, 741.5γ to 1/2⁽⁺⁾; direct β⁺+ε feeding from 1/2⁽⁺⁾ in ^{123}Cs.
750.7 *5*	(9/2⁻,11/2⁻)		F	Jπ: 565.3γ to 7/2⁽⁻⁾, 509.6γ from (13/2⁻).
759.7 *7*			F	
767.64[o] *15*	(11/2⁺)		B DEF	Jπ: 515.6γ Q, ΔJ=2 to (7/2⁺), 249.2γ D+Q to (9/2⁺); probable band assignment.
776.7 *4*	(5/2,7/2,9/2⁺)		F	Jπ: 596.0γ to 5/2⁽⁺⁾, 591.4γ to 7/2⁽⁻⁾, 339.1γ to 7/2⁽⁺⁾.
798.04[g] *19*	(9/2⁺)		F	Jπ: 491.1γ Q(+O), ΔJ=2 to 5/2⁽⁺⁾, 278.9γ to (9/2⁺); probable band assignment.
848.37 *11*	(1/2⁺,3/2)		A F	E(level): there is no evidence for two separate levels of 847.9 and 848.5 proposed by 2001Ga25 in (^{3}He,3nγ). So only a single level is adopted based on ^{123}Cs ε decay. Jπ: 848.0γ to 1/2⁽⁺⁾, 667.8γ to 5/2⁽⁺⁾; possible β⁺+ε feeding from 1/2⁽⁺⁾ in ^{123}Cs.
863.9 *6*	(5/2⁺,7/2⁺)		F	Jπ: 345.4γ to (9/2⁺), 421.3γ to (1/2⁺,3/2⁺).
867.9 *6*	(11/2⁻)		F	Jπ: 682.5γ to 7/2⁽⁻⁾,673.2γ from (15/2⁻).
877.32[b] *20*	(13/2⁻)		B D F	Jπ: 614.0γ D+Q, ΔJ=1 to (11/2⁻), 670.9γ Q, ΔJ=2 to (9/2⁻); probable band assignment.
917.45 *21*	(3/2⁺)		A F	Jπ: possible β⁺+ε feeding from 1/2⁽⁺⁾ in ^{123}Cs; 610.3γ to 5/2⁽⁺⁾, possible 481.0γ to 7/2⁽⁺⁾.
934.81[h] *23*	(11/2⁺)		B D F	Jπ: 497.2γ Q, ΔJ=2 to 7/2⁽⁺⁾; probable band assignment.
971.0 *5*	(11/2⁻)		F	Jπ: 764.6γ D+Q to (9/2⁻), 308.9γ D+Q to (13/2⁻).

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Adopted Levels, Gammas (continued)

^{123}Xe Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	$T_{1/2}$	XREF	Comments
1032.36 *24*	(1/2$^+$,3/2)		A	J$^{\pi}$: possible $\beta^+ + \varepsilon$ feeding from 1/2$^{(+)}$ in ^{123}Cs; 725.1γ to 5/2$^{(+)}$.
1041.6 *5*	(11/2$^-$)		F	J$^{\pi}$: 379.4γ D(+Q), ΔJ=1 to (13/2$^-$), 835.0γ to (9/2$^-$).
1046.4 *4*	(7/2$^+$)		F	J$^{\pi}$: 460.6γ to (3/2$^+$), 249.0γ to (9/2$^+$), 839.8γ to (9/2$^-$).
1051.19 *22*	(9/2$^+$,11/2$^+$)		F	J$^{\pi}$: 532.7γ D+Q to (9/2$^+$), 584.0γ to (7/2$^+$), 379.5γ from (13/2$^+$).
1054.5 *12*			F	
1082.13[n] *19*	(13/2$^+$)		B D F	J$^{\pi}$: 314.5γ D+Q, ΔJ=1 to (11/2$^+$), 363.3γ D(+Q) to (15/2$^-$); probable band assignment.
1125.72 *19*	(1/2$^+$,3/2)		A	J$^{\pi}$: possible $\beta^+ + \varepsilon$ feeding from 1/2$^{(+)}$ in ^{123}Cs; 819.0γ to 5/2$^{(+)}$.
1145.2 *6*			F	
1260.4 *3*	(13/2$^-$)		F	J$^{\pi}$: 289.3γ D+Q to (11/2$^-$), 541.1γ D+Q to (15/2$^-$).
1270.05[a] *21*	(15/2$^-$)		B DEF	J$^{\pi}$: 608.0γ D+Q, ΔJ=1 to (13/2$^-$), 550.9γ D+Q to (15/2$^-$).
1273.28 *18*	(1/2,3/2)		A	J$^{\pi}$: possible $\beta^+ + \varepsilon$ feeding from 1/2$^{(+)}$ in ^{123}Cs.
1278.0 *8*			F	
1294.02[f] *22*	(17/2$^-$)		B DEF	J$^{\pi}$: 631.9γ E2(+M3) to (13/2$^-$), 574.2γ D+Q to (15/2$^-$).
1325.5 *8*			F	
1336.16[e] *23*	(19/2$^-$)	≤3.5 ps	B DEF	J$^{\pi}$: 617.0γ E2, ΔJ=2 to (15/2$^-$); probable band assignment. $T_{1/2}$: from recoil-distance method in (^{12}C,3nγ) (1982Ze05).
1339.0 *6*			F	
1384.3 *12*			F	
1397.65[o] *22*	(15/2$^+$)		B D F	J$^{\pi}$: 630.0γ E2, ΔJ=2 to (11/2$^+$), 315.5γ to (13/2$^+$); probable band assignment.
1430.8[g] *6*	(13/2$^+$)		F	J$^{\pi}$: 633.2γ Q(+O), ΔJ=2 to (9/2$^+$), 663.0γ to (11/2$^+$); probable band assignment.
1452.83 *14*	(1/2,3/2)		A	J$^{\pi}$: possible $\beta^+ + \varepsilon$ feeding from 1/2$^{(+)}$ in ^{123}Cs.
1519.9 *7*			F	
1521.96[b] *22*	(17/2$^-$)		B D F	J$^{\pi}$: 802.7γ D+Q to (15/2$^-$); probable band assignment.
1541.1 *3*	(15/2$^-$)		F	J$^{\pi}$: 879.0γ D+Q, ΔJ=1 to (13/2$^-$), 821.9γ to (15/2$^-$), 499.6γ to (11/2$^-$), possible 247.1γ to (17/2$^-$).
1554.2[h] *3*	(15/2$^+$)		B D F	J$^{\pi}$: 619.4γ Q, ΔJ=2 to (11/2$^+$); probable band assignment.
1580.7 *3*	(11/2$^-$ to 15/2$^-$)		F	J$^{\pi}$: 539.0γ to (11/2$^-$), 861.4γ to (15/2$^-$).
1618.6 *11*			F	
1696.4 *11*			F	
1733.1 *8*			F	
1757.9[n] *4*	(17/2$^+$)		B D F	J$^{\pi}$: 1038.9γ D(+Q) to (15/2$^-$); probable band assignment.
1759.0 *10*			F	
1827.8 *5*	(17/2$^-$)		F	J$^{\pi}$: 557.9γ D+Q, ΔJ=1 to (15/2$^-$), 491.6γ to (19/2$^-$), 567.4γ to (13/2$^-$).
1841.6 *6*			F	
1947.6 *11*	(15/2$^-$)		F	J$^{\pi}$: 1285.5γ D(+Q), ΔJ=1 to (13/2$^-$).
1949.43 *23*			F	
1953.54[a] *22*	(19/2$^-$)		B D F	J$^{\pi}$: 617.3γ to (19/2$^-$), 683.6γ Q to (15/2$^-$).
2063.1[f] *3*	(21/2$^-$)		B D F	J$^{\pi}$: 769.1γ Q, ΔJ=2 to (17/2$^-$), 727.1γ D+Q to (19/2$^-$); probable band assignment.
2089.7[e] *3*	(23/2$^-$)		B DEF	J$^{\pi}$: 753.3γ E2, ΔJ=2 to (19/2$^-$); probable band assignment.
2112.5[o] *3*	(19/2$^+$)		B D F	J$^{\pi}$: 714.9γ Q, ΔJ=2 to (15/2$^+$), 818.7γ to (17/2$^-$); probable band assignment.
2144.6[g] *8*	(17/2$^+$)		F	J$^{\pi}$: band assignment.
2197.1 *8*			F	
2210.0 *6*	(15/2$^-$ to 19/2$^-$)		F	J$^{\pi}$: 668.9γ to (15/2$^-$), 873.8γ to (19/2$^-$).
2226.0 *8*			F	
2227.6 *11*	(23/2$^-$)		B	E(level),J$^{\pi}$: from (^{48}Ca,5nγ) only.
2230.6[h] *5*	(19/2$^+$)		B D F	J$^{\pi}$: 676.7γ to (15/2$^+$); probable band assignment.
2248.9 *7*			F	
2284.6[b] *5*	(21/2$^-$)		B D F	J$^{\pi}$: 762.7γ Q to (17/2$^-$), 948.1γ D+Q to (19/2$^-$).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{123}Xe Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	XREF	Comments
2416.3? *6*		F	
2422.3 *7*	(19/2$^+$)	B D F	J$^{\pi}$: 1128.7γ D to (17/2$^-$), 541.9γ from (23/2$^+$).
2497.5[n] *3*	(21/2$^+$)	B D F	J$^{\pi}$: 739.6γ Q to (17/2$^+$); probable band assignment.
2689.1 *4*	(21/2$^+$)	B D F	J$^{\pi}$: 267.1γ D+Q to (19/2$^+$), 1353.4γ to (19/2$^-$), 480.2γ from (25/2$^+$).
2769.7[a] *3*	(23/2$^-$)	B D F	J$^{\pi}$: 816.1γ Q to (19/2$^-$), 679.7γ D+Q to (23/2$^-$).
2822.3[p] *3*	(23/2$^+$)	B D F	J$^{\pi}$: 709.7γ Q to (19/2$^+$); probable band assignment.
2882.4[o] *3*	(23/2$^+$)	B D F	J$^{\pi}$: 652.1γ and 770.3γ Q to (19/2)$^+$; probable band assignment.
2951.7[f] *4*	(25/2$^-$)	B D F	J$^{\pi}$: 888.6γ Q to (21/2$^-$), 861.8γ D to (23/2$^-$).
2964.2[h] *3*	(23/2$^+$)	B D F	J$^{\pi}$: 541.9γ and 733.7γ Q to (19/2$^+$), 275.0γ D+Q to (21/2$^+$).
2965.6[e] *3*	(27/2$^-$)	B DEF	J$^{\pi}$: 875.9γ Q to (23/2$^-$); probable band assignment.
2991.5 *4*	(27/2$^-$)	B	J$^{\pi}$: 901.9γ Q to (23/2$^-$), 763.9γ to (19/2$^+$).
3152.7[b] *6*	(25/2$^-$)	B D F	J$^{\pi}$: 868.2γ Q to (21/2$^-$), 1062.7γ to (23/2$^-$).
3169.3 *3*	(25/2$^+$)	B D F	J$^{\pi}$: 480.3γ Q to (21/2$^+$), 1079.6γ D to (23/2$^-$).
3210.2[n] *4*	(25/2$^+$)	B D F	J$^{\pi}$: 712.4γ Q to (21/2$^+$); probable band assignment.
3349.6[j] *3*	(27/2$^+$)	B D F	J$^{\pi}$: 180.4γ D+Q to (25/2$^+$); probable band assignment.
3479.1[p] *4*	(27/2$^+$)	B D F	J$^{\pi}$: 656.8γ Q to (23/2$^+$); probable band assignment.
3559.7[o] *6*	(27/2$^+$)	B	
3652.7 *11*		D	
3820.5[i] *4*	(29/2$^+$)	B D	
3854.0[a] *5*	(27/2$^-$)	B D	
3905.5[n] *7*	(29/2$^+$)	B D	
3908.2[#] *3*	(27/2$^-$)	B D	
3951.4[e] *4*	(31/2$^-$)	B D	
3956.6[f] *7*	(29/2$^-$)	B D	
4019.4 *4*	(29/2$^+$)	B	
4103.5[b] *7*	(29/2$^-$)	B D	
4155.9[j] *4*	(31/2$^+$)	B D	
4213.5[p] *4*	(31/2$^+$)	B D	
4283.9[@] *5*	(29/2$^-$)	B	
4325.6[o] *7*	(31/2$^+$)	B	
4355.2 *7*	(31/2$^-$)	B D	
4609.2[#] *3*	(31/2$^-$)	B D	
4627.8[i] *4*	(33/2$^+$)	B D	
4724.9[n] *8*	(33/2$^+$)	B	
4880.4 *5*	(33/2$^+$)	B	
4934.1 *8*	(33/2$^-$)	B	
5010.5[e] *4*	(35/2$^-$)	B D	
5027.0[@] *5*	(33/2$^-$)	B	
5036.5[j] *4*	(35/2$^+$)	B D	
5043.8[f] *8*	(33/2$^-$)	B D	
5064.8[c] *7*	(33/2$^-$)	B	
5066.8[p] *4*	(35/2$^+$)	B D	
5109.8 *9*	(33/2$^-$)	B	
5207.8[o] *7*	(35/2$^+$)	B	
5213.7 *7*	(35/2$^-$)	B D	
5286.2 *9*	(33/2$^-$)	B	
5329.1[b] *12*	(33/2$^-$)	B D	
5338.1[#] *4*	(35/2$^-$)	B D	
5418.3 *7*	(35/2$^-$)	B	
5519.6[i] *4*	(37/2$^+$)	B D	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{123}Xe Levels (continued)

E(level)†	Jπ‡	XREF
5585.6[&] 9	(35/2⁻)	B
5651.3[n] 13	(37/2⁺)	B
5687.6 7	(35/2⁻)	B
5793.7[@] 5	(37/2⁻)	B
5915.8[j] 4	(39/2⁺)	B D
6034.4[p] 4	(39/2⁺)	B D
6046.1[e] 5	(39/2⁻)	B D
6049.1[f] 8	(37/2⁻)	B
6070.5[c] 5	(37/2⁻)	B
6134.1[#] 4	(39/2⁻)	B D
6165.5[o] 7	(39/2⁺)	B
6374.4[&] 6	(39/2⁻)	B
6418.5 5	(39/2⁻)	B
6465.2 5	(39/2⁻)	B D
6477.4[i] 4	(41/2⁺)	B D
6655.5[@] 5	(41/2⁻)	B
6684.1[n] 17	(41/2⁺)	B
6789.6[c] 5	(41/2⁻)	B
7067.2[#] 6	(43/2⁻)	B D
7084.7[j] 4	(43/2⁺)	B D
7107.2[e] 6	(43/2⁻)	B D
7115.2[p] 6	(43/2⁺)	B D
7257.9[&] 5	(43/2⁻)	B
7279.1[o] 8	(43/2⁺)	B
7482.0[i] 5	(45/2⁺)	B D
7617.8[@] 6	(45/2⁻)	B
7781.0 9	(45/2⁻)	B
7807.8[n] 20	(45/2⁺)	B
7840.5 20		B
7970.2[c] 6	(45/2⁻)	B
7991.2[j] 5	(47/2⁺)	B D
8075.6[#] 7	(47/2⁻)	B D
8189.6 6	(47/2⁺)	B
8218.5[e] 6	(47/2⁻)	B D
8225.2[&] 6	(47/2⁻)	B
8298.6[p] 8	(47/2⁺)	B D
8364.0 7	(47/2⁻)	B
8448.9[o] 13	(47/2⁺)	B
8454.0[i] 5	(49/2⁺)	B D
8690.9[@] 7	(49/2⁻)	B
8694.4 6	(49/2⁺)	B
8955.5[c] 7	(49/2⁻)	B
8975.4 14	(49/2⁻)	B
9124.2[j] 5	(51/2⁺)	B
9257.7[#] 7	(51/2⁻)	B D
9357.1[d] 7	(53/2⁻)	B
9377.2[&] 12	(51/2⁻)	B
9419.1[i] 6	(53/2⁺)	B D
9423.1[e] 8	(51/2⁻)	B D

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{123}Xe Levels (continued)

E(level)[†]	Jπ[‡]	XREF	Comments
9465.5[q] 9		B	
9566.6[p] 13	(51/2$^+$)	B	
9591.0 13		B	
9809.2[l] 6	(53/2$^+$)	B	
9904.5[k] 7		B	
9906.8[@] 8	(53/2$^-$)	B	
10068.4[j] 6	(55/2$^+$)	B	
10135.5 7	(55/2$^-$)	B	
10489.8[#] 9	(55/2$^-$)	B	
10574.6[&] 16	(55/2$^-$)	B	
10597.4[i] 7	(57/2$^+$)	B	
10614.1 8	(57/2$^+$)	B	
10634.7[q] 14		B	
10680.1[e] 13	(55/2$^-$)	B	
10708.4[p] 16	(55/2$^+$)	B	
10824.0 8	(57/2$^+$)	B	
10890.8[d] 9	(57/2$^-$)	B	
11046.4 9	(57/2$^-$)	B	
11090.0 8	(59/2$^-$)	B	
11098.0[l] 8	(57/2$^+$)	B	
11133.1[k] 8		B	
11175.7[j] 8	(59/2$^+$)	B	
11176.0[@] 11	(57/2$^-$)	B	
11440.8[m] 12		B	
11721.5[d] 9	(61/2$^-$)	B	
11808.8[i] 8	(61/2$^+$)	B	
11851.4[p] 19	(59/2$^+$)	B	
11898.8?[q] 17		B	
11999.0[e] 14	(59/2$^-$)	B	
12040.2 9	(61/2$^+$)	B	
12146.8[l] 9	(61/2$^+$)	B	
12216.9? 12		B	
12236.7 9	(63/2$^-$)	B	
12296.0[k] 9		B	
12324.1 12		B	
12492.2 10	(63/2$^-$)	B	
12858.8 12		B	
12921.3[m] 16		B	
13173.5[i] 10	(65/2$^+$)	B	
13433.1 10	(67/2$^-$)	B	
13438.7 14	(65/2$^-$)	B	
14485.1 11		B	
14521.7 11		B	
14554.5 17	(69/2$^-$)	B	
14760.3 11	(69/2$^-$)	B	
(2965.6+u)	(31/2$^-$)	D	Decays to 2965, 27/2$^-$ and 3350, 27/2$^+$ levels through unknown transitions. Level energy should be about 5.5 MeV (2002Ra34).
3117.6+u[s] 4	(33/2$^-$)	D	
3316.9+u[r] 6	(35/2$^-$)	D	
3543.0+u[s] 7	(37/2$^-$)	D	
3788.7+u[r] 7	(39/2$^-$)	D	

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Adopted Levels, Gammas (continued)

^{123}Xe Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	XREF
4086.9+u[s] 7	(41/2$^-$)	D
4444.2+u[r] 7	(43/2$^-$)	D
4920.0+u[s] 8	(45/2$^-$)	D
5409.3+u[r] 9	(47/2$^-$)	D

[†] From a least-square fits to γ-ray energies. For the fitting purpose only, where $\Delta E\gamma$ is not given, a value of 0.5 keV for Eγ quoted to nearest tenth keV and 1 keV for Eγ quoted to nearest keV are assumed. See (^{48}Ca,5nγ):SD for additional levels from super-deformed bands.

[‡] Assignments for levels above 3479 are based on probable band assignments from (^{18}O,5nγ) and (^{48}Ca,5nγ) and $\gamma(\theta)$ in (^{48}Ca,5nγ).

[#] Band(A): Band based on 3909,(27/2$^-$) level, α=−1/2.

[@] Band(a): Band based on 4284,(29/2$^-$) level, α=+1/2.

[&] Band(B): Band based on 5585,(35/2$^-$) level.

[a] Band(C): Band based on 206,(9/2$^-$) level (1998Sc23). A different band is proposed by 2001Ga25 based on (9/2$^-$) level and overlaps with the band based on 877,(13/2$^-$) in 1998Sc23.

[b] Band(D): Band based on 877,(13/2$^-$) level.

[c] Band(E): Band based on 5065,(33/2$^-$) level.

[d] Band(F): Band based on 9357,(53/2$^-$) level.

[e] Band(G): Band based on 263,(11/2$^-$) level.

[f] Band(H): Band based on 1294,(17/2$^-$) level.

[g] Band(I): 1/2$^{(+)}$ g.s. band (2001Ga25).

[h] Band(J): Band based on 97,3/2$^{(+)}$ level.

[i] Band(k): Band based on 3821,(29/2$^+$) level, α=+1/2.

[j] Band(K): Band based on 3350,(27/2$^+$) level, α=−1/2.

[k] Band(L): Band based on 9905 level.

[l] Band(M): Band based on 9810 level.

[m] Band(N): Band based on 11441 level.

[n] Band(O): Band based on 519,(9/2$^+$) level.

[o] Band(P): Band based on 252,(7/2$^+$) level.

[p] Band(Q): Band based on 2823,(23/2$^+$) level.

[q] Band(R): Band based on 9465 level.

[r] Band(S): Band based on (35/2$^-$), α=−1/2 from 2002Ra34 in (^{18}O,5nγ).

[s] Band(s): Band based on (33/2$^-$), α=+1/2 from 2002Ra34 in (^{18}O,5nγ).

Adopted Levels, Gammas (continued)

$\gamma(^{123}Xe)$

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ	α[&]	Comments
97.37	$3/2^{(+)}$	97.38[‡] *3*	100	0.0	$1/2^{(+)}$	M1		0.885	B(M1)(W.u.)=0.0333 *26* E_γ: other: 97.3 *1* from (^{3}He,3nγ). Mult.: from ce data in ^{123}Cs ε decay. Others: D+Q with δ=+0.11 *4* from $\gamma(\theta)$ in (^{12}C,3nγ) and D(+Q) from $\gamma(\theta)$ and $\gamma\gamma(\theta)$ in (^{3}He,3nγ), with ΔJ=1.
180.75	$5/2^{(+)}$	83.38[‡] *2*	100[‡] *6*	97.37	$3/2^{(+)}$	M1		1.380	B(M1)(W.u.)=0.00593 *48* E_γ,I_γ: other: 83.2 *1* with Iγ=100 *10* from (^{3}He,3nγ). Mult.: from ce data in ^{123}Cs ε decay; supported by $\gamma(\theta)$ in (^{3}He,3nγ) and (^{12}C,3nγ).
		180.61 *14*	15.0 *15*	0.0	$1/2^{(+)}$	E2		0.228	B(E2)(W.u.)=1.90 *26* E_γ: weighted average of 180.64 *14* from ^{123}Cs ε decay and 180.6 *1* from (^{3}He,3nγ). I_γ: weighted average of 14.7 *15* from ^{123}Cs ε decay and 16 *3* from (^{3}He,3nγ). Mult.: Q from $\gamma(\theta)$ in (^{12}C,3nγ); M1,E2 from ce data in ^{123}Cs ε decay.
185.30	$7/2^{(-)}$	4.6[b]		180.75	$5/2^{(+)}$	[E1]		34.3	B(E1)(W.u.)=1.40×10^{-5} *9* E_γ: from level-energy difference; not observed. This transition is inferred by 1981Lu01 from the fact that decay curves of the 180.5γ and 83.3γ from 185 level and the 97.3γ from 97.3 level were observed to follow the isomeric decay.
206.38	$(9/2^-)$	21.1 *2*	100	185.30	$7/2^{(-)}$	[M1]		11.2 *4*	B(M1)(W.u.)=0.0163 *+34−26* Mult.: 1981Lu01 in (^{3}He,3nγ) states the intensity balance require the same character for the 21γ as the 57γ, which is pure M1 proposed by 1981Lu01 based on $\gamma(\theta)$.
252.01	$(7/2^+)$	66.7 *2*	11 *3*	185.30	$7/2^{(-)}$				
		71.26[‡] *3*	100 *10*	180.75	$5/2^{(+)}$	(M1+E2)	−0.02 *5*	2.17 *4*	E_γ: other: 71.3 *3* from (^{3}He,3nγ). Mult.,δ: D+Q, ΔJ=1 from $\gamma(\theta)$ in (^{3}He,3nγ); M1+E2 required by level scheme.
263.39	$(11/2^-)$	57.0 *2*	100 *10*	206.38	$(9/2^-)$	M1+E2	+0.07 *+2−3*	4.19 *8*	B(M1)(W.u.)=0.0147 *+45−30*; B(E2)(W.u.)=16 *+18−12* Mult.: D+Q from $\gamma(\theta)$ in (^{3}He,3nγ) and (^{12}C,3nγ); M2 ruled out by RUL. δ: weighted average of 0.06 *+2−3* from $\gamma(\theta)$ in (^{3}He,3nγ) (1981Lu01) and +0.09 *4* from $\gamma(\theta)$ in (^{12}C,3nγ) (1982Ze05).
		78.1 *2*	3.3 *10*	185.30	$7/2^{(-)}$	[E2]		4.37 *8*	B(E2)(W.u.)=22 *+18−11*
307.10	$5/2^{(+)}$	209.6[‡] *2*	4.6 *5*	97.37	$3/2^{(+)}$	E2,M1		0.121 *16*	E_γ: others: 209.5 *10* from (^{48}Ca,5nγ), 209.9 from (^{3}He,3nγ). I_γ: weighted average of 4.5 *5* from ^{123}Cs ε decay and 5.0 *10* from (^{3}He,3nγ). Mult.: from ce data in ^{123}Cs ε decay.

$^{123}_{54}Xe_{69}$-8

Adopted Levels, Gammas (continued)

γ(^{123}Xe) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.#	δ	α&	Comments
307.10	5/2(+)	307.1‡ *1*	100‡ *8*	0.0	1/2(+)	E2		0.0388	E_γ,I_γ: others: 307.2 *2* with Iγ=100 *10* in (^{3}He,3nγ); 306.9 *10* from (^{48}Ca,5nγ). Mult.: from ce data and γ(θ) (ΔJ=2) in (^{3}He,3nγ) and ce data in ^{123}Cs ε decay.
437.58	7/2(+)	130.5 *2*	14 *1*	307.10	5/2(+)	D+Q	0.06 *4*		E_γ: from (^{3}He,3nγ). Other: 131.2 *10* from (^{48}Ca,5nγ). Mult.,δ: from (^{3}He,3nγ). Mult and δ from γ(θ) giving ΔJ=1.
		340.2 *2*	100 *10*	97.37	3/2(+)	E2		0.0281	E_γ: weighted average of 340.1 *2* from ^{123}Cs ε decay and 340.2 *2* from (^{3}He,3nγ). Other: 340.2 *10* from (^{48}Ca,5nγ). Mult.: from ce data and γ(θ) (ΔJ=2) in (^{3}He,3nγ) and γ(θ) in (^{12}C,3nγ).
442.58	(1/2+,3/2+)	261.8 *1*	100 *10*	180.75	5/2(+)	M1,E2		0.062 *4*	E_γ: weighted average of 261.8 *1* from ^{123}Cs ε decay and 261.9 *2* from (^{3}He,3nγ). I_γ: from (^{3}He,3nγ). Other: 100 *16* from ^{123}Cs ε decay. Mult.: from ce data in ^{123}Cs ε decay.
		345.3 *2*	15 *6*	97.37	3/2(+)				E_γ: also from ^{123}Cs ε decay. I_γ: unweighted average of 9.7 *18* from ^{123}Cs ε decay and 21 *5* from (^{3}He,3nγ).
		442.6 *2*	29 *4*	0.0	1/2(+)				E_γ: other: 442.8 from (^{3}He,3nγ). I_γ: weighted average of 26 *4* from ^{123}Cs ε decay and 32 *4* from (^{3}He,3nγ).
467.04	(7/2+)	215.0 *2*	17 *2*	252.01	(7/2+)	D(+Q)	0.5 *+16−8*		Mult.,δ: from (^{3}He,3nγ). Mult and δ from γ(θ), giving ΔJ=1.
		286.3 *2*	100 *10*	180.75	5/2(+)	M1+E2	−1.9 *3*	0.0481	Mult.: from ce data and γ(θ) (ΔJ=1) in (^{3}He,3nγ) and γ(θ) (ΔJ=1) in (^{12}C,3nγ). δ: from γ(θ) in (^{3}He,3nγ). Other: <0 from (^{12}C,3nγ).
518.48	(9/2+)	255.1 *2*	25 *3*	263.39	(11/2−)	D(+Q)	0.02 *6*		E_γ: from (^{3}He,3nγ). Other: 255.1 *10* from (^{48}Ca,5nγ). Mult.,δ: from (^{3}He,3nγ). Mult and δ from γγ(θ).
		266.4 *2*	100 *10*	252.01	(7/2+)	M1+E2	−0.9 *3*	0.0583 *14*	E_γ: from (^{3}He,3nγ). Other: 266.2 *10* from (^{48}Ca,5nγ). Mult.: from ce data, γ(θ) (ΔJ=1) and γγ(θ) in (^{3}He,3nγ) and γ(θ) (ΔJ=1) in (^{12}C,3nγ). δ: from γ(θ) and γγ(θ) in (^{3}He,3nγ). Others: <−0.18 from γ(θ) in (^{12}C,3nγ).
		312.2	23 *2*	206.38	(9/2−)				
		333.3	29 *3*	185.30	7/2(−)				
		337.8	25 *3*	180.75	5/2(+)				
567.7	(7/2−,9/2−,11/2−)	304.5	6 *1*	263.39	(11/2−)				
		361.3	100 *10*	206.38	(9/2−)				
		382.4	12 *1*	185.30	7/2(−)				

Adopted Levels, Gammas (continued)

γ(^{123}Xe) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ	α[&]	Comments
585.75	(3/2$^+$)	278.6	22 *5*	307.10	5/2$^{(+)}$				
		333.7 *2*	72 *10*	252.01	(7/2$^+$)				E_γ: from ^{123}Cs ε decay. Other: 333.8 from (^{3}He,3nγ). I_γ: weighted average of 63 *13* from ^{123}Cs ε decay and 77 *10* from (^{3}He,3nγ).
		405.0 *2*	100 *12*	180.75	5/2$^{(+)}$				E_γ: from ^{123}Cs ε decay. Other: 405.1 from (^{3}He,3nγ). I_γ: from (^{3}He,3nγ). Other: 100 *19* from ^{123}Cs ε decay.
		488.4 *2*	79 *11*	97.37	3/2$^{(+)}$				E_γ: from ^{123}Cs ε decay. Other: 448.4 from (^{3}He,3nγ). I_γ: weighted average of 94 *19* from ^{123}Cs ε decay and 74 *11* from (^{3}He,3nγ).
596.59	(1/2$^+$,3/2$^+$)	499.2[‡] *2*	11.3[‡] *15*	97.37	3/2$^{(+)}$	E2,M1		0.0101 *11*	Mult.: from ce data in ^{123}Cs ε decay.
		596.6[‡] *1*	100[‡] *9*	0.0	1/2$^{(+)}$	M1,E2		0.0064 *9*	Mult.: from ce data in ^{123}Cs ε decay.
611.08	(1/2$^+$,3/2$^+$)	304.0[‡] *1*	22[‡] *5*	307.10	5/2$^{(+)}$	M1,E2		0.0397 *7*	Mult.: from ce data in ^{123}Cs ε decay.
		430.5[‡] *2*	6.5[‡] *13*	180.75	5/2$^{(+)}$				
		513.6[‡] *4*	≈45[‡]	97.37	3/2$^{(+)}$				
		611.1[‡] *2*	100[‡] *12*	0.0	1/2$^{(+)}$				
614.3	(3/2$^+$,5/2,7/2$^+$)	307.1[b]	<32	307.10	5/2$^{(+)}$				
		362.2[b]	32 *5*	252.01	(7/2$^+$)				
		433.5	64 *8*	180.75	5/2$^{(+)}$				
		516.9	100 *12*	97.37	3/2$^{(+)}$				
662.12	(13/2$^-$)	398.7 *2*	100 *10*	263.39	(11/2$^-$)	M1+E2	−0.55 *5*	0.0191	E_γ: from (^{3}He,3nγ). Other: 399.0 *10* from (^{48}Ca,5nγ). Mult.,δ: from γ(θ), γγ(θ) and ce data in (^{3}He,3nγ), with ΔJ=1 and δ from γ(θ). Other: δ<−0.4, ΔJ=1 from γ(θ) in (^{12}C,3nγ).
		455.8[a] *2*	50[a] *5*	206.38	(9/2$^-$)				E_γ: from (^{3}He,3nγ). Other: 455.7 *10* from (^{48}Ca,5nγ).
693.73	(1/2,3/2)	693.8[‡] *2*	100	0.0	1/2$^{(+)}$				
719.25	(15/2$^-$)	455.8[a] *2*	100[a]	263.39	(11/2$^-$)	E2		0.01167	B(E2)(W.u.)=63 *+13−9* E_γ: from (^{3}He,3nγ). Other: 455.6 *10* from (^{48}Ca,5nγ). Mult.: from γ(θ) in (^{12}C,3nγ) and (^{3}He,3nγ); M2 ruled out by RUL.
731.35	(9/2$^+$)	213.0	48 *5*	518.48	(9/2$^+$)				
		264.3 *2*	53 *6*	467.04	(7/2$^+$)	D+Q	−0.3 *+2−5*		Mult.,δ: from γ(θ) and γγ(θ) in (^{3}He,3nγ), with δ from γ(θ).
		294.0	16 *3*	437.58	7/2$^{(+)}$				
		424.4	40 *5*	307.10	5/2$^{(+)}$	Q(+O)	−0.05 *+6−3*		Mult.,δ: from γγ(θ) in (^{3}He,3nγ).
		468.2[b]	12 *3*	263.39	(11/2$^-$)				
		479.3 *2*	69 *8*	252.01	(7/2$^+$)				

Adopted Levels, Gammas (continued)

γ(^{123}Xe) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ	α[&]	Comments
731.35	(9/2$^+$)	550.6 *2*	100 *11*	180.75	5/2$^{(+)}$				
741.47	(1/2$^+$,3/2$^+$)	130.3[‡] *2*	2.7[‡] *4*	611.08	(1/2$^+$,3/2$^+$)	[M1,E2]		0.55 *17*	
		434.3[‡] *1*	31[‡] *4*	307.10	5/2$^{(+)}$	M1,E2		0.0146 *13*	Mult.: from ce data in ^{123}Cs ε decay.
		644.1[‡] *1*	83[‡] *17*	97.37	3/2$^{(+)}$				
		741.5[‡] *1*	100[‡] *13*	0.0	1/2$^{(+)}$				
750.7	(9/2$^-$,11/2$^-$)	183.0	8 *2*	567.7	(7/2$^-$,9/2$^-$,11/2$^-$)				
		487.4	100 *11*	263.39	(11/2$^-$)				
		544.3	43 *6*	206.38	(9/2$^-$)				
		565.3	25 *5*	185.30	7/2$^{(-)}$				
759.7		192.0	100 *12*	567.7	(7/2$^-$,9/2$^-$,11/2$^-$)				
		553.4	51 *7*	206.38	(9/2$^-$)				
		574.3	92 *12*	185.30	7/2$^{(-)}$				
767.64	(11/2$^+$)	249.2 *2*	15 *2*	518.48	(9/2$^+$)	D+Q	−0.62 *3*		E_γ: from (^{3}He,3nγ). Other: 249.0 *10* from (^{48}Ca,5nγ). Mult.,δ: from γ(θ) and γγ(θ) in (^{3}He,3nγ), with δ from γγ(θ).
		515.6 *2*	100 *10*	252.01	(7/2$^+$)	Q			Mult.: from γ(θ) in (^{3}He,3nγ) and (^{12}C,3nγ).
776.7	(5/2,7/2,9/2$^+$)	309.7	29 *3*	467.04	(7/2$^+$)				
		339.1	100 *11*	437.58	7/2$^{(+)}$				
		469.7	31 *4*	307.10	5/2$^{(+)}$				
		524.7	32 *5*	252.01	(7/2$^+$)				
		591.4	57 *6*	185.30	7/2$^{(-)}$				
		596.0	76 *8*	180.75	5/2$^{(+)}$				
798.04	(9/2$^+$)	278.9	7 *1*	518.48	(9/2$^+$)				
		331.2	46 *5*	467.04	(7/2$^+$)	D+Q	−0.28 *2*		Mult.,δ: from γγ(θ) in (^{3}He,3nγ).
		359.9	<4	437.58	7/2$^{(+)}$				
		491.1 *2*	100 *10*	307.10	5/2$^{(+)}$	Q(+O)	−0.05 *+6−3*		Mult.,δ: from γγ(θ) in (^{3}He,3nγ).
		545.5	41 *4*	252.01	(7/2$^+$)				
848.37	(1/2$^+$,3/2)	154.8[‡] *3*	5.2[‡] *17*	693.73	(1/2,3/2)	[M1+E2]		0.31 *8*	
		237.6[‡] *3*	22[‡] *16*	611.08	(1/2$^+$,3/2$^+$)				
		251.8[‡] *2*	6.6[‡] *7*	596.59	(1/2$^+$,3/2$^+$)				
		541.0[‡] *5*	50[‡] *19*	307.10	5/2$^{(+)}$				E_γ: other: 541.5 from (^{3}He,3nγ).
		667.8[‡] *2*	100[‡] *23*	180.75	5/2$^{(+)}$				E_γ: other: 667.8 from (^{3}He,3nγ).
		750.8[‡] *2*	67[‡] *5*	97.37	3/2$^{(+)}$				
		848.0[‡] *5*	14[‡] *4*	0.0	1/2$^{(+)}$				
863.9	(5/2$^+$,7/2$^+$)	249.7	40 *8*	614.3	(3/2$^+$,5/2,7/2$^+$)				
		278.2[b]	27 *6*	585.75	(3/2$^+$)				
		345.4	47 *10*	518.48	(9/2$^+$)				

Adopted Levels, Gammas (continued)

γ(^{123}Xe) (continued)

E_i(level)	J_i^π	E_γ [†]	I_γ [†]	E_f	J_f^π	Mult.[#]	δ	α[&]	Comments
863.9	(5/2$^+$,7/2$^+$)	396.9	26 *8*	467.04	(7/2$^+$)				
		421.3	100 *15*	442.58	(1/2$^+$,3/2$^+$)				
		678.8[b]	149 *20*	185.30	7/2$^{(-)}$				
867.9	(11/2$^-$)	661.5	33 *4*	206.38	(9/2$^-$)				
		682.5	100 *11*	185.30	7/2$^{(-)}$	[E2]		0.00395	
877.32	(13/2$^-$)	614.0 *2*	100 *10*	263.39	(11/2$^-$)	D+Q	14 *+5−3*		E_γ: from (^{3}He,3nγ). Other: 613.7 *10* from (^{48}Ca,5nγ). Mult.,δ: from γ(θ) and γγ(θ) in (^{3}He,3nγ), with δ and ΔJ=1 from γ(θ).
		670.9 *2*	64 *7*	206.38	(9/2$^-$)	Q			Mult.: from γ(θ) in (^{3}He,3nγ).
917.45	(3/2$^+$)	481.0		437.58	7/2$^{(+)}$				E_γ: from (^{3}He,3nγ) only.
		610.3[‡] *2*	100	307.10	5/2$^{(+)}$				E_γ: other: 611.4 from (^{3}He,3nγ).
934.81	(11/2$^+$)	137.5	1 *1*	798.04	(9/2$^+$)				
		416.5	2 *1*	518.48	(9/2$^+$)				
		497.2 *2*	100 *10*	437.58	7/2$^{(+)}$	Q			E_γ: from (^{3}He,3nγ). Other: 497.0 *10* from (^{48}Ca,5nγ). Mult.: from γ(θ) in (^{3}He,3nγ).
971.0	(11/2$^-$)	308.9	26 *3*	662.12	(13/2$^-$)	D+Q			Mult.: from γγ(θ) in (^{3}He,3nγ). δ: −0.3 *1* or −4 *+1−2* from γγ(θ) in (^{3}He,3nγ).
		403.4	13 *2*	567.7	(7/2$^-$,9/2$^-$,11/2$^-$)				
		707.6	43 *5*	263.39	(11/2$^-$)				
		764.6	100 *10*	206.38	(9/2$^-$)	D+Q	−1.05 *+34−51*		Mult.,δ: from γγ(θ) in (^{3}He,3nγ).
1032.36	(1/2$^+$,3/2)	422.0[‡] *5*	70[‡] *30*	611.08	(1/2$^+$,3/2$^+$)				
		725.1[‡] *3*	90[‡] *20*	307.10	5/2$^{(+)}$				
		934.7[‡] *5*	100[‡] *30*	97.37	3/2$^{(+)}$				
1041.6	(11/2$^-$)	290.9	9 *2*	750.7	(9/2$^-$,11/2$^-$)				
		379.4	25 *3*	662.12	(13/2$^-$)	D(+Q)	−0.05 *+6−3*		Mult.,δ: from γγ(θ) in (^{3}He,3nγ) giving ΔJ=1.
		778.3	35 *5*	263.39	(11/2$^-$)				
		835.0	100 *11*	206.38	(9/2$^-$)				
1046.4	(7/2$^+$)	249.0	34 *5*	798.04	(9/2$^+$)				
		432.1	52 *7*	614.3	(3/2$^+$,5/2,7/2$^+$)				
		460.6	64 *8*	585.75	(3/2$^+$)				
		527.8	45 *7*	518.48	(9/2$^+$)				
		579.2	82 *10*	467.04	(7/2$^+$)				
		839.8	100 *13*	206.38	(9/2$^-$)				
		860.9	84 *11*	185.30	7/2$^{(-)}$				
1051.19	(9/2$^+$,11/2$^+$)	253.7	12 *2*	798.04	(9/2$^+$)				
		283.6	8 *1*	767.64	(11/2$^+$)				
		319.7	25 *3*	731.35	(9/2$^+$)				
		532.7 *2*	97 *10*	518.48	(9/2$^+$)	D+Q			δ: −5.04 *+57−73* or −0.26 *2* from γγ(θ) in (^{3}He,3nγ).

Adopted Levels, Gammas (continued)

γ(^{123}Xe) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ	α[&]	Comments
1051.19	(9/2$^+$,11/2$^+$)	584.0	100 *11*	467.04	(7/2$^+$)				
		844.8	37 *6*	206.38	(9/2$^-$)				
1054.5		294.8	100	759.7					
1082.13	(13/2$^+$)	314.5 *2*	18 *2*	767.64	(11/2$^+$)	D+Q	−0.9 *+5−9*		E_γ: from (^{3}He,3nγ). Other: 314.2 *10* from (^{48}Ca,5nγ). δ: from γ(θ) and γγ(θ) in (^{3}He,3nγ), with ΔJ=1 and δ from γ(θ).
		363.3	6 *1*	719.25	(15/2$^-$)	D(+Q)	+0.05 *+10−6*		E_γ: other: 363.1 *10* from (^{48}Ca,5nγ). Mult.,δ: from γγ(θ) in (^{3}He,3nγ).
		563.6 *2*	100 *10*	518.48	(9/2$^+$)	[E2]		0.00648	E_γ: other: 563.5 *10* from (^{48}Ca,5nγ).
		818.9	35 *4*	263.39	(11/2$^-$)	D(+Q)	+0.05 *6*		E_γ: other: 818.6 *10* from (^{48}Ca,5nγ). Mult.,δ: from γγ(θ) in (^{3}He,3nγ).
1125.72	(1/2$^+$,3/2)	278.0[‡] *5*	30[‡] *11*	848.37	(1/2$^+$,3/2)				
		819.0[‡] *5*	32[‡] *16*	307.10	5/2$^{(+)}$				
		945.0[‡] *3*	51[‡] *14*	180.75	5/2$^{(+)}$				
		1125.3[‡] *3*	100[‡] *8*	0.0	1/2$^{(+)}$				
1145.2		626.8	77 *10*	518.48	(9/2$^+$)				
		893.3	100 *12*	252.01	(7/2$^+$)				
1260.4	(13/2$^-$)	218.8	14 *2*	1041.6	(11/2$^-$)				
		289.3	23 *3*	971.0	(11/2$^-$)	D+Q			δ: −0.14 *3* or −8 *+2−4* from γγ(θ) in (^{3}He,3nγ).
		509.6	42 *6*	750.7	(9/2$^-$,11/2$^-$)				
		541.1	100 *11*	719.25	(15/2$^-$)	D+Q			δ: −0.08 *+3−6* or +11 *+5−3* from γγ(θ) in (^{3}He,3nγ).
		598.0	38 *6*	662.12	(13/2$^-$)				
		997.0	21 *4*	263.39	(11/2$^-$)				
1270.05	(15/2$^-$)	392.7 *2*	24 *3*	877.32	(13/2$^-$)	(D+Q)			E_γ: other: 392.6 *10* from (^{48}Ca,5nγ). Mult.: from γ(θ) in (^{3}He,3nγ).
		550.9 *2*	27 *4*	719.25	(15/2$^-$)	D+Q	−3.4 *+9−18*		E_γ: other: 550.8 *10* from (^{48}Ca,5nγ). Mult.,δ: from γγ(θ) in (^{3}He,3nγ).
		608.0 *2*	100 *10*	662.12	(13/2$^-$)	D+Q	−2.04 *11*		E_γ: other: 607.7 *10* from (^{48}Ca,5nγ). Mult.,δ: from γ(θ) and γγ(θ) in (^{3}He,3nγ), with ΔJ=1 from γ(θ) and δ from γγ(θ).
1273.28	(1/2,3/2)	1176.2 *4*	64 *28*	97.37	3/2$^{(+)}$				
		1273.2 *2*	100 *14*	0.0	1/2$^{(+)}$				
1278.0		501.3		776.7	(5/2,7/2,9/2$^+$)				
		546.7		731.35	(9/2$^+$)				
1294.02	(17/2$^-$)	574.7 *2*	73 *7*	719.25	(15/2$^-$)	D+Q	−0.41 *18*		E_γ: other: 574.4 *10* from (^{48}Ca,5nγ). Mult.,δ: from γ(θ) and γγ(θ) in (^{3}He,3nγ).
		631.9 *2*	100 *10*	662.12	(13/2$^-$)	E2(+M3)	−0.05 *+6−3*	0.00490 *18*	E_γ: other: 631.6 *10* from (^{48}Ca,5nγ).

$^{123}_{54}Xe_{69}$-13

Adopted Levels, Gammas (continued)

γ(^{123}Xe) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ	α[&]	Comments
									Mult.,δ: from γ(θ) and ce data in (^{3}He,3nγ); Q from γ(θ) in (^{48}Ca,5nγ).
1325.5		448.3		877.32	(13/2$^-$)				
		663.2		662.12	(13/2$^-$)				
1336.16	(19/2$^-$)	616.8 *2*	100	719.25	(15/2$^-$)	E2		0.00510	E_γ: weighted average of 616.6 *2* from (^{48}Ca,5nγ) and 617.0 *2* from (^{3}He,3nγ). Mult.: Q from γ(θ) in (^{12}C,3nγ) and (^{3}He,3nγ); M2 ruled out by RUL. Other: δ(O/Q)=−0.05 *6* from γγ(θ) in (^{3}He,3nγ).
1339.0		287.9		1051.19	(9/2$^+$,11/2$^+$)				
		571.3		767.64	(11/2$^+$)				
		607.5		731.35	(9/2$^+$)				
		820.5		518.48	(9/2$^+$)				
1384.3		520.4	100	863.9	(5/2$^+$,7/2$^+$)				
1397.65	(15/2$^+$)	315.5	6 *1*	1082.13	(13/2$^+$)				E_γ: other: 315.3 *10* from (^{48}Ca,5nγ).
		630.0 *2*	100 *10*	767.64	(11/2$^+$)	E2		0.00484	E_γ: other: 629.9 *10* from (^{48}Ca,5nγ). Mult.: from ce data and γ(θ) in (^{3}He,3nγ).
		735.6	22 *2*	662.12	(13/2$^-$)				E_γ: other: 735.7 *10* from (^{48}Ca,5nγ).
1430.8	(13/2$^+$)	379.5	25 *4*	1051.19	(9/2$^+$,11/2$^+$)				
		633.2	100 *12*	798.04	(9/2$^+$)	Q(+O)	−0.02 +*6*−*10*		Mult.,δ: from γγ(θ) in (^{3}He,3nγ).
		663.0	40 *5*	767.64	(11/2$^+$)				
1452.83	(1/2,3/2)	711.2[‡] *2*	90[‡] *30*	741.47	(1/2$^+$,3/2$^+$)				
		841.8[‡] *2*	48[‡] *9*	611.08	(1/2$^+$,3/2$^+$)				
		1355.9[‡] *5*	100[‡] *24*	97.37	3/2$^{(+)}$				
		1453.0 *5*	33 *15*	0.0	1/2$^{(+)}$				
1519.9		374.7		1145.2					
		752.2		767.64	(11/2$^+$)				
		1001.4		518.48	(9/2$^+$)				
1521.96	(17/2$^-$)	251.9	6 *1*	1270.05	(15/2$^-$)				
		644.7 *2*	100 *11*	877.32	(13/2$^-$)				E_γ: other: 644.6 *10* from (^{48}Ca,5nγ).
		802.7 *2*	49 *15*	719.25	(15/2$^-$)	D+Q	<−16		E_γ: other: 802.8 *10* from (^{48}Ca,5nγ). Mult.,δ: from γγ(θ) in (^{3}He,3nγ).
1541.1	(15/2$^-$)	247.1[b]	17 *10*	1294.02	(17/2$^-$)				
		499.6	8 *5*	1041.6	(11/2$^-$)				
		570.1	80 *11*	971.0	(11/2$^-$)				
		664.0	45 *7*	877.32	(13/2$^-$)				
		673.2	19 *8*	867.9	(11/2$^-$)				
		821.9	37 *7*	719.25	(15/2$^-$)				
		879.0 *2*	100 *12*	662.12	(13/2$^-$)	D+Q	−2.2 +*6*−*7*		Mult.,δ: from γ(θ) in (^{3}He,3nγ), ΔJ=1.
1554.2	(15/2$^+$)	619.4 *2*	100	934.81	(11/2$^+$)	Q			E_γ: other: 619.0 *10* from (^{48}Ca,5nγ). Mult.: from γ(θ) in (^{3}He,3nγ), ΔJ=2.

Adopted Levels, Gammas (continued)

$\gamma(^{123}Xe)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ	α[&]	Comments
1580.7	(11/2$^-$ to 15/2$^-$)	320.3	<30	1260.4	(13/2$^-$)				
		539.0	33 *9*	1041.6	(11/2$^-$)				
		861.4	46 *11*	719.25	(15/2$^-$)				
		918.2	100 *15*	662.12	(13/2$^-$)				
1618.6		572.2	100	1046.4	(7/2$^+$)				
1696.4		1034.3	100	662.12	(13/2$^-$)				
1733.1		650.9		1082.13	(13/2$^+$)				
		682.0		1051.19	(9/2$^+$,11/2$^+$)				
1757.9	(17/2$^+$)	675.7	100 *11*	1082.13	(13/2$^+$)				E$_\gamma$: other: 675.8 *10* from (^{48}Ca,5nγ).
		1038.9	37 *4*	719.25	(15/2$^-$)	D(+Q)	0.05 *6*		E$_\gamma$: other: 1038.3 *10* from (^{48}Ca,5nγ). Mult.,δ: from $\gamma\gamma(\theta)$ in (^{3}He,3nγ). Other: D from $\gamma(\theta)$ in (^{48}Ca,5nγ).
1759.0		1321.4	100	437.58	7/2$^{(+)}$				
1827.8	(17/2$^-$)	491.6		1336.16	(19/2$^-$)				
		533.7		1294.02	(17/2$^-$)				
		557.9		1270.05	(15/2$^-$)	D+Q			δ: −0.52 *11*, −1.56 *21* from $\gamma\gamma(\theta)$ in (^{3}He,3nγ), giving ΔJ=1.
		567.4		1260.4	(13/2$^-$)				
		950.6		877.32	(13/2$^-$)				
		1108.4		719.25	(15/2$^-$)				
1841.6		443.9		1397.65	(15/2$^+$)				
		696.4		1145.2					
		759.3		1082.13	(13/2$^+$)				
		1179.5		662.12	(13/2$^-$)				
1947.6	(15/2$^-$)	1285.5	100	662.12	(13/2$^-$)	D(+Q)	−0.02 *3*		Mult.,δ: from $\gamma\gamma(\theta)$ in (^{3}He,3nγ), giving ΔJ=1.
1949.43		368.7 *2*		1580.7	(11/2$^-$ to 15/2$^-$)				
		427.5 *2*		1521.96	(17/2$^-$)				
		679.4 *2*		1270.05	(15/2$^-$)				
		689.0 *2*		1260.4	(13/2$^-$)				
1953.54	(19/2$^-$)	431.6 *2*	14 *3*	1521.96	(17/2$^-$)				E$_\gamma$: other: 430.9 *10* from (^{48}Ca,5nγ).
		617.3 *2*	<57	1336.16	(19/2$^-$)				E$_\gamma$: other: 617.5 *10* from (^{48}Ca,5nγ).
		659.4 *2*	30 *4*	1294.02	(17/2$^-$)				
		683.6 *2*	100 *11*	1270.05	(15/2$^-$)	Q			E$_\gamma$: other: 683.5 *10* from (^{48}Ca,5nγ).
2063.1	(21/2$^-$)	727.1	69 *10*	1336.16	(19/2$^-$)	D+Q	−0.38 +*7*−*11*		E$_\gamma$: other: 726.9 *10* from (^{48}Ca,5nγ). Mult.: from $\gamma\gamma(\theta)$ in (^{3}He,3nγ).
		769.1 *2*	100 *13*	1294.02	(17/2$^-$)	Q			E$_\gamma$: other: 768.5 *10* from (^{48}Ca,5nγ). Mult.: from $\gamma\gamma(\theta)$ in (^{3}He,3nγ) and (^{48}Ca,5nγ).
2089.7	(23/2$^-$)	753.6 *3*	100	1336.16	(19/2$^-$)	E2		0.00310	E$_\gamma$: weighted average of 753.8 *2* from (^{48}Ca,5nγ) and 753.3 *2* from (^{3}He,3nγ). Mult.: from ce data and $\gamma(\theta)$ in (^{3}He,3nγ).

$^{123}_{54}Xe_{69}$-15

Adopted Levels, Gammas (continued)

γ(^{123}Xe) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.#	Comments
2112.5	(19/2$^+$)	714.9 *2*	100	1397.65	(15/2$^+$)	Q	E_γ: other: 714.7 *10* from (^{48}Ca,5nγ). Mult.: from $\gamma(\theta)$ in (^{3}He,3nγ) and (^{48}Ca,5nγ).
		818.7		1294.02	(17/2$^-$)		
2144.6	(17/2$^+$)	714.0		1430.8	(13/2$^+$)		
		746.8		1397.65	(15/2$^+$)		
2197.1		927.2		1270.05	(15/2$^-$)		
		1477.6		719.25	(15/2$^-$)		
2210.0	(15/2$^-$ to 19/2$^-$)	668.9		1541.1	(15/2$^-$)		
		873.8		1336.16	(19/2$^-$)		
		915.9		1294.02	(17/2$^-$)		
		1490.7		719.25	(15/2$^-$)		
2226.0		684.9		1541.1	(15/2$^-$)		
		932.0		1294.02	(17/2$^-$)		
2230.6	(19/2$^+$)	676.7	100 *11*	1554.2	(15/2$^+$)		E_γ: other: 676.5 *10* from (^{48}Ca,5nγ).
		936.8	24 *4*	1294.02	(17/2$^-$)		E_γ: other: 936.1 *10* from (^{48}Ca,5nγ).
2248.9		668.1		1580.7	(11/2$^-$ to 15/2$^-$)		
		954.9		1294.02	(17/2$^-$)		
		1529.6		719.25	(15/2$^-$)		
2284.6	(21/2$^-$)	762.7	100 *11*	1521.96	(17/2$^-$)	Q	E_γ: other: 762.7 *10* from (^{48}Ca,5nγ).
		948.1	32 *8*	1336.16	(19/2$^-$)	D+Q	E_γ: other: 948.9 *10* from (^{48}Ca,5nγ).
2416.3?		1080.2[b]	100	1336.16	(19/2$^-$)		
2422.3	(19/2$^+$)	1128.7	100	1294.02	(17/2$^-$)	D	E_γ: other: 1128.1 *10* from (^{48}Ca,5nγ).
2497.5	(21/2$^+$)	739.6 *2*	100 *10*	1757.9	(17/2$^+$)	Q	E_γ: from (^{48}Ca,5nγ). Other: 739.7 from (^{3}He,3nγ). I_γ: from (^{3}He,3nγ). Other: 100 *13* from (^{48}Ca,5nγ).
		1160.9 *5*	51 *5*	1336.16	(19/2$^-$)		E_γ: from (^{48}Ca,5nγ). Other: 1161.5 from (^{3}He,3nγ). I_γ: weighted average of 57 *8* from (^{48}Ca,5nγ) and 48 *5* from (^{3}He,3nγ).
2689.1	(21/2$^+$)	267.1	19 *3*	2422.3	(19/2$^+$)	D+Q	E_γ: other: 266.3 from (^{48}Ca,5nγ).
		1353.4	100 *11*	1336.16	(19/2$^-$)		E_γ: other: 1352.4 *10* from (^{48}Ca,5nγ).
2769.7	(23/2$^-$)	484.3 *10*		2284.6	(21/2$^-$)		E_γ: from (^{48}Ca,5nγ) only.
		679.7 *10*		2089.7	(23/2$^-$)	D+Q	E_γ: from (^{48}Ca,5nγ) only.
		816.1 *2*	100	1953.54	(19/2$^-$)	Q	E_γ: from (^{48}Ca,5nγ). Other: 816.9 from (^{3}He,3nγ).
2822.3	(23/2$^+$)	591.8	21 *2*	2230.6	(19/2$^+$)		E_γ: other: 591.5 *10* from (^{48}Ca,5nγ).
		709.7 *2*	100 *10*	2112.5	(19/2$^+$)	Q	E_γ: from (^{48}Ca,5nγ). Other: 709.8 from (^{3}He,3nγ).
		732.7 *10*		2089.7	(23/2$^-$)		E_γ: from (^{48}Ca,5nγ) only.
2882.4	(23/2$^+$)	652.1	50 *6*	2230.6	(19/2$^+$)	Q	E_γ: other: 651.7 *10* from (^{48}Ca,5nγ).
		770.3 *5*	100 *11*	2112.5	(19/2$^+$)	Q	E_γ: from (^{48}Ca,5nγ). Other: 770.2 from (^{3}He,3nγ).
		819.6	77 *9*	2063.1	(21/2$^-$)		E_γ: other: 820.0 *10* from (^{48}Ca,5nγ).
2951.7	(25/2$^-$)	861.8	39 *5*	2089.7	(23/2$^-$)	D	E_γ: other: 861.1 *10* from (^{48}Ca,5nγ).
		888.6 *2*	100 *11*	2063.1	(21/2$^-$)	Q	E_γ: from (^{48}Ca,5nγ). Other: 888.5 from (^{3}He,3nγ).
2964.2	(23/2$^+$)	275.0	29 *3*	2689.1	(21/2$^+$)	D+Q	E_γ: other: 275.3 *10* from (^{48}Ca,5nγ).
		541.9	75 *8*	2422.3	(19/2$^+$)	Q	E_γ: other: 541.8 *10* from (^{48}Ca,5nγ).

$^{123}_{54}Xe_{69}$-16

Adopted Levels, Gammas (continued)

γ(^{123}Xe) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	Comments
2964.2	(23/2$^+$)	733.7	100 *11*	2230.6	(19/2$^+$)	Q	E_γ: other: 733.6 *10* from (^{48}Ca,5nγ).
		875.3 *10*		2089.7	(23/2$^-$)		E_γ: from from (^{48}Ca,5nγ) only.
2965.6	(27/2$^-$)	875.9 *2*	100	2089.7	(23/2$^-$)	Q	E_γ: from (^{48}Ca,5nγ). Other: 876.1 from (^{3}He,3nγ).
2991.5	(27/2$^-$)	763.9 *10*		2227.6	(23/2$^-$)		E_γ: from (^{48}Ca,5nγ) only.
		901.9 *10*		2089.7	(23/2$^-$)	Q	E_γ: from (^{48}Ca,5nγ) only.
3152.7	(25/2$^-$)	868.2 *2*	100 *3*	2284.6	(21/2$^-$)	Q	E_γ: from (^{48}Ca,5nγ). Other: 868.3 from (^{3}He,3nγ).
							I_γ: from (^{3}He,3nγ). Other: 100 *11* from (^{48}Ca,5nγ).
		1062.7	21 *5*	2089.7	(23/2$^-$)		
3169.3	(25/2$^+$)	205.1 *2*	31 *11*	2964.2	(23/2$^+$)		E_γ: from (^{48}Ca,5nγ). Other: 205.1 from (^{3}He,3nγ).
							I_γ: unweighted average of 41 *6* from (^{48}Ca,5nγ) and 20.0 *20* from (^{3}He,3nγ).
		287.0 *2*	21 *8*	2882.4	(23/2$^+$)	D+Q	E_γ: from (^{48}Ca,5nγ). Other: 286.8 from (^{3}He,3nγ).
							I_γ: unweighted average of 28 *4* from (^{48}Ca,5nγ) and 13.0 *10* from (^{3}He,3nγ).
		347.0 *5*	5.2 *22*	2822.3	(23/2$^+$)		E_γ: from (^{48}Ca,5nγ). Other: 347.1 from (^{3}He,3nγ).
							I_γ: unweighted average of 7.3 *12* from (^{48}Ca,5nγ) and 3.0 *10* from (^{3}He,3nγ).
		480.3 *2*	21 *4*	2689.1	(21/2$^+$)	Q	E_γ: from (^{48}Ca,5nγ). Other: 480.2 from (^{3}He,3nγ).
							I_γ: unweighted average of 26 *4* from (^{48}Ca,5nγ) and 16.0 *20* from (^{3}He,3nγ).
		671.8 *2*	68 *8*	2497.5	(21/2$^+$)		E_γ: from (^{48}Ca,5nγ). Other: 671.6 from (^{3}He,3nγ).
							I_γ: weighted average of 61 *7* from (^{48}Ca,5nγ) and 76 *8* from (^{3}He,3nγ).
		1079.6 *2*	100 *10*	2089.7	(23/2$^-$)	D	E_γ: from (^{48}Ca,5nγ). Other: 1079.9 from (^{3}He,3nγ).
							I_γ: from (^{3}He,3nγ). Other: 100 *12* from (^{48}Ca,5nγ).
3210.2	(25/2$^+$)	712.4 *5*	100 *12*	2497.5	(21/2$^+$)	Q	E_γ: from (^{48}Ca,5nγ). Other: 713.0 from (^{3}He,3nγ).
							I_γ: from (^{3}He,3nγ). Other: 100 *13* from (^{48}Ca,5nγ).
		1120.8 *5*	45 *5*	2089.7	(23/2$^-$)		E_γ: from (^{48}Ca,5nγ). Other: 1121.1 from (^{3}He,3nγ).
							I_γ: weighted average of 43 *5* from (^{48}Ca,5nγ) and 50 *7* from (^{3}He,3nγ).
3349.6	(27/2$^+$)	139.4 *5*	16.9 *24*	3210.2	(25/2$^+$)	D+Q	E_γ: from (^{48}Ca,5nγ). Other: 139.0 from (^{3}He,3nγ).
							I_γ: weighted average of 20.0 *26* from (^{48}Ca,5nγ) and 15.0 *20* from (^{3}He,3nγ).
		180.4 *2*	100 *10*	3169.3	(25/2$^+$)	D+Q	E_γ: from (^{48}Ca,5nγ). Other: 180.5 from (^{3}He,3nγ).
							I_γ: from (^{3}He,3nγ). Other: 100 *11* from (^{48}Ca,5nγ).
		385.1 *5*	14.5 *11*	2964.2	(23/2$^+$)		E_γ: from (^{48}Ca,5nγ). Other: 385.5 from (^{3}He,3nγ).
							I_γ: weighted average of 16.8 *21* from (^{48}Ca,5nγ) and 14.0 *10* from (^{3}He,3nγ).
		466.8 *5*	8.8 *13*	2882.4	(23/2$^+$)		E_γ: from (^{48}Ca,5nγ). Other: 467.0 from (^{3}He,3nγ).
							I_γ: weighted average of 7.4 *11* from (^{48}Ca,5nγ) and 10.0 *10* from (^{3}He,3nγ).
3479.1	(27/2$^+$)	656.8 *2*	100	2822.3	(23/2$^+$)	Q	E_γ: from (^{48}Ca,5nγ). Other: 657.0 from (^{3}He,3nγ).
3559.7	(27/2$^+$)	608.8[b] *10*		2951.7	(25/2$^-$)		E_γ: from (^{48}Ca,5nγ) only.
		677.3 *5*	100 *15*	2882.4	(23/2$^+$)	Q	E_γ: from (^{48}Ca,5nγ) only.
3652.7		1563		2089.7	(23/2$^-$)		
3820.5	(29/2$^+$)	470.9 *2*	100	3349.6	(27/2$^+$)		
3854.0	(27/2$^-$)	862.1 *10*		2991.5	(27/2$^-$)		E_γ: from (^{48}Ca,5nγ) only.
		887.8 *10*		2965.6	(27/2$^-$)		E_γ: from (^{48}Ca,5nγ) only.
		1084.5 *5*	100	2769.7	(23/2$^-$)		

$^{123}_{54}Xe_{69}$-17

Adopted Levels, Gammas (continued)

$\gamma(^{123}Xe)$ (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.#	Comments
3854.0	(27/2$^-$)	1764.1 *10*		2089.7	(23/2$^-$)		
3905.5	(29/2$^+$)	555.7 *10*	29 *7*	3349.6	(27/2$^+$)		E_γ,I_γ: from (^{48}Ca,5nγ) only.
		695.6 *10*	100 *14*	3210.2	(25/2$^+$)	Q	
		939.9 *10*	57 *14*	2965.6	(27/2$^-$)		
3908.2	(27/2$^-$)	738.9 *2*	70 *10*	3169.3	(25/2$^+$)	D	E_γ,I_γ: from (^{48}Ca,5nγ) only.
		916.7 *2*	47 *6*	2991.5	(27/2$^-$)		E_γ,I_γ: from (^{48}Ca,5nγ) only.
		942.6 *2*	100 *13*	2965.6	(27/2$^-$)	D+Q	
		1138.3 *2*	49 *6*	2769.7	(23/2$^-$)	Q	
		1818.9 *5*	24 *5*	2089.7	(23/2$^-$)		E_γ,I_γ: from (^{48}Ca,5nγ) only.
3951.4	(31/2$^-$)	985.8 *2*	100	2965.6	(27/2$^-$)	Q	
3956.6	(29/2$^-$)	1005.4 *10*		2951.7	(25/2$^-$)		
4019.4	(29/2$^+$)	669.8 *10*		3349.6	(27/2$^+$)	D+Q	
		850.5 *5*	100 *20*	3169.3	(25/2$^+$)	Q	
4103.5	(29/2$^-$)	950.9 *5*	100	3152.7	(25/2$^-$)	Q	
4155.9	(31/2$^+$)	136.5 *5*	4.3 *7*	4019.4	(29/2$^+$)	D+Q	
		335.2 *5*	6.8 *9*	3820.5	(29/2$^+$)	D+Q	
		806.3 *2*	100 *11*	3349.6	(27/2$^+$)		
4213.5	(31/2$^+$)	734.3 *2*	100	3479.1	(27/2$^+$)	Q	
4283.9	(29/2$^-$)	375.6 *10*		3908.2	(27/2$^-$)	D+Q	
		934.2 *10*		3349.6	(27/2$^+$)	D	
4325.6	(31/2$^+$)	765.9 *5*	100	3559.7	(27/2$^+$)	Q	
4355.2	(31/2$^-$)	403.7 *10*		3951.4	(31/2$^-$)		
		1389.9 *10*		2965.6	(27/2$^-$)		
4609.2	(31/2$^-$)	325.4 *10*		4283.9	(29/2$^-$)		
		700.9 *2*	100 *12*	3908.2	(27/2$^-$)	Q	
		755.1 *10*		3854.0	(27/2$^-$)		
		788.7 *5*	14.3 *22*	3820.5	(29/2$^+$)	D	
4627.8	(33/2$^+$)	471.4 *10*		4155.9	(31/2$^+$)		
		807.4 *10*		3820.5	(29/2$^+$)		
4724.9	(33/2$^+$)	819.4 *5*	100	3905.5	(29/2$^+$)	Q	
4880.4	(33/2$^+$)	724.8 *10*	11.1 *19*	4155.9	(31/2$^+$)		
		861.3 *5*	100 *17*	4019.4	(29/2$^+$)	Q	
4934.1	(33/2$^-$)	830.6 *5*	100	4103.5	(29/2$^-$)		
5010.5	(35/2$^-$)	1059.1 *2*	100	3951.4	(31/2$^-$)	Q	
5027.0	(33/2$^-$)	417.8 *5*	49 *6*	4609.2	(31/2$^-$)	D+Q	
		743.0 *5*	100 *13*	4283.9	(29/2$^-$)	Q	
		871.1 *10*		4155.9	(31/2$^+$)		
5036.5	(35/2$^+$)	156.6 *5*	100 *15*	4880.4	(33/2$^+$)	D+Q	
		408.6 *5*	85 *10*	4627.8	(33/2$^+$)	D+Q	
		880.8 *10*		4155.9	(31/2$^+$)		
5043.8	(33/2$^-$)	1087.3 *5*	100	3956.6	(29/2$^-$)		
5064.8	(33/2$^-$)	961.3 *10*		4103.5	(29/2$^-$)		
5066.8	(35/2$^+$)	853.3 *2*	100	4213.5	(31/2$^+$)	Q	

$^{123}_{54}Xe_{69}$-18

Adopted Levels, Gammas (continued)

$\gamma(^{123}Xe)$ (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.#
5109.8	(33/2$^-$)	1153.2 *10*		3956.6	(29/2$^-$)	
5207.8	(35/2$^+$)	882.2 *5*	100	4325.6	(31/2$^+$)	Q
5213.7	(35/2$^-$)	858.6 *10*		4355.2	(31/2$^-$)	
		1262.5 *10*		3951.4	(31/2$^-$)	
5286.2	(33/2$^-$)	1329.5 *10*		3956.6	(29/2$^-$)	
5329.1	(33/2$^-$)	1225.5 *10*		4103.5	(29/2$^-$)	
5338.1	(35/2$^-$)	710.7 *5*	13.5 *24*	4627.8	(33/2$^+$)	
		728.9 *2*	100 *12*	4609.2	(31/2$^-$)	Q
5418.3	(35/2$^-$)	1466.6 *10*		3951.4	(31/2$^-$)	
5519.6	(37/2$^+$)	483.2 *2*	100 *12*	5036.5	(35/2$^+$)	D+Q
		891.8 *2*	92 *11*	4627.8	(33/2$^+$)	Q
5585.6	(35/2$^-$)	558.4 *10*		5027.0	(33/2$^-$)	D+Q
5651.3	(37/2$^+$)	926.4 *10*	100	4724.9	(33/2$^+$)	Q
5687.6	(35/2$^-$)	401.3 *10*		5286.2	(33/2$^-$)	
		753.8 *10*		4934.1	(33/2$^-$)	
5793.7	(37/2$^-$)	455.9 *10*		5338.1	(35/2$^-$)	D+Q
		757.0 *5*	94 *12*	5036.5	(35/2$^+$)	
		766.5 *5*	100 *12*	5027.0	(33/2$^-$)	Q
5915.8	(39/2$^+$)	396.3 *2*	26.8 *33*	5519.6	(37/2$^+$)	
		848.7 *10*	1.23 *14*	5066.8	(35/2$^+$)	
		879.2 *2*	100 *12*	5036.5	(35/2$^+$)	
6034.4	(39/2$^+$)	967.6 *2*	100	5066.8	(35/2$^+$)	Q
6046.1	(39/2$^-$)	1035.6 *2*	100	5010.5	(35/2$^-$)	Q
6049.1	(37/2$^-$)	1005.3 *2*	100	5043.8	(33/2$^-$)	
6070.5	(37/2$^-$)	382.9 *10*	17.1 *29*	5687.6	(35/2$^-$)	D+Q
		960.6 *10*		5109.8	(33/2$^-$)	Q
		1005.7 *5*	100 *12*	5064.8	(33/2$^-$)	
		1027.3 *10*		5043.8	(33/2$^-$)	
6134.1	(39/2$^-$)	796.0 *2*	100	5338.1	(35/2$^-$)	Q
6165.5	(39/2$^+$)	957.7 *5*	100	5207.8	(35/2$^+$)	Q
6374.4	(39/2$^-$)	580.8 *5*	100 *15*	5793.7	(37/2$^-$)	D+Q
		788.6 *10*		5585.6	(35/2$^-$)	Q
6418.5	(39/2$^-$)	1000.1 *5*	100 *13*	5418.3	(35/2$^-$)	Q
		1408.2 *5*	69 *13*	5010.5	(35/2$^-$)	
6465.2	(39/2$^-$)	394.8 *5*	35 *7*	6070.5	(37/2$^-$)	D+Q
		777.7 *10*		5687.6	(35/2$^-$)	Q
		1251.9 *10*		5213.7	(35/2$^-$)	
		1454.7 *5*	100 *23*	5010.5	(35/2$^-$)	Q
6477.4	(41/2$^+$)	561.5 *2*	100 *13*	5915.8	(39/2$^+$)	D+Q
		958.1 *5*	29 *4*	5519.6	(37/2$^+$)	Q
6655.5	(41/2$^-$)	521.7 *5*	100 *14*	6134.1	(39/2$^-$)	D+Q
		861.5 *5*	77 *9*	5793.7	(37/2$^-$)	Q
6684.1	(41/2$^+$)	1032.8 *10*	100	5651.3	(37/2$^+$)	Q
6789.6	(41/2$^-$)	324.6 *5*	100 *12*	6465.2	(39/2$^-$)	D+Q
		371.1 *5*	44 *5*	6418.5	(39/2$^-$)	D+Q
		655.1 *5*	35 *5*	6134.1	(39/2$^-$)	
		719.2 *5*	79 *12*	6070.5	(37/2$^-$)	Q
7067.2	(43/2$^-$)	933.1 *5*	100	6134.1	(39/2$^-$)	Q
7084.7	(43/2$^+$)	607.4 *2*	100 *12*	6477.4	(41/2$^+$)	D+Q
		919.2 *10*	2.4 *5*	6165.5	(39/2$^+$)	
		1050.2 *5*	17.4 *19*	6034.4	(39/2$^+$)	Q
		1168.8 *5*	41 *5*	5915.8	(39/2$^+$)	Q
7107.2	(43/2$^-$)	1060.9 *10*		6046.1	(39/2$^-$)	Q
7115.2	(43/2$^+$)	1080.7 *5*	100	6034.4	(39/2$^+$)	Q
7257.9	(43/2$^-$)	602.3 *5*	100 *12*	6655.5	(41/2$^-$)	D+Q
		883.7 *10*		6374.4	(39/2$^-$)	
7279.1	(43/2$^+$)	1113.7 *5*	100	6165.5	(39/2$^+$)	Q
7482.0	(45/2$^+$)	366.8 *10*		7115.2	(43/2$^+$)	D+Q
		396.9 *10*		7084.7	(43/2$^+$)	
		1004.7 *2*	100 *12*	6477.4	(41/2$^+$)	Q
7617.8	(45/2$^-$)	550.5 *5*	100 *14*	7067.2	(43/2$^-$)	D+Q
		962.5 *10*		6655.5	(41/2$^-$)	Q
7781.0	(45/2$^-$)	523.1 *10*		7257.9	(43/2$^-$)	D+Q
7807.8	(45/2$^+$)	1123.7 *10*		6684.1	(41/2$^+$)	Q
7840.5		1156.4 *10*		6684.1	(41/2$^+$)	
7970.2	(45/2$^-$)	712.1 *5*	24.1 *35*	7257.9	(43/2$^-$)	D+Q
		1180.6 *5*	100 *12*	6789.6	(41/2$^-$)	Q
7991.2	(47/2$^+$)	712.2 *10*		7279.1	(43/2$^+$)	
		875.8 *10*		7115.2	(43/2$^+$)	
		906.4 *2*	100 *12*	7084.7	(43/2$^+$)	Q
8075.6	(47/2$^-$)	457.6 *10*		7617.8	(45/2$^-$)	
		1008.4 *5*	100 *13*	7067.2	(43/2$^-$)	Q
8189.6	(47/2$^+$)	707.6 *10*		7482.0	(45/2$^+$)	D+Q
		1105.4 *10*		7084.7	(43/2$^+$)	Q
8218.5	(47/2$^-$)	960.8 *5*	55 *8*	7257.9	(43/2$^-$)	
		1111.4 *5*	100 *11*	7107.2	(43/2$^-$)	Q
8225.2	(47/2$^-$)	607.5 *5*	100 *12*	7617.8	(45/2$^-$)	D+Q
		966.7 *10*		7257.9	(43/2$^-$)	
		1118.1 *5*	84 *12*	7107.2	(43/2$^-$)	
8298.6	(47/2$^+$)	1183.4 *5*	100	7115.2	(43/2$^+$)	
8364.0	(47/2$^-$)	1256.6 *5*	100	7107.2	(43/2$^-$)	
8448.9	(47/2$^+$)	1169.8 *10*	100	7279.1	(43/2$^+$)	
8454.0	(49/2$^+$)	462.7 *2*	99 *11*	7991.2	(47/2$^+$)	D+Q
		971.9 *2*	100 *12*	7482.0	(45/2$^+$)	Q
8690.9	(49/2$^-$)	614.6 *10*		8075.6	(47/2$^-$)	
		1073.2 *5*	100 *17*	7617.8	(45/2$^-$)	

$^{123}_{54}Xe_{69}$-19

Adopted Levels, Gammas (continued)

$\gamma(^{123}Xe)$ (continued)

E_i(level)	J_i^π	E_γ [†]	I_γ [†]	E_f	J_f^π	Mult.[#]
8694.4	(49/2$^+$)	240.2 *10*	41 *6*	8454.0	(49/2$^+$)	D+Q
		504.1 *10*	47 *6*	8189.6	(47/2$^+$)	D+Q
		703.4 *10*	53 *6*	7991.2	(47/2$^+$)	
		1212.7 *5*	100 *12*	7482.0	(45/2$^+$)	
8955.5	(49/2$^-$)	591.4 *5*	60 *7*	8364.0	(47/2$^-$)	D+Q
		737.3 *5*	100 *13*	8218.5	(47/2$^-$)	D+Q
		985.0 *10*		7970.2	(45/2$^-$)	
		1174.5 *10*		7781.0	(45/2$^-$)	
8975.4	(49/2$^-$)	1194.4 *10*		7781.0	(45/2$^-$)	
9124.2	(51/2$^+$)	430.1 *5*	14.0 *18*	8694.4	(49/2$^+$)	D+Q
		670.1 *2*	100 *12*	8454.0	(49/2$^+$)	D+Q
		934.9 *5*	25 *4*	8189.6	(47/2$^+$)	Q
		1133.3 *5*	15.8 *18*	7991.2	(47/2$^+$)	Q
9257.7	(51/2$^-$)	566.8 *5*	62 *8*	8690.9	(49/2$^-$)	D+Q
		1182.2 *5*	100 *15*	8075.6	(47/2$^-$)	
9357.1	(53/2$^-$)	401.6 *2*	100	8955.5	(49/2$^-$)	Q
9377.2	(51/2$^-$)	1152.0 *10*		8225.2	(47/2$^-$)	
9419.1	(53/2$^+$)	294.6 *5*	15.4 *31*	9124.2	(51/2$^+$)	D+Q
		965.4 *5*	100 *12*	8454.0	(49/2$^+$)	Q
9423.1	(51/2$^-$)	1204.6 *5*	100	8218.5	(47/2$^-$)	Q
9465.5		1166.9 *5*	100	8298.6	(47/2$^+$)	
9566.6	(51/2$^+$)	1268.0 *10*	100	8298.6	(47/2$^+$)	
9591.0		1292.4 *10*		8298.6	(47/2$^+$)	
9809.2	(53/2$^+$)	684.6 *10*	55 *9*	9124.2	(51/2$^+$)	
		1355.3 *5*	100 *18*	8454.0	(49/2$^+$)	
9904.5		780.2 *5*	100	9124.2	(51/2$^+$)	
9906.8	(53/2$^-$)	649.3 *5*	77 *15*	9257.7	(51/2$^-$)	
		1215.7 *5*	100 *15*	8690.9	(49/2$^-$)	
10068.4	(55/2$^+$)	944.3 *5*	100	9124.2	(51/2$^+$)	Q
10135.5	(55/2$^-$)	778.3 *2*	100	9357.1	(53/2$^-$)	D+Q
10489.8	(55/2$^-$)	582.7 *10*	64 *7*	9906.8	(53/2$^-$)	
		1232.0 *5*	100 *22*	9257.7	(51/2$^-$)	
10574.6	(55/2$^-$)	1197.4 *10*		9377.2	(51/2$^-$)	
10597.4	(57/2$^+$)	1178.2 *5*	100	9419.1	(53/2$^+$)	
10614.1	(57/2$^+$)	1195.0 *5*	100	9419.1	(53/2$^+$)	Q
10634.7		1169.2 *10*		9465.5		
10680.1	(55/2$^-$)	1257.0 *10*		9423.1	(51/2$^-$)	Q
10708.4	(55/2$^+$)	1141.8 *10*	100	9566.6	(51/2$^+$)	
10824.0	(57/2$^+$)	1404.9 *5*	100	9419.1	(53/2$^+$)	Q
10890.8	(57/2$^-$)	755.3 *10*		10135.5	(55/2$^-$)	
		1534.0 *10*	100 *22*	9357.1	(53/2$^-$)	
11046.4	(57/2$^-$)	910.9 *5*	100	10135.5	(55/2$^-$)	D+Q
11090.0	(59/2$^-$)	199.4 *5*	43 *5*	10890.8	(57/2$^-$)	D+Q

Adopted Levels, Gammas (continued)

γ(^{123}Xe) (continued)

E_i(level)	J_i^π	E_γ [†]	I_γ [†]	E_f	J_f^π	Mult.[#]	Comments
11090.0	(59/2$^-$)	954.6 *5*	100 *13*	10135.5	(55/2$^-$)	Q	
11098.0	(57/2$^+$)	1029.6 *5*	100 *19*	10068.4	(55/2$^+$)	D+Q	
		1288.5 *10*	29 *5*	9809.2	(53/2$^+$)		
11133.1		1064.7 *5*	100 *20*	10068.4	(55/2$^+$)		
		1228.3 *10*		9904.5			
11175.7	(59/2$^+$)	1107.3 *5*	100	10068.4	(55/2$^+$)		
11176.0	(57/2$^-$)	685.6 *10*	50 *17*	10489.8	(55/2$^-$)		
		1269.9 *10*	100 *17*	9906.8	(53/2$^-$)		
11440.8		1372.4 *10*		10068.4	(55/2$^+$)		
11721.5	(61/2$^-$)	631.5 *5*	50 *7*	11090.0	(59/2$^-$)	D+Q	
		674.7 *10*	26.7 *33*	11046.4	(57/2$^-$)		
		830.6 *5*	100 *10*	10890.8	(57/2$^-$)	Q	
11808.8	(61/2$^+$)	633.1 *5*	100 *13*	11175.7	(59/2$^+$)	D+Q	
		1211.3 *10*		10597.4	(57/2$^+$)		
11851.4	(59/2$^+$)	1143.0 *10*		10708.4	(55/2$^+$)		
11898.8?		1264.0[b] *10*		10634.7			
11999.0	(59/2$^-$)	1318.9 *5*	100	10680.1	(55/2$^-$)		
12040.2	(61/2$^+$)	1216.2 *5*	100	10824.0	(57/2$^+$)	Q	
12146.8	(61/2$^+$)	1048.8 *5*	100	11098.0	(57/2$^+$)	Q	
12216.9?		1126.9[b] *10*	100	11090.0	(59/2$^-$)		
12236.7	(63/2$^-$)	515.1 *5*	100 *20*	11721.5	(61/2$^-$)	D+Q	
		1146.5 *10*	53 *7*	11090.0	(59/2$^-$)	Q	
12296.0		1162.9 *5*	100	11133.1			
12324.1		1234.2 *10*		11090.0	(59/2$^-$)		
12492.2	(63/2$^-$)	1402.3 *5*	100	11090.0	(59/2$^-$)	Q	
12858.8		534.8 *10*		12324.1			
		1137.1 *10*		11721.5	(61/2$^-$)		
12921.3		1480.5 *10*	100	11440.8			
13173.5	(65/2$^+$)	1364.7 *5*	100	11808.8	(61/2$^+$)		
13433.1	(67/2$^-$)	941.0 *5*	100 *14*	12492.2	(63/2$^-$)	Q	
		1196.0 *10*	43 *7*	12236.7	(63/2$^-$)		
13438.7	(65/2$^-$)	1202.0 *10*		12236.7	(63/2$^-$)	D+Q	
		1222.1[b] *10*		12216.9?			
14485.1		1311.6 *5*	100	13173.5	(65/2$^+$)		
14521.7		1348.2 *5*	100	13173.5	(65/2$^+$)		
14554.5	(69/2$^-$)	1115.8 *10*	100	13438.7	(65/2$^-$)		
14760.3	(69/2$^-$)	1327.2 *5*	100	13433.1	(67/2$^-$)	D+Q	
3117.6+u	(33/2$^-$)	152.0 *4*	100	2965.6+u?	(31/2$^-$)	D[@]	Decays to 2965, 23/2$^+$ level also through unknown transitions.
3316.9+u	(35/2$^-$)	199.3 *4*	100	3117.6+u	(33/2$^-$)	(D)[@]	
3543.0+u	(37/2$^-$)	226.1 *4*	100	3316.9+u	(35/2$^-$)	(D)[@]	
3788.7+u	(39/2$^-$)	245.5 *4*	100 *7*	3543.0+u	(37/2$^-$)	(D)[@]	

Adopted Levels, Gammas (continued)

$\gamma(^{123}Xe)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]
3788.7+u	(39/2$^-$)	471.8 *4*	5 *2*	3316.9+u	(35/2$^-$)	(Q)[@]	4444.2+u	(43/2$^-$)	655.2 *4*	21 *4*	3788.7+u	(39/2$^-$)	(Q)[@]
4086.9+u	(41/2$^-$)	298.2 *4*	100 *8*	3788.7+u	(39/2$^-$)	D[@]	4920.0+u	(45/2$^-$)	475.7 *4*	70 *8*	4444.2+u	(43/2$^-$)	(D)[@]
		544.1 *4*	18 *5*	3543.0+u	(37/2$^-$)	(Q)[@]			833.2 *4*	100 *16*	4086.9+u	(41/2$^-$)	(Q)[@]
4444.2+u	(43/2$^-$)	357.4 *4*	100 *7*	4086.9+u	(41/2$^-$)	D[@]	5409.3+u	(47/2$^-$)	489.3 *4*	100	4920.0+u	(45/2$^-$)	(D)[@]

[†] From (^{3}He,3nγ) up to 3479 level and from (^{48}Ca,5nγ) above that, unless otherwise noted.
[‡] From ^{123}Cs ε decay.
[#] From $\gamma(\theta)$ in (^{48}Ca,5nγ), unless otherwise noted.
[@] From $\gamma\gamma$(DCO) in (^{18}O,5nγ) (2002Ra34).
[&] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
[a] Multiply placed with intensity suitably divided.
[b] Placement of transition in the level scheme is uncertain.

$^{123}_{54}Xe_{69}$-22

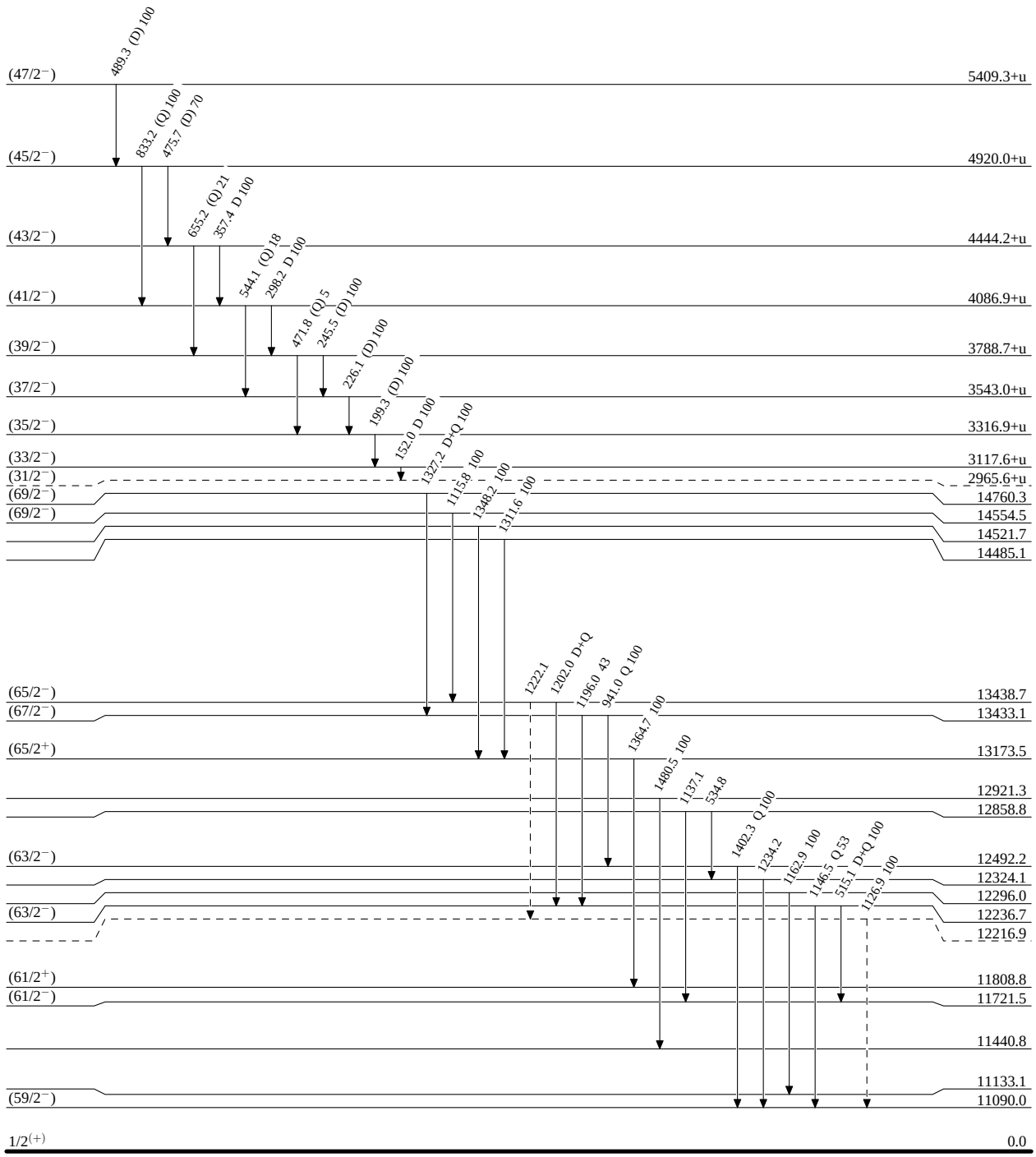
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{123}_{54}Xe_{69}$

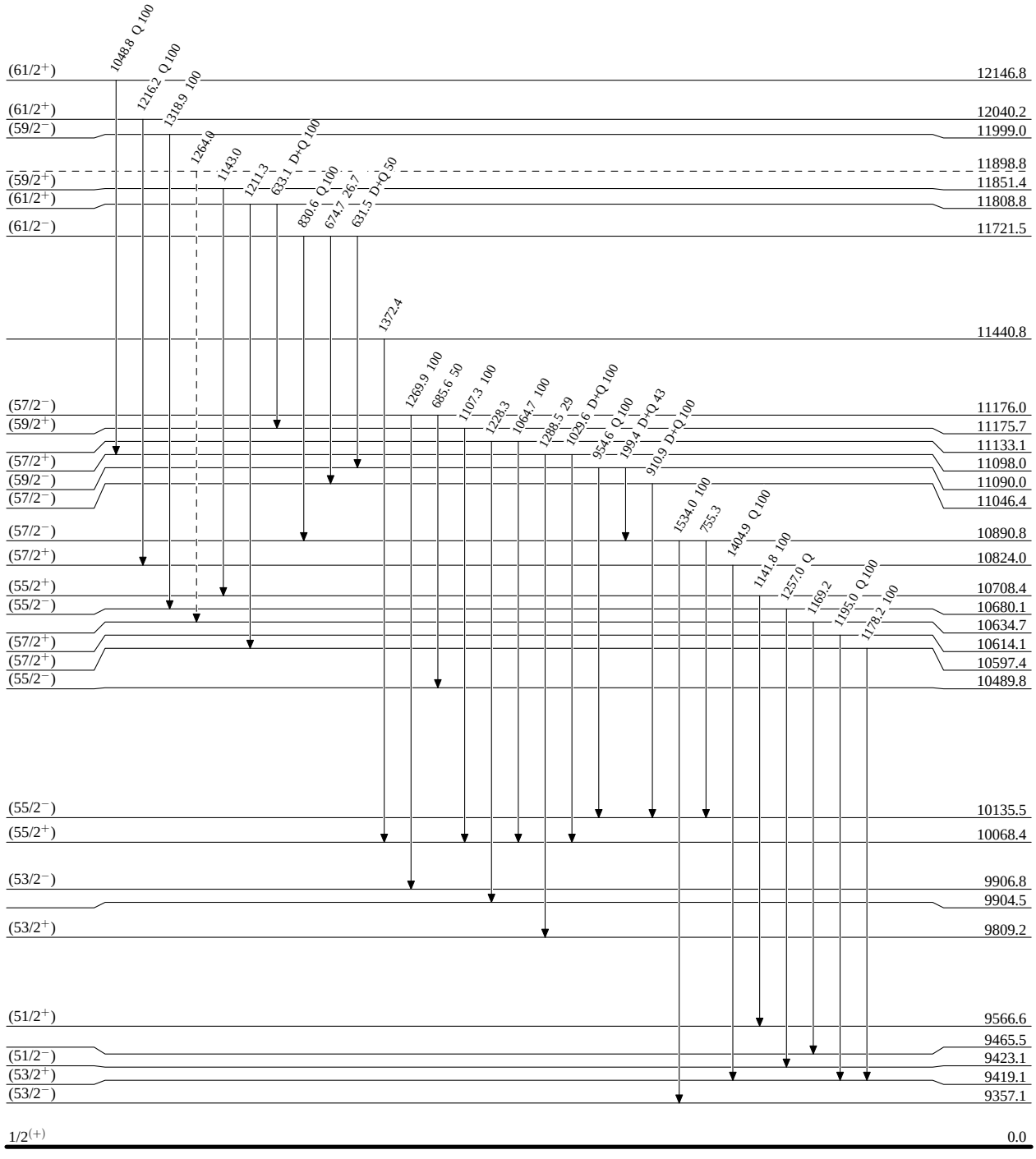
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

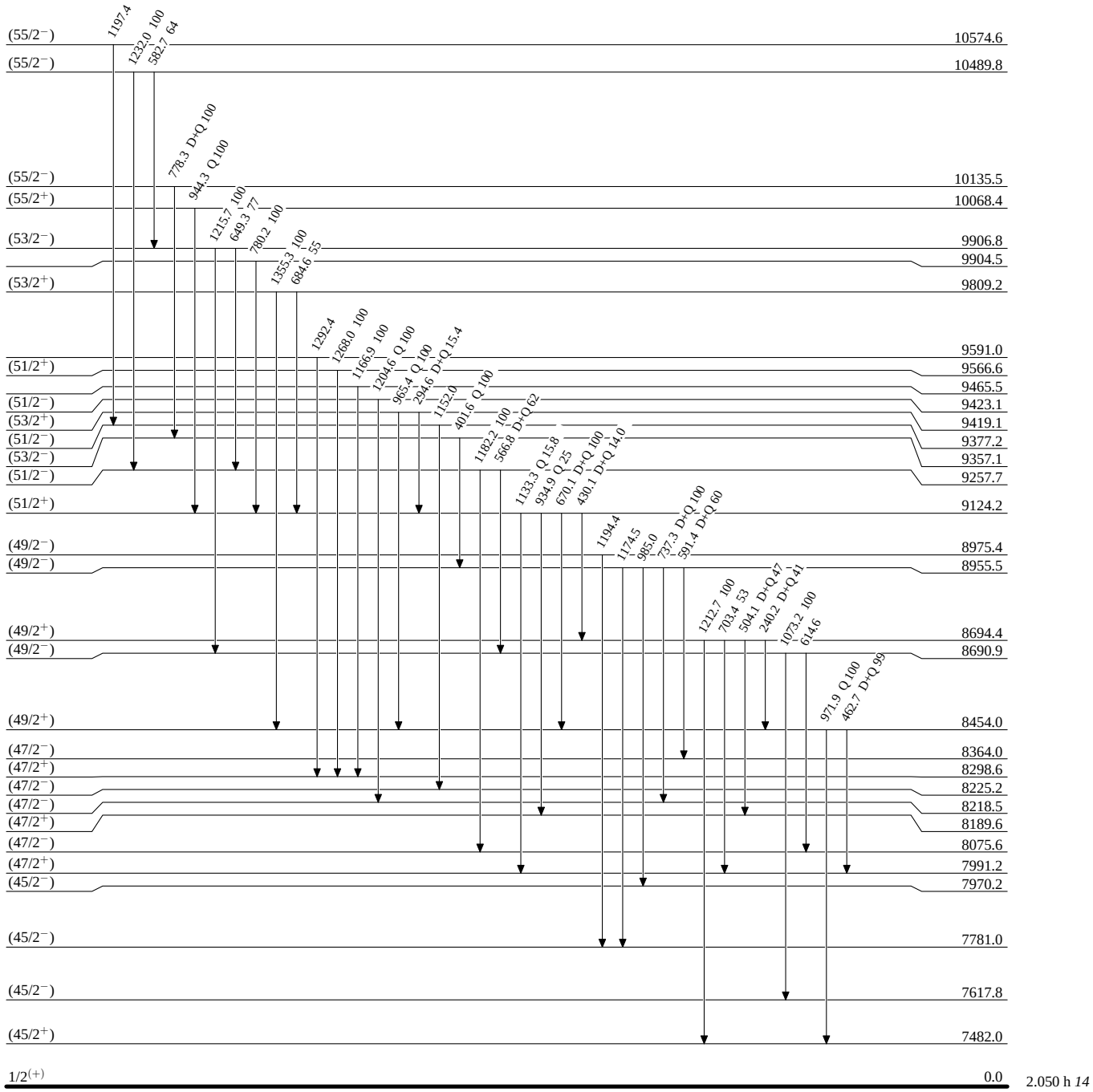


$^{123}_{54}Xe_{69}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

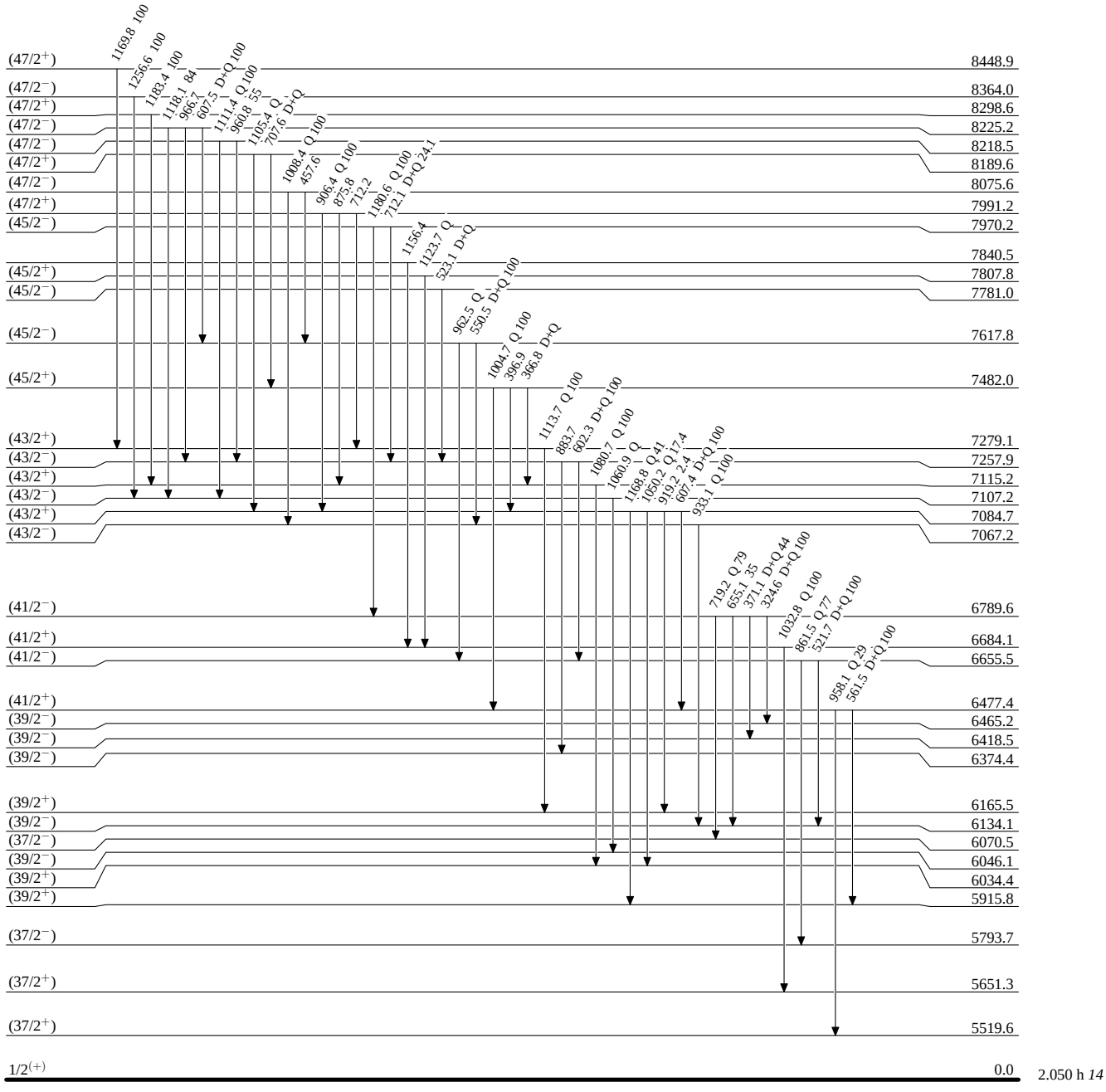


$^{123}_{54}Xe_{69}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

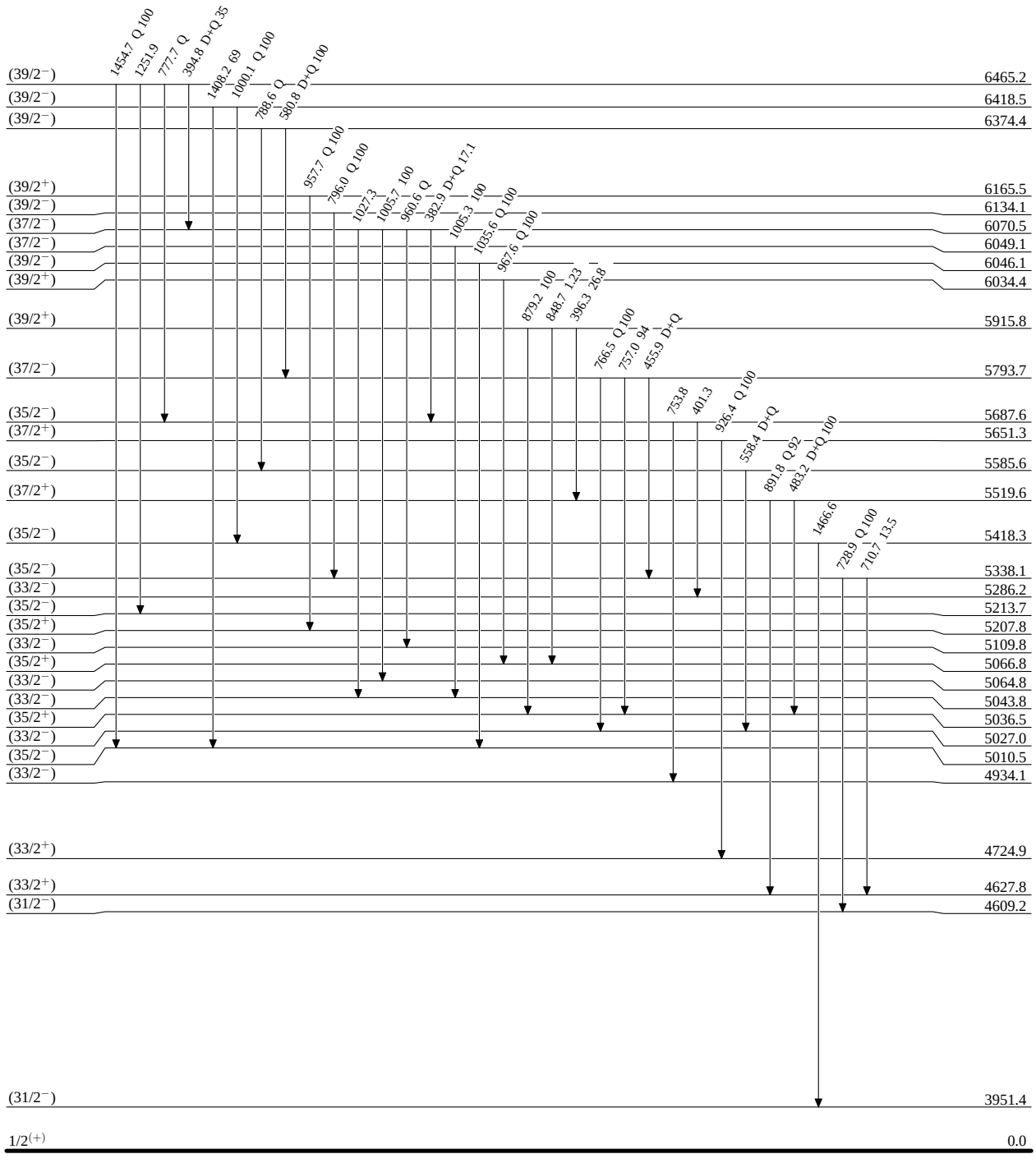


$^{123}_{54}Xe_{69}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

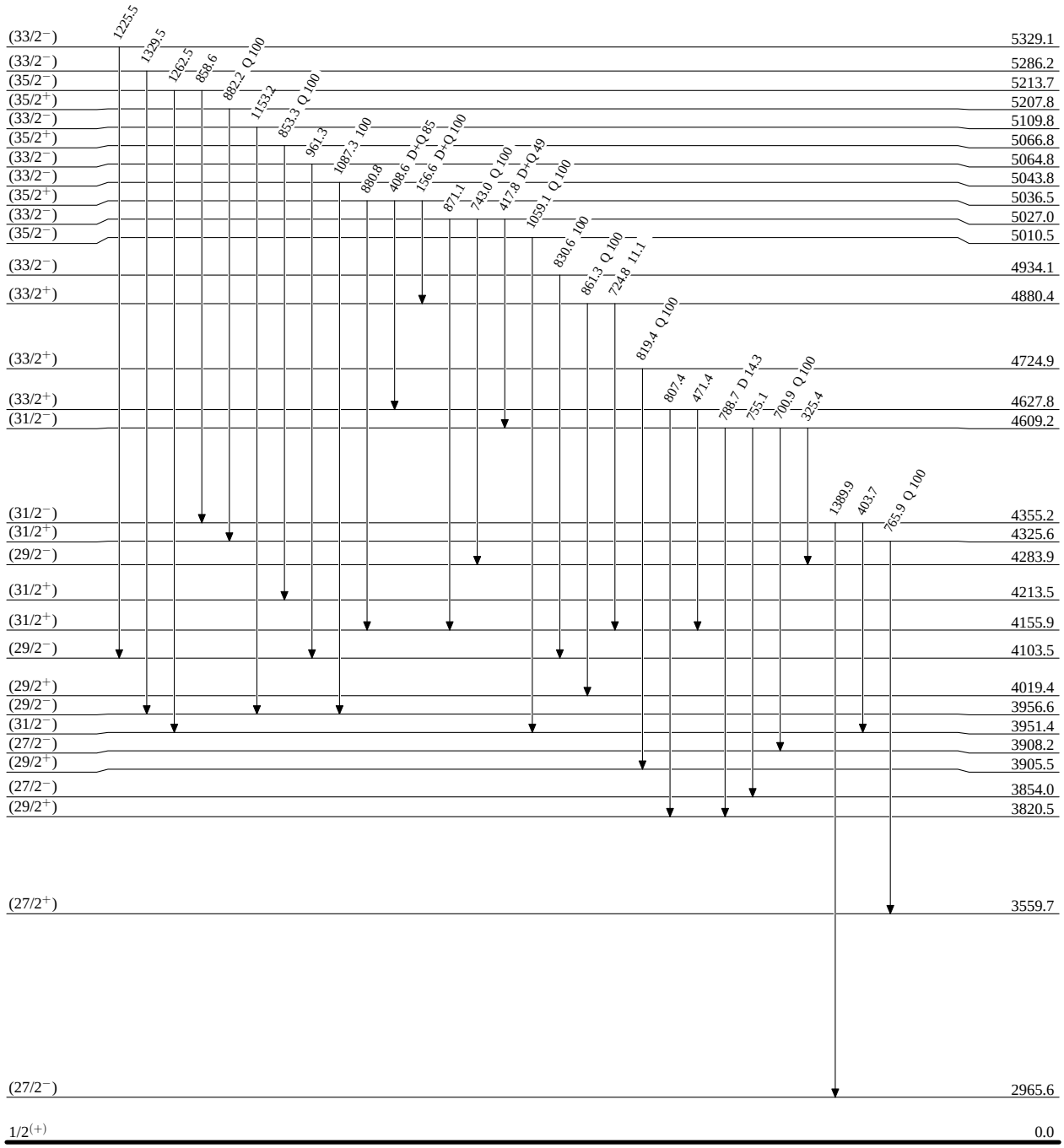


$^{123}_{54}Xe_{69}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{123}_{54}Xe_{69}$

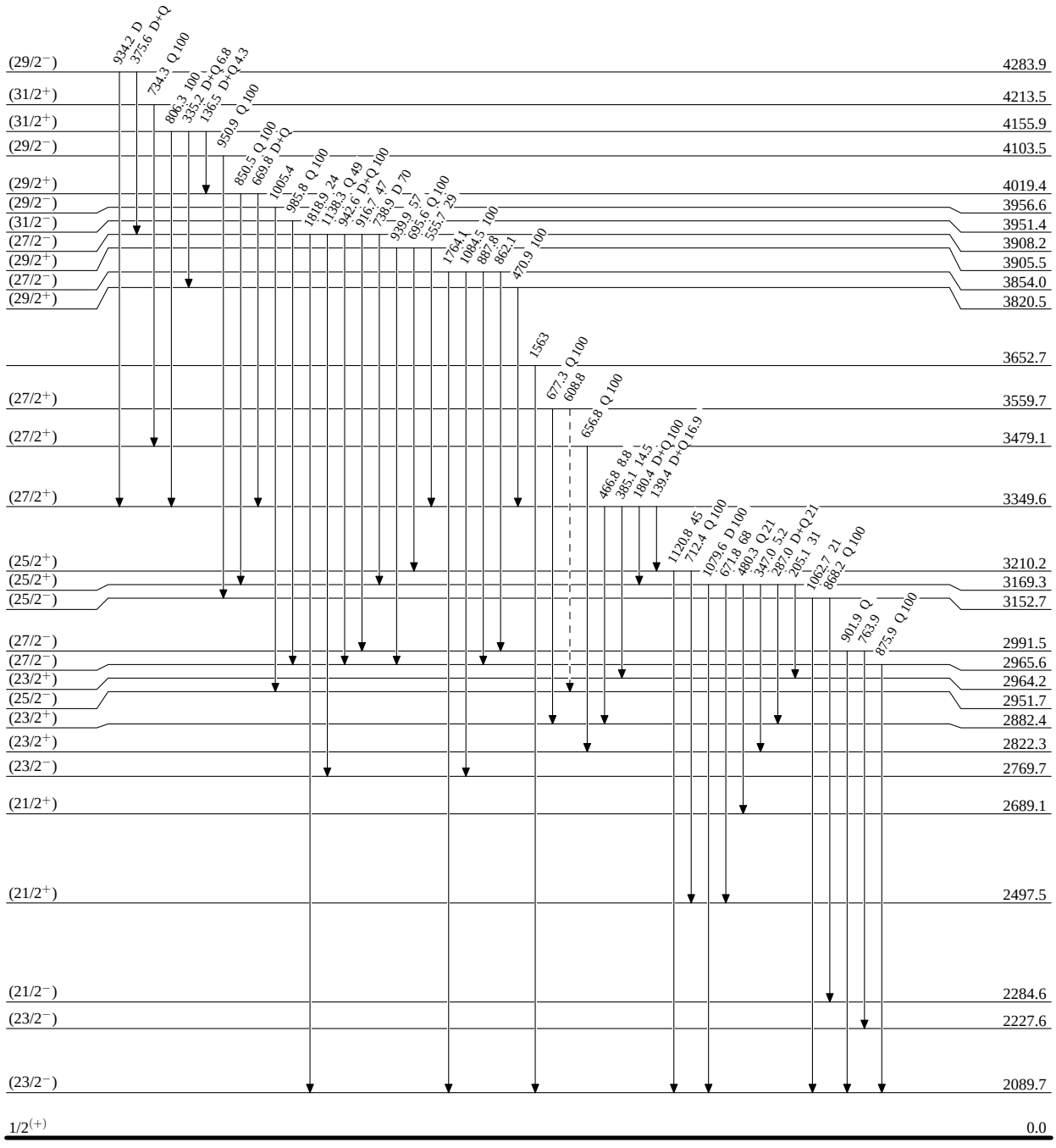
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{123}_{54}Xe_{69}$

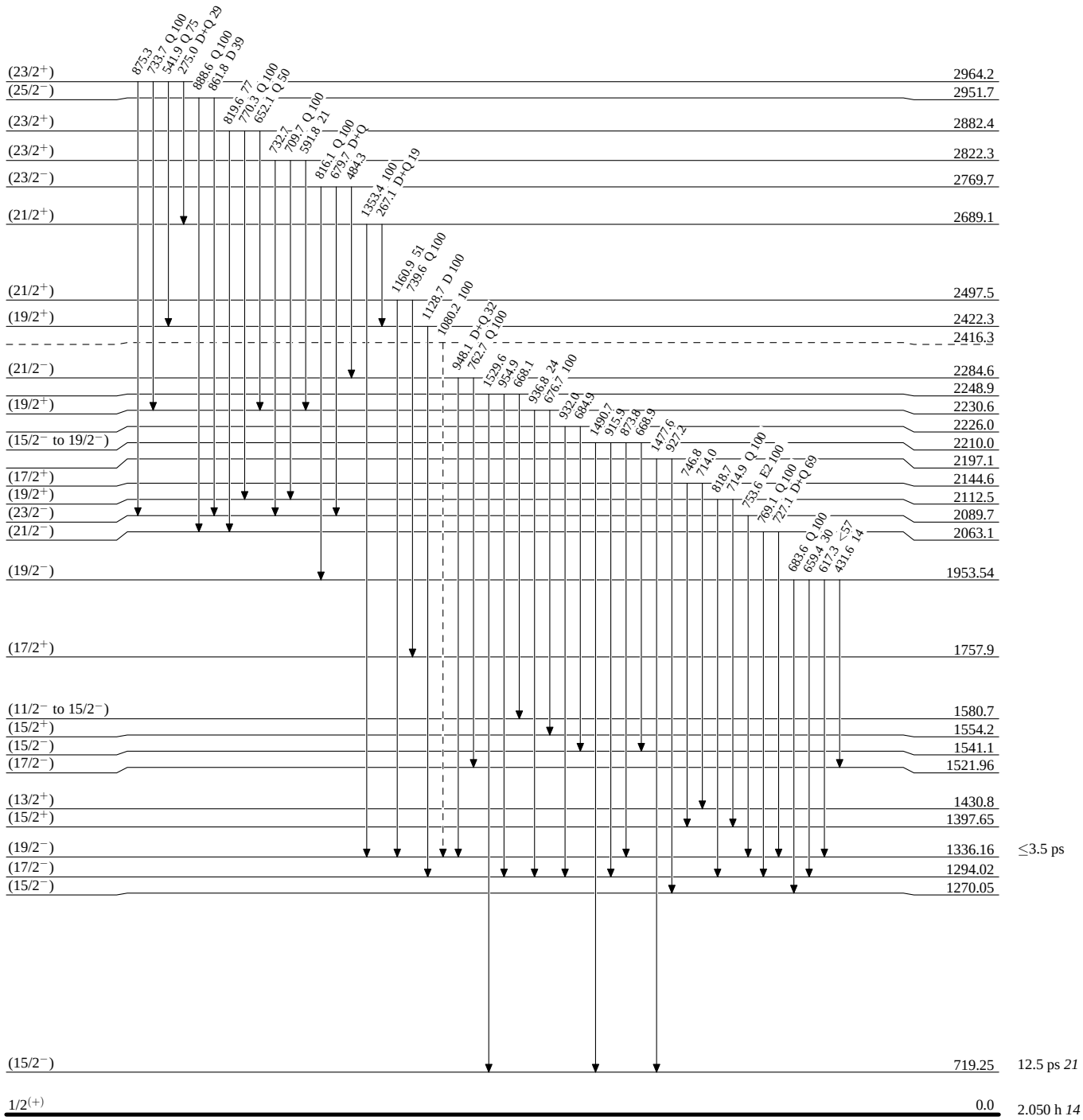
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{123}_{54}Xe_{69}$

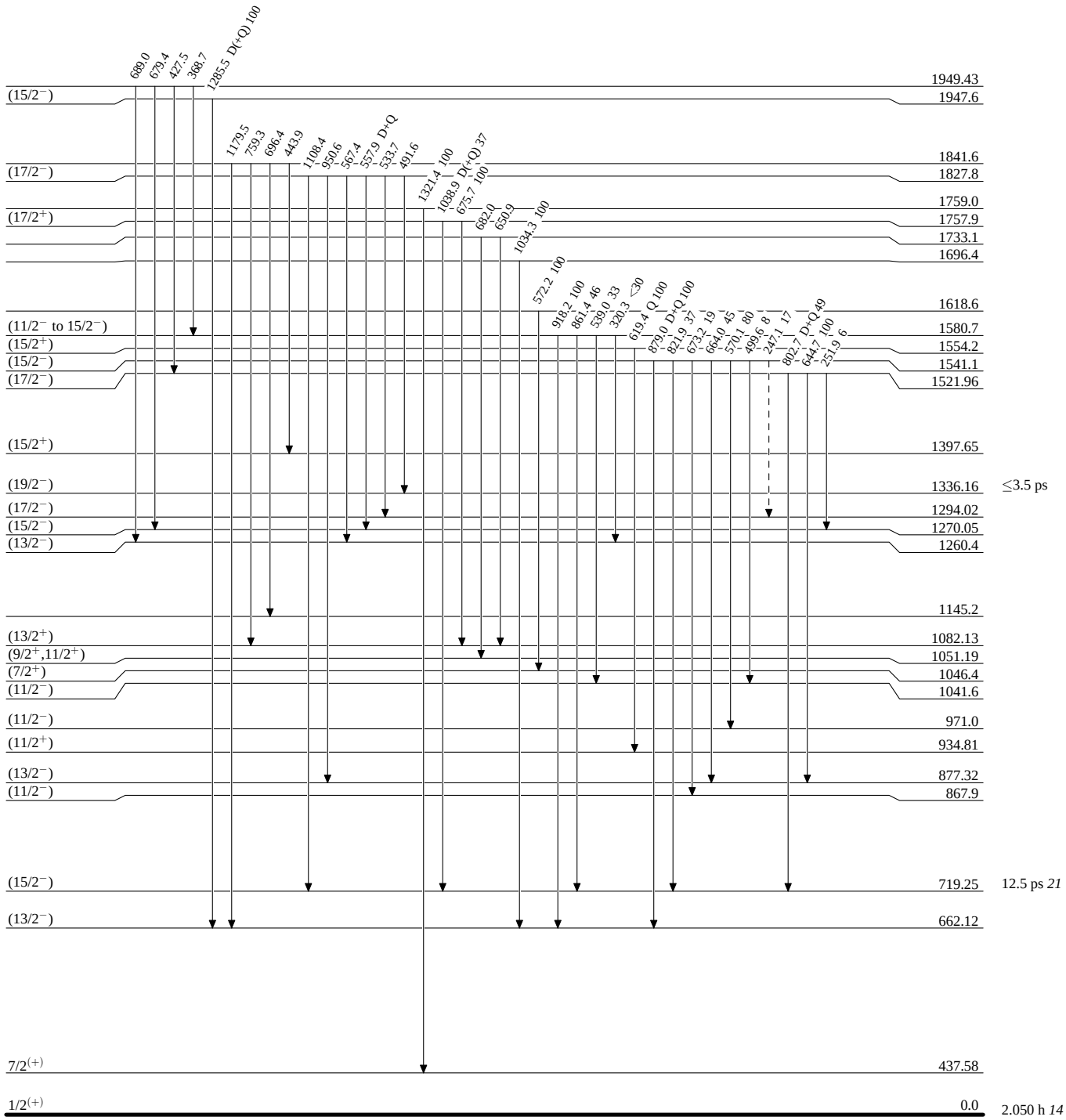
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

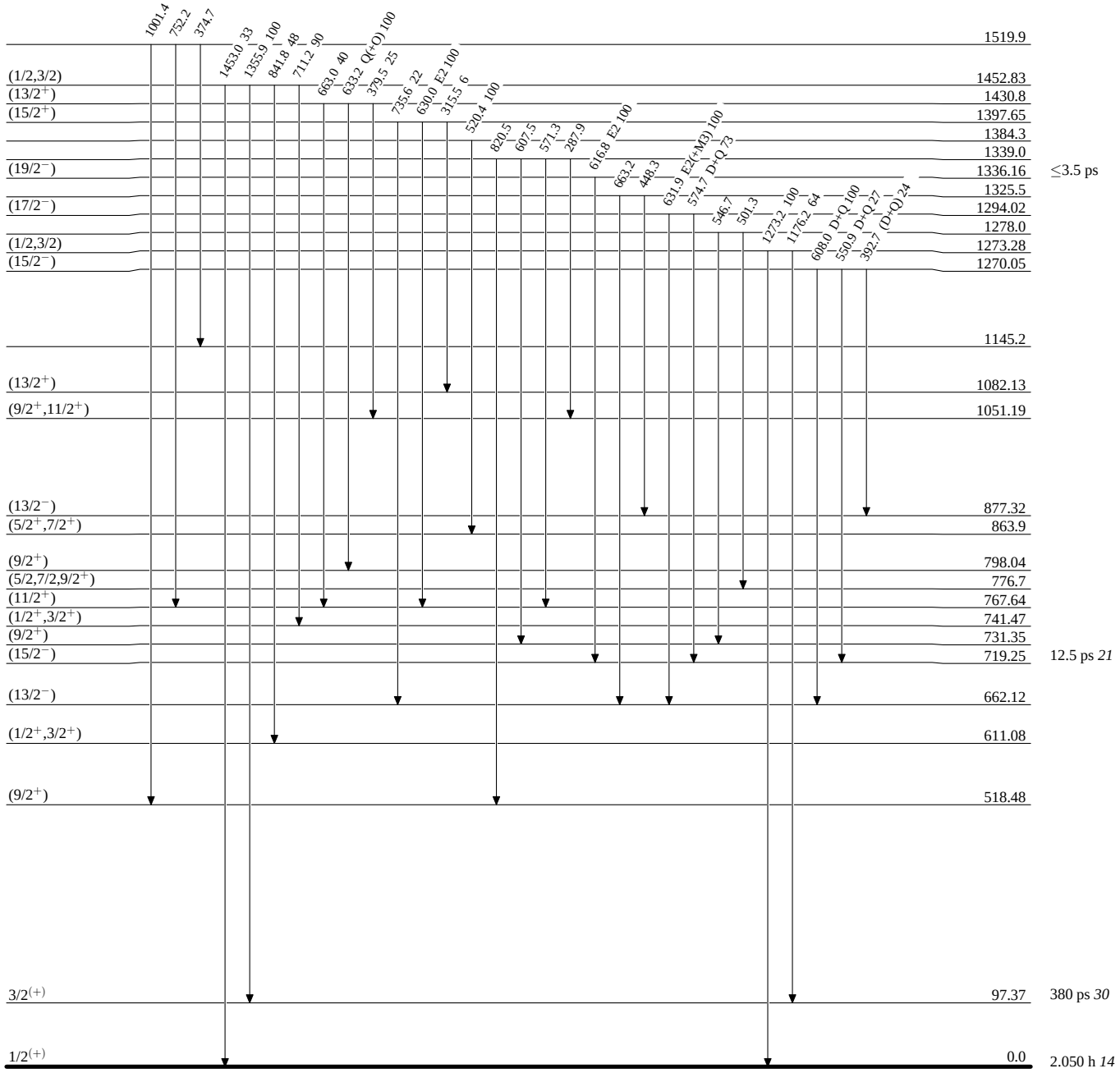


$^{123}_{54}Xe_{69}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

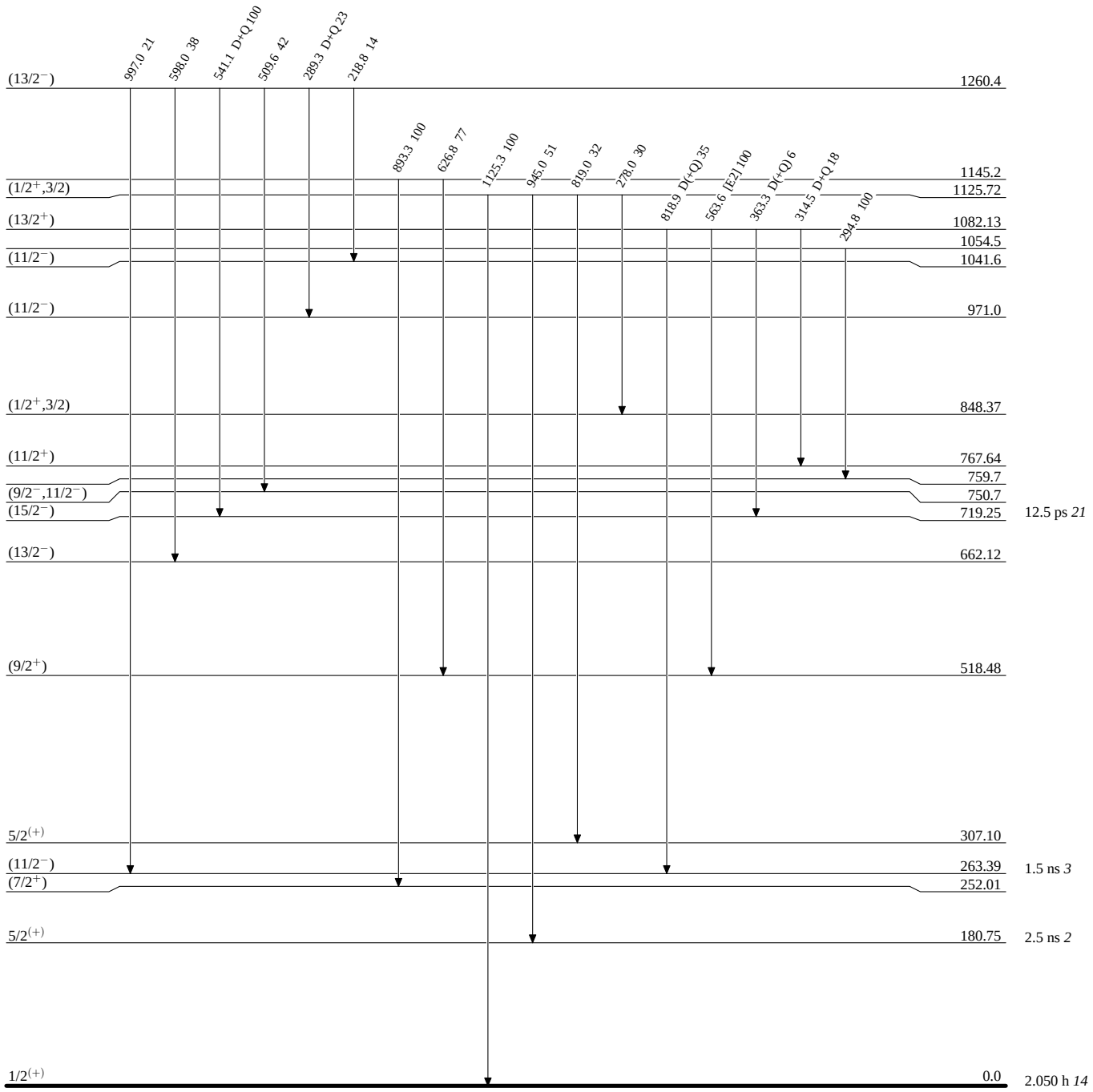


$^{123}_{54}Xe_{69}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



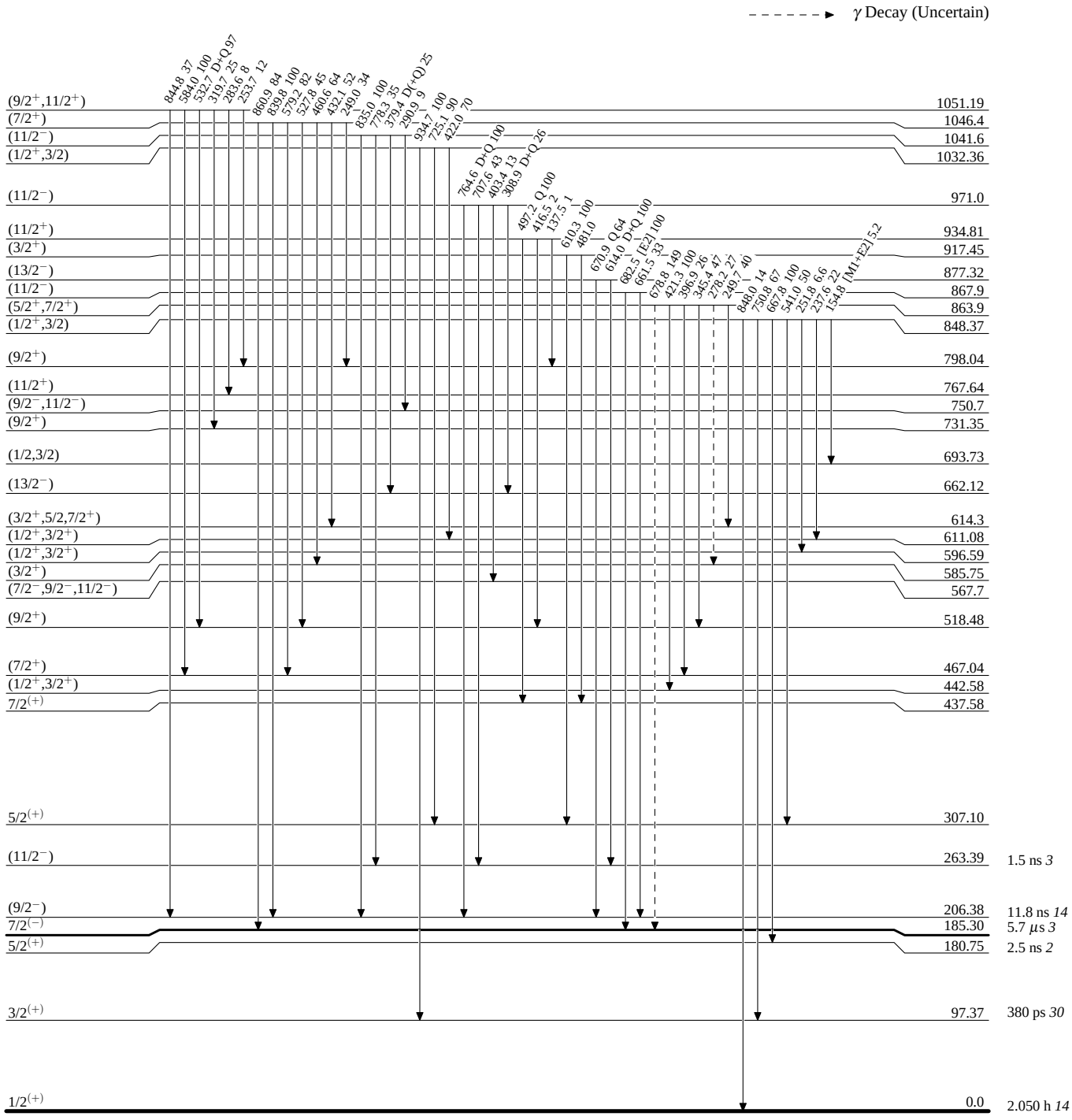
$^{123}_{54}Xe_{69}$

Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

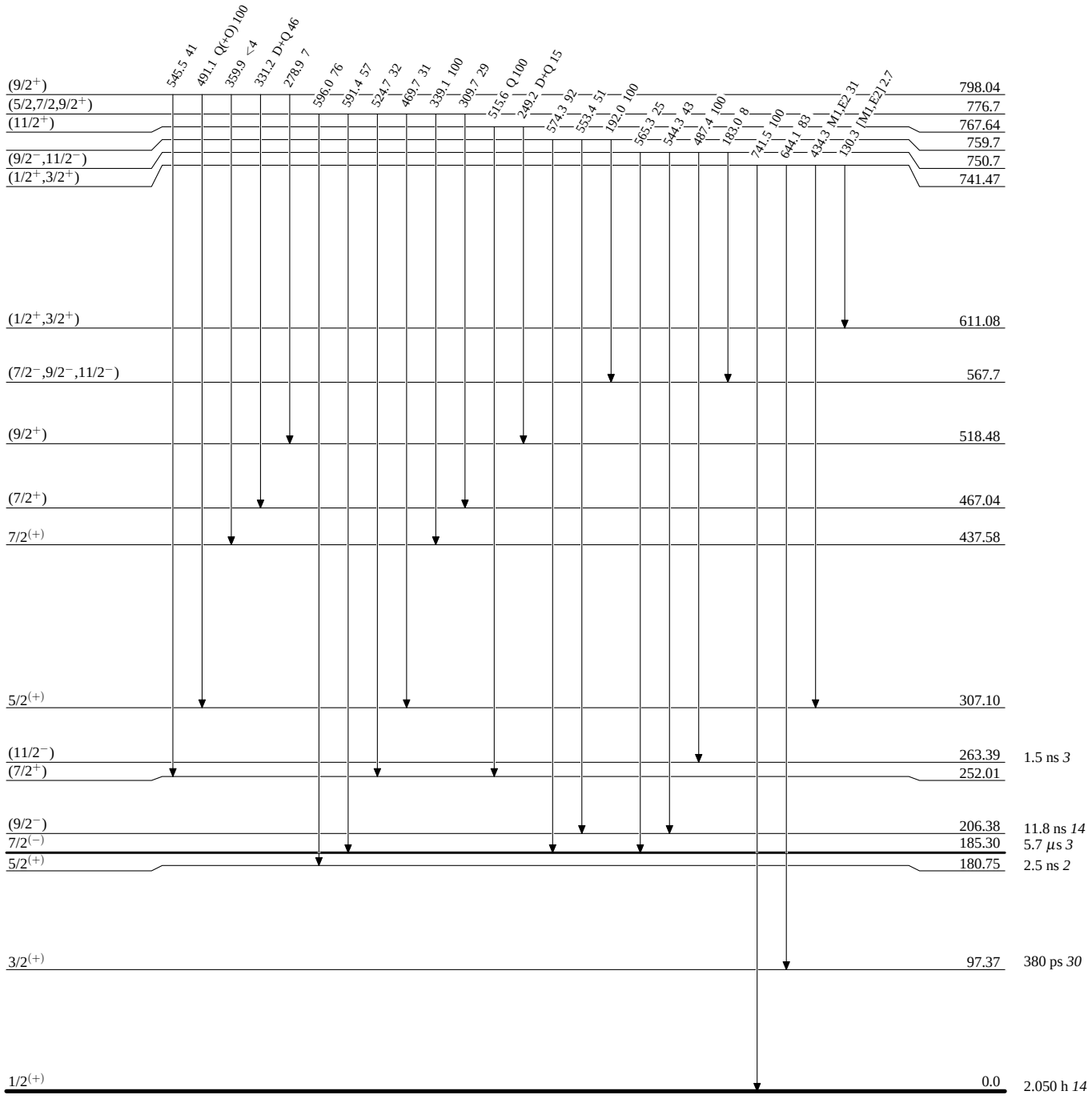


$^{123}_{54}Xe_{69}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{123}_{54}Xe_{69}$

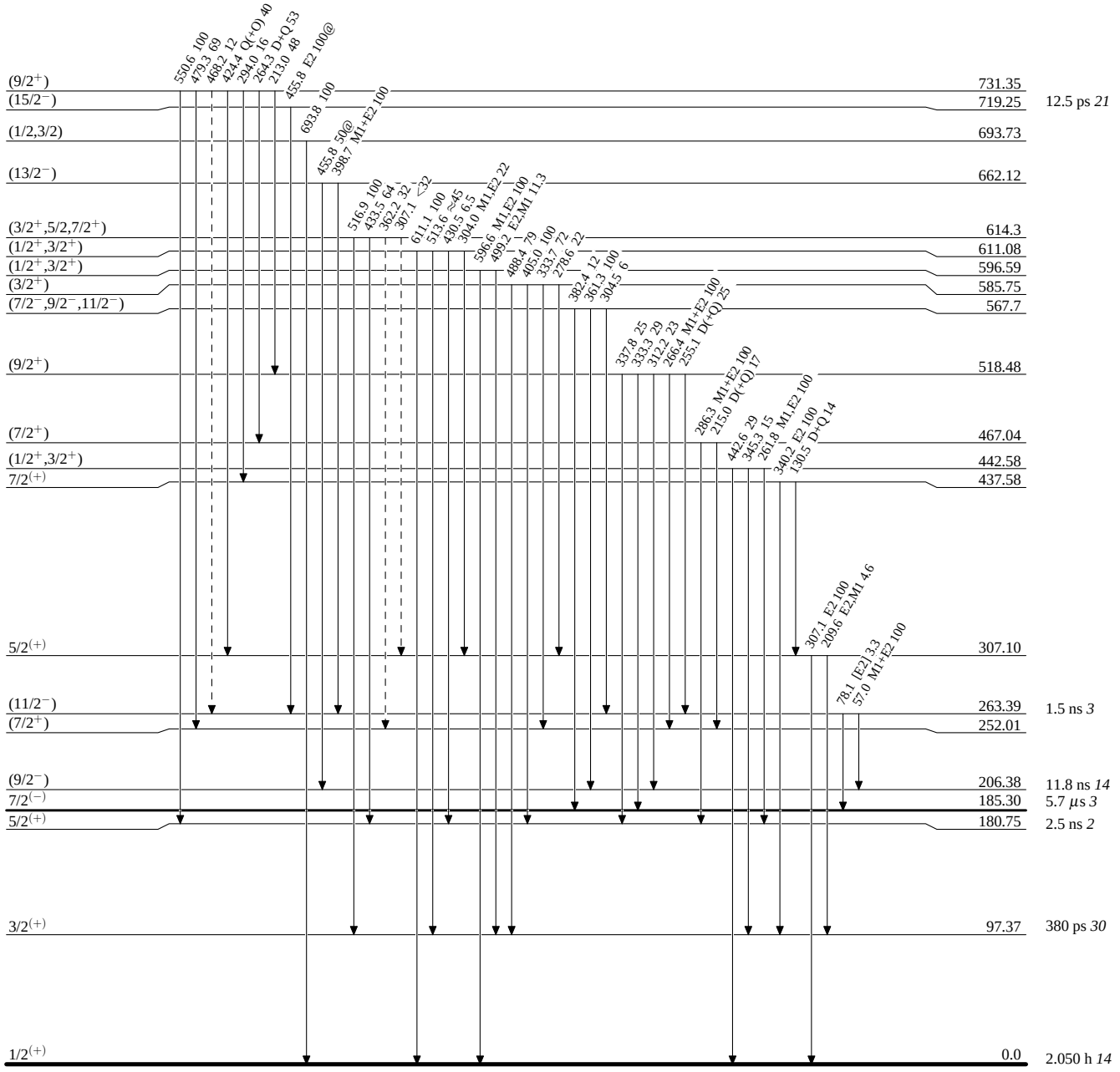
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided

– – – – – – ► γ Decay (Uncertain)

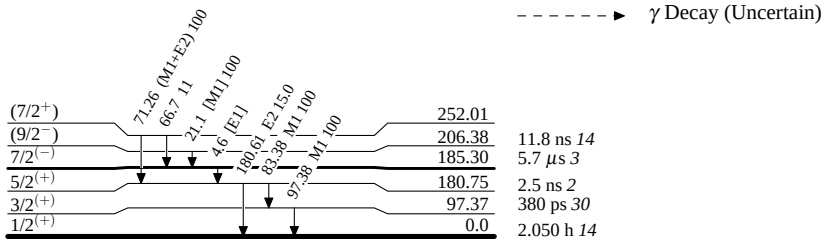


$^{123}_{54}Xe_{69}$

Adopted Levels, Gammas

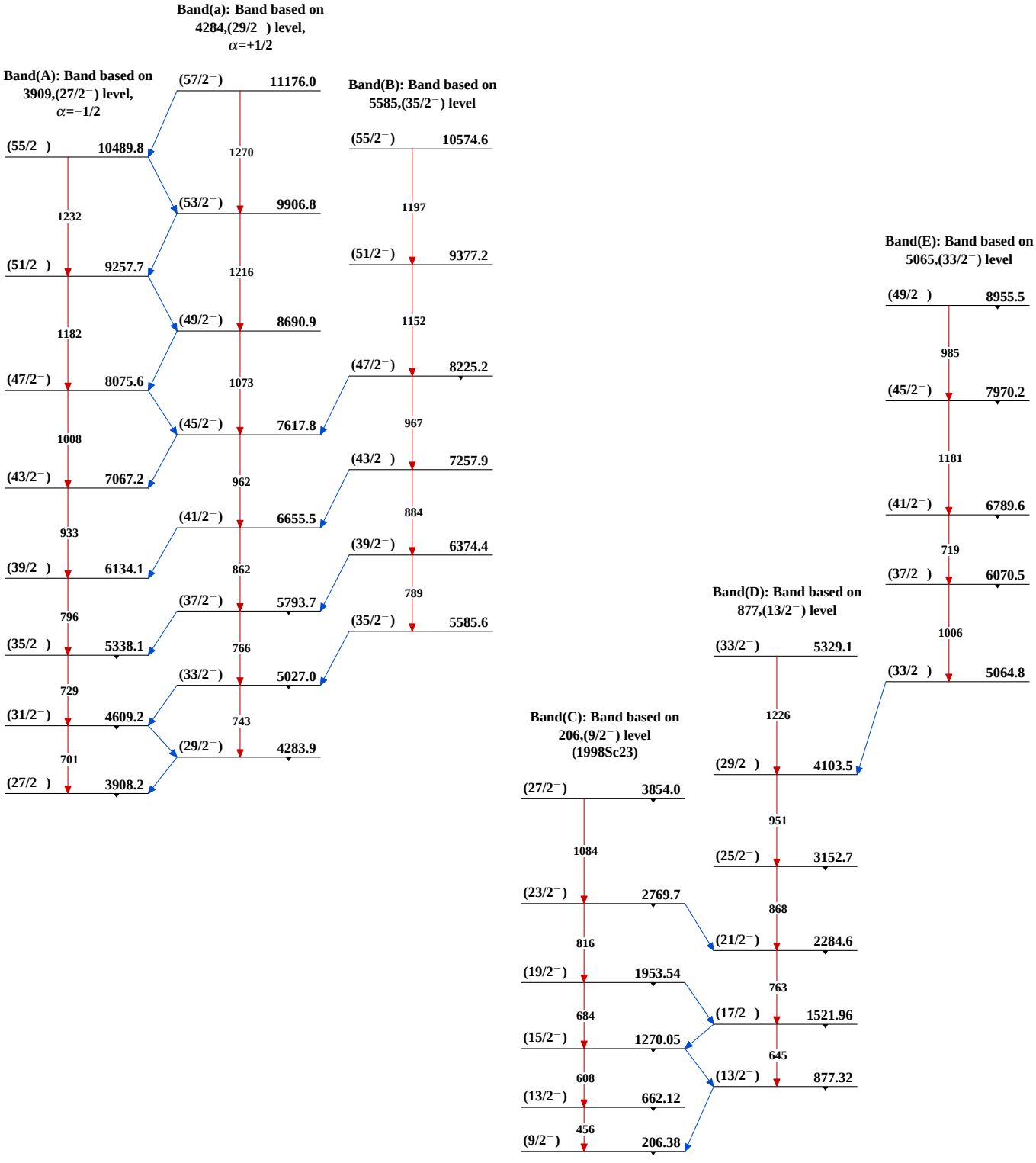
Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided



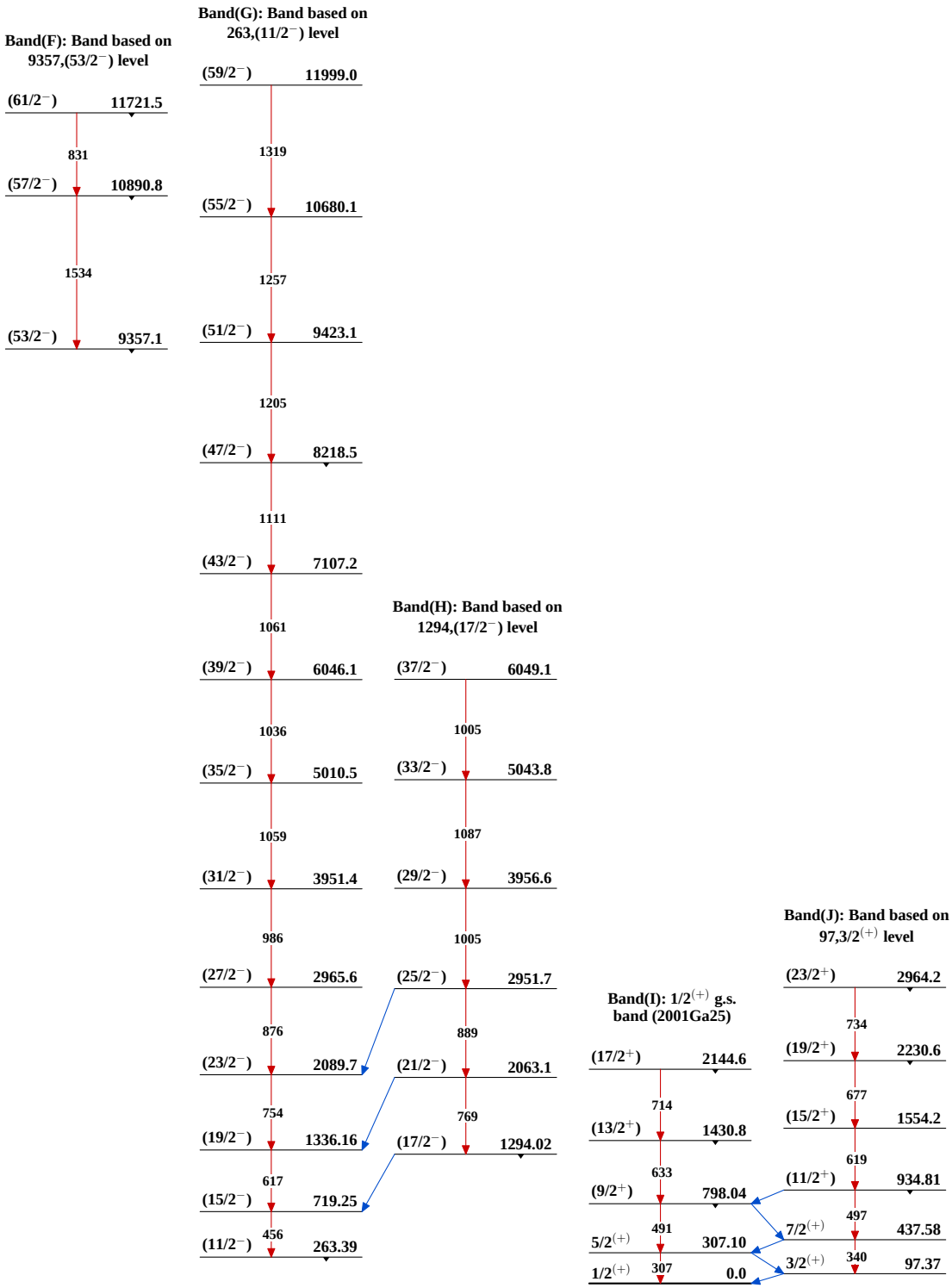
$^{123}_{54}Xe_{69}$

Adopted Levels, Gammas



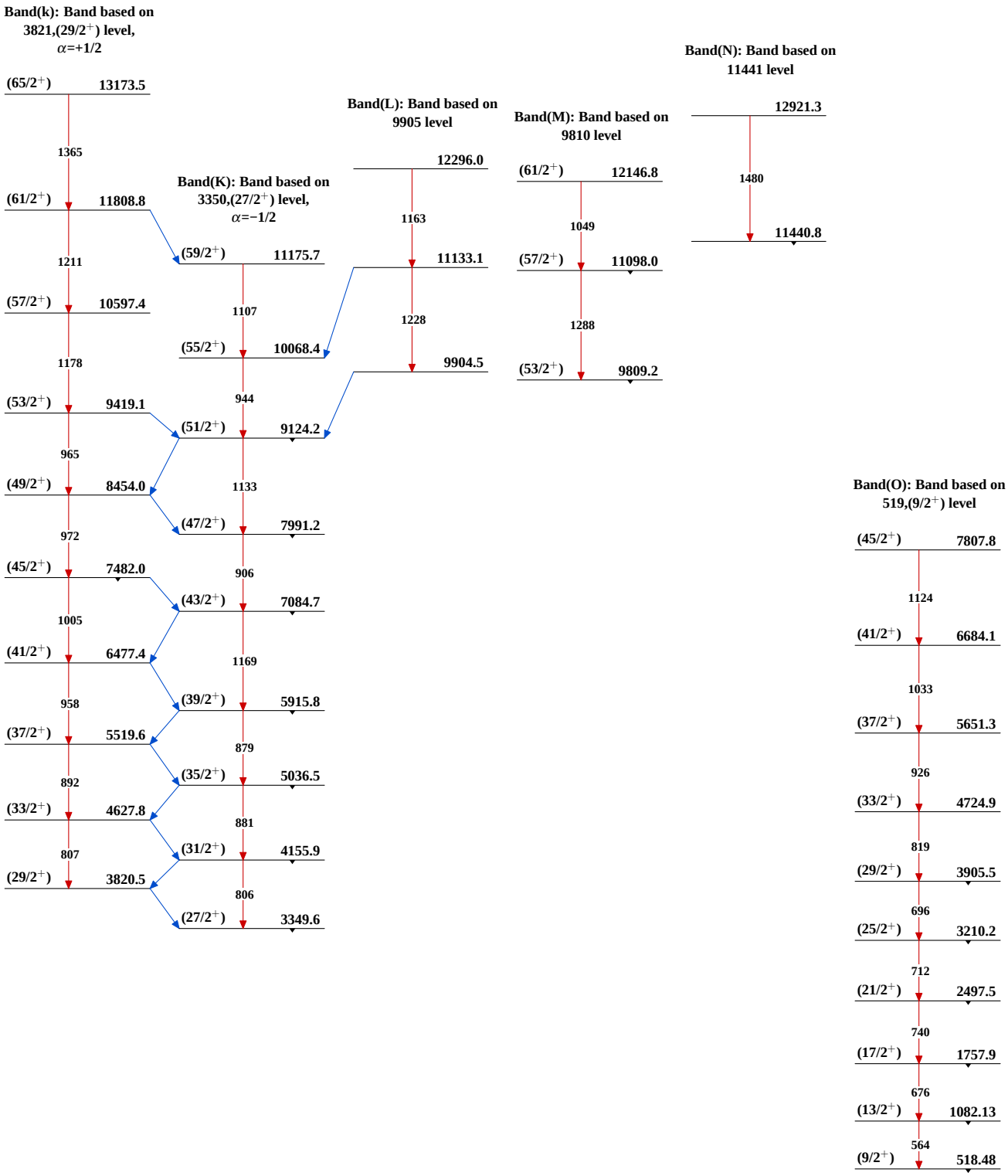
$^{123}_{54}Xe_{69}$

Adopted Levels, Gammas (continued)

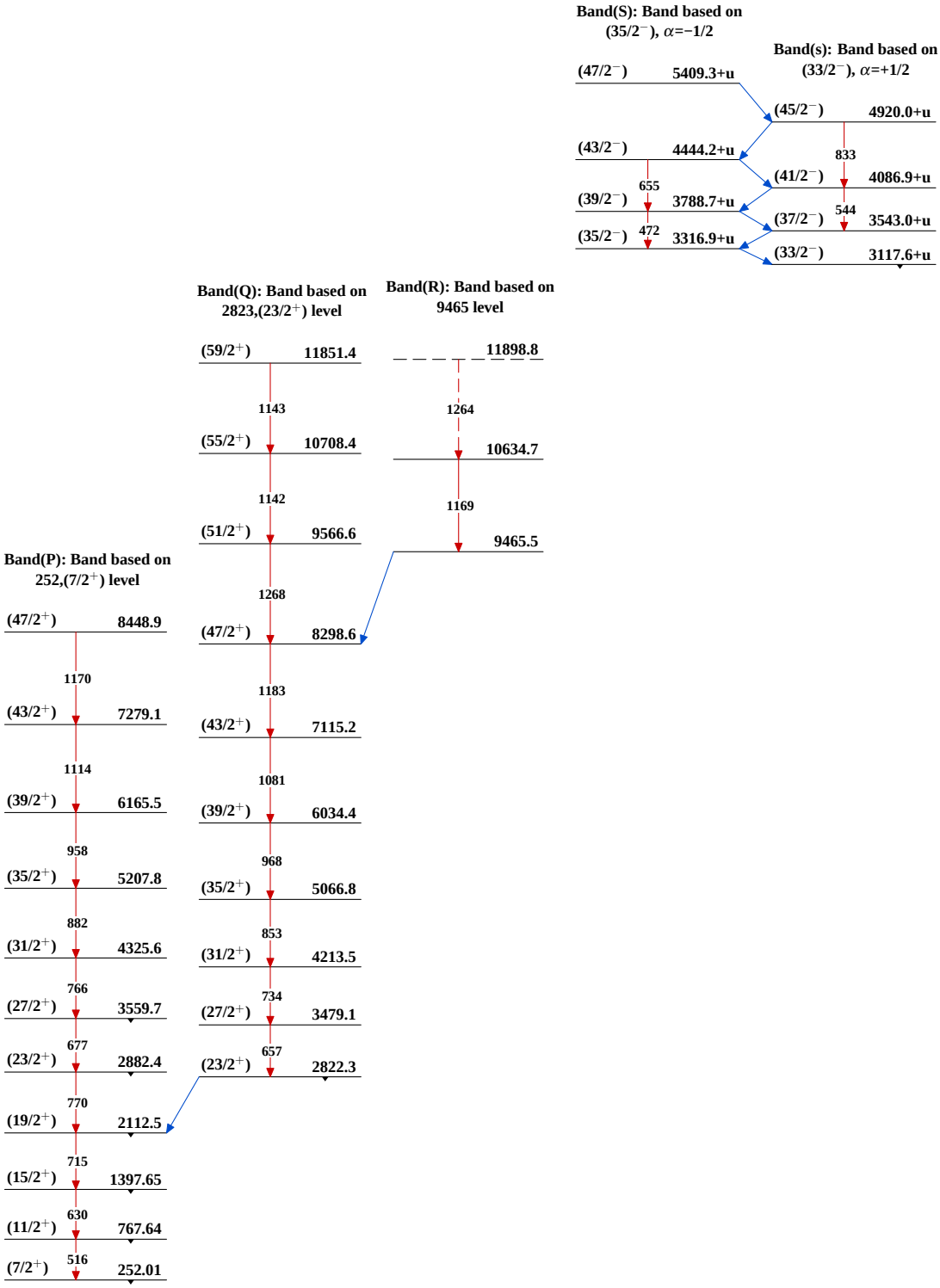


$^{123}_{54}Xe_{69}$

Adopted Levels, Gammas (continued)



Adopted Levels, Gammas (continued)



$^{123}_{54}Xe_{69}$

^{123}Cs ε decay 1981Ma01,1981So06

Parent: ^{123}Cs: E=0.0; $J^{\pi}=1/2^{(+)}$; $T_{1/2}$=5.86 min *10*; Q(ε)=4205 *15*; %ε+%β^+ decay=100

^{123}Cs-J^{π},$T_{1/2}$: From Adopted Levels of ^{123}Cs.

^{123}Cs-Q(ε): From 2021Wa16.

1981Ma01: ^{123}Cs source was produced via ^{139}La(p,3p14n) with E=600 MeV proton provided by the CERN synchro-cyclotron and separated by the ISOLDE separator. Separated ions were implanted into an aluminum-coated mylar tape. γ rays were detected with Ge(Li) detectors and conversion electrons were detected with a Si(Li) detector; positrons were detected with a 4πβ plastic scintillator. Measured Eγ, Iγ, γγ-coin, γ(t), E(ce), I(ce), γ-ce-coin, Eβ$^+$, Iβ$^+$, γ-β$^+$-coin. Deduced levels, J, π, parent $T_{1/2}$, decay branching ratios, log *ft* values, conversion coefficients, γ-ray multipolarities. Systematics of odd-mass Xe nuclei. Comparisons with theoretical calculations.

1981So06: ^{123}Cs source was produced via ^{124}Xe(p,2n) with E=33 MeV proton beam provided by the McGill synchro-cyclotron on ^{124}Xe gas target. γ rays were detected with Ge(Li) (with a positron annihilator of Cu) and an x-ray detectors. Measured Eγ, Iγ, E(x ray), I(x ray), γγ-coin, Eβ$^+$, Iβ$^+$. Deduced level, J, π, parent $T_{1/2}$, Q-value, log *ft*, conversion coefficients, γ-ray multipolarities.

1987Fr10: ^{123}Cs source was produced by irradiation of a cerium target by 270 MeV ^{3}He beam and separated by the ISOCELE separator at Orsay. γ rays were detected with a plastic scintillator and conversion electrons were detected with a magnetic spectrometer. Measured Eγ, Iγ, E(ce), I(ce), γ-ce-coin, γ-ce(t). Deduced $T_{1/2}$, conversion coefficients, γ-ray multipolarities, transition strengths. Comparisons with theoretical calculations.

1975We23: ^{123}Cs source was produced via La(p,spallation) with 600 MeV proton beam provided from the CERN Synchro-cyclotron. γ rays and positrons were detected with a combination of Ge(Li) and plastic scintillator, respectively, or a combination of NaI(Tl) and Si(Li) detectors. Measured Eγ, Iγ, Eβ$^+$, Iβ$^+$, β$^+$-γ-coin. Deduced decay energies, Q-value.

1966Da09: ^{123}Cs source was produced via In(^{14}N,xn) reaction with E=140 MeV ^{14}N beam provided by the Yale Heavy Ion Accelerator on a natural indium target. γ rays were detected with a Ge(Li) detector and a NaI crystal and positrons were detected with a plastic phosphor. Measured Eγ, Iγ, E(x ray), I(x ray), Eβ$^+$, Iβ$^+$, γγ-coin, βγ-coin, βγ(t). Deduced levels, J, π, parent $T_{1/2}$, β$^+$-decay branchings, log *ft*, γ-ray conversion coefficients.

Others:

1996Os04, measured Q-value=4110 *30* 1975LyZY,

1980KaZB: measured I(ce). Deduced J, γ-ray multipolarity.

1977KoYL: La(p,spallation) E=635 MeV. Measured Eγ, Iγ, γγ(t).

1975LyZY: measured I(ce). Deduced levels, J, π.

Decay scheme is that proposed by 1981Ma01 and 1981So06 on the basis of Eγ sums and γγ-coin. There are major differences in the two level schemes. The level scheme is incomplete due to a large gap of about 3 MeV between Q-value and the highest populated level at 1453.

^{123}Xe Levels

E(level)[†]	J^{π}[‡]	$T_{1/2}$[‡]	Comments
0.0	$1/2^{(+)}$	2.050 h *14*	
97.38 *3*	$3/2^{(+)}$	380 ps *30*	$T_{1/2}$: adopted value from ce-γ-coin in 1987Fr10. Other: <9 ns (1966Da09).
180.75 *4*	$5/2^{(+)}$[#]	2.5 ns *2*	$T_{1/2}$: adopted value from ce-γ-coin in 1987Fr10.
252.01 *5*	$(7/2^+)$[#]		
307.11 *7*	$5/2^{(+)}$[#]		
437.48 *21*	$7/2^{(+)}$[#]		
442.58 *9*	$(1/2^+,3/2^+)$		
585.75 *12*	$(3/2^+)$		
596.60 *9*	$(1/2^+,3/2^+)$		
611.09 *8*	$(1/2^+,3/2^+)$		
693.74 *17*	(1/2,3/2)		
741.47 *6*	$(1/2^+,3/2^+)$		
848.42 *11*	$(1/2^+,3/2)$		
917.42 *21*	$(3/2^+)$		
1032.37 *24*	$(1/2^+,3/2)$		
1125.73 *19*	$(1/2^+,3/2)$		

Continued on next page (footnotes at end of table)

^{123}Cs ε decay 1981Ma01,1981So06 (continued)

^{123}Xe Levels (continued)

E(level)[†]	Jπ[‡]
1273.28 *18*	(1/2,3/2)
1452.84 *14*	(1/2,3/2)

† From a least-squares fit to γ-ray energies.
‡ From Adopted Levels. Values from this study are adopted in Adopted Levels where noted, or given in comments if different.
# (1/2,3/2) proposed in 1981Ma01 and/or 1981So06 based on log *ft* values, which however should be considered as approximate due to incomplete decay scheme.

ε,β+ radiations

I(ε+β+) and log *ft* values should be considered as approximate since the decay scheme is incomplete.

E(decay)	E(level)	Iβ+ [‡]	Iε[‡]	Log *ft*	I(ε+β+)[†‡]	Comments
(2752 *15*)	1452.84	0.65 *15*	1.1 *3*	6.0 *1*	1.8 *4*	
(2932 *15*)	1273.28	2.1 *5*	2.6 *6*	5.7 *1*	4.7 *11*	
(3079 *15*)	1125.73	0.79 *15*	0.81 *15*	6.2 *1*	1.6 *3*	
(3173 *15*)	1032.37	0.29 *6*	0.26 *6*	6.7 *1*	0.55 *12*	
(3288 *15*)	917.42	0.15 *5*	0.12 *4*	7.1 *2*	0.27 *9*	
(3357 *15*)	848.42	1.8 *4*	1.2 *2*	6.1 *1*	3.0 *6*	
(3464 *15*)	741.47	3.8 *6*	2.3 *4*	5.9 *1*	6.1 *10*	E(decay): Eβ+=2.5×10^3 *10* (1975We23), in coincidence with 742γ .
(3511 *15*)	693.74	0.73 *13*	0.42 *8*	6.6 *1*	1.15 *21*	
(3594 *15*)	611.09	3.0 *5*	1.6 *2*	6.1 *1*	4.6 *7*	E(decay): Eβ+=2.79×10^3 *41* (1975We23), in coincidence with 611γ .
(3608 *15*)	596.60	8.3 *11*	4.2 *6*	5.6 *1*	12.5 *17*	E(decay): Eβ+=2.37×10^3 *14* (1981So06), 2.54×10^3 *26* (1975We23), in coincidence with 597γ .
(3619 *15*)	585.75	0.56 *9*	0.28 *5*	6.8 *1*	0.84 *14*	
(3762 *15*)	442.58	2.3 *4*	0.98 *18*	6.3 *1*	3.3 *6*	
(3768 *15*)	437.48	0.21 *8*	0.09 *3*	7.3 *2*	0.30 *11*	
(3898 *15*)	307.11	1.1 *4*	0.40 *16*	6.7 *2*	1.5 *6*	
(3953 *15*)	252.01	0.7 *3*	0.2 *1*	7.0 *2*	0.9 *4*	
(4024 *15*)	180.75	3.8 *8*	1.2 *2*	6.3 *1*	5.0 *10*	
(4108 *15*)	97.38	14.5 *19*	4.3 *6*	5.7 *1*	18.8 *24*	E(decay): Eβ+=2.99×10^3 *31* (in coincidence with 100γ) (1975We23). I(ε+β+): others: 26 *3* from 1966Da09, determined by correlating, through the radioactive decay parent-grand-daughter relationships, the yield of the 97-keV transition and the total yield of the well-studied isobaric grand-daughter ^{123}I with appropriate corrections for known fluorescence yields and theoretical K/L ratio; 1966Da09 then tentatively assign the rest 74% *3* to the g.s. feeding, without considering possible feedings to higher-energy excited states which are proposed in later studies but not in 1966Da09. A value of 12.5 *6* is reported in 1981So06, based on their measured total positron intensity of 650 *100* relative to Iγ=100 for 97.4γ and γ+ce feedings to 97.4 level, with their measured α(K)exp=0.9 *1* for 97.4γ; based on this branching to 97.4 level and total γ+ce feedings to ground state, 1981So06 deduce 62% *14* branching to g.s. Measured K-capture to positron ratio=0.505 *40* (1966Da09).

Continued on next page (footnotes at end of table)

^{123}Cs ε decay 1981Ma01,1981So06 (continued)

ε,β+ radiations (continued)

E(decay)	E(level)	Iβ+ ‡	Iε‡	Log *ft*	I(ε+β+)†‡	Comments
(4205 *15*)	0.0	26 *6*	7.0 *15*	5.5 *1*	33 *7*	I(ε+β+): from 1981Ma01, deduced from total γ+ce feedings to ground state and total number of positrons with tabulated data of capture to β+ ratios of allowed decays (1971Go40). This value should be considered as approximate because of incomplete decay scheme and also because of assumptions of capture to β+ ratios. Others: 62 *14* (1981So06), ≈74 *3* (1966Da09); see comments for the feeding to 97.4 level.

† From γ+ce intensity balance at each level, unless otherwise noted. The quoted values should be considered as approximate due to incomplete decay scheme. Large discrepancies exist between values from 1981Ma01 and 1981So06. See detailed comments at branches.

‡ Absolute intensity per 100 decays.

γ(^{123}Xe)

Iγ normalization: From ΣI(γ+ce to g.s.)=100−%I(ε+β$^+$)(g.s.), with the latter=33% *7* from 1981Ma01. This normalization should be considered as approximate due to incomplete decay scheme.
I(K x rays)/Iγ(97γ)=1.6 *3* (1981Ma01).
α(K)exp values given under comments are from 1981Ma01, normalized to α(K)(theory) for the 322.4 E2 transition in ^{120}Cs decay.

E_γ[†]	I_γ[†@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[#]	α[&]	Comments
71.26 *3*	1.7 *5*	252.01	(7/2$^+$)	180.75	5/2$^{(+)}$	(M1+E2)	−0.02 *5*	2.17 *4*	%Iγ=0.35 *11* E_γ: weighted average of 71.5 *3* from 1981Ma01 and 71.26 *3* from 1981So06. I_γ: unweighted average of 2.2 *4* from 1981Ma01 and 1.2 *1* from 1981So06.
83.38 *2*	20.4 *12*	180.75	5/2$^{(+)}$	97.38	3/2$^{(+)}$	M1		1.380	%Iγ=4.2 *5* E_γ: weighted average of 83.3 *1* from 1981Ma01 and 83.38 *2* from 1981So06. I_γ: weighted average of 18.0 *20* from 1981Ma01 and 21 *1* from 1981So06. Mult.: supported by ce(K)/ce(L+M+N)=7.2 *8* (1987Fr10), α(K)exp=1.30 *6* (1981So06), α(K)exp=1.3 *3*, α(L)exp=0.22 *6*, α(M)=0.033 *8* (1981Ma01). δ(E2/M1)<0.17 calculated using BrIccMixing based on all ce data above.
97.38 *3*	100	97.38	3/2$^{(+)}$	0.0	1/2$^{(+)}$	M1		0.885	%Iγ=20.5 *22* E_γ: weighted average of 97.3 *1* from 1981Ma01 and 97.39 *3* from 1981So06. Other: 100 *1* (1975We23). Mult.: supported by ce(K)/ce(L+M+N)=6.8 *7* (1987Fr10), α(K)exp=0.9 *1* (1981So06), α(K)exp=0.74 *15*, α(L)exp=0.13 *4*, α(M)exp=0.029 *10* (1981Ma01), α(K)exp=0.80 *2* (1966Da09). δ(E2/M1)<0.2 calculated using BrIccMixing based on all ce data above.
130.3 *2*	0.40 *6*	741.47	(1/2$^+$,3/2$^+$)	611.09	(1/2$^+$,3/2$^+$)	[M1,E2]		0.55 *17*	%Iγ=0.081 *15*
154.8 *3*	0.3 *1*	848.42	(1/2$^+$,3/2)	693.74	(1/2,3/2)	[M1,E2]		0.31 *8*	%Iγ=0.061 *22*
180.64 *14*	3.0 *3*	180.75	5/2$^{(+)}$	0.0	1/2$^{(+)}$	E2		0.228	%Iγ=0.61 *9* E_γ: unweighted average of 180.5 *1* from 1981Ma01 and 180.77 *3* from 1981So06. Other: 177 *1* (1975We23). I_γ: weighted average of 2.8 *5* from 1981Ma01 and 3.1 *3* from 1981So06. Mult.: α(K)exp=0.17 *4* (1981Ma01) and ce(K)(97.4γ)/ce(K)(180.6γ)=30 *10* (1987Fr10) give M1,E2 (1981Ma01).
[x]191.5 *2*	0.6 *1*								%Iγ=0.122 *25*
209.6 *2*	0.9 *1*	307.11	5/2$^{(+)}$	97.38	3/2$^{(+)}$	E2,M1		0.121 *16*	%Iγ=0.18 *3* E_γ: weighted average of 209.5 *2* from 1981Ma01 and

^{123}Cs ε decay 1981Ma01,1981So06 (continued)

$\gamma(^{123}Xe)$ (continued)

E_γ[†]	I_γ[†@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	α[&]	Comments
								209.7 *2* from 1981So06. I_γ: weighted average of 0.9 *1* from 1981Ma01 and 0.7 *2* from 1981So06. Mult.: from α(K)exp=0.14 *6* (1981Ma01).
[x]234.2 *3*	0.45 *5*							%Iγ=0.092 *14*
237.6 *3*	1.3 *9*	848.42	(1/2$^+$,3/2)	611.09	(1/2$^+$,3/2$^+$)	[M1,E2]	0.083 *8*	%Iγ=0.26 *19* E_γ: weighted average of 237.4 *3* from 1981Ma01 and 238.0 *5* from 1981So06. I_γ: unweighted average of 0.45 *5* from 1981Ma01 and 2.2 *6* from 1981So06.
251.8 *2*	0.38 *4*	848.42	(1/2$^+$,3/2)	596.60	(1/2$^+$,3/2$^+$)	[M1,E2]	0.069 *5*	%Iγ=0.077 *12*
252.0[‡a] *5*	2.2[‡] *6*	252.01	(7/2$^+$)	0.0	1/2$^{(+)}$			%Iγ=0.44 *13* E_γ,I_γ: this quoted intensity from Table IV of 1981So06 is inconsistent I(252γ)/I(71γ)=0.23/0.41 in Fig.11. Also, this γ is seen neither by 1981Ma01 and in other studies. So the placement of this γ is considered as questionable by the evaluator and is not included in Adopted Gammas.
261.8 *1*	11.3 *18*	442.58	(1/2$^+$,3/2$^+$)	180.75	5/2$^{(+)}$	M1,E2	0.062 *4*	%Iγ=2.3 *5* E_γ: weighted average of 261.7 *1* from 1981Ma01 and 261.9 *1* from 1981So06. I_γ: unweighted average of 9.5 *10* from 1981Ma01 and 13 *1* from 1981So06. Mult.: from α(K)exp=0.050 *8*, α(L)exp=0.006 *2* (1981Ma01).
278.0[‡] *5*	1.1[‡] *4*	1125.73	(1/2$^+$,3/2)	848.42	(1/2$^+$,3/2)			%Iγ=0.22 *9* E_γ,I_γ: other: a 278.3 *3* with Iγ=0.25 *5* not placed in 1981Ma01.
[x]286.1 *2*	0.8 *1*							%Iγ=0.16 *3*
[x]294.5 *2*	1.0 *6*							%Iγ=0.20 *13* E_γ: other: 294.5 *5* (1981So06). I_γ: unweighted average of 0.4 *1* from 1981Ma01 and 1.6 *4* from 1981So06.
304.0 *1*	3.4 *8*	611.09	(1/2$^+$,3/2$^+$)	307.11	5/2$^{(+)}$	M1,E2	0.0397 *7*	%Iγ=0.69 *18* E_γ: from 1981So06. Other: 304.0 *2* (1981Ma01). I_γ: weighted average of 3.0 *5* from 1981Ma01 and 5 *1* from 1981So06. Mult.: from α(K)exp=0.033 *10* (1981Ma01).
307.1 *1*	20.2 *16*	307.11	5/2$^{(+)}$	0.0	1/2$^{(+)}$	E2	0.0388	%Iγ=4.1 *6* E_γ: weighted average of 307.0 *1* from 1981Ma01 and 307.1 *1* from 1981So06. Other: 306 *1* (1975We23). I_γ: weighted average of 17.0 *20* from 1981Ma01 and 21 *1* from 1981So06. Mult.: α(K)exp=0.037 *6*, α(L)exp=0.005 *2* (1981Ma01) give M1,E2.
333.7 *2*	1.0 *2*	585.75	(3/2$^+$)	252.01	(7/2$^+$)			%Iγ=0.20 *5*
340.1 *2*	1.4 *2*	437.48	7/2$^{(+)}$	97.38	3/2$^{(+)}$	E2	0.0281	%Iγ=0.29 *5*

^{123}Cs ε decay 1981Ma01,1981So06 (continued)

γ(^{123}Xe) (continued)

E_γ[†]	I_γ[†@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	α[&]	Comments
344.5[‡a] *5*	3.4[‡] *9*	596.60	(1/2$^+$,3/2$^+$)	252.01	(7/2$^+$)			%Iγ=0.69 *20* E_γ: could be the same as 345.3γ, placed from 442 level in 1981Ma01 and other studies. This placement by 1981So06 is considered as questionable by the evaluator and is not included in Adopted Gammas.
345.3 *2*	1.1 *2*	442.58	(1/2$^+$,3/2$^+$)	97.38	3/2$^{(+)}$			%Iγ=0.22 *5*
[x]353.5 *2*	0.5 *1*							%Iγ=0.102 *23*
[x]361.4 *2*	1.1 *2*							%Iγ=0.22 *5*
405.0 *2*	1.6 *3*	585.75	(3/2$^+$)	180.75	5/2$^{(+)}$			%Iγ=0.33 *7* 1981So06 place a γ of E=405.0 *5* from the 848 level, with Iγ=1.1 *2*. See comments for that γ.
405.0[‡a] *5*	1.1[‡] *2*	848.42	(1/2$^+$,3/2)	442.58	(1/2$^+$,3/2$^+$)			%Iγ=0.22 *5* Placed by 1981So06, listed as seen in coincidence with 261.8γ in Table V. But a peak at this energy is barely seen in the coincidence spectrum of 261.8γ in Fig.8 of 1981So06. 1981Ma01 place a γ of E=405.0 *2* from the 586 level with Iγ=1.6, and this γ is listed as seen in coincidence with 83.4γ and 97.4γ, but not with 261.8γ. 2001Ga25 in ^{123}Te(^{3}He,3nγ) also place a 405.1γ from the 586 level but not from the 848 level. So the placement by 1981So06 is considered as questionable (by the evaluator) and this γ could be the same γ seen from 586 level in 1981Ma01 and 2001Ga25.
422.0[‡] *5*	0.7[‡] *3*	1032.37	(1/2$^+$,3/2)	611.09	(1/2$^+$,3/2$^+$)			%Iγ=0.14 *7*
430.5 *2*	1.0 *2*	611.09	(1/2$^+$,3/2$^+$)	180.75	5/2$^{(+)}$			%Iγ=0.20 *5* E_γ: weighted average of 430.6 *2* from 1981Ma01 and 430.0 *5* from 1981So06. I_γ: weighted average of 1.1 *2* from 1981Ma01 and 0.8 *2* from 1981So06.
434.3 *1*	4.7 *6*	741.47	(1/2$^+$,3/2$^+$)	307.11	5/2$^{(+)}$	M1,E2	0.0146 *13*	%Iγ=0.96 *16* E_γ: other: 434.3 *2* (1981So06). I_γ: other: 4.7 *7* (1981So06). Mult.: from α(K)exp=0.014 *5* (1981Ma01).
437.2[a] *2*	1.7 *3*	437.48	7/2$^{(+)}$	0.0	1/2$^{(+)}$			%Iγ=0.35 *8* E_γ: seen and placed only by 1981Ma01, with J(437)=(1/2,3/2). But the adopted J^π(437)=7/2$^{(+)}$ would require Mult=M3 for this transition to 1/2$^{(+)}$ ground state, which is very unlikely since it would require an isomeric $T_{1/2}$>2 ms for the 437 level in order for B(M3)(W.u.) not to exceed RUL=10. So this placement is considered as questionable by the evaluator and this γ is not included in Adopted Gammas.
442.6 *2*	2.9 *4*	442.58	(1/2$^+$,3/2$^+$)	0.0	1/2$^{(+)}$			%Iγ=0.59 *11*
[x]447.1 *3*	0.5 *1*							%Iγ=0.102 *23*
[x]484.7 *2*	2.9 *4*							%Iγ=0.59 *11*

γ(^{123}Xe) (continued)

E_γ [†]	I_γ [†@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	α[&]	Comments
488.4 *2*	1.5 *3*	585.75	(3/2$^+$)	97.38	3/2$^{(+)}$			%Iγ=0.31 *7*
499.2 *2*	6.2 *8*	596.60	(1/2$^+$,3/2$^+$)	97.38	3/2$^{(+)}$	E2,M1	0.0101 *11*	%Iγ=1.26 *21* E_γ: weighted average of 499.3 *1* from 1981Ma01 and 498.9 *2* from 1981So06. I_γ: weighted average of 6.2 *8* from 1981Ma01 and 6 *2* from 1981So06. Mult.: from α(K)exp=0.007 *3* (1981Ma01).
513.6 *4*	≈7.0	611.09	(1/2$^+$,3/2$^+$)	97.38	3/2$^{(+)}$			%Iγ=1.4 *8* I_γ: Masked by the strong 511-keV line. Iγ estimated from ce spectrum by assuming mult=M1,E2 (1981Ma01).
541.0 *5*	2.9 *11*	848.42	(1/2$^+$,3/2)	307.11	5/2$^{(+)}$			%Iγ=0.59 *23* E_γ: unweighted average of 541.5 *2* from 1981Ma01 and 540.5 *5* from 1981So06. I_γ: unweighted average of 1.8 *3* from 1981Ma01 and 4 *1* from 1981So06.
[x]553.1 *3*	0.3 *1*							%Iγ=0.061 *22*
[x]573.6 *4*	1.0 *3*							%Iγ=0.20 *7*
596.6 *1*	55 *5*	596.60	(1/2$^+$,3/2$^+$)	0.0	1/2$^{(+)}$	M1,E2	0.0064 *9*	%Iγ=11.2 *15* E_γ: weighted average of 596.7 *1* from 1981Ma01 and 596.4 *2* from 1981So06. Other: 598 *1* (1975We23). I_γ: weighted average of 45 *6* from 1981Ma01 and 57 *3* from 1981So06. Mult.: from α(K)exp=0.006 *2* (1981Ma01).
610.3[‡] *2*	1.3[‡] *4*	917.42	(3/2$^+$)	307.11	5/2$^{(+)}$			%Iγ=0.26 *9*
611.1 *2*	15.4 *19*	611.09	(1/2$^+$,3/2$^+$)	0.0	1/2$^{(+)}$			%Iγ=3.1 *5* E_γ: weighted average of 611.2 *2* from 1981Ma01 and 610.9 *2* from 1981So06. Other: 612 *1* (1975We23). I_γ: weighted average of 14.0 *20* from 1981Ma01 and 16.7 *19* from 1981So06.
[x]626.7 *3*	0.5 *1*							%Iγ=0.102 *23*
[x]635.8 *3*	0.3 *1*							%Iγ=0.061 *22*
644.1 *1*	12.5 *25*	741.47	(1/2$^+$,3/2$^+$)	97.38	3/2$^{(+)}$			%Iγ=2.5 *6* E_γ: weighted average of 644.2 *2* from 1981Ma01 and 644.1 *1* from 1981So06. Other: 645 *1* (1975We23). I_γ: unweighted average of 10.0 *15* from 1981Ma01 and 15 *2* from 1981So06.
667.8 *2*	5.8 *13*	848.42	(1/2$^+$,3/2)	180.75	5/2$^{(+)}$			%Iγ=1.2 *3* E_γ: weighted average of 667.9 *2* from 1981Ma01 and 667.6 *4* from 1981So06. I_γ: unweighted average of 4.5 *7* from 1981Ma01 and 7 *1* from 1981So06.
693.8 *2*	6.0 *8*	693.74	(1/2,3/2)	0.0	1/2$^{(+)}$			%Iγ=1.22 *21* E_γ: weighted average of 693.8 *2* from 1981Ma01 and 693.6 *4* from 1981So06. I_γ: weighted average of 5.7 *8* from 1981Ma01 and 8 *2* from 1981So06.

$\gamma(^{123}Xe)$ (continued)

E_γ[†]	I_γ[†@]	E_i(level)	J_i^π	E_f	J_f^π	Comments
711.2 *2*	3.0 *10*	1452.84	(1/2,3/2)	741.47	$(1/2^+,3/2^+)$	%Iγ=0.61 *22* E_γ: weighted average of 711.4 *2* from 1981Ma01 and 711.0 *2* from 1981So06. I_γ: unweighted average of 2.0 *3* from 1981Ma01 and 4 *1* from 1981So06.
[x]723.1 *3*	0.5 *1*					%Iγ=0.102 *23*
725.1 *3*	1.0 *2*	1032.37	$(1/2^+,3/2)$	307.11	$5/2^{(+)}$	%Iγ=0.20 *5* E_γ: weighted average of 725.1 *3* from 1981Ma01 and 725.0 *5* from 1981So06. I_γ: weighted average of 0.9 *2* from 1981Ma01 and 1.3 *3* from 1981So06.
741.5 *1*	15.0 *20*	741.47	$(1/2^+,3/2^+)$	0.0	$1/2^{(+)}$	%Iγ=3.1 *5* E_γ: from 1981So06. Other: 741.5 *2* (1981Ma01), 743 *1* (1975We23). I_γ: weighted average of 13.0 *20* from 1981Ma01 and 17 *2* from 1981So06.
750.8 *2*	3.9 *3*	848.42	$(1/2^+,3/2)$	97.38	$3/2^{(+)}$	%Iγ=0.79 *11* E_γ: weighted average of 750.9 *3* from 1981Ma01 and 750.7 *2* from 1981So06. I_γ: weighted average of 3.5 *5* from 1981Ma01 and 4.8 *7* from 1981So06.
819.0[‡] *5*	1.2[‡] *6*	1125.73	$(1/2^+,3/2)$	307.11	$5/2^{(+)}$	%Iγ=0.24 *13*
841.8 *2*	1.6 *3*	1452.84	(1/2,3/2)	611.09	$(1/2^+,3/2^+)$	%Iγ=0.33 *7* E_γ: weighted average of 841.9 *4* from 1981Ma01 and 841.8 *2* from 1981So06. I_γ: weighted average of 1.5 *3* from 1981Ma01 and 1.8 *5* from 1981So06.
849.0 *5*	0.8 *2*	848.42	$(1/2^+,3/2)$	0.0	$1/2^{(+)}$	%Iγ=0.16 *5* E_γ: weighted average of 848.9 *5* from 1981Ma01 and 849.0 *5* from 1981So06. I_γ: weighted average of 0.8 *2* from 1981Ma01 and 0.7 *4* from 1981So06.
934.7 *5*	1.0 *3*	1032.37	$(1/2^+,3/2)$	97.38	$3/2^{(+)}$	%Iγ=0.20 *7*
945.0[‡] *3*	1.9[‡] *5*	1125.73	$(1/2^+,3/2)$	180.75	$5/2^{(+)}$	%Iγ=0.39 *11*
1125.3[‡] *3*	3.7[‡] *3*	1125.73	$(1/2^+,3/2)$	0.0	$1/2^{(+)}$	%Iγ=0.75 *10*
1176.2[‡] *4*	9[‡] *4*	1273.28	(1/2,3/2)	97.38	$3/2^{(+)}$	%Iγ=1.8 *9*
[x]1189.0 *5*	1.6 *4*					%Iγ=0.33 *9*
[x]1255.8[‡] *4*	1.6[‡] *5*					%Iγ=0.33 *11*
1273.2[‡] *2*	14[‡] *2*	1273.28	(1/2,3/2)	0.0	$1/2^{(+)}$	%Iγ=2.9 *5*
1355.9 *5*	3.3 *8*	1452.84	(1/2,3/2)	97.38	$3/2^{(+)}$	%Iγ=0.67 *18* E_γ: weighted average of 1356.2 *5* from 1981Ma01 and 1355.6 *5* from 1981So06. I_γ: weighted average of 3.0 *8* from 1981Ma01 and 5 *2* from 1981So06.
1453.0[‡] *5*	1.1[‡] *5*	1452.84	(1/2,3/2)	0.0	$1/2^{(+)}$	%Iγ=0.22 *11*

[†] From 1981Ma01, unless otherwise noted. Iγ values from 1981Ma01 relative to Iγ=1000 for 97.3γ have been re-normalized by the evaluator relative to Iγ=100 for 97.3γ. Weighted average is taken where comparable values are also available in 1981So06. The intensity values for weak γ rays are quite different between 1981Ma01 and 1981So06.

[‡] From 1981So06.

[#] From Adopted Gammas. Values from this study are deduced based on ce data given under comments and they are also given under comments if different from adopted values.

^{123}Cs ε decay 1981Ma01,1981So06 (continued)

$\gamma(^{123}Xe)$ (continued)

@ For absolute intensity per 100 decays, multiply by 0.205 *22*.
& Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
a Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

$^{123}_{54}Xe_{69}$-50

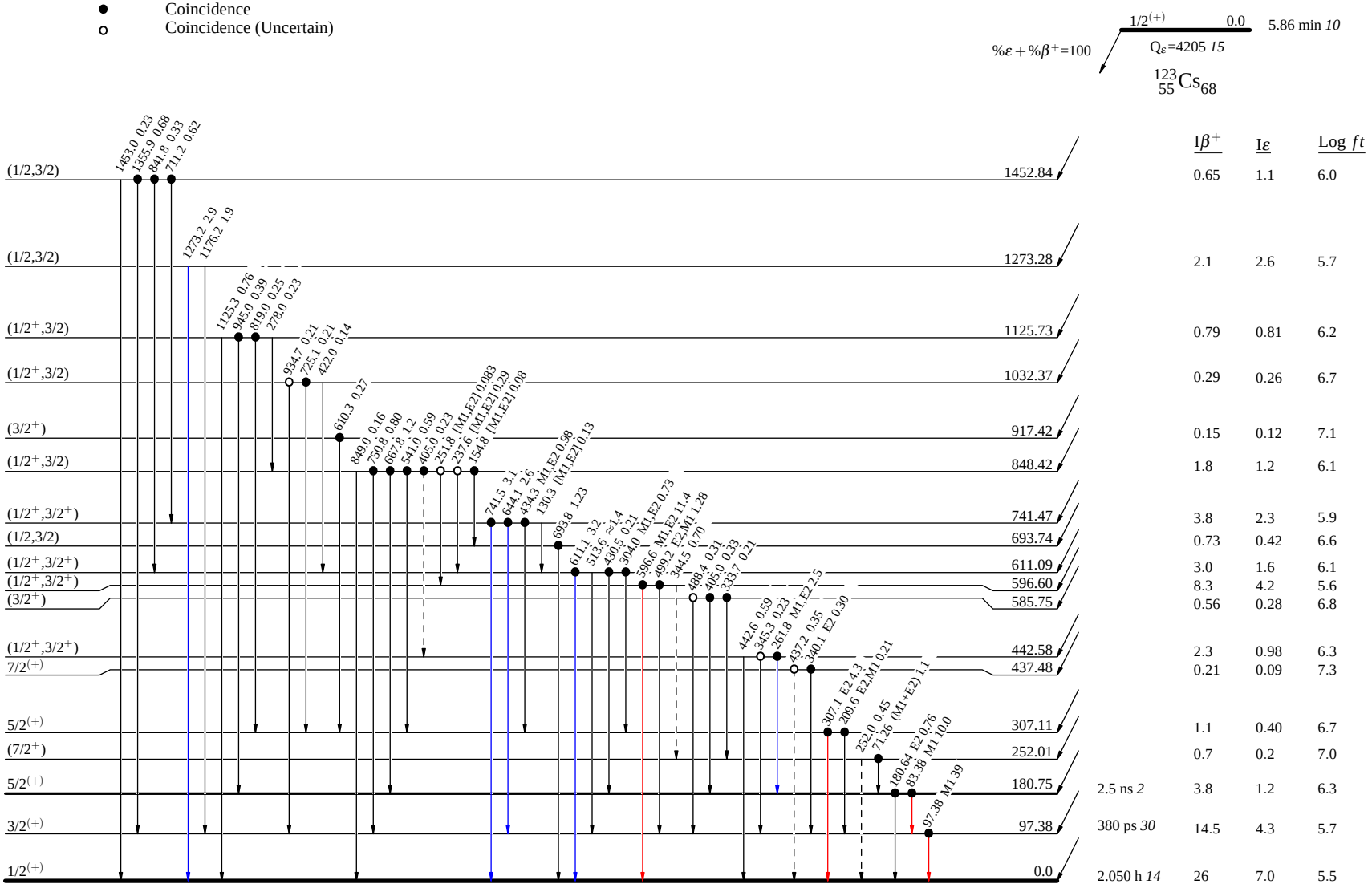
^{123}Cs ε decay 1981Ma01,1981So06

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays

Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)
- Coincidence
- Coincidence (Uncertain)



	Iβ+	Iε	Log *ft*
1452.84	0.65	1.1	6.0
1273.28	2.1	2.6	5.7
1125.73	0.79	0.81	6.2
1032.37	0.29	0.26	6.7
917.42	0.15	0.12	7.1
848.42	1.8	1.2	6.1
741.47	3.8	2.3	5.9
693.74	0.73	0.42	6.6
611.09	3.0	1.6	6.1
596.60	8.3	4.2	5.6
585.75	0.56	0.28	6.8
442.58	2.3	0.98	6.3
437.48	0.21	0.09	7.3
307.11	1.1	0.40	6.7
252.01	0.7	0.2	7.0
180.75	3.8	1.2	6.3
97.38	14.5	4.3	5.7
0.0	26	7.0	5.5

^{80}Se(^{48}Ca,5nγ):Nd 2020Ba12

This datasets contains data for normal-deformed (ND) bands from the measurement of ^{80}Se(^{48}Ca,5nγ). See 2021Ba03 for data of super-deformed bands from the same measurement.

2020Ba12: E=207 MeV ^{48}Ca beam was produced from the ATLAS accelerator at ANL. Target was 0.6 mg/cm^2 ^{80}Se on a 0.3 mg/cm^2 Au backing. γ rays were detected with the Gammasphere array of 101 Compton-suppressed Ge detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma\gamma$-coin, γ angular intensity ratios. Deduced levels, J, π, band structures, γ-ray multipolarities. Comparisons with Cranked Nilsson-Strutinsky (CNS) calculations.

^{123}Xe Levels

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
0.0		3209.8[m] 7	25/2$^+$	6045.8[e] 7	39/2$^-$	9422.8[e] 10	51/2$^-$
97.38[g] 3	3/2$^+$	3349.3[i] 6	27/2$^+$	6048.5[f] 10	(37/2$^-$)	9465.2[p] 11	
180.76 4	5/2$^+$	3478.8[o] 7	27/2$^+$	6070.1[c] 7	37/2$^-$	9566.3[o] 14	(51/2$^+$)
185.31 20	7/2$^-$	3559.4[n] 8	27/2$^+$	6133.8[#] 7	39/2$^-$	9590.7 14	
206.4 3	9/2$^-$	3820.2[h] 6	29/2$^+$	6165.1[n] 9	39/2$^+$	9808.9[k] 8	(53/2$^+$)
252.02[n] 5	7/2$^+$	3853.7[a] 7	(27/2$^-$)	6374.1[&] 8	39/2$^-$	9904.2[j] 9	
263.41[e] 25	11/2$^-$	3905.2[m] 9	29/2$^+$	6418.2 7	39/2$^-$	9906.5[@] 9	(53/2$^-$)
306.8 7	5/2$^+$	3907.9[#] 6	27/2$^-$	6464.9 7	39/2$^-$	10068.1[i] 8	55/2$^+$
437.8[g] 8	7/2$^+$	3951.1[e] 6	31/2$^-$	6477.0[h] 7	41/2$^+$	10135.1 9	55/2$^-$
518.5[m] 5	9/2$^+$	3956.0[f] 9	(29/2$^-$)	6655.2[@] 7	41/2$^-$	10489.5[#] 10	(55/2$^-$)
662.1 6	13/2$^-$	4019.1 7	29/2$^+$	6683.8[m] 17	41/2$^+$	10574.3[&] 17	(55/2$^-$)
719.1[e] 6	15/2$^-$	4103.4[b] 8	29/2$^-$	6789.2[c] 7	41/2$^-$	10597.0[h] 9	(57/2$^+$)
767.6[n] 6	11/2$^+$	4155.6[i] 6	31/2$^+$	7066.9[#] 8	43/2$^-$	10613.8 9	57/2$^+$
877.2[b] 8	13/2$^-$	4213.1[o] 7	31/2$^+$	7084.4[i] 7	43/2$^+$	10634.4[p] 15	
934.8[g] 10	11/2$^+$	4283.6[@] 7	29/2$^-$	7106.9[e] 8	43/2$^-$	10679.8[e] 14	55/2$^-$
1082.0[m] 6	13/2$^+$	4325.3[n] 9	31/2$^+$	7114.9[o] 8	43/2$^+$	10708.1[o] 17	(55/2$^+$)
1269.8[a] 7	15/2$^-$	4354.9 9	(31/2$^-$)	7257.6[&] 8	43/2$^-$	10823.7 9	57/2$^+$
1293.6[f] 7	17/2$^-$	4608.9[#] 6	31/2$^-$	7278.8[n] 9	43/2$^+$	10890.5[d] 10	57/2$^-$
1335.7[e] 6	19/2$^-$	4627.4[h] 7	33/2$^+$	7481.7[h] 7	45/2$^+$	11046.1 10	57/2$^-$
1397.5[n] 7	15/2$^+$	4724.6[m] 10	33/2$^+$	7617.4[@] 8	45/2$^-$	11089.7 10	59/2$^-$
1522.0[b] 8	17/2$^-$	4880.0 7	33/2$^+$	7780.7 10	45/2$^-$	11097.6[k] 9	57/2$^+$
1553.7[g] 10	15/2$^+$	4933.9 9	(33/2$^-$)	7807.5[m] 20	45/2$^+$	11132.7[j] 9	
1757.5[m] 6	17/2$^+$	5010.2[e] 7	35/2$^-$	7840.2 20		11175.4[i] 9	(59/2$^+$)
1953.3[a] 6	19/2$^-$	5026.7[@] 7	33/2$^-$	7969.8[c] 8	45/2$^-$	11175.7[@] 12	(57/2$^-$)
2062.1[f] 8	21/2$^-$	5036.2[i] 7	35/2$^+$	7990.9[i] 7	47/2$^+$	11440.5[l] 13	
2089.4[e] 6	23/2$^-$	5043.2[f] 10	(33/2$^-$)	8075.3[#] 9	47/2$^-$	11721.2[d] 10	61/2$^-$
2112.2[n] 6	19/2$^+$	5064.5[c] 9	(33/2$^-$)	8189.3 8	47/2$^+$	11808.4[h] 10	(61/2$^+$)
2227.3 12	(23/2$^-$)	5066.5[o] 7	35/2$^+$	8218.2[e] 8	47/2$^-$	11851.1[o] 20	(59/2$^+$)
2230.2[g] 7	19/2$^+$	5109.4 11	33/2$^-$	8224.9[&] 8	47/2$^-$	11898.0?[p]	
2284.4[b] 8	21/2$^-$	5207.4[n] 9	35/2$^+$	8298.3[o] 9	(47/2$^+$)	11998.7[e] 15	(59/2$^-$)
2422.1 8	19/2$^+$	5213.3 9	(35/2$^-$)	8363.6 9	47/2$^-$	12039.9 11	61/2$^+$
2497.1[m] 6	21/2$^+$	5285.8 11	(33/2$^-$)	8448.6[n] 14	(47/2$^+$)	12146.4[k] 11	61/2$^+$
2688.6 6	21/2$^+$	5328.9[b] 13	(33/2$^-$)	8453.6[h] 7	49/2$^+$	12216.2?	
2769.5[a] 6	23/2$^-$	5337.8[#] 6	35/2$^-$	8690.6[@] 9	(49/2$^-$)	12236.4 11	63/2$^-$
2822.0[o] 6	23/2$^+$	5418.0 8	35/2$^-$	8694.0 8	49/2$^+$	12295.6[j] 11	
2882.1[n] 6	23/2$^+$	5519.3[h] 7	37/2$^+$	8955.2[c] 8	49/2$^-$	12323.8 13	
2950.7[f] 8	25/2$^-$	5585.3[&] 10	35/2$^-$	8975.1 15	(49/2$^-$)	12491.9 11	63/2$^-$
2963.9[g] 6	23/2$^+$	5651.0[m] 14	37/2$^+$	9123.9[i] 7	51/2$^+$	12858.4 13	
2965.3[e] 6	27/2$^-$	5687.3 9	35/2$^-$	9257.4[#] 9	(51/2$^-$)	12921.0[l] 17	
2991.2 6	27/2$^-$	5793.4[@] 7	37/2$^-$	9356.8[d] 9	53/2$^-$	13173.1[h] 11	(65/2$^+$)
3152.6[b] 8	25/2$^-$	5915.5[i] 7	39/2$^+$	9376.9[&] 13	(51/2$^-$)	13432.8 11	67/2$^-$
3169.0 6	25/2$^+$	6034.1[o] 7	39/2$^+$	9418.8[h] 8	53/2$^+$	13438.4 15	65/2$^-$

^{80}Se(^{48}Ca,5nγ):Nd 2020Ba12 (continued)

^{123}Xe Levels (continued)

E(level)[†]	Jπ[‡]
14484.7 *12*	
14521.3 *12*	
14554.2 *18*	(69/2$^-$)
14760.0 *13*	69/2$^-$

† From a least-squares fit to γ-ray energies, unless otherwise noted.
‡ From 2020Ba12, based on measured γ angular intensity ratios, band structures, and known assignments of low-lying states. When considered in Adopted Levels, firm assignments by 2020Ba12 will be placed inside parentheses if there is lack of firm experimental evidences.
# Band(A): Band 1 based on 27/2$^-$, α=−1/2.
@ Band(a): Band 2 based on 29/2$^-$, α=+1/2.
& Band(B): Band 3 based on 35/2$^-$.
a Band(C): Band 4 based on 15/2$^-$.
b Band(D): Band 5 based on 13/2$^-$.
c Band(E): Band 6 based on (33/2$^-$).
d Band(F): Band 7 based on 53/2$^-$.
e Band(G): Band 8 based on 11/2$^-$.
f Band(H): Band 9 based on 17/2$^-$.
g Band(I): Band 10 based on 3/2$^+$.
h Band(J): Band 11 based on 29/2$^+$.
i Band(K): Band 12 based on 27/2$^+$.
j Band(L): Band 12A based on 9905 level.
k Band(M): Band 12B based on 9810 level.
l Band(N): Band 12C based on 11441 level.
m Band(O): Band 13 based on 9/2$^+$.
n Band(P): Band 14 based on 7/2$^+$.
o Band(Q): Band 15 based on 23/2$^+$.
p Band(R): Band 15A based on 9465 level.

γ(^{123}Xe)

E$_\gamma$[†]	I$_\gamma$[‡]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[b]	Comments
21.1[#] *2*		206.4	9/2$^-$	185.31	7/2$^-$		
57.0[#] *2*		263.41	11/2$^-$	206.4	9/2$^-$		
66.7[#] *2*		252.02	7/2$^+$	185.31	7/2$^-$		
71.26[#] *3*		252.02	7/2$^+$	180.76	5/2$^+$		
78.1[#] *2*		263.41	11/2$^-$	185.31	7/2$^-$		
83.38[#] *2*		180.76	5/2$^+$	97.38	3/2$^+$		
97.38[#] *3*		97.38	3/2$^+$	0.0			
131.2 *10*		437.8	7/2$^+$	306.8	5/2$^+$		
136.5 *5*	19 *3*	4155.6	31/2$^+$	4019.1	29/2$^+$	D+Q	R$_\theta$=0.52 *5*.
139.4 *5*	76 *10*	3349.3	27/2$^+$	3209.8	25/2$^+$	D+Q	R$_\theta$=0.67 *7*.
156.6 *5*	20 *3*	5036.2	35/2$^+$	4880.0	33/2$^+$	D+Q	R$_\theta$=0.56 *6*.
180.4 *2*	3.8×10^2 *4*	3349.3	27/2$^+$	3169.0	25/2$^+$	D+Q	R$_\theta$=0.65 *6*.
180.5 *10*		180.76	5/2$^+$	0.0			

Continued on next page (footnotes at end of table)

^{80}Se(^{48}Ca,5nγ):Nd 2020Ba12 (continued)

$\gamma(^{123}Xe)$ (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [b]	Comments
199.4 *5*	17 *2*	11089.7	59/2$^-$	10890.5	57/2$^-$	D+Q	R_θ=0.78 *7*.
205.1 *2*	167 *24*	3169.0	25/2$^+$	2963.9	23/2$^+$		
209.5 *10*		306.8	5/2$^+$	97.38	3/2$^+$		
240.2 *10*	7 *1*	8694.0	49/2$^+$	8453.6	49/2$^+$	D+Q	R_θ=1.07 *12*.
249.0 *10*		767.6	11/2$^+$	518.5	9/2$^+$		
255.1 *10*		518.5	9/2$^+$	263.41	11/2$^-$	D	R_θ=0.93 *11*.
266.2 *10*		518.5	9/2$^+$	252.02	7/2$^+$	D+Q	R_θ=0.63 *6*.
266.3 *10*		2688.6	21/2$^+$	2422.1	19/2$^+$	D+Q	R_θ=0.49 *6*.
275.3 *10*		2963.9	23/2$^+$	2688.6	21/2$^+$	D+Q	R_θ=0.63 *7*.
287.0 *2*	113 *16*	3169.0	25/2$^+$	2882.1	23/2$^+$	D+Q	R_θ=0.60 *5*.
294.6 *5*	10 *2*	9418.8	53/2$^+$	9123.9	51/2$^+$	D+Q	R_θ=0.48 *4*.
306.9 *10*		306.8	5/2$^+$	0.0			
312.2 *10*		518.5	9/2$^+$	206.4	9/2$^-$		
314.2 *10*		1082.0	13/2$^+$	767.6	11/2$^+$		
315.3 *10*		1397.5	15/2$^+$	1082.0	13/2$^+$		
324.6 *5*	43 *5*	6789.2	41/2$^-$	6464.9	39/2$^-$	D+Q	R_θ=0.68 *5*.
325.4 *10*		4608.9	31/2$^-$	4283.6	29/2$^-$		
333.3 *10*		518.5	9/2$^+$	185.31	7/2$^-$		
335.2 *5*	30 *4*	4155.6	31/2$^+$	3820.2	29/2$^+$	D+Q	R_θ=0.72 *7*.
337.8 *10*		518.5	9/2$^+$	180.76	5/2$^+$		
340.2 *10*		437.8	7/2$^+$	97.38	3/2$^+$	Q	R_θ=1.23 *13*.
347.0 *5*	30 *5*	3169.0	25/2$^+$	2822.0	23/2$^+$		
363.1 *10*		1082.0	13/2$^+$	719.1	15/2$^-$		
366.8 *10*		7481.7	45/2$^+$	7114.9	43/2$^+$	D+Q	R_θ=0.71 *6*.
371.1 *5*	19 *2*	6789.2	41/2$^-$	6418.2	39/2$^-$	D+Q	R_θ=0.38 *5*.
375.6 *10*		4283.6	29/2$^-$	3907.9	27/2$^-$	D+Q	R_θ=0.64 *6*.
382.9 *10*	6 *1*	6070.1	37/2$^-$	5687.3	35/2$^-$	D+Q	R_θ=0.67 *13*.
385.1 *5*	64 *8*	3349.3	27/2$^+$	2963.9	23/2$^+$		
392.6 *10*		1269.8	15/2$^-$	877.2	13/2$^-$		
394.8 *5*	11 *2*	6464.9	39/2$^-$	6070.1	37/2$^-$	D+Q	R_θ=0.68 *5*.
396.3[@] *2*	196[a] *24*	5915.5	39/2$^+$	5519.3	37/2$^+$		
396.9[@] *10*	[a]	7481.7	45/2$^+$	7084.4	43/2$^+$		
399.0 *10*		662.1	13/2$^-$	263.41	11/2$^-$		
401.3 *10*		5687.3	35/2$^-$	5285.8	(33/2$^-$)		
401.6 *2*	169 *20*	9356.8	53/2$^-$	8955.2	49/2$^-$	Q	R_θ=1.38 *12*.
403.7 *10*		4354.9	(31/2$^-$)	3951.1	31/2$^-$		
408.6 *5*	17 *2*	5036.2	35/2$^+$	4627.4	33/2$^+$	D+Q	R_θ=0.72 *8*.
417.8 *5*	35 *4*	5026.7	33/2$^-$	4608.9	31/2$^-$	D+Q	R_θ=0.67 *7*.
430.1 *5*	16 *2*	9123.9	51/2$^+$	8694.0	49/2$^+$	D+Q	R_θ=0.92 *10*.
430.9 *10*		1953.3	19/2$^-$	1522.0	17/2$^-$		
455.6 *10*		719.1	15/2$^-$	263.41	11/2$^-$		
455.7 *10*		662.1	13/2$^-$	206.4	9/2$^-$		
455.9 *10*		5793.4	37/2$^-$	5337.8	35/2$^-$	D+Q	R_θ=0.68 *7*.
457.6 *10*		8075.3	47/2$^-$	7617.4	45/2$^-$		
462.7 *2*	111 *12*	8453.6	49/2$^+$	7990.9	47/2$^+$	D+Q	R_θ=0.71 *7*.
466.8 *5*	28 *4*	3349.3	27/2$^+$	2882.1	23/2$^+$		
470.9[@] *2*	190[a] *23*	3820.2	29/2$^+$	3349.3	27/2$^+$		
471.4[@] *10*	[a]	4627.4	33/2$^+$	4155.6	31/2$^+$		
480.3 *2*	107 *15*	3169.0	25/2$^+$	2688.6	21/2$^+$	Q	R_θ=1.39 *16*.
483.2 *2*	109 *13*	5519.3	37/2$^+$	5036.2	35/2$^+$	D+Q	R_θ=0.88 *10*.
484.3 *10*		2769.5	23/2$^-$	2284.4	21/2$^-$		
497.0 *10*		934.8	11/2$^+$	437.8	7/2$^+$		
504.1 *10*	8 *1*	8694.0	49/2$^+$	8189.3	47/2$^+$	D+Q	R_θ=0.66 *7*.
515.1 *5*	15 *3*	12236.4	63/2$^-$	11721.2	61/2$^-$	D+Q	R_θ=0.76 *6*.
515.6 *10*		767.6	11/2$^+$	252.02	7/2$^+$		

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^{80}Se(^{48}Ca,5nγ):Nd 2020Ba12 (continued)

$\gamma(^{123}Xe)$ (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[b]	Comments
521.7 *5*	43 *6*	6655.2	41/2$^-$	6133.8	39/2$^-$	D+Q	R_θ=0.71 *6*.
523.1 *10*		7780.7	45/2$^-$	7257.6	43/2$^-$	D+Q	R_θ=0.84 *8*.
534.8 *10*		12858.4		12323.8			
541.8 *10*		2963.9	23/2$^+$	2422.1	19/2$^+$	Q	R_θ=1.29 *10*.
550.5 *5*	22 *3*	7617.4	45/2$^-$	7066.9	43/2$^-$	D+Q	R_θ=0.59 *6*.
550.8 *10*		1269.8	15/2$^-$	719.1	15/2$^-$	D+Q	R_θ=0.71 *7*.
555.7 *10*	2.0 *5*	3905.2	29/2$^+$	3349.3	27/2$^+$		
558.4 *10*		5585.3	35/2$^-$	5026.7	33/2$^-$	D+Q	R_θ=0.62 *7*.
561.5 *2*	3.1×10^2 *4*	6477.0	41/2$^+$	5915.5	39/2$^+$	D+Q	R_θ=0.59 *6*.
563.5 *10*		1082.0	13/2$^+$	518.5	9/2$^+$		
566.8 *5*	16 *2*	9257.4	(51/2$^-$)	8690.6	(49/2$^-$)	D+Q	R_θ=0.46 *5*.
574.4 *10*		1293.6	17/2$^-$	719.1	15/2$^-$	D+Q	R_θ=0.45 *6*.
580.8 *5*	34 *5*	6374.1	39/2$^-$	5793.4	37/2$^-$	D+Q	R_θ=0.58 *6*.
582.7 *10*	9 *1*	10489.5	(55/2$^-$)	9906.5	(53/2$^-$)		
591.4 *5*	33 *4*	8955.2	49/2$^-$	8363.6	47/2$^-$	D+Q	R_θ=0.97 *9*.
591.5 *10*		2822.0	23/2$^+$	2230.2	19/2$^+$		
602.3 *5*	26 *3*	7257.6	43/2$^-$	6655.2	41/2$^-$	D+Q	R_θ=0.82 *9*.
607.4 *2*	207 *24*	7084.4	43/2$^+$	6477.0	41/2$^+$	D+Q	R_θ=0.58 *6*.
607.5 *5*	25 *3*	8224.9	47/2$^-$	7617.4	45/2$^-$	D+Q	R_θ=0.60 *6*.
607.7 *10*		1269.8	15/2$^-$	662.1	13/2$^-$	D+Q	R_θ=0.61 *6*.
608.8[c] *10*		3559.4	27/2$^+$	2950.7	25/2$^-$		
613.7 *10*		877.2	13/2$^-$	263.41	11/2$^-$	D+Q	R_θ=0.90 *10*.
614.6 *10*		8690.6	(49/2$^-$)	8075.3	47/2$^-$		
616.6 *2*	1000	1335.7	19/2$^-$	719.1	15/2$^-$	Q	R_θ=1.46 *11*.
617.5 *10*		1953.3	19/2$^-$	1335.7	19/2$^-$		
619.0 *10*		1553.7	15/2$^+$	934.8	11/2$^+$		
629.9 *10*		1397.5	15/2$^+$	767.6	11/2$^+$	Q	R_θ=1.34 *14*.
631.5 *5*	15 *2*	11721.2	61/2$^-$	11089.7	59/2$^-$	D+Q	R_θ=0.63 *7*.
631.6 *10*		1293.6	17/2$^-$	662.1	13/2$^-$	Q	R_θ=1.31 *5*.
633.1 *5*	48 *6*	11808.4	(61/2$^+$)	11175.4	(59/2$^+$)	D+Q	R_θ=0.73 *7*.
644.6 *10*		1522.0	17/2$^-$	877.2	13/2$^-$		
649.3 *5*	10 *2*	9906.5	(53/2$^-$)	9257.4	(51/2$^-$)		
651.7 *10*		2882.1	23/2$^+$	2230.2	19/2$^+$	Q	R_θ=1.37 *14*.
655.1 *5*	15 *2*	6789.2	41/2$^-$	6133.8	39/2$^-$		
656.8 *2*	139 *18*	3478.8	27/2$^+$	2822.0	23/2$^+$	Q	R_θ=1.37 *11*.
669.8 *10*		4019.1	29/2$^+$	3349.3	27/2$^+$	D+Q	R_θ=0.40 *5*.
670.1 *2*	114 *13*	9123.9	51/2$^+$	8453.6	49/2$^+$	D+Q	R_θ=0.62 *7*.
671.8 *2*	2.5×10^2 *3*	3169.0	25/2$^+$	2497.1	21/2$^+$		
674.7 *10*	8 *1*	11721.2	61/2$^-$	11046.1	57/2$^-$		
675.8 *10*		1757.5	17/2$^+$	1082.0	13/2$^+$		
676.5 *10*		2230.2	19/2$^+$	1553.7	15/2$^+$		
677.3 *5*	27 *4*	3559.4	27/2$^+$	2882.1	23/2$^+$	Q	R_θ=1.70 *21*.
679.7 *10*		2769.5	23/2$^-$	2089.4	23/2$^-$	D+Q	R_θ=0.44 *5*.
683.5 *10*		1953.3	19/2$^-$	1269.8	15/2$^-$	Q	R_θ=1.53 *14*.
684.6 *10*	6 *1*	9808.9	(53/2$^+$)	9123.9	51/2$^+$		
685.6 *10*	3 *1*	11175.7	(57/2$^-$)	10489.5	(55/2$^-$)		
695.6 *10*	7 *1*	3905.2	29/2$^+$	3209.8	25/2$^+$	Q	R_θ=1.78 *21*.
700.9 *2*	182 *21*	4608.9	31/2$^-$	3907.9	27/2$^-$	Q	R_θ=1.74 *20*.
703.4 *10*	9 *1*	8694.0	49/2$^+$	7990.9	47/2$^+$		
707.6 *10*		8189.3	47/2$^+$	7481.7	45/2$^+$	D+Q	R_θ=0.59 *7*.
709.7 *2*	168 *22*	2822.0	23/2$^+$	2112.2	19/2$^+$	Q	R_θ=1.67 *18*.
710.7 *5*	23 *4*	5337.8	35/2$^-$	4627.4	33/2$^+$		
712.1 *5*	14 *2*	7969.8	45/2$^-$	7257.6	43/2$^-$	D+Q	R_θ=0.69 *7*.
712.2 *10*		7990.9	47/2$^+$	7278.8	43/2$^+$		
712.4 *5*	79 *10*	3209.8	25/2$^+$	2497.1	21/2$^+$	Q	R_θ=1.53 *16*.

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^{80}Se(^{48}Ca,5nγ):Nd 2020Ba12 (continued)

$\gamma(^{123}Xe)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[b]	Comments
714.7 *10*		2112.2	19/2$^+$	1397.5	15/2$^+$	Q	R_θ=1.30 *15*.
719.2 *5*	34 *5*	6789.2	41/2$^-$	6070.1	37/2$^-$	Q	R_θ=1.26 *14*.
724.8 *10*	6 *1*	4880.0	33/2$^+$	4155.6	31/2$^+$		
726.9 *10*		2062.1	21/2$^-$	1335.7	19/2$^-$		
728.9 *2*	170 *20*	5337.8	35/2$^-$	4608.9	31/2$^-$	Q	R_θ=1.40 *15*.
732.7 *10*		2822.0	23/2$^+$	2089.4	23/2$^-$		
733.6 *10*		2963.9	23/2$^+$	2230.2	19/2$^+$	Q	R_θ=1.69 *24*.
734.3 *2*	123 *16*	4213.1	31/2$^+$	3478.8	27/2$^+$	Q	R_θ=1.30 *16*.
735.7 *10*		1397.5	15/2$^+$	662.1	13/2$^-$		
737.3 *5*	55 *7*	8955.2	49/2$^-$	8218.2	47/2$^-$	D+Q	R_θ=0.82 *11*.
738.9 *2*	2.1×10^2 *3*	3907.9	27/2$^-$	3169.0	25/2$^+$	D	R_θ=0.77 *13*.
739.6 *2*	119 *15*	2497.1	21/2$^+$	1757.5	17/2$^+$	Q	R_θ=1.33 *17*.
743.0 *5*	71 *9*	5026.7	33/2$^-$	4283.6	29/2$^-$	Q	R_θ=1.71 *19*.
753.8 *2*	8.8×10^2 *8*	2089.4	23/2$^-$	1335.7	19/2$^-$	Q	R_θ=1.43 *15*.
753.8 *10*		5687.3	35/2$^-$	4933.9	(33/2$^-$)		
755.1 *10*		4608.9	31/2$^-$	3853.7	(27/2$^-$)		
755.3 *10*		10890.5	57/2$^-$	10135.1	55/2$^-$		
757.0 *5*	48 *6*	5793.4	37/2$^-$	5036.2	35/2$^+$		
762.7 *10*		2284.4	21/2$^-$	1522.0	17/2$^-$	Q	R_θ=1.38 *17*.
763.9 *10*		2991.2	27/2$^-$	2227.3	(23/2$^-$)		
765.9 *5*	31 *4*	4325.3	31/2$^+$	3559.4	27/2$^+$	Q	R_θ=1.35 *24*.
766.5 *5*	51 *6*	5793.4	37/2$^-$	5026.7	33/2$^-$	Q	R_θ=1.70 *19*.
768.5 *10*		2062.1	21/2$^-$	1293.6	17/2$^-$	Q	R_θ=1.56 *17*.
770.3 *5*	62 *8*	2882.1	23/2$^+$	2112.2	19/2$^+$	Q	R_θ=1.41 *16*.
777.7 *10*		6464.9	39/2$^-$	5687.3	35/2$^-$	Q	R_θ=1.20 *15*.
778.3 *2*	127 *14*	10135.1	55/2$^-$	9356.8	53/2$^-$	D+Q	R_θ=0.65 *8*.
780.2 *5*	30 *5*	9904.2		9123.9	51/2$^+$		
788.6 *10*		6374.1	39/2$^-$	5585.3	35/2$^-$	Q	R_θ=1.26 *16*.
788.7 *5*	26 *4*	4608.9	31/2$^-$	3820.2	29/2$^+$	D	R_θ=0.95 *18*.
796.0 *2*	132 *15*	6133.8	39/2$^-$	5337.8	35/2$^-$	Q	R_θ=1.40 *15*.
802.8 *10*		1522.0	17/2$^-$	719.1	15/2$^-$		
806.3[@] *2*	4.4×10^2[a] *5*	4155.6	31/2$^+$	3349.3	27/2$^+$		
807.4[@&] *10*	[a]	4627.4	33/2$^+$	3820.2	29/2$^+$		
816.1 *2*	2.6×10^2 *3*	2769.5	23/2$^-$	1953.3	19/2$^-$	Q	R_θ=1.31 *15*.
818.6 *10*		1082.0	13/2$^+$	263.41	11/2$^-$		
819.4 *10*		2112.2	19/2$^+$	1293.6	17/2$^-$		
819.4 *5*	18 *3*	4724.6	33/2$^+$	3905.2	29/2$^+$	Q	R_θ=1.88 *27*.
820.0 *10*		2882.1	23/2$^+$	2062.1	21/2$^-$		
830.6 *5*	19 *2*	4933.9	(33/2$^-$)	4103.4	29/2$^-$		
830.6 *5*	30 *3*	11721.2	61/2$^-$	10890.5	57/2$^-$	Q	R_θ=1.54 *19*.
848.7 *10*	9 *1*	5915.5	39/2$^+$	5066.5	35/2$^+$		
850.5 *5*	40 *8*	4019.1	29/2$^+$	3169.0	25/2$^+$	Q	R_θ=1.31 *18*.
853.3 *2*	105 *13*	5066.5	35/2$^+$	4213.1	31/2$^+$	Q	R_θ=1.46 *19*.
858.6 *10*		5213.3	(35/2$^-$)	4354.9	(31/2$^-$)		
861.1 *10*		2950.7	25/2$^-$	2089.4	23/2$^-$	D	
861.3 *5*	54 *9*	4880.0	33/2$^+$	4019.1	29/2$^+$	Q	R_θ=1.68 *24*.
861.5 *5*	33 *4*	6655.2	41/2$^-$	5793.4	37/2$^-$	Q	R_θ=1.69 *21*.
862.1 *10*		3853.7	(27/2$^-$)	2991.2	27/2$^-$		
868.2 *2*	134 *15*	3152.6	25/2$^-$	2284.4	21/2$^-$	Q	R_θ=1.60 *22*.
871.1 *10*		5026.7	33/2$^-$	4155.6	31/2$^+$		
875.3 *10*		2963.9	23/2$^+$	2089.4	23/2$^-$		
875.8 *10*		7990.9	47/2$^+$	7114.9	43/2$^+$		
875.9 *2*	4.1×10^2 *5*	2965.3	27/2$^-$	2089.4	23/2$^-$	Q	R_θ=1.49 *18*.
879.2[@] *2*	7.3×10^2[a] *9*	5915.5	39/2$^+$	5036.2	35/2$^+$		

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^{80}Se(^{48}Ca,5nγ):Nd 2020Ba12 (continued)

$\gamma(^{123}Xe)$ (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [b]	Comments
880.8[@] *10*	[a]	5036.2	35/2$^+$	4155.6	31/2$^+$		
882.2 *5*	25 *4*	5207.4	35/2$^+$	4325.3	31/2$^+$	Q	R_θ=1.40 *20*.
883.7 *10*		7257.6	43/2$^-$	6374.1	39/2$^-$		
887.8 *10*		3853.7	(27/2$^-$)	2965.3	27/2$^-$		
888.6 *2*	141 *17*	2950.7	25/2$^-$	2062.1	21/2$^-$	Q	R_θ=1.89 *27*.
891.8 *2*	100 *12*	5519.3	37/2$^+$	4627.4	33/2$^+$	Q	R_θ=1.29 *18*.
901.9 *10*		2991.2	27/2$^-$	2089.4	23/2$^-$	Q	R_θ=1.84 *25*.
906.4 *2*	113 *14*	7990.9	47/2$^+$	7084.4	43/2$^+$	Q	R_θ=1.43 *18*.
910.9 *5*	20 *2*	11046.1	57/2$^-$	10135.1	55/2$^-$	D+Q	R_θ=0.83 *12*.
916.7 *2*	142 *17*	3907.9	27/2$^-$	2991.2	27/2$^-$		
919.2 *10*	5 *1*	7084.4	43/2$^+$	6165.1	39/2$^+$		
926.4 *10*	9 *2*	5651.0	37/2$^+$	4724.6	33/2$^+$	Q	R_θ=1.71 *21*.
933.1 *5*	68 *8*	7066.9	43/2$^-$	6133.8	39/2$^-$	Q	R_θ=1.48 *19*.
934.2 *10*		4283.6	29/2$^-$	3349.3	27/2$^+$	D	R_θ=0.74 *9*.
934.9 *5*	29 *4*	9123.9	51/2$^+$	8189.3	47/2$^+$	Q	R_θ=1.23 *18*.
936.1 *10*		2230.2	19/2$^+$	1293.6	17/2$^-$		
939.9 *10*	4 *1*	3905.2	29/2$^+$	2965.3	27/2$^-$		
941.0 *5*	14 *2*	13432.8	67/2$^-$	12491.9	63/2$^-$	Q	R_θ=1.45 *19*.
942.6 *2*	3.0×10^2 *4*	3907.9	27/2$^-$	2965.3	27/2$^-$	D+Q	R_θ=1.08 *12*.
944.3 *5*	98 *12*	10068.1	55/2$^+$	9123.9	51/2$^+$	Q	R_θ=1.53 *23*.
948.9 *10*		2284.4	21/2$^-$	1335.7	19/2$^-$	D+Q	R_θ=1.08 *15*.
950.9 *5*	86 *10*	4103.4	29/2$^-$	3152.6	25/2$^-$	Q	R_θ=1.48 *22*.
954.6 *5*	40 *5*	11089.7	59/2$^-$	10135.1	55/2$^-$	Q	R_θ=1.70 *23*.
957.7 *5*	15 *2*	6165.1	39/2$^+$	5207.4	35/2$^+$	Q	R_θ=1.48 *22*.
958.1 *5*	89 *11*	6477.0	41/2$^+$	5519.3	37/2$^+$	Q	R_θ=1.40 *21*.
960.6 *10*		6070.1	37/2$^-$	5109.4	33/2$^-$	Q	R_θ=1.62 *24*.
960.8 *5*	42[a] *6*	8218.2	47/2$^-$	7257.6	43/2$^-$		
961.3 *10*		5064.5	(33/2$^-$)	4103.4	29/2$^-$		
962.5 *10*	[a]	7617.4	45/2$^-$	6655.2	41/2$^-$	Q	R_θ=1.62 *21*.
965.4 *5*	65 *8*	9418.8	53/2$^+$	8453.6	49/2$^+$	Q	R_θ=1.63 *21*.
966.7 *10*		8224.9	47/2$^-$	7257.6	43/2$^-$		
967.6 *2*	117 *15*	6034.1	39/2$^+$	5066.5	35/2$^+$	Q	R_θ=1.54 *20*.
971.9 *2*	112 *13*	8453.6	49/2$^+$	7481.7	45/2$^+$	Q	R_θ=1.76 *23*.
985.0 *10*		8955.2	49/2$^-$	7969.8	45/2$^-$		
985.8 *2*	2.8×10^2 *3*	3951.1	31/2$^-$	2965.3	27/2$^-$	Q	R_θ=1.52 *15*.
1000.1 *5*	16 *2*	6418.2	39/2$^-$	5418.0	35/2$^-$	Q	R_θ=1.34 *16*.
1004.7 *2*	102 *12*	7481.7	45/2$^+$	6477.0	41/2$^+$	Q	R_θ=1.59 *22*.
1005.3[@] *2*	118[a] *15*	6048.5	(37/2$^-$)	5043.2	(33/2$^-$)		
1005.4[@] *10*	[a]	3956.0	(29/2$^-$)	2950.7	25/2$^-$		
1005.7 *5*	35 *4*	6070.1	37/2$^-$	5064.5	(33/2$^-$)		
1008.4 *5*	54 *7*	8075.3	47/2$^-$	7066.9	43/2$^-$	Q	R_θ=1.32 *20*.
1027.3 *10*		6070.1	37/2$^-$	5043.2	(33/2$^-$)		
1029.6 *5*	21 *4*	11097.6	57/2$^+$	10068.1	55/2$^+$	D+Q	R_θ=0.58 *10*.
1032.8 *10*	7 *1*	6683.8	41/2$^+$	5651.0	37/2$^+$	Q	R_θ=1.26 *13*.
1035.6 *2*	129 *14*	6045.8	39/2$^-$	5010.2	35/2$^-$	Q	R_θ=1.37 *15*.
1038.3 *10*		1757.5	17/2$^+$	719.1	15/2$^-$	D	R_θ=0.85 *11*.
1048.8 *5*	12 *2*	12146.4	61/2$^+$	11097.6	57/2$^+$	Q	R_θ=1.58 *22*.
1050.2 *5*	36 *4*	7084.4	43/2$^+$	6034.1	39/2$^+$	Q	R_θ=1.51 *21*.
1059.1 *2*	2.4×10^2[a] *3*	5010.2	35/2$^-$	3951.1	31/2$^-$	Q	R_θ=1.83 *24*.
1060.9 *10*	[a]	7106.9	43/2$^-$	6045.8	39/2$^-$	Q	R_θ=1.55 *20*.
1062.7 *10*		3152.6	25/2$^-$	2089.4	23/2$^-$		
1064.7 *5*	15 *3*	11132.7		10068.1	55/2$^+$		
1073.2 *5*	18 *3*	8690.6	(49/2$^-$)	7617.4	45/2$^-$		
1079.6 *2*	4.1×10^2 *5*	3169.0	25/2$^+$	2089.4	23/2$^-$	D	R_θ=0.80 *9*.

Continued on next page (footnotes at end of table)

^{80}Se(^{48}Ca,5nγ):Nd 2020Ba12 (continued)

$\gamma(^{123}Xe)$ (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [b]	Comments
1080.7 *5*	58 *8*	7114.9	43/2$^+$	6034.1	39/2$^+$	Q	R_θ=1.29 *22*.
1084.5 *5*	47 *6*	3853.7	(27/2$^-$)	2769.5	23/2$^-$		
1087.3 *5*	34 *5*	5043.2	(33/2$^-$)	3956.0	(29/2$^-$)		
1105.4 *10*		8189.3	47/2$^+$	7084.4	43/2$^+$	Q	R_θ=1.66 *28*.
1107.3 *5*	41 *6*	11175.4	(59/2$^+$)	10068.1	55/2$^+$		
1111.4 *5*	76 *8*	8218.2	47/2$^-$	7106.9	43/2$^-$	Q	R_θ=1.76 *23*.
1113.7 *5*	10 *2*	7278.8	43/2$^+$	6165.1	39/2$^+$	Q	R_θ=1.22 *22*.
1115.8 *10*	7 *1*	14554.2	(69/2$^-$)	13438.4	65/2$^-$		
1118.1 *5*	21 *3*	8224.9	47/2$^-$	7106.9	43/2$^-$		
1120.8 *5*	34 *4*	3209.8	25/2$^+$	2089.4	23/2$^-$		
1123.7 *10*		7807.5	45/2$^+$	6683.8	41/2$^+$	Q	R_θ=1.87 *34*.
1126.9[c] *10*	3 *1*	12216.2?		11089.7	59/2$^-$		
1128.1 *10*		2422.1	19/2$^+$	1293.6	17/2$^-$	D	R_θ=0.80 *9*.
1133.3 *5*	18 *2*	9123.9	51/2$^+$	7990.9	47/2$^+$	Q	R_θ=1.67 *21*.
1137.1 *10*		12858.4		11721.2	61/2$^-$		
1138.3 *2*	147 *18*	3907.9	27/2$^-$	2769.5	23/2$^-$	Q	R_θ=1.60 *21*.
1141.8[@] *10*	8[a] *2*	10708.1	(55/2$^+$)	9566.3	(51/2$^+$)		
1143.0[@] *10*	[a]	11851.1	(59/2$^+$)	10708.1	(55/2$^+$)		
1146.5 *10*	8 *1*	12236.4	63/2$^-$	11089.7	59/2$^-$	Q	R_θ=1.86 *27*.
1152.0 *10*		9376.9	(51/2$^-$)	8224.9	47/2$^-$		
1153.2 *10*		5109.4	33/2$^-$	3956.0	(29/2$^-$)		
1156.4 *10*		7840.2		6683.8	41/2$^+$		
1160.9 *5*	68 *9*	2497.1	21/2$^+$	1335.7	19/2$^-$		
1162.9 *5*	14 *3*	12295.6		11132.7			
1166.9 *5*	10[a] *2*	9465.2		8298.3	(47/2$^+$)		
1168.8 *5*	85 *10*	7084.4	43/2$^+$	5915.5	39/2$^+$	Q	R_θ=1.47 *19*.
1169.2 *10*	[a]	10634.4		9465.2			
1169.8 *10*	3 *1*	8448.6	(47/2$^+$)	7278.8	43/2$^+$		
1174.5 *10*		8955.2	49/2$^-$	7780.7	45/2$^-$		
1178.2 *5*	11 *2*	10597.0	(57/2$^+$)	9418.8	53/2$^+$		
1180.6 *5*	58 *7*	7969.8	45/2$^-$	6789.2	41/2$^-$	Q	R_θ=1.22 *12*.
1182.2 *5*	26 *4*	9257.4	(51/2$^-$)	8075.3	47/2$^-$		
1183.4 *5*	28 *4*	8298.3	(47/2$^+$)	7114.9	43/2$^+$		
1194.4 *10*		8975.1	(49/2$^-$)	7780.7	45/2$^-$		
1195.0 *5*	11 *2*	10613.8	57/2$^+$	9418.8	53/2$^+$	Q	R_θ=1.47 *22*.
1196.0 *10*	6 *1*	13432.8	67/2$^-$	12236.4	63/2$^-$		
1197.4 *10*		10574.3	(55/2$^-$)	9376.9	(51/2$^-$)		
1202.0 *10*		13438.4	65/2$^-$	12236.4	63/2$^-$	D+Q	R_θ=0.28 *8*.
1204.6 *5*	35 *4*	9422.8	51/2$^-$	8218.2	47/2$^-$	Q	R_θ=1.23 *18*.
1211.3 *10*		11808.4	(61/2$^+$)	10597.0	(57/2$^+$)		
1212.7 *5*	17 *2*	8694.0	49/2$^+$	7481.7	45/2$^+$		
1215.7 *5*	13 *2*	9906.5	(53/2$^-$)	8690.6	(49/2$^-$)		
1216.2 *5*	16 *2*	12039.9	61/2$^+$	10823.7	57/2$^+$	Q	R_θ=1.73 *29*.
1222.1[c] *10*		13438.4	65/2$^-$	12216.2?			
1225.5 *10*		5328.9	(33/2$^-$)	4103.4	29/2$^-$		
1228.3 *10*		11132.7		9904.2			
1232.0 *5*	14 *3*	10489.5	(55/2$^-$)	9257.4	(51/2$^-$)		
1234.2 *10*		12323.8		11089.7	59/2$^-$		
1251.9 *10*		6464.9	39/2$^-$	5213.3	(35/2$^-$)		
1256.6 *5*	29[a] *4*	8363.6	47/2$^-$	7106.9	43/2$^-$		
1257.0 *10*	[a]	10679.8	55/2$^-$	9422.8	51/2$^-$	Q	R_θ=1.26 *20*.
1262.5 *10*		5213.3	(35/2$^-$)	3951.1	31/2$^-$		
1264.0[c] *10*		11898.0?		10634.4			
1268.0 *10*	9 *2*	9566.3	(51/2$^+$)	8298.3	(47/2$^+$)		

Continued on next page (footnotes at end of table)

^{80}Se(^{48}Ca,5nγ):Nd 2020Ba12 (continued)

$\gamma(^{123}Xe)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[b]	Comments
1269.9 *10*	6 *1*	11175.7	(57/2$^-$)	9906.5	(53/2$^-$)		
1288.5 *10*	6 *1*	11097.6	57/2$^+$	9808.9	(53/2$^+$)		
1292.4 *10*		9590.7		8298.3	(47/2$^+$)		
1311.6 *5*	20 *3*	14484.7		13173.1	(65/2$^+$)		
1318.9 *5*	14 *2*	11998.7	(59/2$^-$)	10679.8	55/2$^-$		
1327.2 *5*	10 *2*	14760.0	69/2$^-$	13432.8	67/2$^-$	D+Q	R_θ=0.24 *7*.
1329.5 *10*		5285.8	(33/2$^-$)	3956.0	(29/2$^-$)		
1348.2 *5*	27 *3*	14521.3		13173.1	(65/2$^+$)		
1352.4 *10*		2688.6	21/2$^+$	1335.7	19/2$^-$		
1355.3 *5*	11 *2*	9808.9	(53/2$^+$)	8453.6	49/2$^+$		
1364.7 *5*	58 *6*	13173.1	(65/2$^+$)	11808.4	(61/2$^+$)		
1372.4 *10*		11440.5		10068.1	55/2$^+$		
1389.9 *10*		4354.9	(31/2$^-$)	2965.3	27/2$^-$		
1402.3 *5*	14 *2*	12491.9	63/2$^-$	11089.7	59/2$^-$	Q	R_θ=1.78 *28*.
1404.9 *5*	33 *5*	10823.7	57/2$^+$	9418.8	53/2$^+$	Q	R_θ=1.84 *30*.
1408.2 *5*	11 *2*	6418.2	39/2$^-$	5010.2	35/2$^-$		
1454.7 *5*	31 *7*	6464.9	39/2$^-$	5010.2	35/2$^-$	Q	R_θ=1.76 *18*.
1466.6 *10*		5418.0	35/2$^-$	3951.1	31/2$^-$		
1480.5 *10*	7 *2*	12921.0		11440.5			
1534.0 *10*	9 *2*	10890.5	57/2$^-$	9356.8	53/2$^-$		
1764.1 *10*		3853.7	(27/2$^-$)	2089.4	23/2$^-$		
1818.9 *5*	73 *15*	3907.9	27/2$^-$	2089.4	23/2$^-$		

† From 2020Ba12. Uncertainties are not explicitly given by 2020Ba12 and assigned by the evaluator as follows based on authors' general statement that the uncertainty lies between 0.2 and 1.0 keV depending on intensity: $\Delta E\gamma$=0.2 keV for $I\gamma\geq$100, 0.5 keV for $I\gamma\geq$10, and 1.0 keV for the rest, unless otherwise noted.

‡ Relative to $I\gamma$=1000 for 616.6γ from 1335 level (2020Ba12).

From Adopted Gammas; not seen in 2020Ba12. Original values quoted by 2020Ba12 are taken by the authors from 1981Lu01 in (^{3}He,3nγ).

@ Measurement of angular distribution ratio was not possible due to the presence of gamma rays of overlapping energy (2020Ba12).

& The energy of gamma ray could not be measured exactly due to the presence of multiple gamma rays of similar energy (2020Ba12).

a The quoted intensity is the combined value for gamma rays of overlapping energies (2020Ba12).

b From 2020Ba12 based on measured γ angular intensity ratios R_θ given under comments. Expected R_θ values are ≈0.6 and 1.4 for stretched dipole and stretched quadrupole transitions, respectively. Original assignments are given by 2020Ba12 as M1+E2, E1 and E2 with definite electric or magnetic natures, but have been replaced by the evaluator with D+Q, D and Q, respectively, due to lack of experimental evidence from this work for the electric or magnetic natures.

c Placement of transition in the level scheme is uncertain.

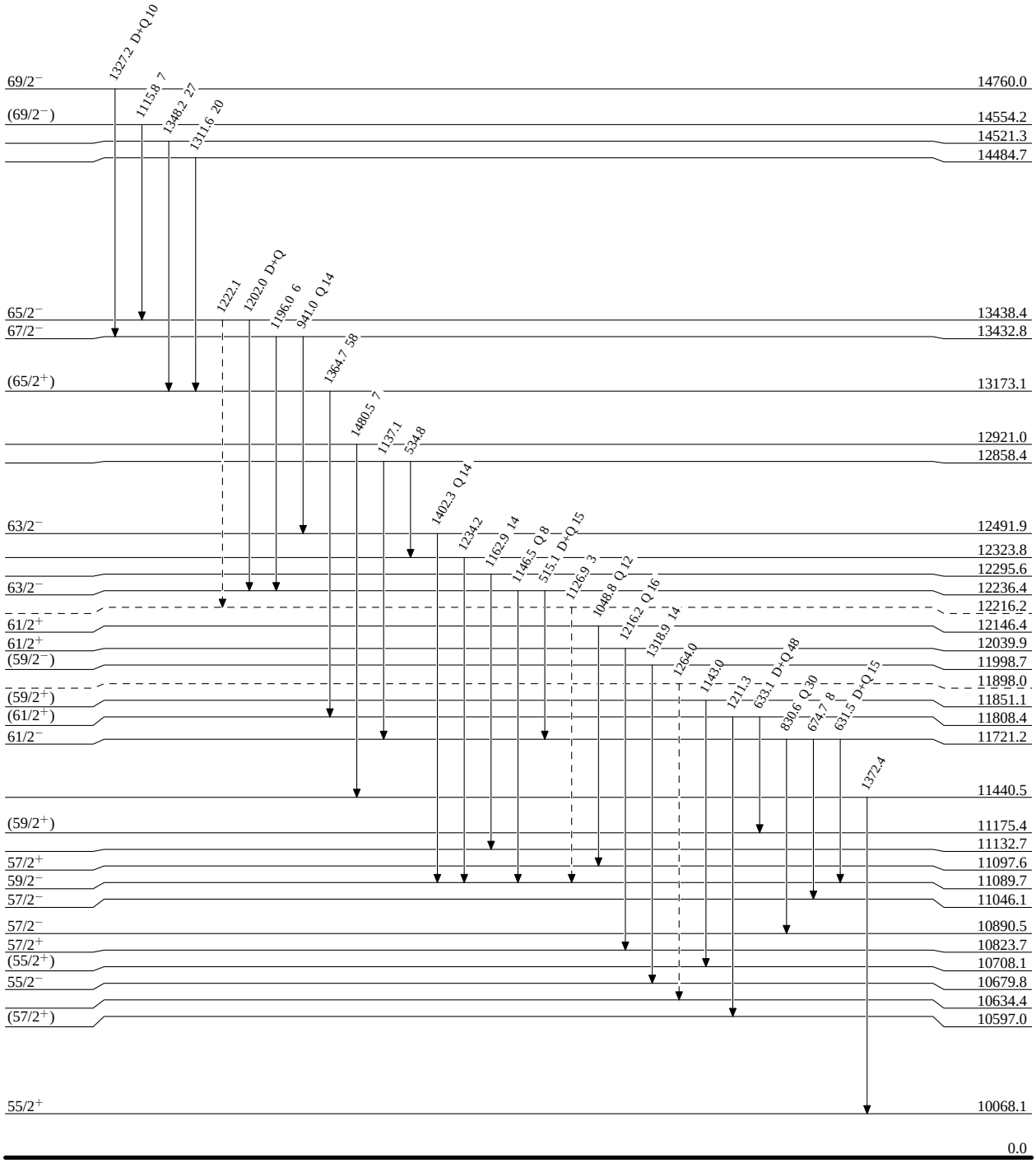
^{80}Se(^{48}Ca,5nγ):Nd 2020Ba12

Level Scheme

Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)



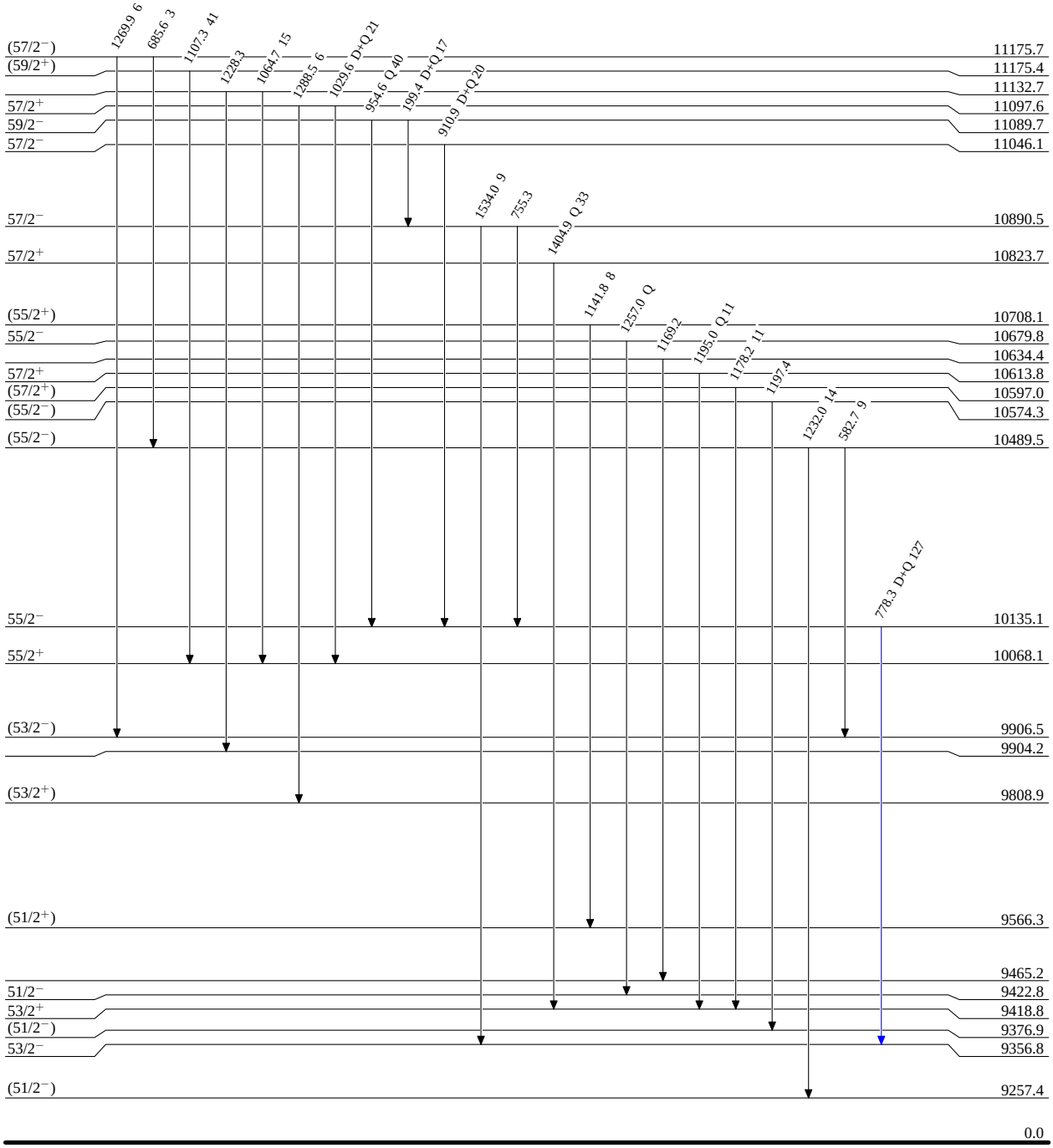
$^{123}_{54}Xe_{69}$

^{80}Se(^{48}Ca,5nγ):Nd 2020Ba12

Level Scheme (continued)

Intensities: Relative I_γ

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



$^{123}_{54}Xe_{69}$

^{80}Se(^{48}Ca,5nγ):Nd 2020Ba12

Level Scheme (continued)

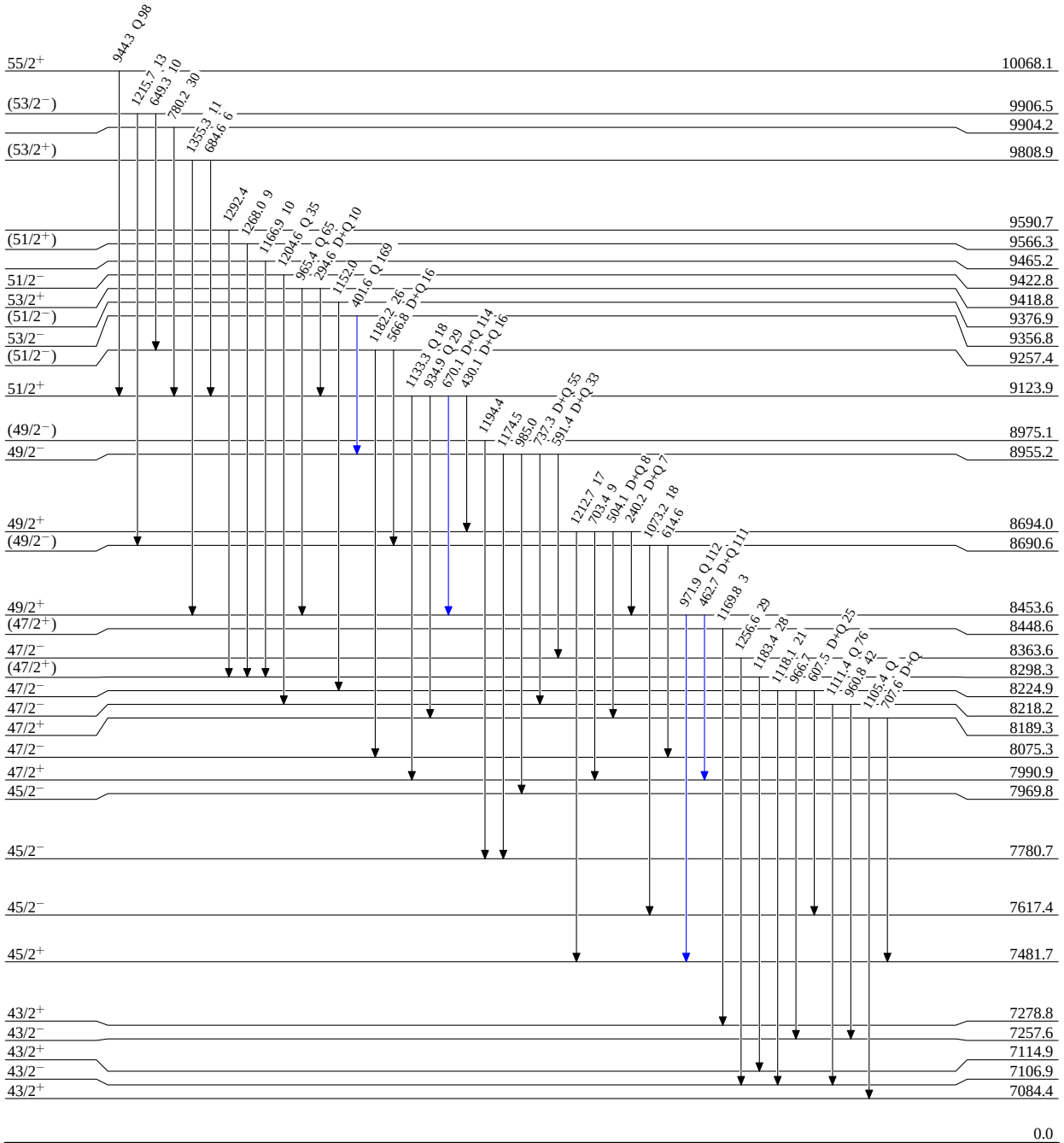
Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$



$^{123}_{54}Xe_{69}$

^{80}Se(^{48}Ca,5nγ):Nd 2020Ba12

Level Scheme (continued)

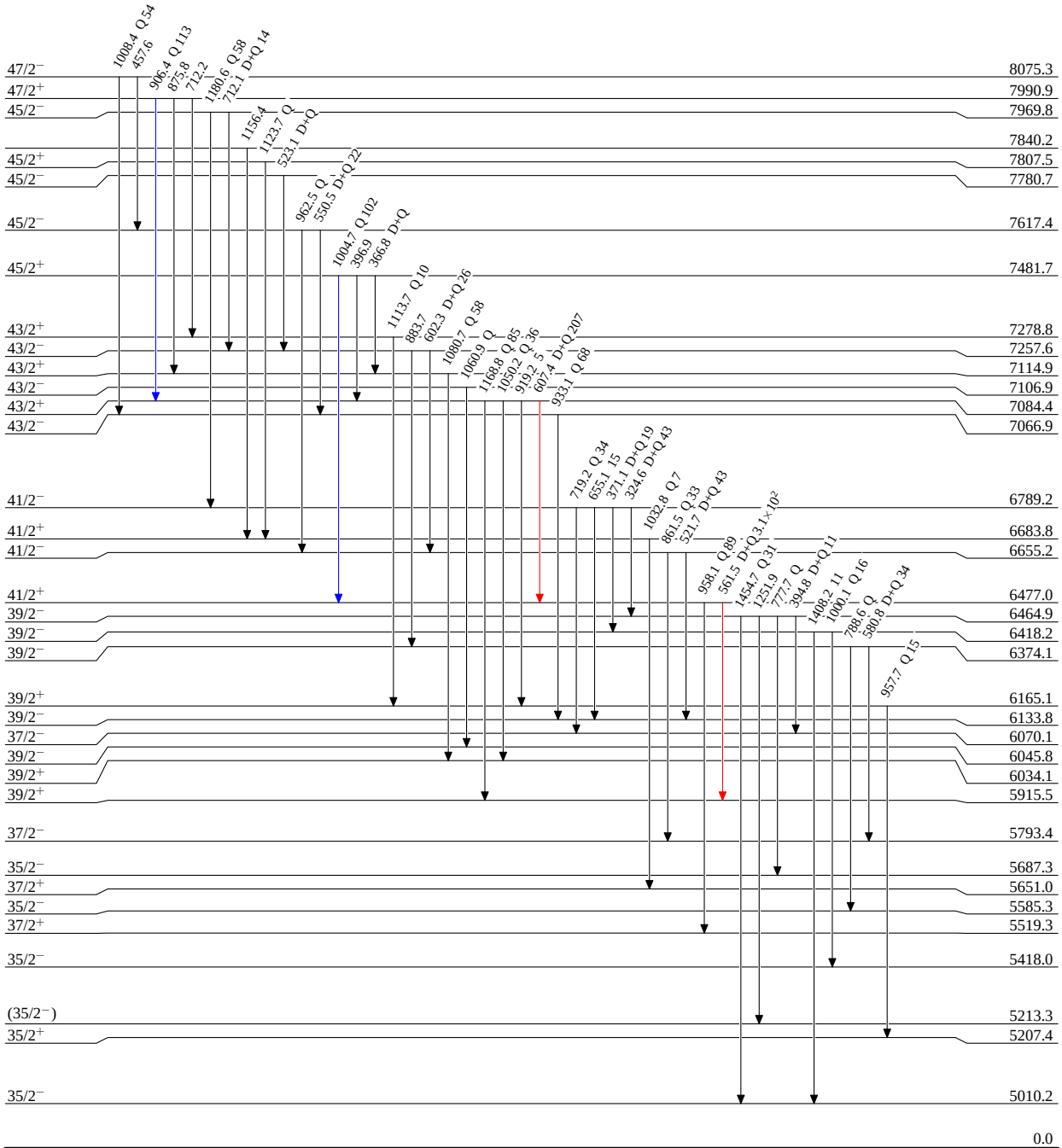
Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$



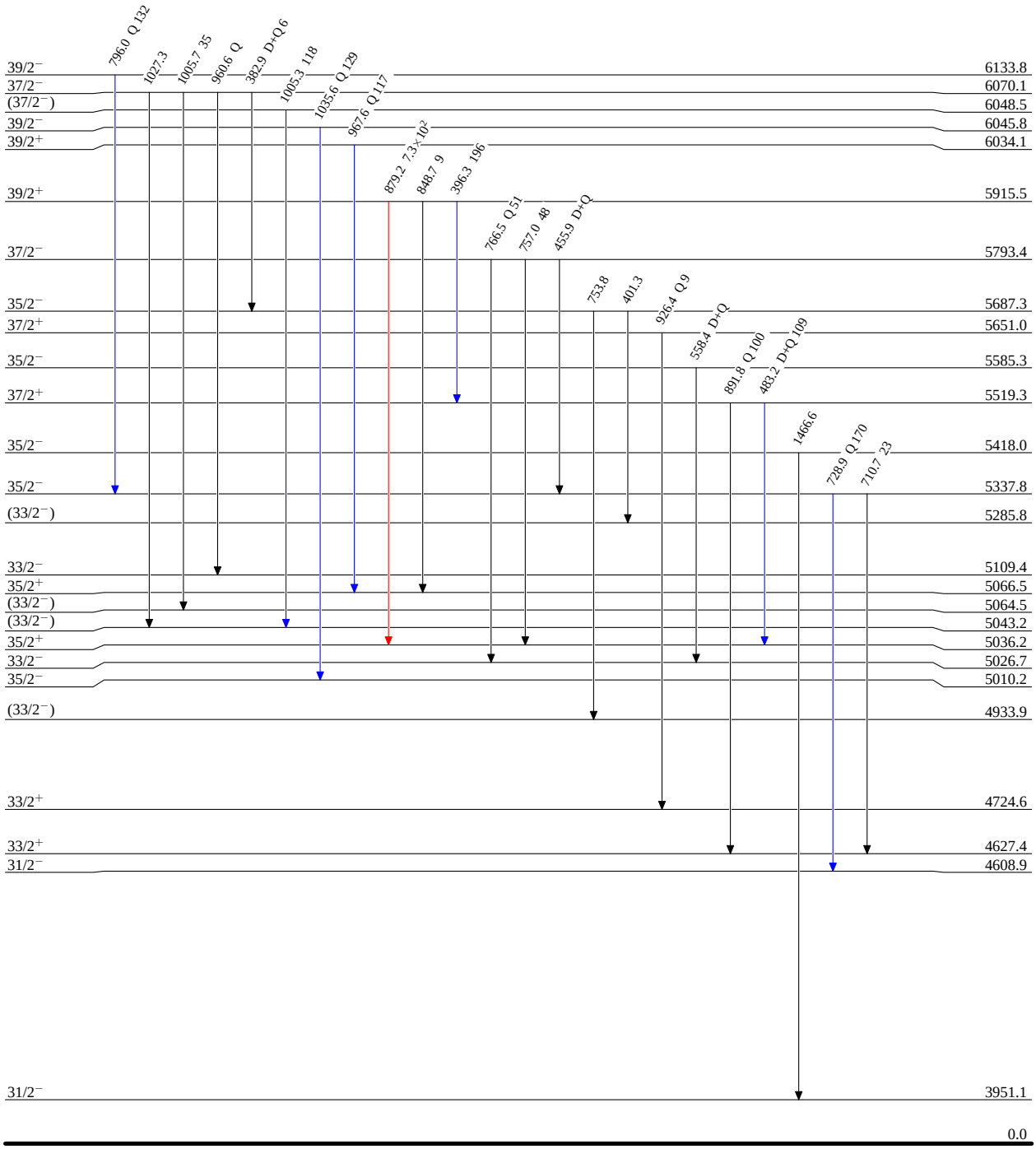
$^{123}_{54}Xe_{69}$

^{80}Se(^{48}Ca,5nγ):Nd 2020Ba12

Level Scheme (continued)

Intensities: Relative I_γ

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$

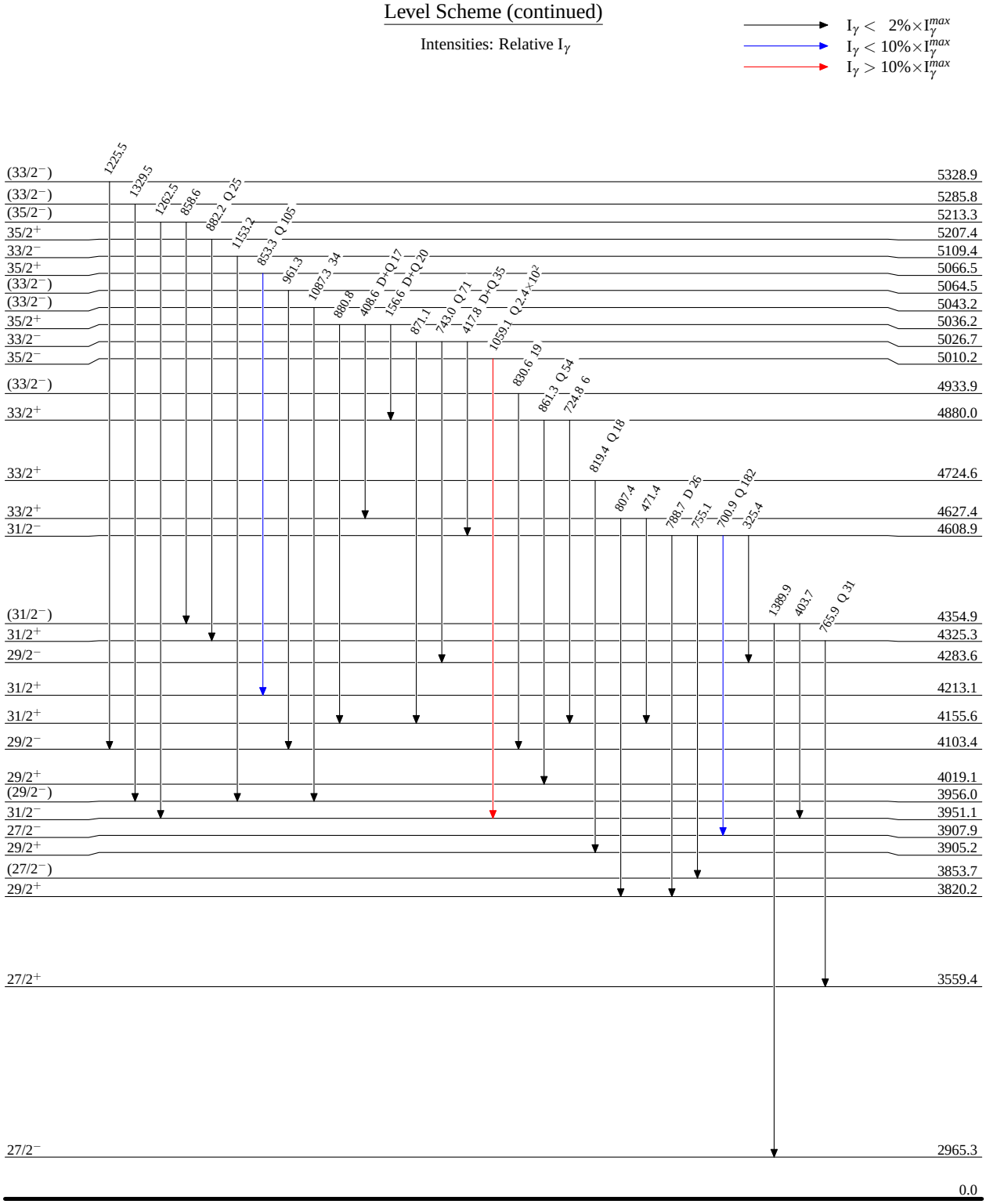


$^{123}_{54}Xe_{69}$

^{80}Se(^{48}Ca,5nγ):Nd 2020Ba12

Level Scheme (continued)

Intensities: Relative I_γ



$^{123}_{54}Xe_{69}$

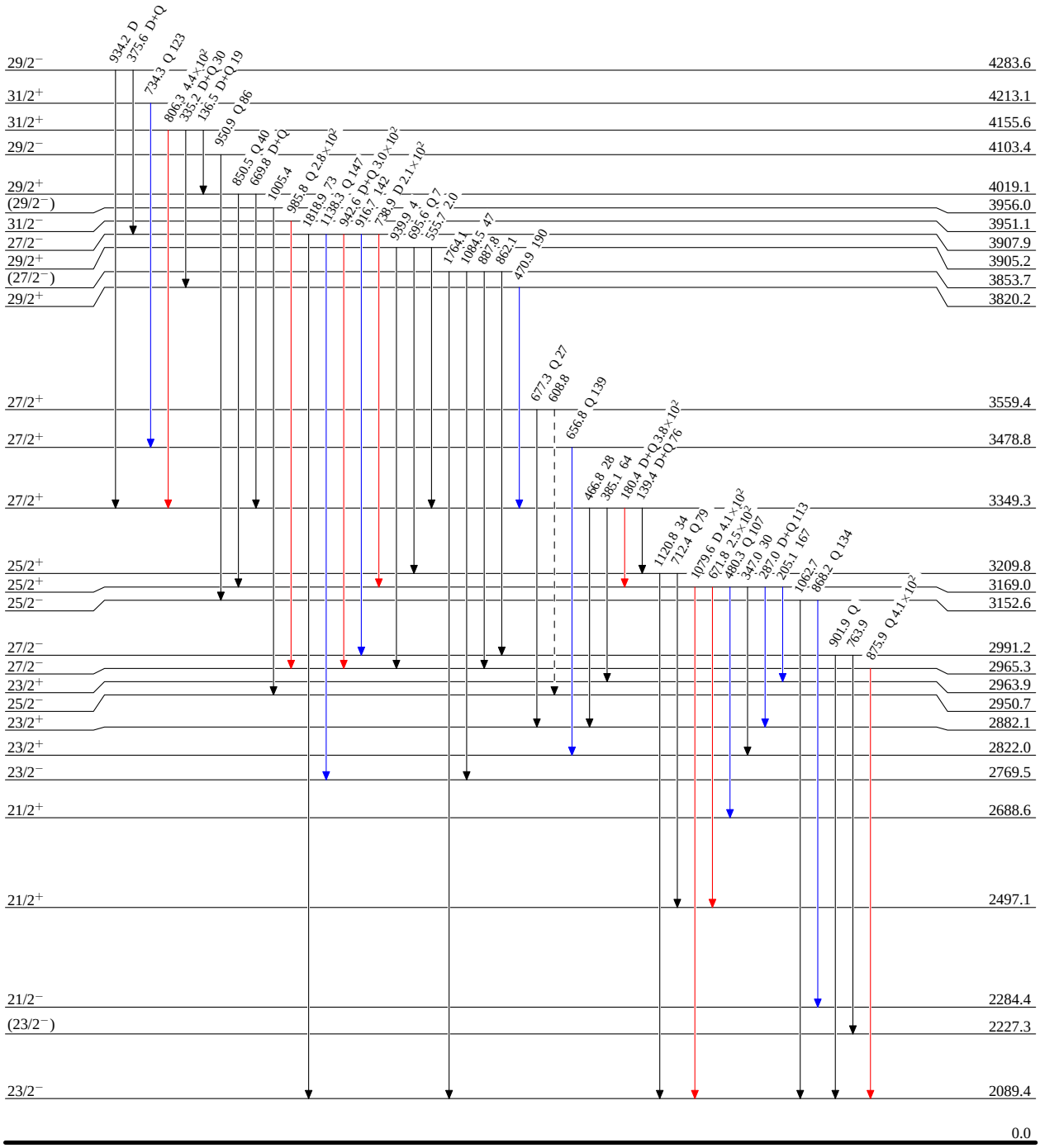
^{80}Se(^{48}Ca,5nγ):Nd 2020Ba12

Level Scheme (continued)

Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)

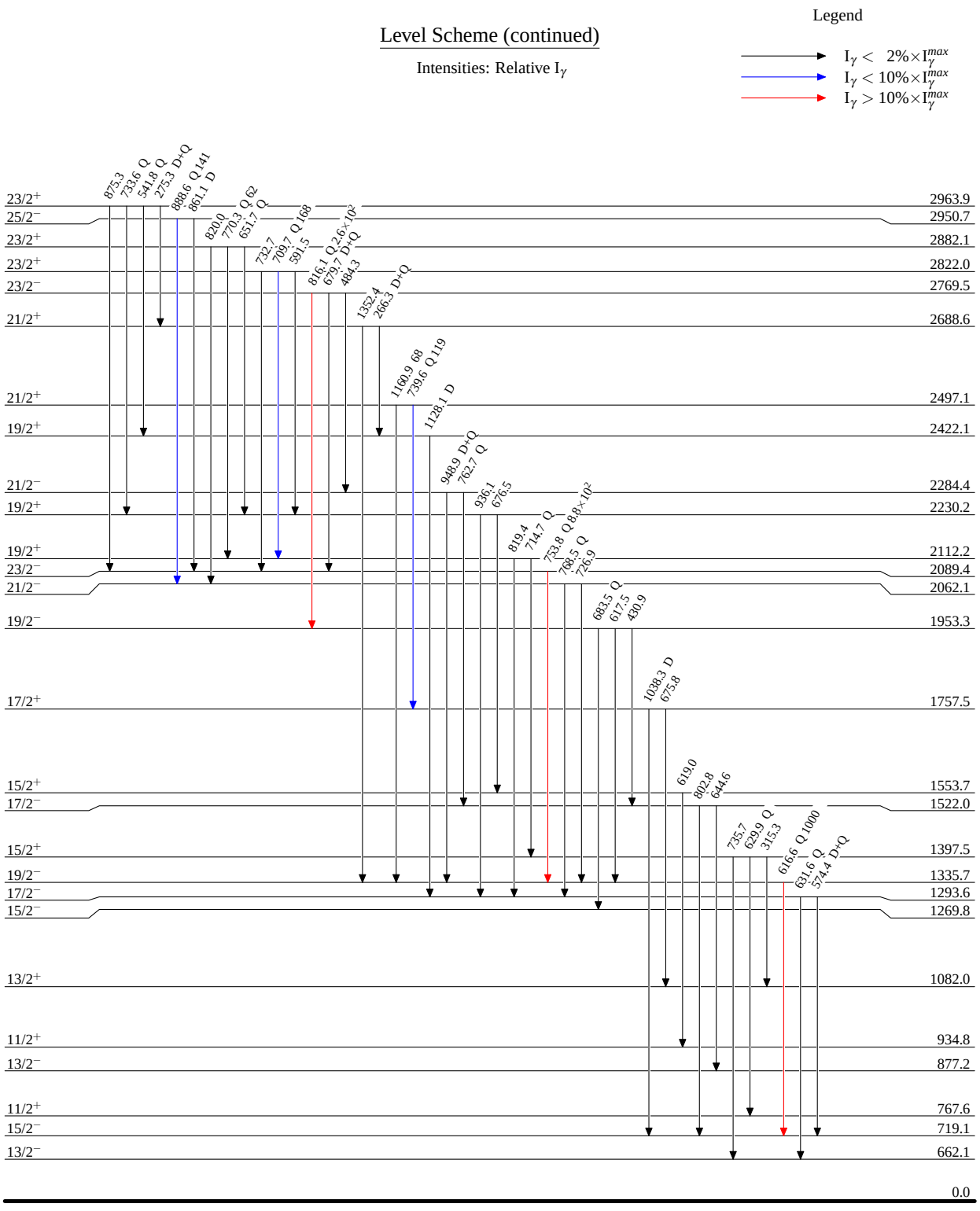


$^{123}_{54}Xe_{69}$

^{80}Se(^{48}Ca,5nγ):Nd 2020Ba12

Level Scheme (continued)

Intensities: Relative I_γ

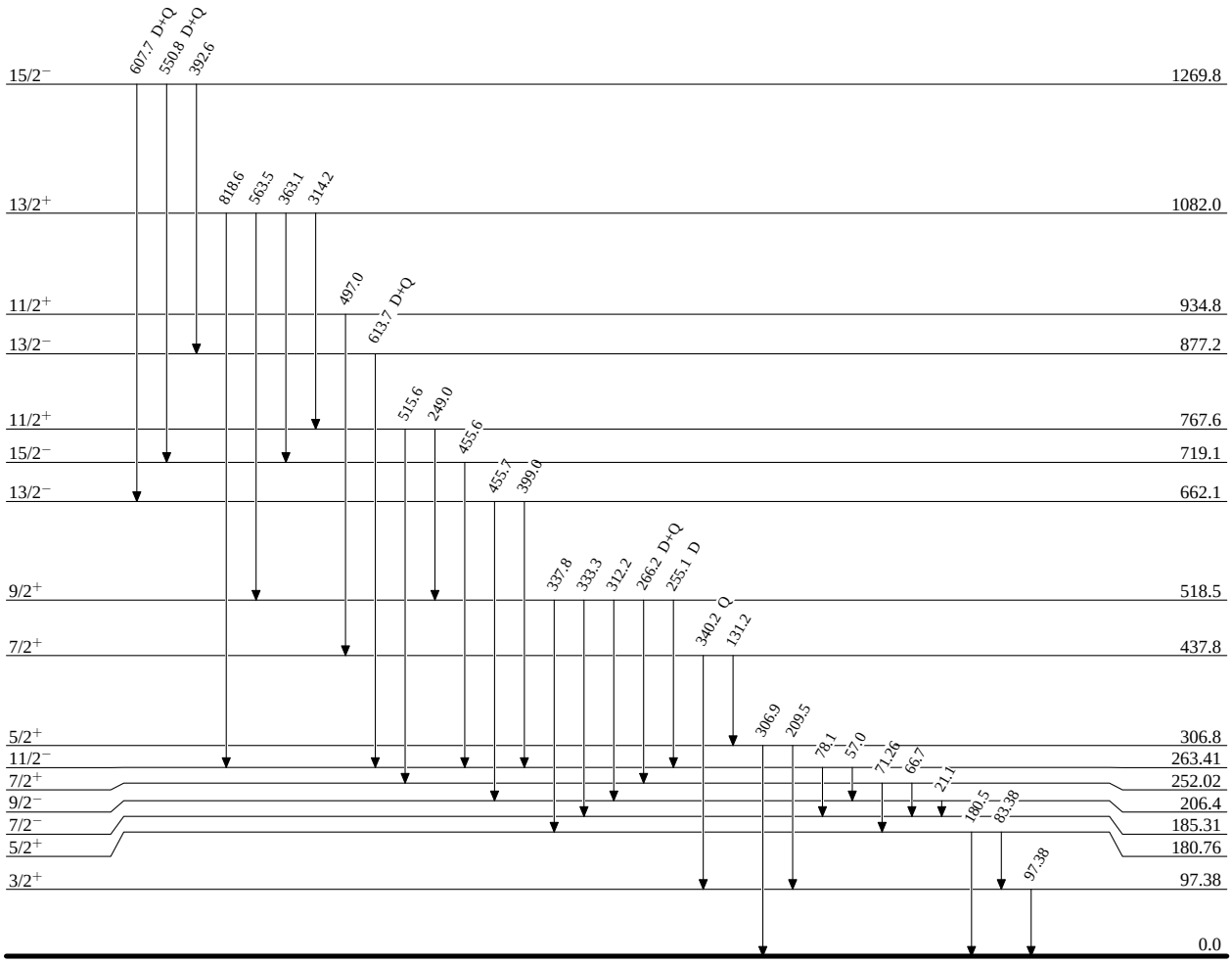


$^{123}_{54}Xe_{69}$

^{80}Se(^{48}Ca,5nγ):Nd 2020Ba12

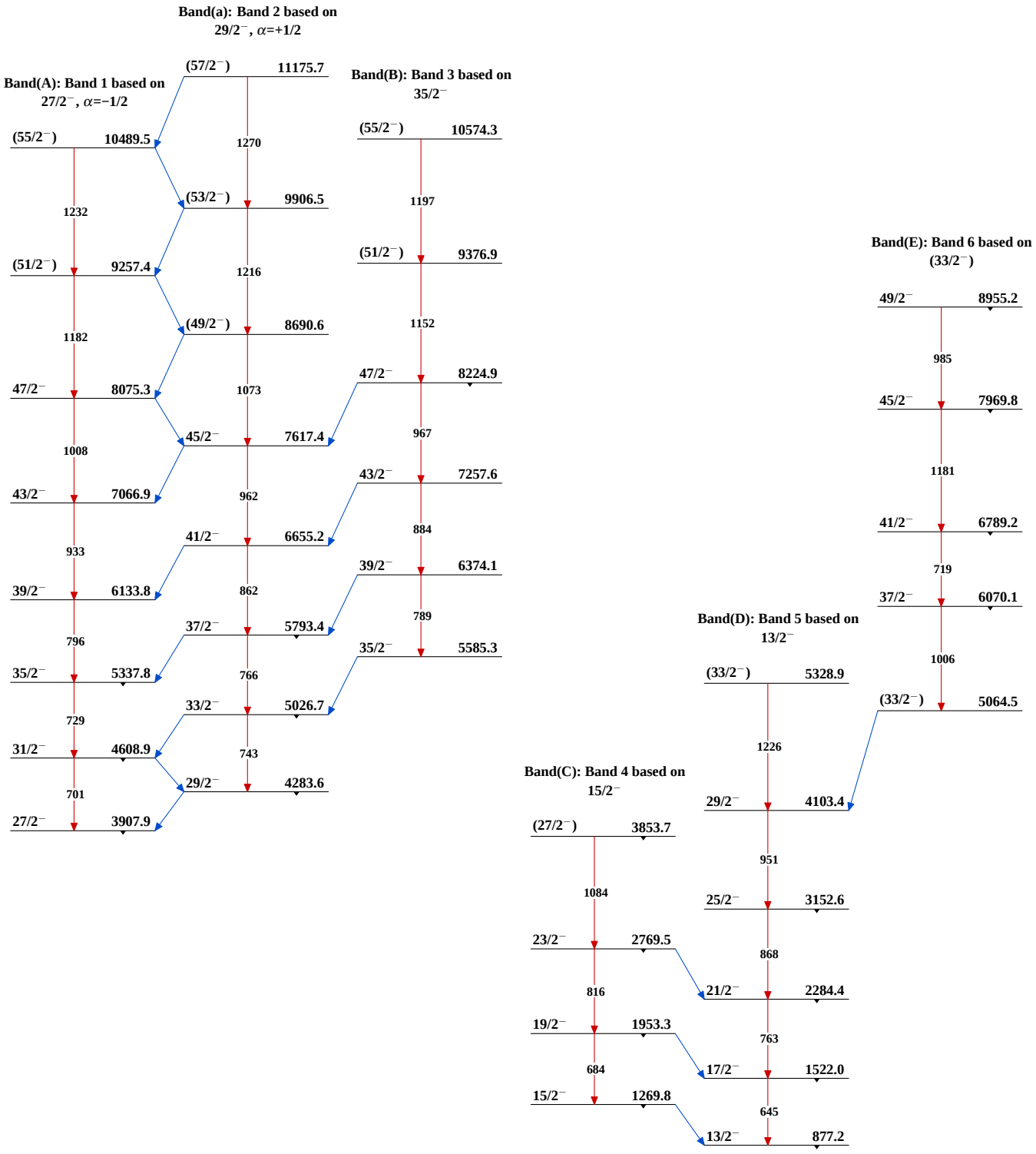
Level Scheme (continued)

Intensities: Relative I_γ



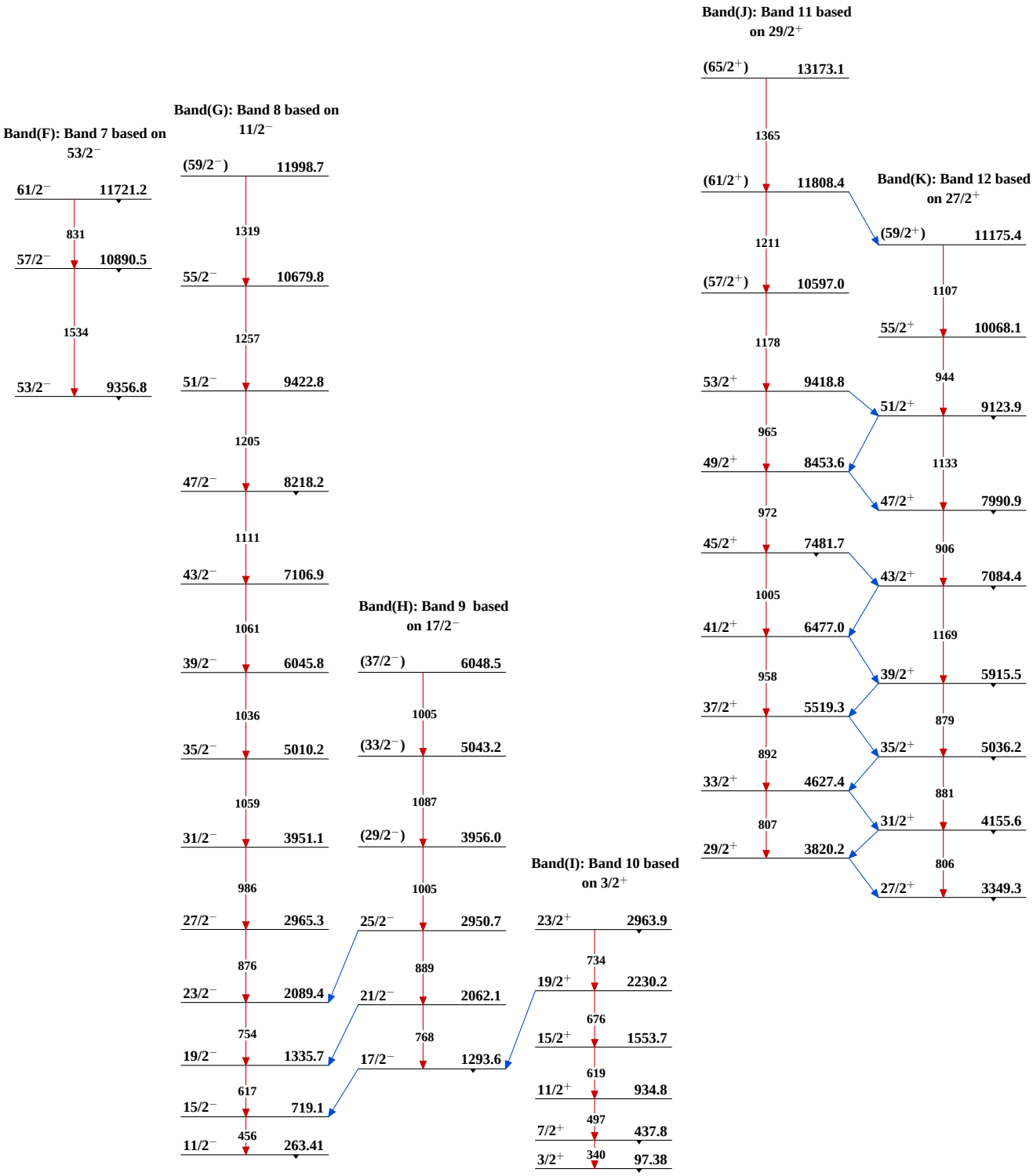
$^{123}_{54}Xe_{69}$

^{80}Se(^{48}Ca,5nγ):Nd 2020Ba12



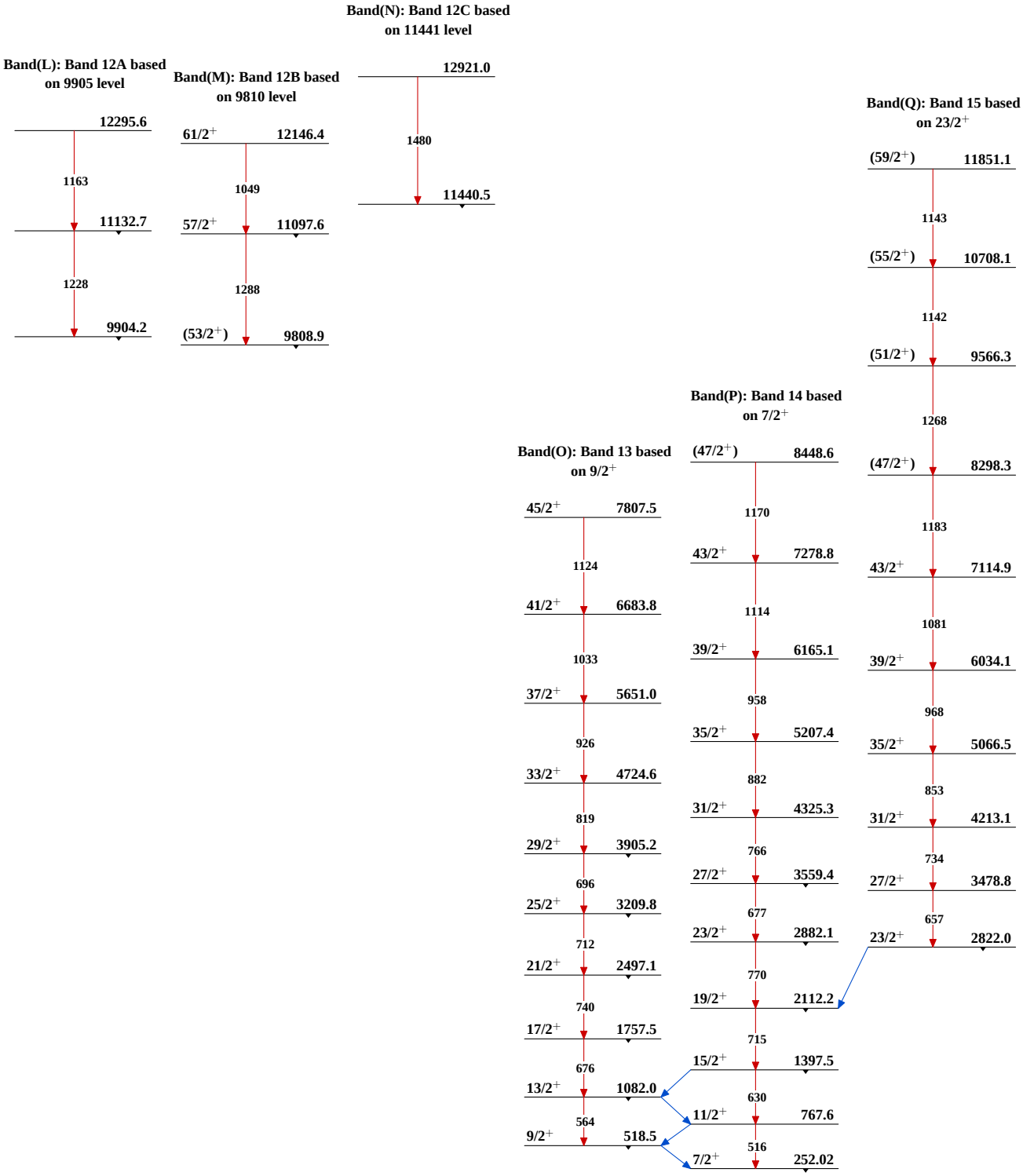
$^{123}_{54}Xe_{69}$

^{80}Se(^{48}Ca,5nγ):Nd 2020Ba12 (continued)



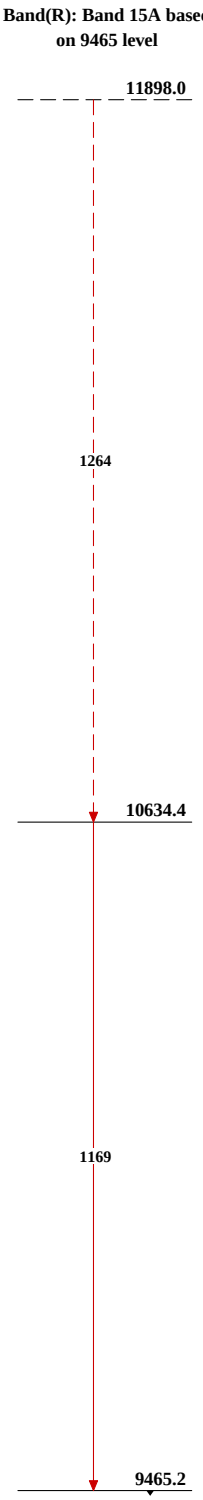
$^{123}_{54}Xe_{69}$

^{80}Se(^{48}Ca,5nγ):Nd 2020Ba12 (continued)



$^{123}_{54}Xe_{69}$

^{80}Se(^{48}Ca,5nγ):Nd 2020Ba12 (continued)



$^{123}_{54}Xe_{69}$

^{80}Se(^{48}Ca,5nγ):SD 2021Ba03

This datasets contains data for super-deformed (SD) bands from the measurement of ^{80}Se(^{48}Ca,5nγ). See 2020Ba12 for data of normal-deformed bands from the same measurement.

2021Ba03: E=207 MeV ^{48}Ca beam was produced from the ATLAS accelerator at ANL. Target was 0.6 mg/cm^2 ^{80}Se on a 0.3 mg/cm^2 Au backing. γ rays were detected with the Gammasphere array of 101 Compton-suppressed Ge detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma\gamma$-coin, γ angular intensity ratios. Deduced levels, J, π, band structures, γ-ray multipolarities. Comparisons with Cranked Nilsson-Strutinsky (CNS) calculations.

The four highly-deformed bands are found to feed the normal-deformed (ND) levels of ^{123}Xe observed in 2020Ba12.

^{123}Xe Levels

E(level)[†]	J$^\pi$[‡]	E(level)[†]	J$^\pi$[‡]	E(level)[†]	J$^\pi$[‡]	E(level)[†]	J$^\pi$[‡]
z+4640[f]	(37/2$^+$)	y+12242[d]	(61/2$^-$)	z+17901[e]	(77/2$^+$)	z+25263[e]	(93/2$^+$)
z+5576[f]	(41/2$^+$)	w+12393[@]	(61/2$^-$)	w+18014[#]	(77/2$^-$)	y+25443[c]	(93/2$^-$)
z+6655[f]	(45/2$^+$)	w+12400[#]	(61/2$^-$)	y+18207[c]	(77/2$^-$)	x+26702[b]	(95/2$^-$)
z+7873[f]	(49/2$^+$)	x+13300[b]	(63/2$^-$)	x+19315[b]	(79/2$^-$)	w+27008[#]	(97/2$^-$)
z+9224[f]	(53/2$^+$)	z+13354[e]	(65/2$^+$)	z+19610[e]	(81/2$^+$)	z+27276[e]	(97/2$^+$)
y+9346[d]	(53/2$^-$)	w+13687[#]	(65/2$^-$)	w+19617[#]	(81/2$^-$)	y+27506[c]	(97/2$^-$)
z+9387	(53/2$^+$)	y+13700[c]	(65/2$^-$)	y+19869[c]	(81/2$^-$)	w+29105[#]	(101/2$^-$)
w+9999[&]	(53/2$^-$)	y+13750	(65/2$^-$)	x+21077[b]	(83/2$^-$)	z+29341[e]	(101/2$^+$)
z+10646	(57/2$^+$)	x+14649[b]	(67/2$^-$)	w+21313[#]	(85/2$^-$)	y+29665[c]	(101/2$^-$)
z+10657[f]	(57/2$^+$)	z+14772[e]	(69/2$^+$)	z+21413[e]	(85/2$^+$)	w+31159[a]	(105/2$^-$)
z+10706	(57/2$^+$)	w+15054[#]	(69/2$^-$)	y+21627[c]	(85/2$^-$)	w+31327[#]	(105/2$^-$)
y+10718[d]	(57/2$^-$)	y+15140[c]	(69/2$^-$)	x+22907[b]	(87/2$^-$)	z+31493[e]	(105/2$^+$)
z+10811	(57/2$^+$)	x+16099[b]	(71/2$^-$)	w+23108[#]	(89/2$^-$)	y+31922[c]	(105/2$^-$)
w+11027[@]	(57/2$^-$)	z+16289[e]	(73/2$^+$)	z+23299[e]	(89/2$^+$)	w+33278[a]	(109/2$^-$)
w+11114	(57/2$^-$)	w+16496[#]	(73/2$^-$)	y+23485[c]	(89/2$^-$)	w+33631[#]	(109/2$^-$)
w+11192[&]	(57/2$^-$)	y+16633[c]	(73/2$^-$)	x+24761[b]	(91/2$^-$)	z+33683[e]	(109/2$^+$)
z+12000[e]	(61/2$^+$)	x+17655[b]	(75/2$^-$)	w+25006[#]	(93/2$^-$)		

[†] From 2021Ba03. x, y, z and w in E(level) are unknown excitations (2021Ba03).
[‡] From 2021Ba03, based on measured γ angular intensity ratios and band assignments.
[#] Band(A): Band L1 based on (65/2$^-$).
[@] Band(B): Band L1a based on (57/2$^-$).
[&] Band(C): Band L1b based on (52/2$^-$).
[a] Band(D): Band L1c based on (105/2$^-$).
[b] Band(E): Band L2 based on (63/2$^-$).
[c] Band(F): Band L3 based on (65/2$^-$).
[d] Band(G): Band L3a based on (53/2$^-$).
[e] Band(H): Band L4 based on (61/2$^+$).
[f] Band(I): Band L4a based on (37/2$^+$).

γ(^{123}Xe)

E$_\gamma$[†]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$
936[#] *1*	z+5576	(41/2$^+$)	z+4640	(37/2$^+$)
1079[#] *1*	z+6655	(45/2$^+$)	z+5576	(41/2$^+$)
1189 *1*	z+12000	(61/2$^+$)	z+10811	(57/2$^+$)
1193 *1*	w+11192	(57/2$^-$)	w+9999	(53/2$^-$)

Continued on next page (footnotes at end of table)

^{80}Se(^{48}Ca,5nγ):SD 2021Ba03 (continued)

$\gamma(^{123}Xe)$ (continued)

E_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [‡]	Comments
1208 *1*	w+12400	(61/2$^-$)	w+11192	(57/2$^-$)		
1218 *1*	z+7873	(49/2$^+$)	z+6655	(45/2$^+$)	Q	1.45 *16*.
1270 *1*	z+10657	(57/2$^+$)	z+9387	(53/2$^+$)		
1286 *1*	w+12400	(61/2$^-$)	w+11114	(57/2$^-$)		
1287.1 *6*	w+13687	(65/2$^-$)	w+12400	(61/2$^-$)	Q	1.66 *17*.
1294 *1*	z+12000	(61/2$^+$)	z+10706	(57/2$^+$)		
1294 *1*	w+13687	(65/2$^-$)	w+12393	(61/2$^-$)		
1343 *1*	z+12000	(61/2$^+$)	z+10657	(57/2$^+$)		
1349 *1*	x+14649	(67/2$^-$)	x+13300	(63/2$^-$)		
1351 *1*	z+9224	(53/2$^+$)	z+7873	(49/2$^+$)		
1354 *1*	z+12000	(61/2$^+$)	z+10646	(57/2$^+$)		
1354 *1*	z+13354	(65/2$^+$)	z+12000	(61/2$^+$)		
1366 *1*	w+12393	(61/2$^-$)	w+11027	(57/2$^-$)		
1367 *1*	w+15054	(69/2$^-$)	w+13687	(65/2$^-$)	Q	1.36 *14*.
1372 *1*	y+10718	(57/2$^-$)	y+9346	(53/2$^-$)		
1390 *1*	y+15140	(69/2$^-$)	y+13750	(65/2$^-$)		
1418 *1*	z+14772	(69/2$^+$)	z+13354	(65/2$^+$)	Q	1.70 *20*.
1433 *1*	z+10657	(57/2$^+$)	z+9224	(53/2$^+$)		
1440 *1*	y+15140	(69/2$^-$)	y+13700	(65/2$^-$)		
1441.5 *6*	w+16496	(73/2$^-$)	w+15054	(69/2$^-$)	Q	1.45 *16*.
1450 *2*	x+16099	(71/2$^-$)	x+14649	(67/2$^-$)		
1458 *1*	y+13700	(65/2$^-$)	y+12242	(61/2$^-$)		
1483 *1*	z+10706	(57/2$^+$)	z+9224	(53/2$^+$)		
1493 *1*	y+16633	(73/2$^-$)	y+15140	(69/2$^-$)		
1517 *1*	z+16289	(73/2$^+$)	z+14772	(69/2$^+$)		
1518.4 *6*	w+18014	(77/2$^-$)	w+16496	(73/2$^-$)	Q	1.52 *17*.
1524 *1*	y+12242	(61/2$^-$)	y+10718	(57/2$^-$)		
1556 *2*	x+17655	(75/2$^-$)	x+16099	(71/2$^-$)		
1574 *1*	y+18207	(77/2$^-$)	y+16633	(73/2$^-$)		
1603.0 *8*	w+19617	(81/2$^-$)	w+18014	(77/2$^-$)	Q	1.40 *17*.
1612 *1*	z+17901	(77/2$^+$)	z+16289	(73/2$^+$)		
1660 *2*	x+19315	(79/2$^-$)	x+17655	(75/2$^-$)		
1662 *1*	y+19869	(81/2$^-$)	y+18207	(77/2$^-$)		
1696 *1*	w+21313	(85/2$^-$)	w+19617	(81/2$^-$)	Q	1.42 *18*.
1709 *1*	z+19610	(81/2$^+$)	z+17901	(77/2$^+$)		
1758 *1*	y+21627	(85/2$^-$)	y+19869	(81/2$^-$)		
1762 *2*	x+21077	(83/2$^-$)	x+19315	(79/2$^-$)		
1795 *1*	w+23108	(89/2$^-$)	w+21313	(85/2$^-$)		
1803 *1*	z+21413	(85/2$^+$)	z+19610	(81/2$^+$)		
1830 *3*	x+22907	(87/2$^-$)	x+21077	(83/2$^-$)		
1854 *3*	x+24761	(91/2$^-$)	x+22907	(87/2$^-$)		
1858 *1*	y+23485	(89/2$^-$)	y+21627	(85/2$^-$)		
1886 *1*	z+23299	(89/2$^+$)	z+21413	(85/2$^+$)		
1898 *1*	w+25006	(93/2$^-$)	w+23108	(89/2$^-$)		
1941 *3*	x+26702	(95/2$^-$)	x+24761	(91/2$^-$)		
1958 *2*	y+25443	(93/2$^-$)	y+23485	(89/2$^-$)		
1964 *2*	z+25263	(93/2$^+$)	z+23299	(89/2$^+$)		
2002 *1*	w+27008	(97/2$^-$)	w+25006	(93/2$^-$)		
2013 *3*	z+27276	(97/2$^+$)	z+25263	(93/2$^+$)		
2054 *2*	w+31159	(105/2$^-$)	w+29105	(101/2$^-$)		
2063 *2*	y+27506	(97/2$^-$)	y+25443	(93/2$^-$)		
2065 *2*	z+29341	(101/2$^+$)	z+27276	(97/2$^+$)		
2097 *2*	w+29105	(101/2$^-$)	w+27008	(97/2$^-$)		
2119 *3*	w+33278	(109/2$^-$)	w+31159	(105/2$^-$)		
2152 *2*	z+31493	(105/2$^+$)	z+29341	(101/2$^+$)		
2159 *2*	y+29665	(101/2$^-$)	y+27506	(97/2$^-$)		

Continued on next page (footnotes at end of table)

^{80}Se(^{48}Ca,5nγ):SD 2021Ba03 (continued)

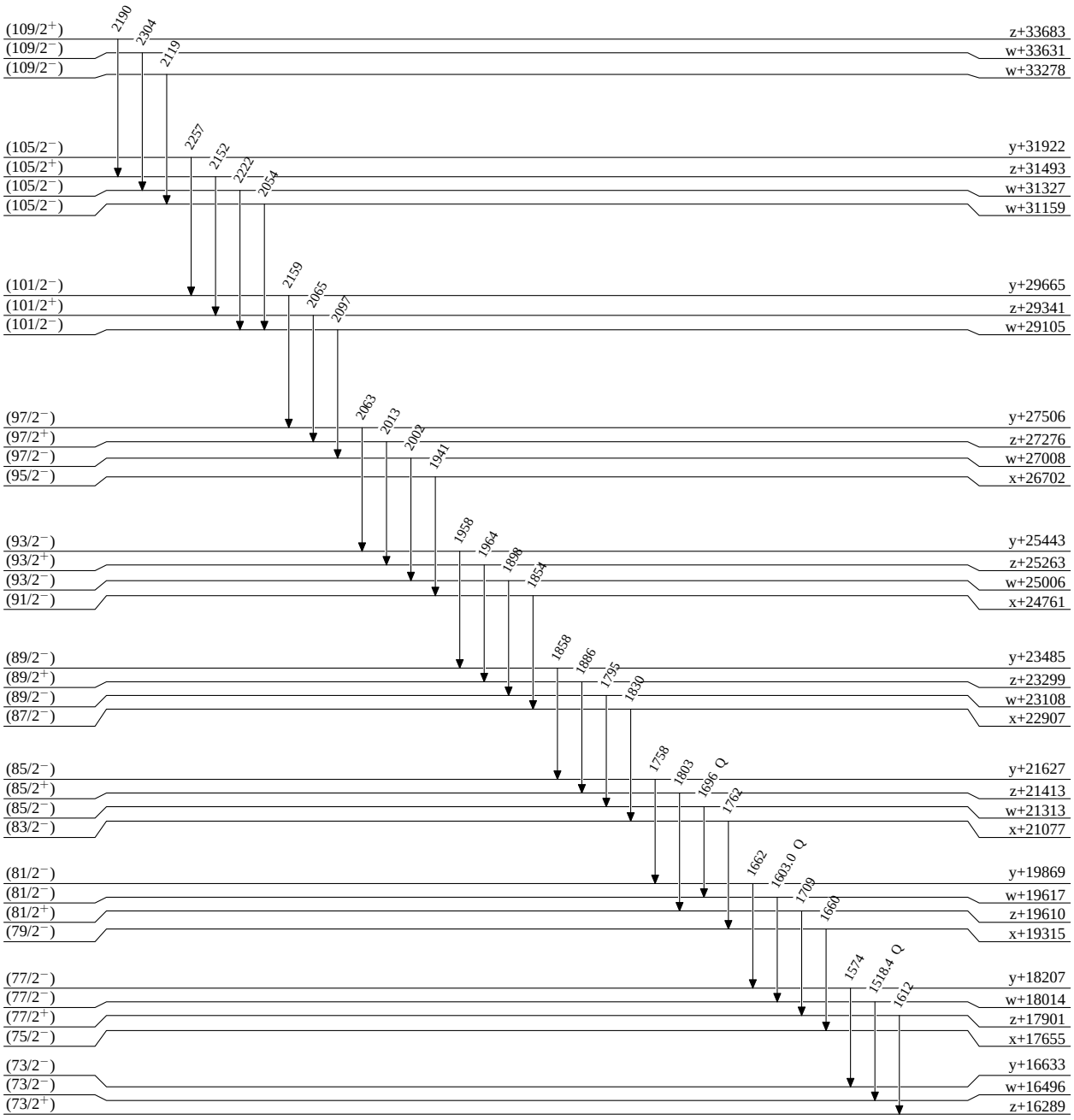
$\gamma(^{123}Xe)$ (continued)

E_γ [†]	E_i(level)	J_i^π	E_f	J_f^π
2190 *3*	z+33683	(109/2$^+$)	z+31493	(105/2$^+$)
2222 *2*	w+31327	(105/2$^-$)	w+29105	(101/2$^-$)
2257 *3*	y+31922	(105/2$^-$)	y+29665	(101/2$^-$)
2304 *3*	w+33631	(109/2$^-$)	w+31327	(105/2$^-$)

† From 2021Ba03.
‡ From 2021Ba03 based on measured γ angular intensity ratios R_θ given under comments. Expected R_θ values are ≈0.6 and 1.4 for stretched dipole and stretched quadrupole transitions, respectively. Original assignments are given by 2020Ba12 as M1+E2, E1 and E2 with definite electric or magnetic natures, but have been replaced by the evaluator with D+Q, D and Q, respectively, due to lack of experimental evidence from this work for the electric or magnetic natures.
# Placement of transition in the level scheme is uncertain.

^{80}Se(^{48}Ca,5nγ):SD 2021Ba03

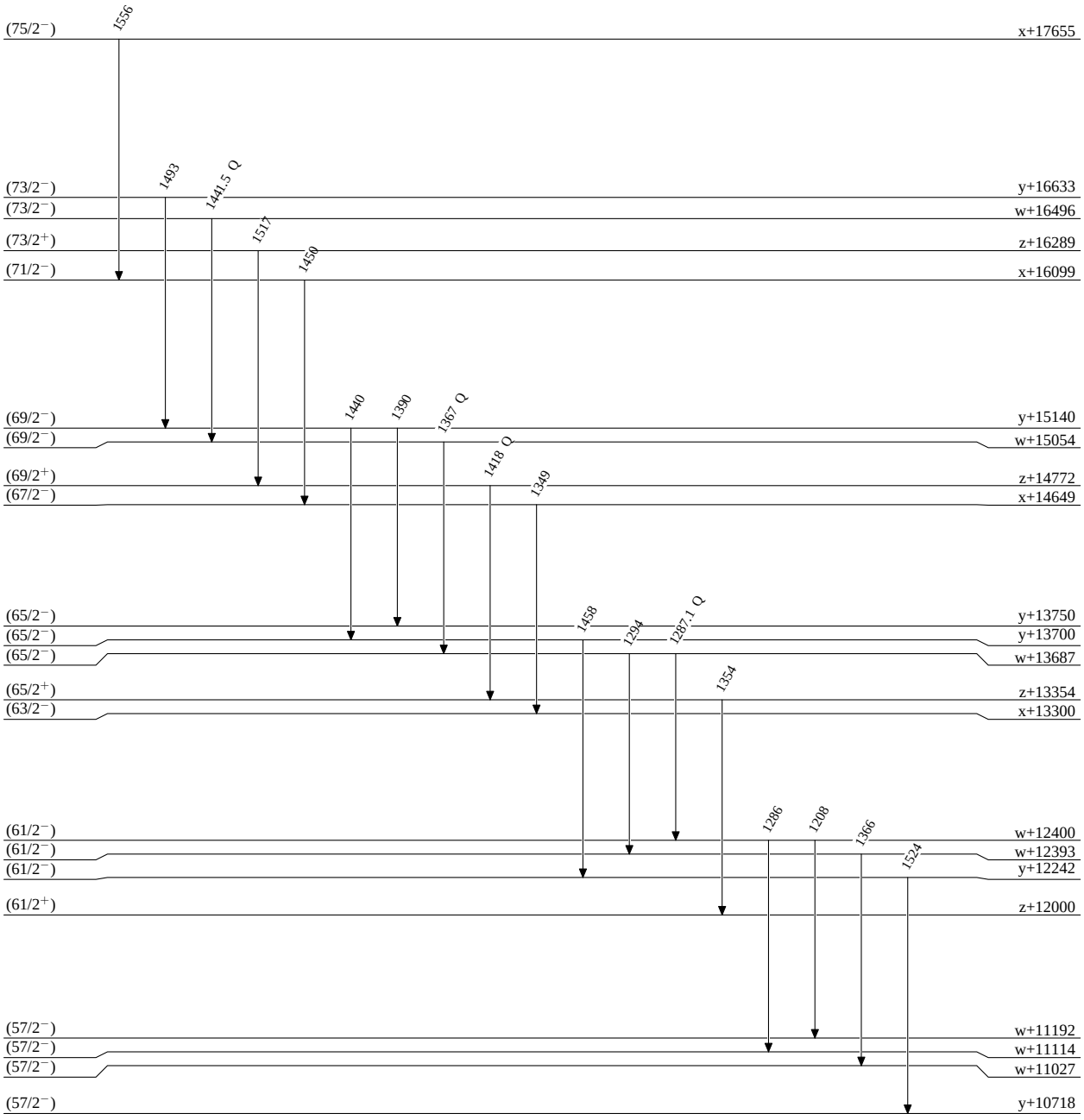
Level Scheme



$^{123}_{54}Xe_{69}$

^{80}Se(^{48}Ca,5nγ):SD 2021Ba03

Level Scheme (continued)



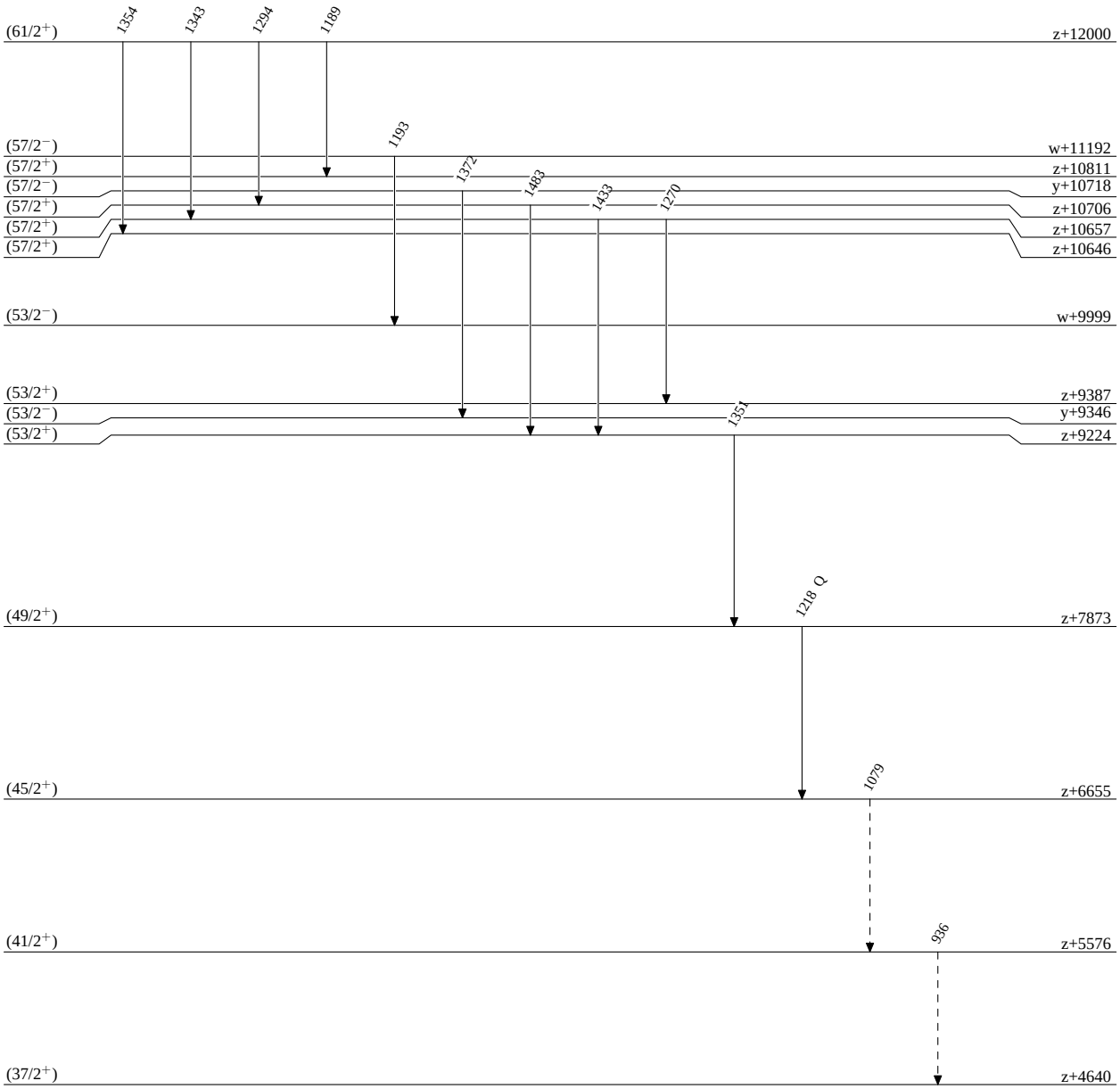
$^{123}_{54}Xe_{69}$

Legend

^{80}Se(^{48}Ca,5nγ):SD 2021Ba03

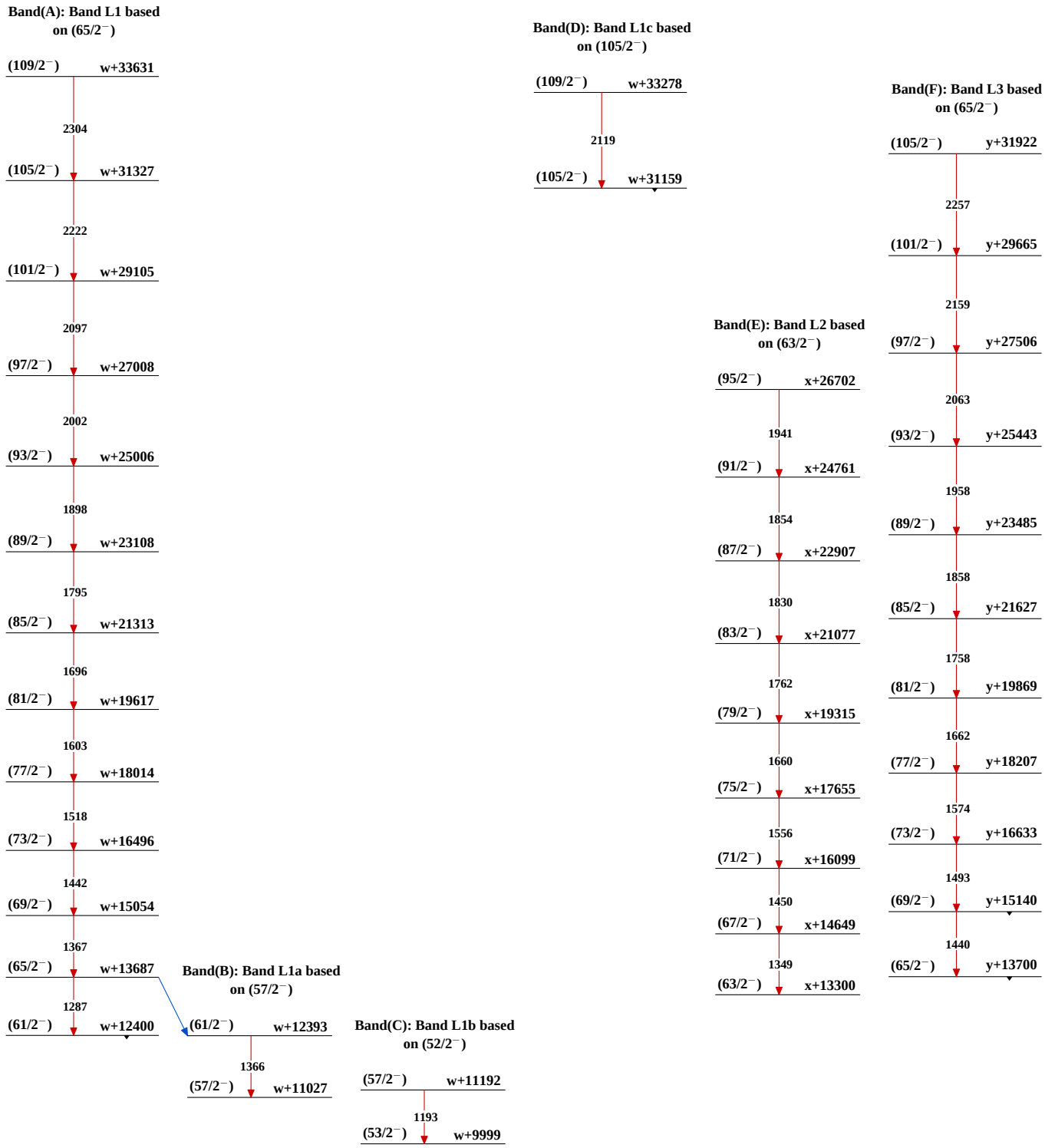
Level Scheme (continued)

γ Decay (Uncertain)



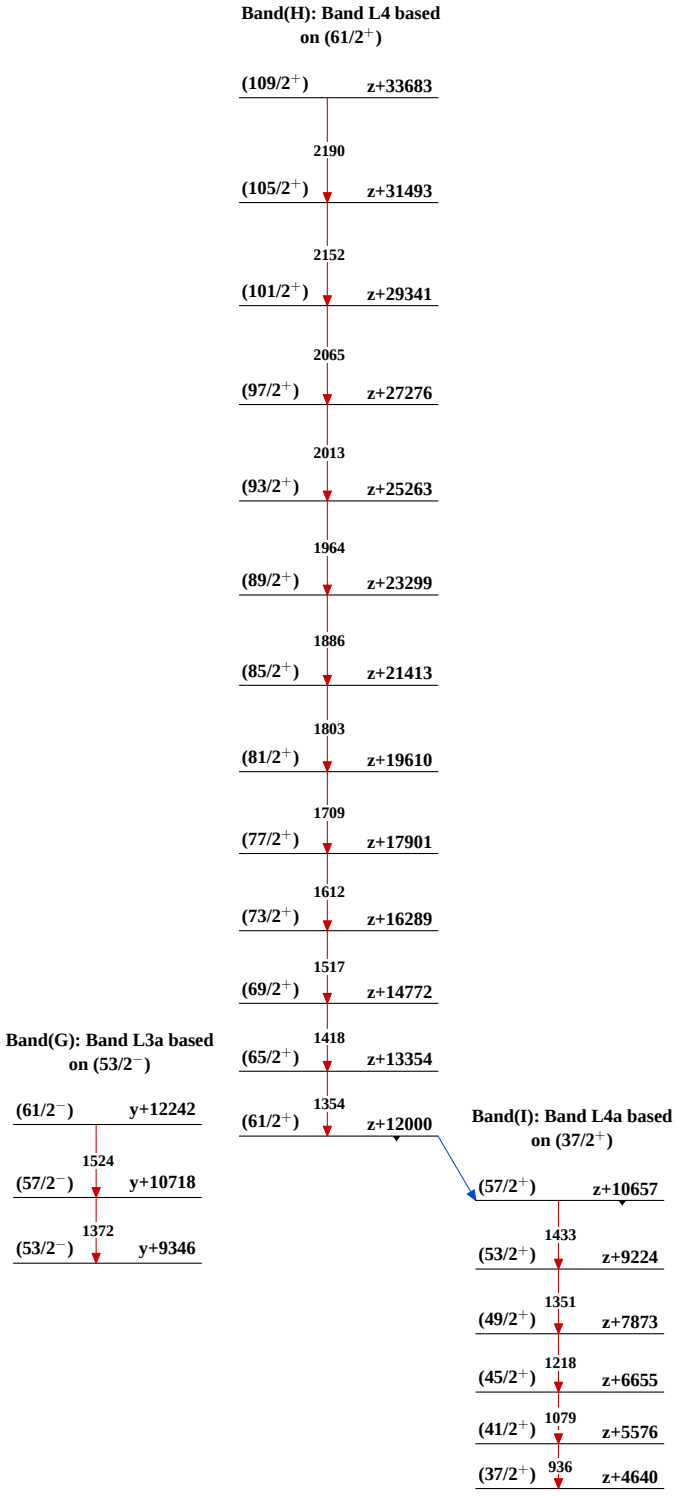
$^{123}_{54}Xe_{69}$

^{80}Se(^{48}Ca,5nγ):SD 2021Ba03



$^{123}_{54}Xe_{69}$

^{80}Se(^{48}Ca,5nγ):SD 2021Ba03 (continued)



$^{123}_{54}Xe_{69}$

^{110}Pd(^{18}O,5nγ) 1998Sc23,2002Ra34

Also includes ^{110}Pd(^{16}O,3nγ) in 1987Ha03.

1998Sc23: E=86 MeV ^{18}O beam was produced from the FN tandem facility in Riso. Target was 1 mg/cm^2 foil of 97.7% enriched ^{110}Pd on 3 mg/cm^2 Tantalum backing. γ rays were detected with the Compton-suppressed NORDBALL spectrometer with a 60-segment BaF2-calorimeter. Measured Eγ, Iγ, $\gamma\gamma$(DCO), $\gamma\gamma$-coin. Deduced levels, J, π, band structures. No data of Iγ and DCO are given.

2002Ra34,2000Ra34: E=75 ^{18}O beam was produced from the XTU tandem accelerator at the Legnaro National Laboratory. Target was 10 mg/cm^2 enriched ^{110}Pd. γ rays were detected with the GASP spectrometer consisting of HPGe and BGO detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma$(DCO). Deduced levels, J, π, band structures, γ-ray multipolarities. Comparisons with theoretical calculations. Data in 2000Ra34 is superseded by those in 2002Ra34.

1987Ha03: E=65 MeV ^{16}O beam was produced from the Tandem van de Graaff facility in Riso. γ rays were detected with four Compton-suppressed Ge detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin. Authors proposed high spin states using 891γ, 1057γ, 807γ, 1080γ. However these γ rays were included in the more detailed levels proposed by 1998Sc23.

Others:

2002ChZU: ^{110}Pd(^{18}O,5nγ) E=86 MeV at LBNL. Measured Eγ, Iγ, $\gamma\gamma$-coin. Deduced rotational band features. No data are available.

1998NaZY: E=86 MeV. Measured Eγ, Iγ. No data are available.

^{123}Xe Levels

Level scheme is from 1998Sc23 constructed based on their $\gamma\gamma$-coin and $\gamma\gamma$(DCO) data and known low-spin states from 1981Lu01 via ^{122}Te(^{3}He,2nγ) and ^{123}Te(^{3}He,3nγ), except for the part based on unknown state at E(level)=x, which is from 2002Ra34 only. Band assignments are from 1998Sc23, unless otherwise noted.

E(level)[†]	J$^\pi$[#]	Comments
0[&]	1/2$^{(+)}$[@]	
97.9[a] *9*	3/2$^{(+)}$[@]	
181.7 *13*	5/2$^{(+)}$[@]	
186.4 *14*	7/2$^{(-)}$[@]	E(level): this level is taken by 2002Ra34 from 1981Lu01, which is adopted in Adopted Levels.
206.6[c] *15*	(9/2$^-$)	
253.3[j] *14*	(7/2$^+$)	
264.2[d] *15*	(11/2$^-$)	
307.1[&] *9*	(5/2$^+$)	
438.1[a] *10*	(7/2$^+$)	
519.4[i] *14*	(9/2$^+$)	
662.9[c] *15*	(13/2$^-$)	
720.2[d] *15*	(15/2$^-$)	
768.9[j] *15*	(11/2$^+$)	
877.8[e] *15*	(13/2$^-$)	
935.4[a] *13*	(11/2$^+$)	
1083.1[i] *15*	(13/2$^+$)	
1270.5[c] *15*	(15/2$^-$)	J$^\pi$: 1998Sc23 give 15/2$^-$, but the band assignment suggests 17/2$^-$.
1295.2[f] *15*	(17/2$^-$)	
1337.1[d] *15*	(19/2$^-$)	
1398.8[j] *16*	(15/2$^+$)	
1523.0[e] *16*	(17/2$^-$)	
1554.6[a] *15*	(15/2$^+$)	
1759.1[i] *16*	(17/2$^+$)	
1954.1[c] *16*		
2064.7[f] *16*	(21/2$^-$)	

Continued on next page (footnotes at end of table)

^{110}Pd(^{18}O,5nγ) 1998Sc23,2002Ra34 (continued)

^{123}Xe Levels (continued)

E(level)[†]	Jπ[#]	E(level)[†]	Jπ[#]	E(level)[†]	Jπ[#]	E(level)[†]	Jπ[#]
2090.6[d] 15	(23/2⁻)	3480.4[k] 18	(27/2⁺)	5067.8[k] 20	(35/2⁺)	8078[b] 3	(47/2⁻)
2113.8[j] 16	(19/2⁺)	3653.6 18		5214.0 21		8222[d] 3	(47/2⁻)
2231.8[a] 15	(19/2⁺)	3821.6[g] 17	(29/2⁺)	5330.8[e] 22		8300.6[k] 24	(47/2⁺)
2286.0[e] 16		3854.7[c] 17		5340.1[b] 20	(35/2⁻)	8455.6[g] 21	(49/2⁺)
2423.6 16	(19/2⁺)	3906.7[i] 17	(29/2⁺)	5521.1[g] 18	(37/2⁺)	9261[b] 3	(51/2⁻)
2498.8[i] 16	(21/2⁺)	3909.6[b] 16	(27/2⁻)	5917.0[h] 19	(39/2⁺)	9420.6[g] 23	(53/2⁺)
2690.6 16	(21/2⁺)	3952.4[d] 20	(31/2⁻)	6035.5[k] 20	(39/2⁺)	9428[d] 3	(51/2⁻)
2770.8[c] 16		3957.6[f] 19		6047.6[d] 24	(39/2⁻)	x[‡l]	(31/2⁻)
2823.7[k] 16	(23/2⁺)	4105.8[e] 20		6136.1[b] 23	(39/2⁻)	152.00+x[m] 20	(33/2⁻)
2883.7[j] 15	(23/2⁺)	4156.6[h] 17	(31/2⁺)	6466.8 22		351.3+x[l] 5	(35/2⁻)
2952.6[f] 17		4215.1[k] 19	(31/2⁺)	6478.5[g] 19	(41/2⁺)	577.4+x[m] 5	(37/2⁻)
2966.0[a] 15	(23/2⁺)	4355.8 20		7069.1[b] 25	(43/2⁻)	823.1+x[l] 6	(39/2⁻)
2966.6[d] 18	(27/2⁻)	4611.1[b] 17	(31/2⁻)	7086.3[h] 19	(43/2⁺)	1121.3+x[m] 6	(41/2⁻)
3154.8[e] 17		4629.0[g] 17	(33/2⁺)	7111[d] 3	(43/2⁻)	1478.7+x[l] 6	(43/2⁻)
3170.7[g] 15	(25/2⁺)	5011.6[d] 22	(35/2⁻)	7116.5[k] 22	(43/2⁺)	1954.5+x[m] 6	(45/2⁻)
3211.5[i] 16	(25/2⁺)	5037.9[h] 18	(35/2⁺)	7483.8[g] 20	(45/2⁺)	2443.8+x[l] 6	(47/2⁻)
3350.7[h] 15	(27/2⁺)	5044.6[f] 22		7992.4[h] 21	(47/2⁺)		

[†] From a least-squares fit to γ-ray energies, assuming ΔEγ=1 keV where not available.
[‡] Decays to 2966.5, 27/2⁻ and 3350.9, 27/2⁺ levels through unknown transitions (2002Ra34).
[#] From 1998Sc23 or 2002Ra34 based on γγ(DCO), band assignments, and known assignments of low-lying states, unless otherwise noted. 1998Sc23 use γγ(DCO) information for their spin-parity assignments, but no data are given.
[@] From Adopted Levels.
[&] Band(A): (1/2)⁺ g.s. Band.
[a] Band(a): ΔJ=2 band based on 3/2(+).
[b] Band(B): ΔJ=2 band based on (27/2⁻).
[c] Band(C): ΔJ=2 band based on (9/2⁻).
[d] Band(D): Yrast band, based on (11/2⁻).
[e] Band(E): ΔJ=2 band based on (13/2⁻).
[f] Band(F): ΔJ=2 band based on (17/2⁻).
[g] Band(G): Band based on (29/2⁺).
[h] Band(g): Band based on (25/2⁺).
[i] Band(H): ΔJ=2 band based on (9/2⁺).
[j] Band(I): ΔJ=2 band based on (7/2⁺).
[k] Band(J): ΔJ=2 band based on (23/2⁺).
[l] Band(K): Five-quasiparticle band based on (31/2⁻), α=−1/2. Band from 2000Ra34 with updated spins and energies from 2002Ra34.
[m] Band(k): Five-quasiparticle band based on (33/2⁻), α=+1/2. Band from 2000Ra34 with updated spins and energies from 2002Ra34.

γ(^{123}Xe)

Eγ[†]	Ei(level)	Jiπ	Ef	Jfπ	Mult.[a]	Comments
(4.6)	186.4	7/2(−)	181.7	5/2(+)	[E1]	Eγ: From Adopted Gammas.
20[@]	206.6	(9/2⁻)	186.4	7/2(−)		
58[@]	264.2	(11/2⁻)	206.6	(9/2⁻)		

Continued on next page (footnotes at end of table)

^{110}Pd(^{18}O,5nγ) 1998Sc23,2002Ra34 (continued)

γ(^{123}Xe) (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[a]	Comments
72[@]		253.3	(7/2$^+$)	181.7	5/2$^{(+)}$		
84[@]		181.7	5/2$^{(+)}$	97.9	3/2$^{(+)}$		
98		97.9	3/2$^{(+)}$	0	1/2$^{(+)}$		
131[@]		438.1	(7/2$^+$)	307.1	(5/2$^+$)		
139		3350.7	(27/2$^+$)	3211.5	(25/2$^+$)		
152.0[‡] *2*	4.4 *4*	152.00+x	(33/2$^-$)	x	(31/2$^-$)	D	Mult.: DCO=0.4 *2* (2002Ra34).
180[#]		3350.7	(27/2$^+$)	3170.7	(25/2$^+$)		
199.3[‡] *4*	2.8 *2*	351.3+x	(35/2$^-$)	152.00+x	(33/2$^-$)	(D)[b]	
205[@]		3170.7	(25/2$^+$)	2966.0	(23/2$^+$)		
226.1[‡] *2*	3.3 *3*	577.4+x	(37/2$^-$)	351.3+x	(35/2$^-$)	(D)[b]	
245.5[‡] *4*	2.8 *2*	823.1+x	(39/2$^-$)	577.4+x	(37/2$^-$)	(D)[b]	
249[@]		768.9	(11/2$^+$)	519.4	(9/2$^+$)		
255[@]		519.4	(9/2$^+$)	264.2	(11/2$^-$)		
266[@]		519.4	(9/2$^+$)	253.3	(7/2$^+$)		
267[@]		2690.6	(21/2$^+$)	2423.6	(19/2$^+$)		
275[@]		2966.0	(23/2$^+$)	2690.6	(21/2$^+$)		
287[@]		3170.7	(25/2$^+$)	2883.7	(23/2$^+$)		
298.2[‡] *2*	3.8 *3*	1121.3+x	(41/2$^-$)	823.1+x	(39/2$^-$)	D	Mult.: DCO=0.6 *2* (2002Ra34).
307[@]		307.1	(5/2$^+$)	0	1/2$^{(+)}$		
314[@]		1083.1	(13/2$^+$)	768.9	(11/2$^+$)		
333[@]		519.4	(9/2$^+$)	186.4	7/2$^{(-)}$		
335[@]		4156.6	(31/2$^+$)	3821.6	(29/2$^+$)		
340		438.1	(7/2$^+$)	97.9	3/2$^{(+)}$		
347[@]		3170.7	(25/2$^+$)	2823.7	(23/2$^+$)		
357.4[‡] *1*	13.1 *9*	1478.7+x	(43/2$^-$)	1121.3+x	(41/2$^-$)	D	Mult.: DCO=0.5 *2* (2002Ra34).
363[@]		1083.1	(13/2$^+$)	720.2	(15/2$^-$)		
385		3350.7	(27/2$^+$)	2966.0	(23/2$^+$)		
393[@]		1270.5	(15/2$^-$)	877.8	(13/2$^-$)		
396[@]		5917.0	(39/2$^+$)	5521.1	(37/2$^+$)		
398		7483.8	(45/2$^+$)	7086.3	(43/2$^+$)		
399		662.9	(13/2$^-$)	264.2	(11/2$^-$)		
409[@]		5037.9	(35/2$^+$)	4629.0	(33/2$^+$)		
431[@]		1954.1		1523.0	(17/2$^-$)		Eγ: from level-energy difference. Eγ=418 reported by 1998Sc23 seems to be a misprint.
456		662.9	(13/2$^-$)	206.6	(9/2$^-$)		
456[#]		720.2	(15/2$^-$)	264.2	(11/2$^-$)		
463		8455.6	(49/2$^+$)	7992.4	(47/2$^+$)		
467		3350.7	(27/2$^+$)	2883.7	(23/2$^+$)		
471[#]		3821.6	(29/2$^+$)	3350.7	(27/2$^+$)		
471.8[‡] *4*	0.20[&] *5*	823.1+x	(39/2$^-$)	351.3+x	(35/2$^-$)	(Q)[b]	
473		4629.0	(33/2$^+$)	4156.6	(31/2$^+$)		
475.7[‡] *4*	2.6 *3*	1954.5+x	(45/2$^-$)	1478.7+x	(43/2$^-$)	(D)[b]	
480		3170.7	(25/2$^+$)	2690.6	(21/2$^+$)		
483		5521.1	(37/2$^+$)	5037.9	(35/2$^+$)		
489.3[‡] *2*	4.8 *9*	2443.8+x	(47/2$^-$)	1954.5+x	(45/2$^-$)	(D)	Mult.: DCO=0.7 *2* (2002Ra34).
497		935.4	(11/2$^+$)	438.1	(7/2$^+$)		
516		768.9	(11/2$^+$)	253.3	(7/2$^+$)		
542		2966.0	(23/2$^+$)	2423.6	(19/2$^+$)		

Continued on next page (footnotes at end of table)

^{110}Pd(^{18}O,5nγ) 1998Sc23,2002Ra34 (continued)

γ(^{123}Xe) (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[a]
544.1[‡] *4*	0.7[&] *2*	1121.3+x	(41/2$^-$)	577.4+x	(37/2$^-$)	(Q)[b]
550[@]		1270.5	(15/2$^-$)	720.2	(15/2$^-$)	
562		6478.5	(41/2$^+$)	5917.0	(39/2$^+$)	
564		1083.1	(13/2$^+$)	519.4	(9/2$^+$)	
575[#]		1295.2	(17/2$^-$)	720.2	(15/2$^-$)	
592		2823.7	(23/2$^+$)	2231.8	(19/2$^+$)	
608		1270.5	(15/2$^-$)	662.9	(13/2$^-$)	
608		7086.3	(43/2$^+$)	6478.5	(41/2$^+$)	
614		877.8	(13/2$^-$)	264.2	(11/2$^-$)	
617[#]		1337.1	(19/2$^-$)	720.2	(15/2$^-$)	
617		1954.1		1337.1	(19/2$^-$)	
619		1554.6	(15/2$^+$)	935.4	(11/2$^+$)	
630		1398.8	(15/2$^+$)	768.9	(11/2$^+$)	
632[#]		1295.2	(17/2$^-$)	662.9	(13/2$^-$)	
645		1523.0	(17/2$^-$)	877.8	(13/2$^-$)	
652		2883.7	(23/2$^+$)	2231.8	(19/2$^+$)	
655.2[‡] *4*	2.7[&] *5*	1478.7+x	(43/2$^-$)	823.1+x	(39/2$^-$)	(Q)[b]
657		3480.4	(27/2$^+$)	2823.7	(23/2$^+$)	
671[@]		877.8	(13/2$^-$)	206.6	(9/2$^-$)	
672[#]		3170.7	(25/2$^+$)	2498.8	(21/2$^+$)	
676		1759.1	(17/2$^+$)	1083.1	(13/2$^+$)	
677		2231.8	(19/2$^+$)	1554.6	(15/2$^+$)	
684		1954.1		1270.5	(15/2$^-$)	
696		3906.7	(29/2$^+$)	3211.5	(25/2$^+$)	
701		4611.1	(31/2$^-$)	3909.6	(27/2$^-$)	
710		2823.7	(23/2$^+$)	2113.8	(19/2$^+$)	
713[#]		3211.5	(25/2$^+$)	2498.8	(21/2$^+$)	
715		2113.8	(19/2$^+$)	1398.8	(15/2$^+$)	
728		2064.7	(21/2$^-$)	1337.1	(19/2$^-$)	
729		5340.1	(35/2$^-$)	4611.1	(31/2$^-$)	
734		2966.0	(23/2$^+$)	2231.8	(19/2$^+$)	
735		4215.1	(31/2$^+$)	3480.4	(27/2$^+$)	
740[#]		2498.8	(21/2$^+$)	1759.1	(17/2$^+$)	
754[#]		2090.6	(23/2$^-$)	1337.1	(19/2$^-$)	
763		2286.0		1523.0	(17/2$^-$)	
769[#]		2064.7	(21/2$^-$)	1295.2	(17/2$^-$)	
770[@]		2883.7	(23/2$^+$)	2113.8	(19/2$^+$)	
790[@]		4611.1	(31/2$^-$)	3821.6	(29/2$^+$)	
796		6136.1	(39/2$^-$)	5340.1	(35/2$^-$)	
803		1523.0	(17/2$^-$)	720.2	(15/2$^-$)	
806[#]		4156.6	(31/2$^+$)	3350.7	(27/2$^+$)	
807		4629.0	(33/2$^+$)	3821.6	(29/2$^+$)	
817		2770.8		1954.1		
819[#]		2883.7	(23/2$^+$)	2064.7	(21/2$^-$)	
833.2[‡] *2*	3.7[&] *6*	1954.5+x	(45/2$^-$)	1121.3+x	(41/2$^-$)	(Q)[b]
853		5067.8	(35/2$^+$)	4215.1	(31/2$^+$)	
858[@]		5214.0		4355.8		
862		2952.6		2090.6	(23/2$^-$)	
868		3154.8		2286.0		
876[#]		2966.6	(27/2$^-$)	2090.6	(23/2$^-$)	
879		5917.0	(39/2$^+$)	5037.9	(35/2$^+$)	

Continued on next page (footnotes at end of table)

^{110}Pd(^{18}O,5nγ) 1998Sc23,2002Ra34 (continued)

$\gamma(^{123}Xe)$ (continued)

E_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	E_γ [†]	E_i(level)	J_i^π	E_f	J_f^π
881[#]	5037.9	(35/2$^+$)	4156.6	(31/2$^+$)	1065	3154.8		2090.6	(23/2$^-$)
888[#]	2952.6		2064.7	(21/2$^-$)	1080[#]	3170.7	(25/2$^+$)	2090.6	(23/2$^-$)
892	5521.1	(37/2$^+$)	4629.0	(33/2$^+$)	1081[@]	7116.5	(43/2$^+$)	6035.5	(39/2$^+$)
906	7992.4	(47/2$^+$)	7086.3	(43/2$^+$)	1084[@]	3854.7		2770.8	
933	7069.1	(43/2$^-$)	6136.1	(39/2$^-$)	1087	5044.6		3957.6	
937	2231.8	(19/2$^+$)	1295.2	(17/2$^-$)	1111[@]	8222	(47/2$^-$)	7111	(43/2$^-$)
940[@]	3906.7	(29/2$^+$)	2966.0	(23/2$^+$)	1121	3211.5	(25/2$^+$)	2090.6	(23/2$^-$)
943	3909.6	(27/2$^-$)	2966.0	(23/2$^+$)	1128	2423.6	(19/2$^+$)	1295.2	(17/2$^-$)
948	2286.0		1337.1	(19/2$^-$)	1139[@]	3909.6	(27/2$^-$)	2770.8	
951	4105.8		3154.8		1162[#]	2498.8	(21/2$^+$)	1337.1	(19/2$^-$)
957	6478.5	(41/2$^+$)	5521.1	(37/2$^+$)	1169	7086.3	(43/2$^+$)	5917.0	(39/2$^+$)
965	9420.6	(53/2$^+$)	8455.6	(49/2$^+$)	1183[@]	9261	(51/2$^-$)	8078	(47/2$^-$)
968[@]	6035.5	(39/2$^+$)	5067.8	(35/2$^+$)	1184[@]	8300.6	(47/2$^+$)	7116.5	(43/2$^+$)
972	8455.6	(49/2$^+$)	7483.8	(45/2$^+$)	1206[@]	9428	(51/2$^-$)	8222	(47/2$^-$)
986[#]	3952.4	(31/2$^-$)	2966.6	(27/2$^-$)	1225[@]	5330.8		4105.8	
1005	3957.6		2952.6		1253[@]	6466.8		5214.0	
1005	7483.8	(45/2$^+$)	6478.5	(41/2$^+$)	1262	5214.0		3952.4	(31/2$^-$)
1009[@]	8078	(47/2$^-$)	7069.1	(43/2$^-$)	1353	2690.6	(21/2$^+$)	1337.1	(19/2$^-$)
1036	6047.6	(39/2$^-$)	5011.6	(35/2$^-$)	1389[@]	4355.8		2966.6	(27/2$^-$)
1039	1759.1	(17/2$^+$)	720.2	(15/2$^-$)	1455[@]	6466.8		5011.6	(35/2$^-$)
1051[@]	7086.3	(43/2$^+$)	6035.5	(39/2$^+$)	1563[@]	3653.6		2090.6	(23/2$^-$)
1059	5011.6	(35/2$^-$)	3952.4	(31/2$^-$)	1764[@]	3854.7		2090.6	(23/2$^-$)
1063	7111	(43/2$^-$)	6047.6	(39/2$^-$)					

[†] From the level scheme in Fig.1 of 1998Sc23, unless otherwise noted. No $\Delta E\gamma$ is given in 1998Sc23.
[‡] From 2002Ra34, with uncertainties of γ energies based on a general comment of between 0.1 keV and 0.4 keV in Table I of 2002Ra34 and assigned by the evaluator as $\Delta E\gamma$=0.4 keV for Iγ<3, 0.2 keV for 3<Iγ<10, and 0.1 keV for Iγ>10, accordingly.
[#] Large-intensity gamma ray, as shown in Figure 1 of 1998Sc23.
[@] Weak-intensity gamma ray, as shown in Figure 1 of 1998Sc23.
[&] From $\gamma\gamma$-coin, with gate on M1 transition that directly populates level (2002Ra34).
[a] From $\gamma\gamma$(DCO) in 2002Ra34, unless noted otherwise.
[b] Proposed in 2002Ra34, but no DCO values given.

^{110}Pd(^{18}O,5nγ) 1998Sc23,2002Ra34

Level Scheme

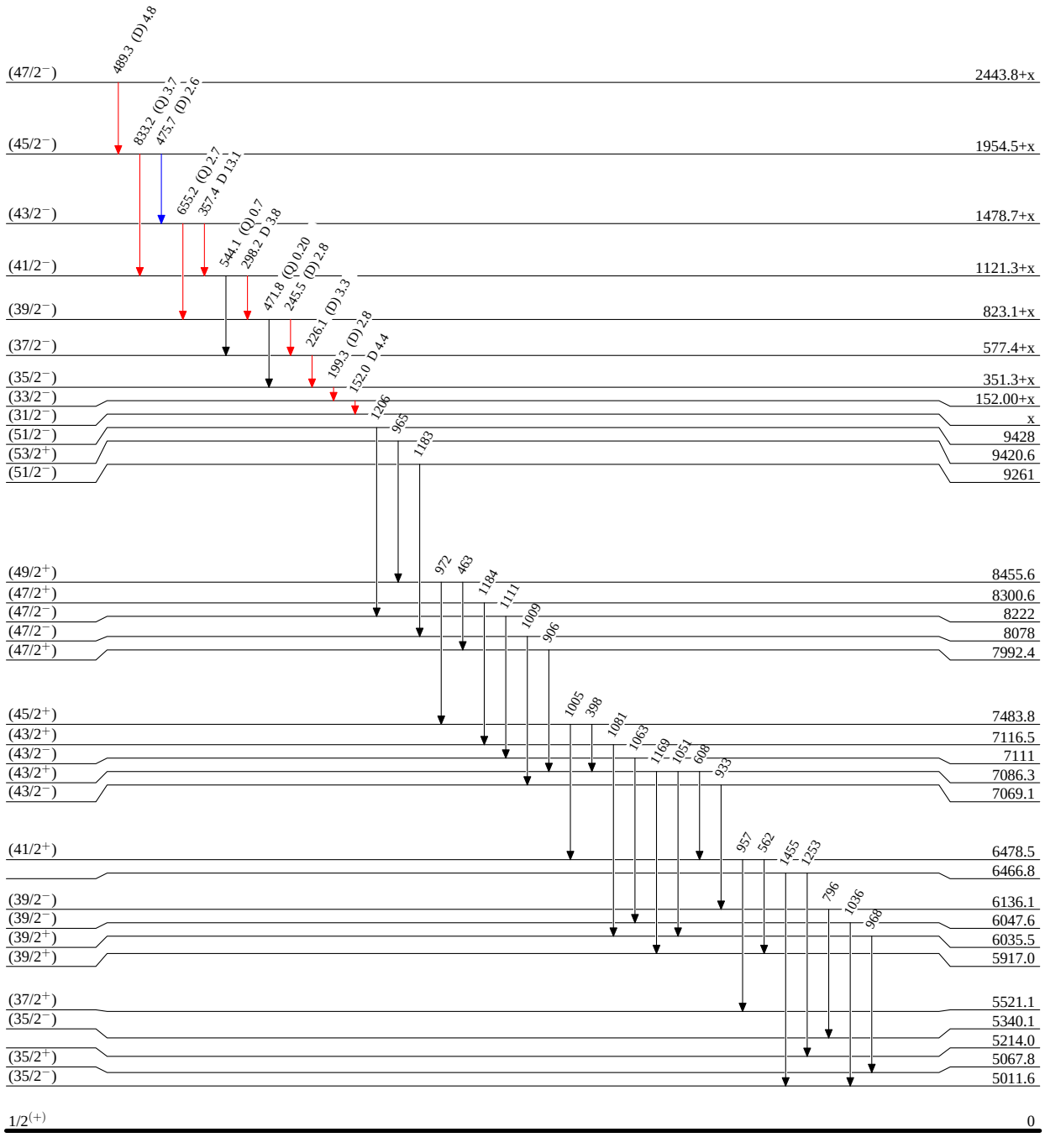
Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

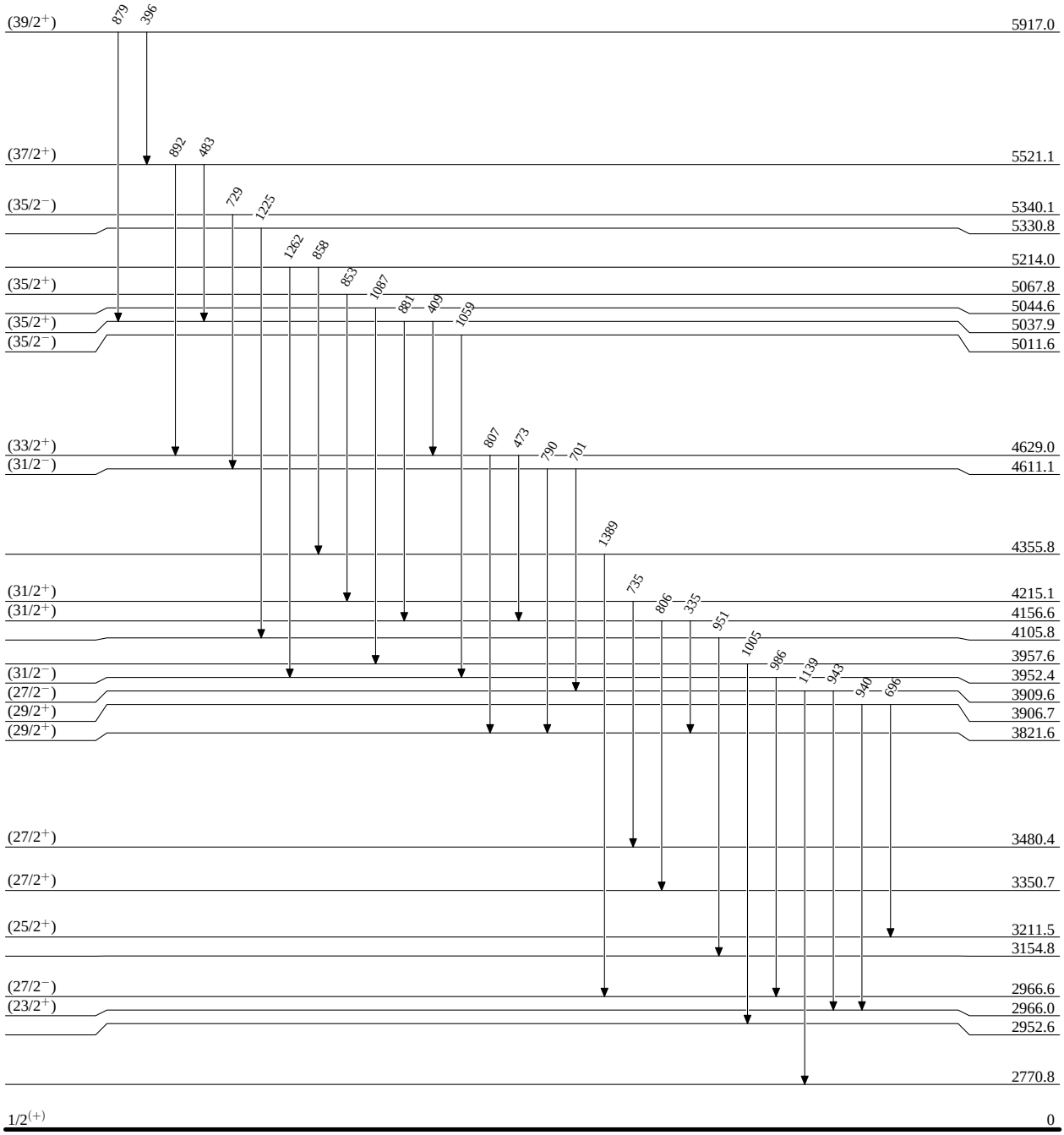


$^{123}_{54}Xe_{69}$

^{110}Pd(^{18}O,5nγ) 1998Sc23,2002Ra34

Level Scheme (continued)

Intensities: Relative I_γ

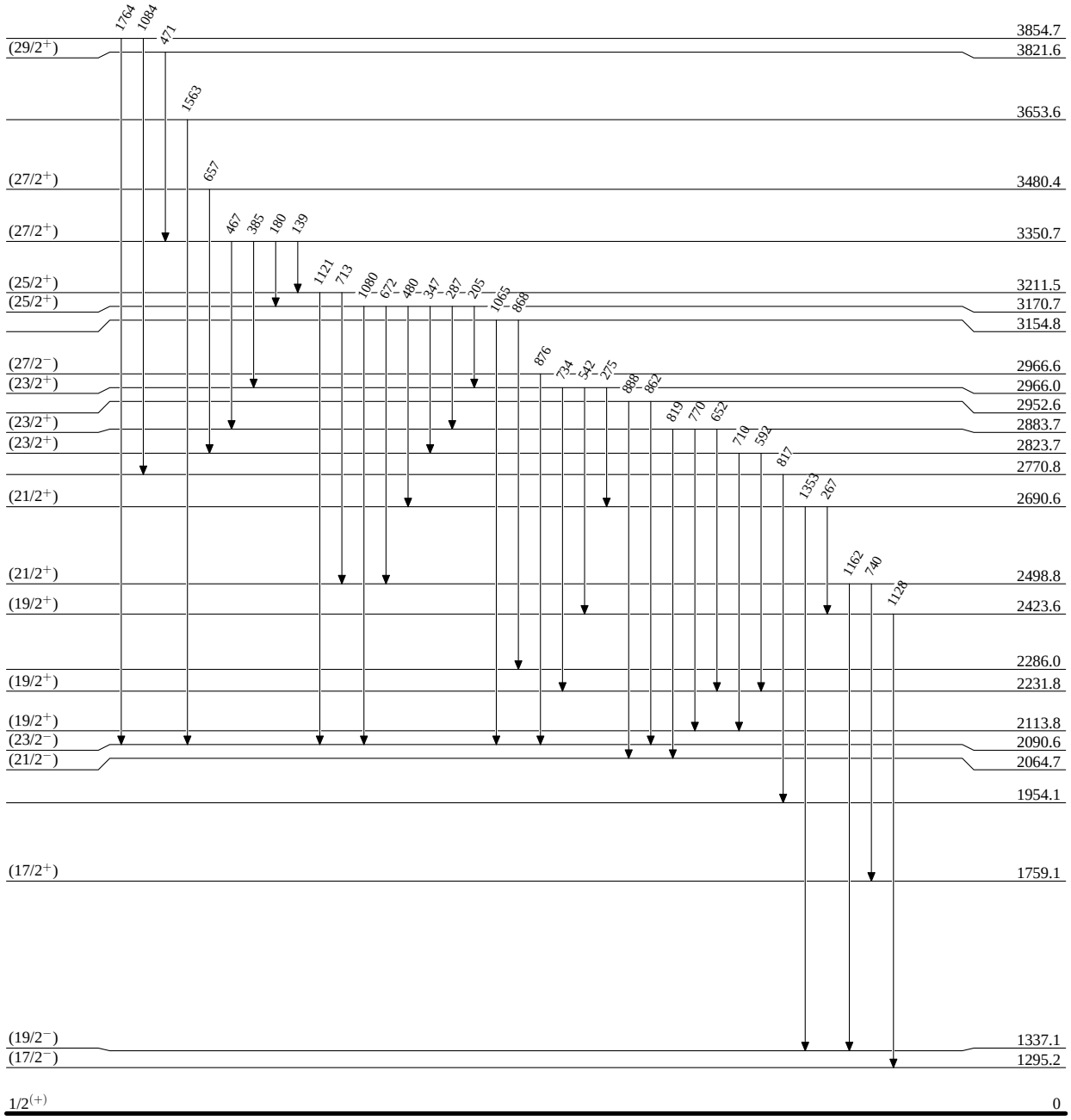


$^{123}_{54}Xe_{69}$

^{110}Pd(^{18}O,5nγ) 1998Sc23,2002Ra34

Level Scheme (continued)

Intensities: Relative I_γ

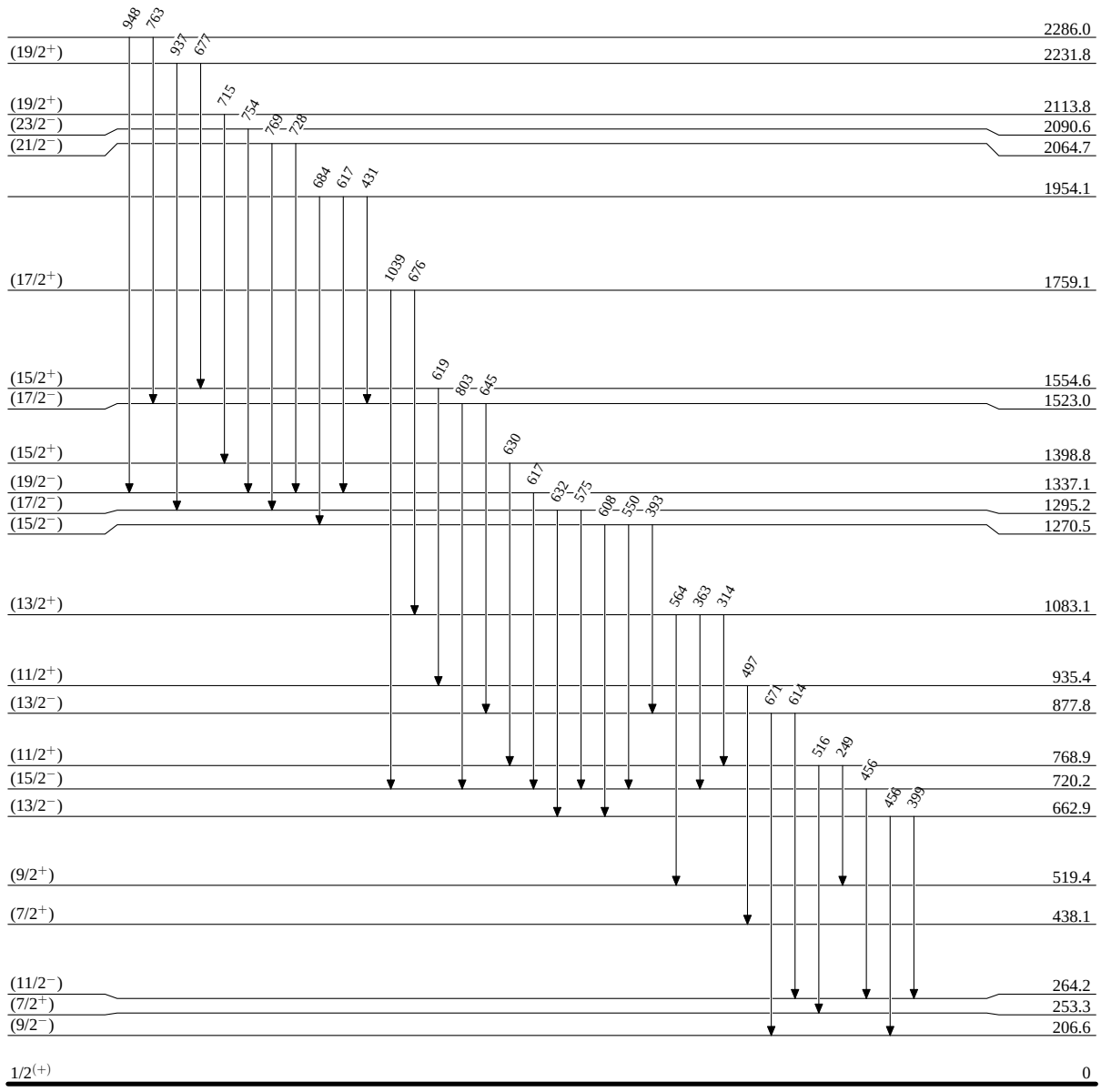


$^{123}_{54}Xe_{69}$

^{110}Pd(^{18}O,5nγ) 1998Sc23,2002Ra34

Level Scheme (continued)

Intensities: Relative I_γ



$^{123}_{54}Xe_{69}$

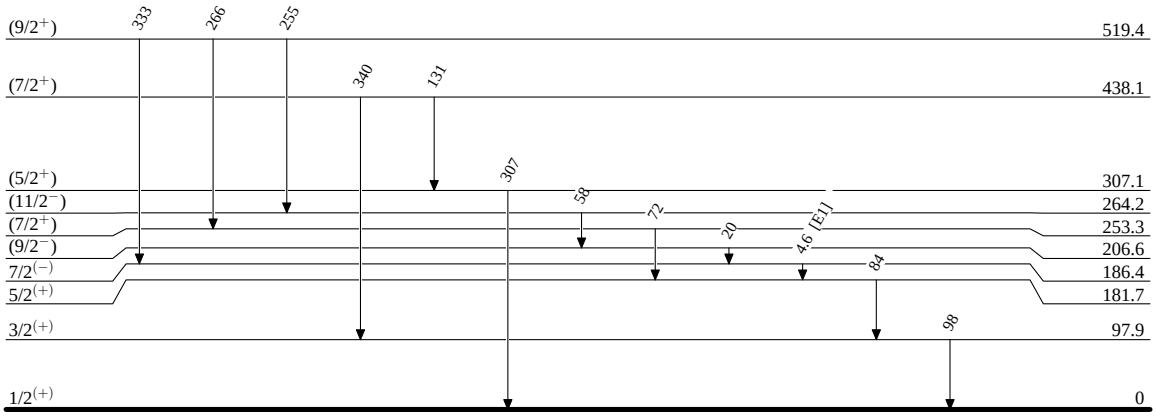
^{110}Pd(^{18}O,5nγ) 1998Sc23,2002Ra34

Legend

Level Scheme (continued)

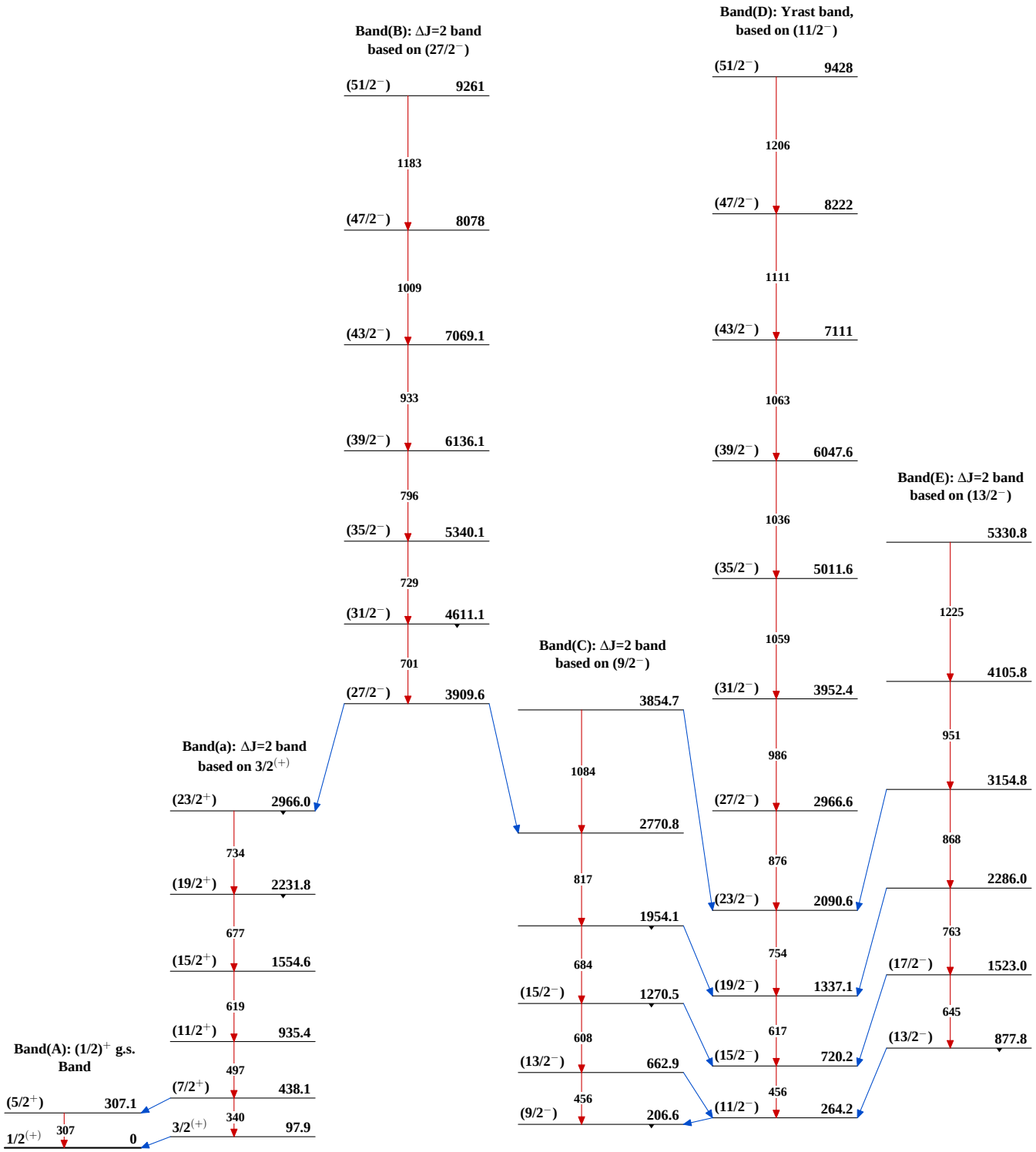
Intensities: Relative I_γ

γ Decay (Uncertain)



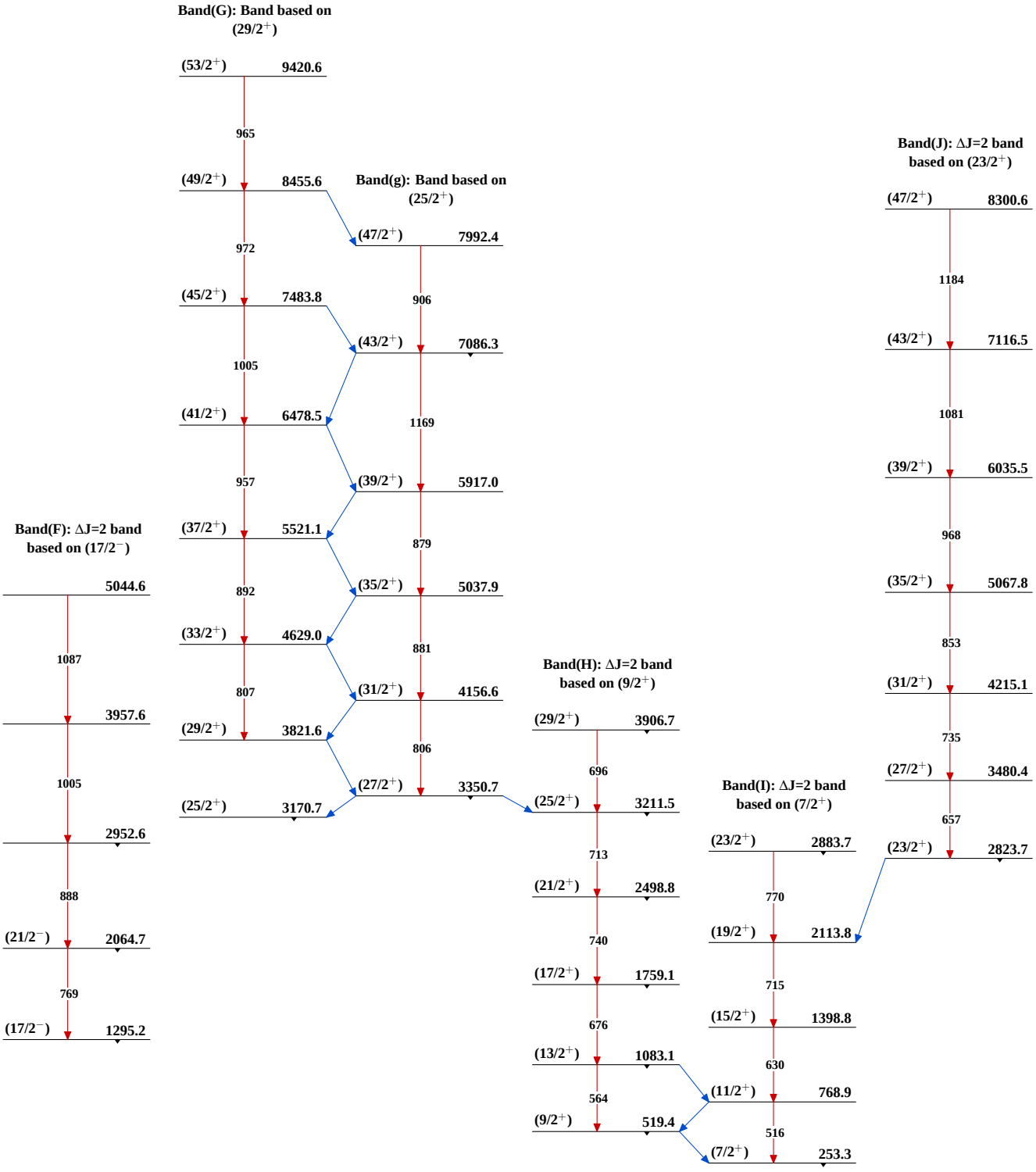
$^{123}_{54}Xe_{69}$

^{110}Pd(^{18}O,5nγ) 1998Sc23,2002Ra34



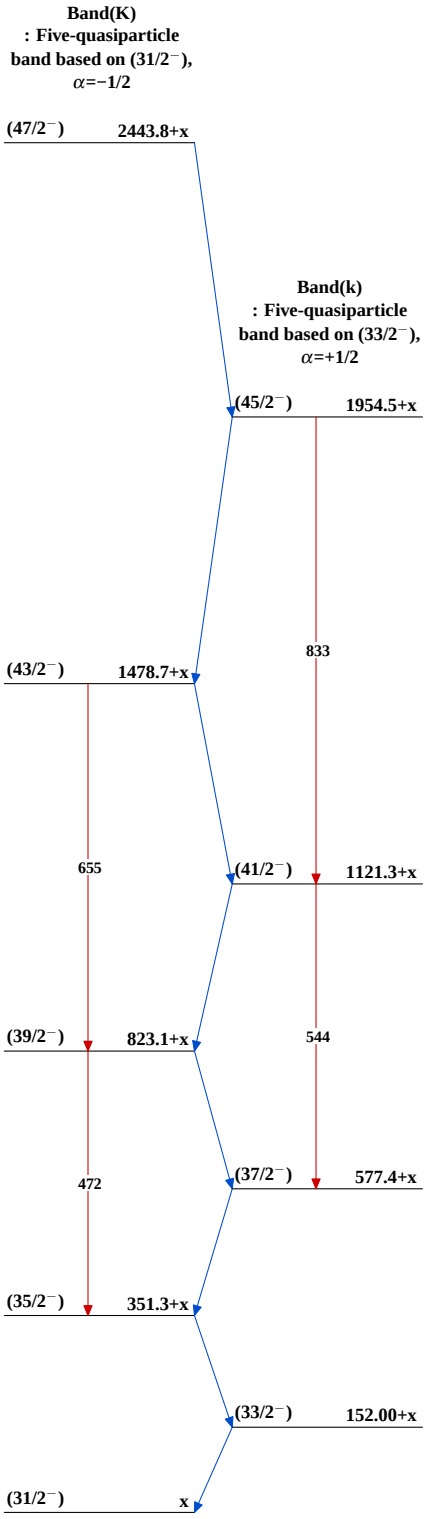
$^{123}_{54}Xe_{69}$

^{110}Pd(^{18}O,5nγ) 1998Sc23,2002Ra34 (continued)



$^{123}_{54}Xe_{69}$

^{110}Pd(^{18}O,5nγ) 1998Sc23,2002Ra34 (continued)



$^{123}_{54}Xe_{69}$

^{114}Cd(^{12}C,3nγ),(^{13}C,4nγ) 1982Ze05

1982Ze05: E=50-62 MeV ^{12}C and ^{13}C beams were produced from the heavy-ion accelerator VICKSI of the Hahn-Meitner-Institut in Berlin. Targets were isotopically enriched ^{114}Cd. γ rays were detected with Ge(Li), Si(Li), HPGe and NaI(Tl) detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma(\theta)$, γ(t), $\gamma(\theta$,t,H), recoil-distance. Deduced levels, J, π, $T_{1/2}$, g-factor, quadrupole moment, γ-ray multipolarities, mixing ratios. Comparisons with theoretical calculations.

Other:

^{116}Cd(^{12}C,5nγ): 1970Co05 propose a partial level scheme based on observed γ transitions assigned to ^{123}Xe, but none of the transitions and the proposed levels are seen and confirmed in any of other studies. It could be that those γ rays were incorrectly assigned to ^{123}Xe.

1974BoYA: measured σ(Eγ,θ), $\gamma\gamma$-coin. Deduced levels.

All data are from 1982Ze05, unless otherwise noted.

^{123}Xe Levels

Nuclear moments μ and Q from Time-Differential observation of the Perturbed Angular Distribution (TDPAD) (1982Ze05).

The 180+x level in 1982Ze05 is resolved to be at 185 keV in Adopted Levels and other levels based on it in 1982Ze05 are thus resolved accordingly.

E(level)†	J$^\pi$‡	$T_{1/2}$#	Comments
0	$1/2^{(+)}$		
97.0 *9*	$3/2^{(+)}$		
180.0 *9*	$5/2^{(+)}$		
184.6 *13*	$7/2^{(-)}$	5.2 μs *5*	μ=−0.896 *7*; Q=1.4 *3* (1982Ze05) E(level): 180+x in 1982Ze05. The position of this isomer is proposed by 1981Lu01 in ^{123}Te(^{3}He,3nγ), which is adopted in Adopted Levels. J$^\pi$: spin=7/2 from analysis of the quadrupole modulation spectra (1982Ze05). μ: from g-factor=−0.256 *2* and spin=7/2, without correction for dia-magnetic shielding or Knight shift (TDPAD,1982Ze05). See also 2014StZZ compilation. $T_{1/2}$: from γ(t) of 97γ, 83γ and 180γ in 1982Ze05.
205.6 *17*	$(9/2^-)$	11.8 ns *14*	Q=1.1 *6* (1982Ze05) E(level): 201+x in 1982Ze05. $T_{1/2}$: from 21γ(t) in 1982Ze05. Q: from model independent ratio of Q(9/2$^-$)/Q(7/2$^-$)=0.80 *40* from the analysis of the amplitude reduction and phase shift and Q(9/2$^-$)=1.4 *3* (1982Ze05). But 1.1 *7* is given in 1982Ze05.
251.0 *13*	$(7/2^+)$		
262.6 *20*	$(11/2^-)$	1.5 ns *3*	E(level): 258+x in 1982Ze05.
437.0 *13*	$7/2^{(+)}$		
466.0 *13*	$(7/2^+)$		
517.0 *17*	$(9/2^+)$		
661.6 *22*	$(13/2^-)$		E(level): 657+x in 1982Ze05.
718.6 *22*	$(15/2^-)$	12.5 ps *21*	E(level): 714+x in 1982Ze05.
767.0 *17*	$(11/2^+)$		
1269.6 *24*	$(15/2^-)$		E(level): 1265+x in 1982Ze05.
1293.6 *24*	$(17/2^-)$		E(level): 1289+x in 1982Ze05.
1335.6 *24*	$(19/2^-)$	≤3.5 ps	E(level): 1331+x in 1982Ze05.
2089 *3*	$(23/2^-)$		E(level): 2084+x in 1982Ze05.
2966 *3*	$(27/2^-)$		E(level): 2961+x in 1982Ze05.

† From a least-squares fit to γ-ray energies, assuming ΔEγ=1 keV.

‡ From Adopted Levels. Assignments for excited states are supported by $\gamma(\theta)$ data in 1982Ze05, where available in comments.

From recoil-distance method (1982Ze05), unless otherwise noted.

^{114}Cd(^{12}C,3nγ),(^{13}C,4nγ) 1982Ze05 (continued)

$\gamma(^{123}Xe)$

E_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	Comments
(4.6)	184.6	$7/2^{(-)}$	180.0	$5/2^{(+)}$	[E1]		E_γ: From Adopted Levels, Gammas; not observed and considered as unknown in 1982Ze05.
21	205.6	$(9/2^-)$	184.6	$7/2^{(-)}$			
57	262.6	$(11/2^-)$	205.6	$(9/2^-)$	D+Q	+0.09 *4*	Mult.: A_2=−0.26 *2*.
71	251.0	$(7/2^+)$	180.0	$5/2^{(+)}$	D+Q		Mult.: A_2=−0.20 *5*.
83	180.0	$5/2^{(+)}$	97.0	$3/2^{(+)}$	D+Q		Mult.: A_2=−0.15 *1*.
97	97.0	$3/2^{(+)}$	0	$1/2^{(+)}$	D+Q	+0.11 *4*	Mult.: A_2=−0.07 *1*. δ: or −2.35 *25*.
180	180.0	$5/2^{(+)}$	0	$1/2^{(+)}$	Q		E_γ: From 1982Ze05. Mult.: A_2=+0.16 *2*.
266	517.0	$(9/2^+)$	251.0	$(7/2^+)$	D+Q	<−0.18	Mult.: A_2=−0.66 *24*.
286	466.0	$(7/2^+)$	180.0	$5/2^{(+)}$	D+Q	<0	E_γ: From 1982Ze05. Mult.: A_2=−0.44 *25*.
340	437.0	$7/2^{(+)}$	97.0	$3/2^{(+)}$	Q		Mult.: A_2=+0.24 *16*.
399	661.6	$(13/2^-)$	262.6	$(11/2^-)$	D+Q	<−0.4	Mult.: A_2=−0.76 *15*, A_4=+0.08 *7*.
456	718.6	$(15/2^-)$	262.6	$(11/2^-)$	Q		Mult.: A_2=+0.30 *7*, A_4=−0.15 *6*.
516	767.0	$(11/2^+)$	251.0	$(7/2^+)$	Q		Mult.: A_2=+0.32 *15*, A_4=−0.23 *16*.
608	1269.6	$(15/2^-)$	661.6	$(13/2^-)$			
617	1335.6	$(19/2^-)$	718.6	$(15/2^-)$	Q		Mult.: A_2=+0.23 *4*, A_4=−0.10 *4*.
632	1293.6	$(17/2^-)$	661.6	$(13/2^-)$			
753	2089	$(23/2^-)$	1335.6	$(19/2^-)$			
877	2966	$(27/2^-)$	2089	$(23/2^-)$			

[†] From the level scheme in Fig.1 of 1982Ze05, unless otherwise noted.

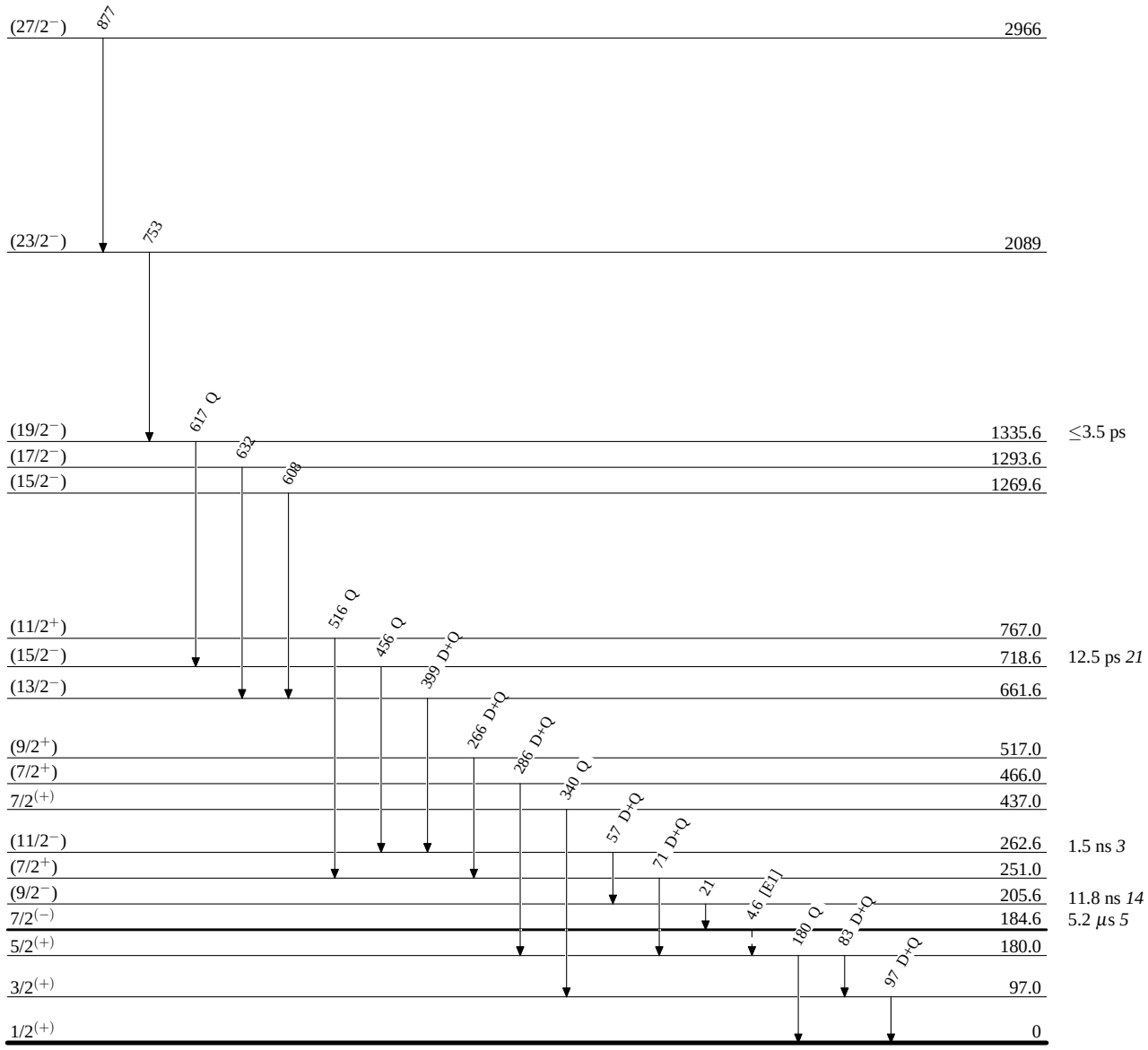
[‡] From $\gamma(\theta)$ in 1982Ze05, with ΔJ=1 for D+Q and ΔJ=2 for Q. Since there is no experimental evidence for the assignments of electric or magnetic nature, D for M1 and Q for E2 are quoted here.

^{114}Cd(^{12}C,3nγ),(^{13}C,4nγ) 1982Ze05

Legend

γ Decay (Uncertain)

Level Scheme



$^{123}_{54}Xe_{69}$

^{123}Te(^{3}He,3nγ) 2001Ga25,1981Lu01

Also includes ^{122}Te(^{3}He,2nγ) from 1981Lu01 and ^{122}Te(α,3nγ) from 1997Sa09, 1970Ke01.

2001Ga25: ^{123}Te(^{3}He,3nγ), E=24 MeV ^{3}He beam was produced from the FN-tandem at the University of Cologne. Target was 15 mg/cm^2 self-supporting ^{123}Te (99.3% enriched). γ rays were detected with 6 Compton-suppressed Ge detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma(\theta)$. Deduced levels, J, π, band structures, γ-ray multipolarities, mixing ratios, branching ratios. Comparisons with theoretical calculations.

1981Lu01: ^{122}Te(^{3}He,2nγ), ^{123}Te(^{3}He,3nγ), E=14-27 MeV ^{3}He beam was produced from the Jyvaskyla University MC-20 cyclotron. Targets were 7-10 mg/cm^2 self-supporting ^{122}Te (91% enriched) and ^{123}Te (67% enriched). γ rays were detected with planar HPGe detectors and coaxial Ge(Li) detectors; conversion electrons were detected with an intermediate-image magnetic-plus Si(Li) electron spectrometer (FWHM=3.0 keV at 1 MeV). Measured Eγ, Iγ, E(ce), I(ce), $\gamma\gamma$-coin, $\gamma(\theta)$, γ(t). Deduced levels, J, π, band structures, isomeric $T_{1/2}$, γ-ray multipolarities, mixing ratios, conversion coefficients. Comparisons with theoretical calculations. Most of the data are from (^{3}He,2nγ) measurement.

1997Sa09: ^{122}Te(α,3nγ), E=40 MeV α beam was produced from the Variable Energy Cyclotron, Calcutta. γ rays were detected with coaxial HPGe detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma(\theta)$. Deduced levels, J, π, γ-ray multipolarities, mixing ratios, branching ratios. Comparisons with available data and theoretical calculations.

Others: ^{122}Te(α,3nγ), 1970Ke01 (1970KeZV,1970KeZO), 1978Gi16.

^{123}Xe Levels

Band assignments are from 2001Ga25.

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	Comments
0[a]	1/2$^{(+)}$		
97.34[&] *8*	3/2$^{(+)}$		
180.61[c] *8*	5/2$^{(+)}$		
185.27 *17*	7/2$^{(-)}$	5.8 μs *3*	E(level): the position of this isomeric state is proposed by 1981Lu01 based on their observation of the 66.7γ in coincidence with 266.4γ and 515.7γ both feeding the 252 level. J$^\pi$: other: 1970Ke01 tentatively assign J^π=9/2$^-$ and E<250 keV to this isomer and proposed that this isomer feeds the 181 level by a M2 transition. $T_{1/2}$: weighted average of 5.6 μs *3* from γ(t) of 97.3γ, 83.2γ and 180.6γ in 1981Lu01, and 6.3 μs *5* from 97.3γ(t) and 83.2γ(t) in 1970Ke01.
206.35[g] *19*	(9/2$^-$)		
251.99[#] *13*	(7/2$^+$)		
263.35[e] *18*	(11/2$^-$)		
307.02[a] *13*	5/2$^{(+)}$		
437.57[&] *15*	7/2$^{(+)}$		
442.59 *15*	(1/2$^+$,3/2$^+$)		
466.91[b] *14*	(7/2$^+$)		
518.47[@] *15*	(9/2$^+$)		
567.7 *3*	(7/2$^-$,9/2$^-$,11/2$^-$)		
585.71 *24*	(3/2$^+$)		
614.2 *3*	(3/2$^+$,5/2,7/2$^+$)		
662.10[d] *19*	(13/2$^-$)		
719.19[e] *20*	(15/2$^-$)		
731.29[c] *14*	(9/2$^+$)		
750.7 *3*	(9/2$^-$,11/2$^-$)		
759.7 *4*			
767.63[#] *17*	(11/2$^+$)		
776.66 *22*	(5/2,7/2,9/2$^+$)		
797.87[a] *16*	(9/2$^+$)		
847.9 *5*	(1/2$^+$,3/2)		

Continued on next page (footnotes at end of table)

^{123}Te(^{3}He,3nγ) 2001Ga25,1981Lu01 (continued)

^{123}Xe Levels (continued)

E(level)[†]	Jπ[‡]	E(level)[†]	Jπ[‡]	E(level)[†]	Jπ[‡]
848.5 *4*	(1/2$^+$,3/2)	1397.79[#] *22*	(15/2$^+$)	2197.0 *4*	
863.9 *3*	(5/2$^+$,7/2$^+$)	1430.8[a] *3*	(13/2$^+$)	2209.9 *4*	
867.8 *4*	(11/2$^-$)	1519.9 *4*		2226.0 *4*	
877.27[g] *20*	(13/2$^-$)	1521.91[g] *23*	(17/2$^-$)	2230.8[&] *3*	(19/2$^+$)
918.5 *4*	(3/2$^+$)	1541.11 *23*	(15/2$^-$)	2248.8 *4*	
934.85[&] *21*	(11/2$^+$)	1554.2[&] *3*	(15/2$^+$)	2284.3[g] *4*	
971.0 *3*	(11/2$^-$)	1580.6 *3*		2416.4? *3*	
1041.5 *3*	(11/2$^-$)	1618.5 *6*		2422.6 *4*	(19/2$^+$)
1046.31 *23*	(7/2$^+$)	1696.4 *6*		2497.8[@] *4*	(21/2$^+$)
1051.16[b] *19*	(9/2$^+$,11/2$^+$)	1733.1[b] *4*		2689.5 *4*	(21/2$^+$)
1054.5 *6*		1758.0[@] *4*	(17/2$^+$)	2770.4[f] *6*	
1082.17[@] *19*	(13/2$^+$)	1759.0 *6*		2822.5 *4*	(23/2$^+$)
1145.2 *3*		1827.8 *3*	(17/2$^-$)	2882.8[#] *4*	(23/2$^+$)
1260.29 *25*	(13/2$^-$)	1841.6 *3*		2951.5[d] *5*	
1270.02[f] *21*	(15/2$^-$)	1947.6 *6*	(15/2$^-$)	2964.5[&] *4*	(23/2$^+$)
1278.0 *4*		1949.3 *4*		2965.7[e] *6*	(27/2$^-$)
1293.97[d] *21*	(17/2$^-$)	1953.5[f] *4*		3152.5[g] *5*	
1325.4 *4*		2063.1[d] *3*	(21/2$^-$)	3169.5 *3*	(25/2$^+$)
1336.21[e] *24*	(19/2$^-$)	2089.6[e] *3*	(23/2$^-$)	3210.8[@] *4*	(25/2$^+$)
1338.9[c] *3*		2112.7[#] *3*	(19/2$^+$)	3349.9 *4*	(27/2$^+$)
1384.3 *6*		2144.7[a] *5*		3479.5 *7*	(27/2$^+$)

[†] From a least-squares fit to γ-ray energies, assuming $\Delta E\gamma$=0.5 keV if not given.

[‡] From Adopted Levels. Assignments by 2001Ga25 are based on their $\gamma\gamma(\theta)$ data and assignments in 1981Lu01 as starting basis, with the latter from $\gamma(\theta)$ and ce data in 1981Lu01.

[#] Band(A): Band based on (7/2$^+$).

[@] Band(B): Band based on (9/2$^+$).

[&] Band(C): Band based on 3/2$^{(+)}$.

[a] Band(D): Band based on 1/2$^{(+)}$.

[b] Band(E): Band based on (7/2$^+$).

[c] Band(F): Band based on 5/2$^{(+)}$.

[d] Band(G): Band based on (13/2$^-$).

[e] Band(H): Band based on (11/2$^-$).

[f] Band(I): Band based on (15/2$^-$).

[g] Band(J): Band based on (9/2$^-$).

^{123}Te(^{3}He,3nγ) 2001Ga25,1981Lu01 (continued)

$\gamma(^{123}Xe)$

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[&]	δ[&]	α[b]	Comments
97.34	3/2$^{(+)}$	97.3 *1*	100	0	1/2$^{(+)}$	D(+Q)		1.4 *6*	E_γ: weighted average of 97.3 *1* (1970Ke01) and 97.4 *2* (1981Lu01). Other: 97.5 (2001Ga25). Relative Iγ=100 (1981Lu01 and 1997Sa09), 100 *8* (1970Ke01). δ: all possible solutions: 0.00 *15*, +0.23 *12*, or −2.2 *+6−10* from 340.3γ-97.5$\gamma(\theta)$ (2001Ga25). Isotropic from $\gamma(\theta)$ in 1997Sa09. A_2=−0.02 (1981Lu01); A_2=0.00 *2* (1997Sa09).
180.61	5/2$^{(+)}$	83.2 *1*	100 *10*	97.34	3/2$^{(+)}$				E_γ: weighted average of 83.2 *1* (1970Ke01) and 83.4 *2* (1981Lu01). Other: 83.4 (2001Ga25). I_γ: other: 100 *10* (1981Lu01). Mult.: Isotropic from $\gamma(\theta)$ in 1997Sa09. Relative Iγ=67 *7* (1981Lu01), 81 *7* (1970Ke01), 77.3 (1997Sa09). A_2=−0.02 *2* (1981Lu01); A_2=−0.02 *3* (1997Sa09).
		180.6 *1*	16 *3*	0	1/2$^{(+)}$				E_γ: weighted average of 180.5 *1* (1970Ke01) and 180.8 *2* (1981Lu01). Other: 180.8 (2001Ga25). I_γ: weighted average of 11 *3* from 2001Ga25 and 17.2 *18* from 1981Lu01. Relative Iγ=11.5 *12* (1981Lu01), 15 *2* (1970Ke01).
185.27	7/2$^{(-)}$	(4.6)	100	180.61	5/2$^{(+)}$	[E1]		39.0	E_γ: from level-energy difference; not observed. This transition is inferred by 1981Lu01 from the fact that decay curves of the 180.8γ and 83.4γ from 180.6 level and the 97.3γ from 97.3 level were observed to follow the isomeric decay. Mult.: If E1, hindrance factor=7.2×10^4 is consistent with observed values in cerium and barium.
206.35	(9/2$^-$)	21.1 *2*	100	185.27	7/2$^{(-)}$	(M1)			E_γ: other: 21.1 (2001Ga25). Mult.: 1981Lu01 states the intensity balance require the same character for the 21γ as the 57γ, which is proposed to be pure M1 from $\gamma(\theta)$ in 1981Lu01. Relative Iγ=9.0 *9* (1981Lu01).
251.99	(7/2$^+$)	66.7 *2*	11 *3*	185.27	7/2$^{(-)}$				E_γ: other: 66.8 (2001Ga25). I_γ: from 1981Lu01. Other: <20 (2001Ga25). Relative Iγ=1.0 *3* (1981Lu01).
		71.3 *2*	100 *10*	180.61	5/2$^{(+)}$	D+Q[a]	−0.02[a] *5*		E_γ: other: 71.4 (2001Ga25). I_γ: from 2001Ga25 and 1981Lu01. A_2=−0.17 *4*, A_4=−0.04 *6* (1981Lu01). Relative Iγ=9.0 *9* (1981Lu01).
263.35	(11/2$^-$)	57.0 *2*	100 *10*	206.35	(9/2$^-$)	D+Q[a]	0.06[a] *+2−3*		E_γ: other: 57.0 (2001Ga25). I_γ: from relative Iγ in 1981Lu01. δ: other: −0.15 *10* from $\gamma(\theta)$ in 1997Sa09. A_2=−0.12 *3*, A_4=−0.02 *4* (1981Lu01); A_2=−0.36 *4* (1997Sa09). Relative Iγ=18.0 *18* (1981Lu01), 23.9 (1997Sa09).
		78.1 *2*	3.3 *10*	185.27	7/2$^{(-)}$				E_γ: other: 77.9 (2001Ga25). I_γ: from relative Iγ in 1981Lu01. Relative Iγ=0.60 *18* (1981Lu01).

^{123}Te(^{3}He,3nγ) 2001Ga25,1981Lu01 (continued)

$\gamma(^{123}Xe)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[&]	δ[&]	α[b]	Comments
307.02	5/2$^{(+)}$	209.9	5 *1*	97.34	3/2$^{(+)}$				
		307.2 *2*	100 *10*	0	1/2$^{(+)}$	E2[a]		0.0389	E_γ: other: 307.2 (2001Ga25). Mult.: α(K)exp=0.026 *4* (1981Lu01). A_2=+0.13 *1*, A_4=−0.01 *1* (1981Lu01); A_2=+0.31 *15* (1997Sa09). Relative Iγ=9.6 *10* (1981Lu01), 3.6 (1997Sa09).
437.57	7/2$^{(+)}$	130.5 *2*	14 *1*	307.02	5/2$^{(+)}$	D+Q	0.06 *4*		E_γ: other: 130.6 (2001Ga25). I_γ: other: 15 *5* (1981Lu01). δ: weighted average of 0.05 *4* (1981Lu01) and 0.07 *5* from 130.5γ-307.2$\gamma(\theta)$ (2001Ga25). Other: 0.02 *+6−13* or −5 *+2−11* from 497.1γ-130.5$\gamma(\theta)$ in 2001Ga25. A_2=−0.10 *1*, A_4=+0.02 *1* (1981Lu01). Relative Iγ=1.8 *6* (1981Lu01).
		185.6[d]	2 *1*	251.99	(7/2$^+$)				E_γ: only from 2001Ga25, but not seen in any other studies.
		340.2 *2*	100 *10*	97.34	3/2$^{(+)}$	E2[a]		0.0282	E_γ: other: 340.3 (2001Ga25). I_γ: from 2001Ga25 and 1981Lu01. Mult.: α(K)exp=0.018 *3* (1981Lu01). A_2=+0.21 *1*, A_4=−0.02 *1* (1981Lu01); A_2=+0.32 *3* (1997Sa09). Relative Iγ=11.8 *12* (1981Lu01), 41.0 (1997Sa09).
442.59	(1/2$^+$,3/2$^+$)	261.9 *2*	100 *10*	180.61	5/2$^{(+)}$				E_γ: other: 261.9 (2001Ga25). I_γ: other: 100 *27* (1981Lu01). Relative Iγ=1.1 *3* (1981Lu01).
		345.3 *2*	21 *5*	97.34	3/2$^{(+)}$				E_γ: other: 345.3 (2001Ga25). I_γ: weighted average of 20 *3* from 2001Ga25 and 45 *14* from 1981Lu01. Relative Iγ=0.50 *15* (1981Lu01).
		442.8	32 *4*	0	1/2$^{(+)}$				E_γ: from 2001Ga25. Not reported in 1981Lu01, but an unlabelled apparent peak can be seen at this energy in the γ-ray spectrum in Fig.1.
466.91	(7/2$^+$)	215.0 *2*	17 *2*	251.99	(7/2$^+$)	D(+Q)[a]	0.5[a] *+16−8*		E_γ: other: 215.1 (2001Ga25). I_γ: other: 18 *6* (1981Lu01). A_2=+0.27 *9*, A_4=−0.06 *3* (1981Lu01). Relative Iγ=1.3 *4* (1981Lu01).
		286.3 *2*	100 *10*	180.61	5/2$^{(+)}$	M1+E2[a]	−1.9[a] *3*	0.0483	E_γ: other: 286.5 (2001Ga25). I_γ: from 2001Ga25 and 1981Lu01. Mult.: α(K)exp=0.026 *4* (1981Lu01). δ: others: −0.31 *7*, −1.80 *+24−30* from 584.0γ-286.5$\gamma(\theta)$, −1.62 *11*, −0.36 *3*, −0.22 *2*, −2.13 *+11−3* from 264.4γ-286.5$\gamma(\theta)$, in 2001Ga25, none of them adopted by the authors. A_2=−0.33 *1*, A_4=+0.04 *2* (1981Lu01). Relative Iγ=7.3 *7* (1981Lu01).
518.47	(9/2$^+$)	255.1 *2*	25 *3*	263.35	(11/2$^-$)	D(+Q)	0.02 *6*		E_γ: other: 255.2 (2001Ga25).

$^{123}_{54}Xe_{69}$-100

^{123}Te(^{3}He,3nγ) 2001Ga25,1981Lu01 (continued)

$\gamma(^{123}Xe)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[&]	δ[&]	α[b]	Comments
518.47	(9/2$^+$)	266.4 *2*	100 *10*	251.99	(7/2$^+$)	M1+E2	−0.9 *2*	0.0587 *11*	I$_\gamma$: weighted average of 26 *3* from 2001Ga25 and 22 *6* from 1981Lu01. δ: other: <−8 also from 2001Ga25. Relative Iγ=1.4 *4* (1981Lu01). E$_\gamma$: other: 266.5 (2001Ga25). I$_\gamma$: 100 *11* from 1981Lu01. Mult.: α(K)exp=0.046 *5* (1981Lu01). δ: from 563.7γ-266.4$\gamma(\theta)$ in 2001Ga25; −0.9 *3* from $\gamma(\theta)$ in 1981Lu01. Others: −0.61 *8*, −0.47 *3*, −1.14 *7*, −1.33 *6* from 249.3γ-266.4$\gamma(\theta)$ in 2001Ga25. A$_2$=−0.59 *1*, A$_4$=+0.07 *1* (1981Lu01). Relative Iγ=6.5 *7* (1981Lu01).
		312.2	23 *2*	206.35	(9/2$^-$)				
		333.3	29 *3*	185.27	7/2$^{(-)}$				
		337.8	25 *3*	180.61	5/2$^{(+)}$				
567.7	(7/2$^-$,9/2$^-$,11/2$^-$)	304.5	6 *1*	263.35	(11/2$^-$)				
		361.3	100 *10*	206.35	(9/2$^-$)				
		382.4	12 *1*	185.27	7/2$^{(-)}$				
585.71	(3/2$^+$)	278.6	22 *5*	307.02	5/2$^{(+)}$				
		333.8	77 *10*	251.99	(7/2$^+$)				
		405.1	100 *12*	180.61	5/2$^{(+)}$				
		488.4	74 *11*	97.34	3/2$^{(+)}$				
614.2	(3/2$^+$,5/2,7/2$^+$)	307.1[d]	<32	307.02	5/2$^{(+)}$				
		362.2[d]	32 *5*	251.99	(7/2$^+$)				
		433.5	64 *8*	180.61	5/2$^{(+)}$				
		516.9	100 *12*	97.34	3/2$^{(+)}$				
662.10	(13/2$^-$)	398.7 *2*	100 *10*	263.35	(11/2$^-$)	M1+E2[a]	−0.55[a] *5*	0.0192	E$_\gamma$: other: 398.9 (2001Ga25). I$_\gamma$: from 2001Ga25 and 1981Lu01. Mult.: α(K)exp=0.013 *7* (1981Lu01). δ: others: −0.62 *9*, −1.3 *2* from 631.7γ-398.7$\gamma(\theta)$ in 2001Ga25; −0.8 *+4−9* from $\gamma(\theta)$ in 1997Sa09. A$_2$=−0.69 *1*, A$_4$=+0.04 *1* (1981Lu01); A$_2$=−0.82 *5* (1997Sa09). Relative Iγ=18.0 *18* (1981Lu01), 21.2 (1997Sa09).
		455.8[c] *2*	50[c] *5*	206.35	(9/2$^-$)				E$_\gamma$: other: 455.8 (2001Ga25). I$_\gamma$: other: 11 *3* (1981Lu01). Relative Iγ=2.0 *6* (1981Lu01).
719.19	(15/2$^-$)	455.8[c] *2*	100[c]	263.35	(11/2$^-$)	(Q)[a]			E$_\gamma$: other: 455.8 (2001Ga25). Mult.: A$_2$=+0.30 *1*, A$_4$=−0.06 *1* (1981Lu01); A$_2$=+0.29 *5*, A$_4$=−0.14 *6* for the doublet (1997Sa09). Relative Iγ=47 *5* (1981Lu01), 86.6 for the doublet (1997Sa09).
731.29	(9/2$^+$)	213.0	48 *5*	518.47	(9/2$^+$)				

$^{123}_{54}Xe_{69}$-101

^{123}Te(^{3}He,3nγ) 2001Ga25,1981Lu01 (continued)

$\gamma(^{123}Xe)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[&]	δ[&]	Comments
731.29	(9/2$^+$)	264.3 *2*	53 *6*	466.91	(7/2$^+$)	D+Q[a]	−0.3[a] *+2−5*	E_γ: other: 264.4 (2001Ga25). δ: others: −0.34 *4*, −3.2 *3* from 264.3γ-286.5$\gamma(\theta)$ (2001Ga25). I_γ: other: 140 *40* (1981Lu01). A_2=−0.44 *5*, A_4=−0.09 *9* (1981Lu01). Relative Iγ=1.4 *4* (1981Lu01).
		294.0	16 *3*	437.57	7/2$^{(+)}$			
		424.4	40 *5*	307.02	5/2$^{(+)}$	Q(+O)	−0.05 *+6−3*	δ: other: 1.80 *+30−24* also from 424.4γ-307.2$\gamma(\theta)$ in 2001Ga25.
		468.2[d]	12 *3*	263.35	(11/2$^-$)			
		479.3 *2*	69 *8*	251.99	(7/2$^+$)			E_γ: other: 479.5 (2001Ga25). I_γ: other: 100 *30* (1981Lu01). Relative Iγ=1.0 *3* (1981Lu01).
		550.6 *2*	100 *11*	180.61	5/2$^{(+)}$			E_γ: other: 550.8 (2001Ga25). I_γ: other: 100 *30* (1981Lu01). Relative Iγ=1.0 *3* (1981Lu01).
750.7	(9/2$^-$,11/2$^-$)	183.0	8 *2*	567.7	(7/2$^-$,9/2$^-$,11/2$^-$)			
		487.4	100 *11*	263.35	(11/2$^-$)			
		544.3	43 *6*	206.35	(9/2$^-$)			
		565.3	25 *5*	185.27	7/2$^{(-)}$			
759.7		192.0	100 *12*	567.7	(7/2$^-$,9/2$^-$,11/2$^-$)			
		553.4	51 *7*	206.35	(9/2$^-$)			
		574.3	92 *12*	185.27	7/2$^{(-)}$			
767.63	(11/2$^+$)	249.2 *2*	15 *2*	518.47	(9/2$^+$)	D+Q	−0.62 *3*	E_γ: other: 249.3 (2001Ga25). I_γ: weighted average of 16.0 *20* from 2001Ga25 and 12 *4* from 1981Lu01. δ: others: −0.64 *3*, −1.35 *15*, −1.6 *1* also from 249.2γ-266.5$\gamma(\theta)$, −1.9 *5*, −0.46 *+11−21* from 630.2γ-249.2$\gamma(\theta)$, −0.46 *+15−30*, −2.5 *+11−14* from 249.2γ-333.3$\gamma(\theta)$ in 2001Ga25, and −0.4 *+3−31* from $\gamma(\theta)$ in 1981Lu01. A_2=−0.54 *2*, A_4=−0.07 *20* (1981Lu01). Relative Iγ=1.2 *4* (1981Lu01).
		515.6 *2*	100 *10*	251.99	(7/2$^+$)	Q[a]		E_γ: other: 517.2 (2001Ga25). Mult.: A_2=+0.29 *4*, A_4=−0.03 *5* (1981Lu01). Relative Iγ=10.3 *10* (1981Lu01).
776.66	(5/2,7/2,9/2$^+$)	309.7	29 *3*	466.91	(7/2$^+$)			
		339.1	100 *11*	437.57	7/2$^{(+)}$			
		469.7	31 *4*	307.02	5/2$^{(+)}$			
		524.7	32 *5*	251.99	(7/2$^+$)			
		591.4	57 *6*	185.27	7/2$^{(-)}$			
		596.0	76 *8*	180.61	5/2$^{(+)}$			
797.87	(9/2$^+$)	278.9	7 *1*	518.47	(9/2$^+$)			
		331.2 *2*	46 *5*	466.91	(7/2$^+$)	D+Q	−0.28 *2*	E_γ: other: 330.2 (2001Ga25). Relative Iγ=1.5 *5* (1981Lu01).

$^{123}_{54}Xe_{69}$-102

^{123}Te(^{3}He,3nγ) 2001Ga25,1981Lu01 (continued)

$\gamma(^{123}Xe)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[&]	δ[&]	Comments
797.87	(9/2$^+$)	359.9	<4	437.57	7/2$^{(+)}$			
		491.1 *2*	100 *10*	307.02	5/2$^{(+)}$	Q(+O)	−0.05 *+6−3*	E_γ: other: 490.4 (2001Ga25). δ: other: 1.80 *+30−24* also from 2001Ga25. Relative Iγ=1.0 *3* (1981Lu01).
		545.5	41 *4*	251.99	(7/2$^+$)			
847.9	(1/2$^+$,3/2)	750.6	100	97.34	3/2$^{(+)}$			
848.5	(1/2$^+$,3/2)	541.5		307.02	5/2$^{(+)}$			
		667.8		180.61	5/2$^{(+)}$			
863.9	(5/2$^+$,7/2$^+$)	249.7	40 *8*	614.2	(3/2$^+$,5/2,7/2$^+$)			
		278.2[d]	27 *6*	585.71	(3/2$^+$)			
		345.4	47 *10*	518.47	(9/2$^+$)			
		396.9	26 *8*	466.91	(7/2$^+$)			
		421.3	100 *15*	442.59	(1/2$^+$,3/2$^+$)			
		678.8[d]	149 *20*	185.27	7/2$^{(-)}$			
867.8	(11/2$^-$)	661.5	33 *4*	206.35	(9/2$^-$)			
		682.5	100 *11*	185.27	7/2$^{(-)}$			
877.27	(13/2$^-$)	614.0 *2*	100 *10*	263.35	(11/2$^-$)	D+Q[a]	14[a] *+5−3*	E_γ: other: 613.8 (2001Ga25). I_γ: 100 *11* (1981Lu01). δ: others: >+16, +0.08 *3* from 644.5γ-613.8$\gamma(\theta)$ (2001Ga25). A_2=+0.06 *1*, A_4=+0.13 *1* (1981Lu01). Relative Iγ=8.5 *9* (1981Lu01).
		670.9 *2*	64 *7*	206.35	(9/2$^-$)	Q		E_γ: other: 670.7 (2001Ga25). I_γ: other: 106 *11* (1981Lu01). Mult.: from $\gamma(\theta)$ in 1997Sa09. A_2=+0.30 *4* (1997Sa09). Relative Iγ=9.0 *9* (1981Lu01), 43.1 (1997Sa09).
918.5	(3/2$^+$)	481.0		437.57	7/2$^{(+)}$			
		611.4		307.02	5/2$^{(+)}$			
934.85	(11/2$^+$)	137.5	1 *1*	797.87	(9/2$^+$)			
		416.5	2 *1*	518.47	(9/2$^+$)			
		497.2 *2*	100 *10*	437.57	7/2$^{(+)}$	Q[a]		E_γ: other: 497.1 (2001Ga25). Mult.: A_2=+0.30 *2*, A_4=−0.06 *3*. Relative Iγ=8.0 *8* (1981Lu01).
971.0	(11/2$^-$)	308.9	26 *3*	662.10	(13/2$^-$)	D+Q		δ: −0.3 *1*, or −4 *+1−2* from 308.9γ-455.8$\gamma(\theta)$ (2001Ga25).
		403.4	13 *2*	567.7	(7/2$^-$,9/2$^-$,11/2$^-$)			
		707.6	43 *5*	263.35	(11/2$^-$)			
		764.6	100 *10*	206.35	(9/2$^-$)	D+Q	−1.05 *+34−51*	
1041.5	(11/2$^-$)	290.9	9 *2*	750.7	(9/2$^-$,11/2$^-$)			
		379.4	25 *3*	662.10	(13/2$^-$)	D(+Q)	−0.05 *+6−3*	
		778.3	35 *5*	263.35	(11/2$^-$)			
		835.0	100 *11*	206.35	(9/2$^-$)			
1046.31	(7/2$^+$)	249.0	34 *5*	797.87	(9/2$^+$)			

^{123}Te(^{3}He,3nγ) 2001Ga25,1981Lu01 (continued)

$\gamma(^{123}Xe)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[&]	δ[&]	Comments
1046.31	(7/2$^+$)	432.1	52 *7*	614.2	(3/2$^+$,5/2,7/2$^+$)			
		460.6	64 *8*	585.71	(3/2$^+$)			
		527.8	45 *7*	518.47	(9/2$^+$)			
		579.2	82 *10*	466.91	(7/2$^+$)			
		839.8	100 *13*	206.35	(9/2$^-$)			
		860.9	84 *11*	185.27	7/2$^{(-)}$			
1051.16	(9/2$^+$,11/2$^+$)	253.7	12 *2*	797.87	(9/2$^+$)			
		283.6	8 *1*	767.63	(11/2$^+$)			
		319.7	25 *3*	731.29	(9/2$^+$)			
		532.7 *2*	97 *10*	518.47	(9/2$^+$)	D+Q		E_γ: other: 532.7 (2001Ga25). δ: −5.04 *+57−73*, or −0.26 *2* from 532.7γ-266.5$\gamma(\theta)$ (2001Ga25). Relative Iγ=2.0 *6* (1981Lu01).
		584.0	100 *11*	466.91	(7/2$^+$)			
		844.8	37 *6*	206.35	(9/2$^-$)			
1054.5		294.8	100	759.7				
1082.17	(13/2$^+$)	314.5 *2*	18 *2*	767.63	(11/2$^+$)	D+Q[a]	−0.9[a] *+5−9*	E_γ: other: 314.6 (2001Ga25). δ: others: −0.46 *+11−16*, −2.1 *7* from 314.5γ-515.7$\gamma(\theta)$ (2001Ga25). A_2=−0.89 *8*, A_4=+0.10 *5* (1981Lu01). Relative Iγ=0.70 *21* (1981Lu01).
		363.3	6 *1*	719.19	(15/2$^-$)	D(+Q)	+0.05 *+10−6*	δ: other: 11 *+21−5* also from 2001Ga25.
		563.6 *2*	100 *10*	518.47	(9/2$^+$)			E_γ: other: 563.7 (2001Ga25). Relative Iγ=3.0 *9* (1981Lu01).
		818.9	35 *4*	263.35	(11/2$^-$)	D(+Q)	+0.05 *6*	E_γ: 802.6 in Table 3 of 2001Ga25 is a misprint. δ: other: <−16 also from 2001Ga25.
1145.2		626.8	77 *10*	518.47	(9/2$^+$)			
		893.3	100 *12*	251.99	(7/2$^+$)			
1260.29	(13/2$^-$)	218.8	14 *2*	1041.5	(11/2$^-$)			
		289.3	23 *3*	971.0	(11/2$^-$)	D+Q		δ: −0.14 *3*, −8 *+2−4* from 289.3γ-764.6$\gamma(\theta)$ (2001Ga25).
		509.6	42 *6*	750.7	(9/2$^-$,11/2$^-$)			
		541.1	100 *11*	719.19	(15/2$^-$)	D+Q		δ: −0.08 *+3−6*, +11 *+5−3* from 541.1γ-455.8$\gamma(\theta)$ (2001Ga25).
		598.0	38 *6*	662.10	(13/2$^-$)			
		997.0	21 *4*	263.35	(11/2$^-$)			
1270.02	(15/2$^-$)	392.7 *2*	24 *3*	877.27	(13/2$^-$)	(D+Q)		E_γ: other: 392.7 (2001Ga25). I_γ: weighted average of 23 *3* from 2001Ga25 and 28 *8* from 1981Lu01. A_2<0 (1981Lu01). Relative Iγ=1.4 *4* (1981Lu01).
		550.9 *2*	27 *4*	719.19	(15/2$^-$)	D+Q	−3.4 *+9−18*	E_γ: other: 550.6 (2001Ga25). I_γ: weighted average of 26 *3* from 2001Ga25 and 50 *16* from 1981Lu01. δ: other: 0.98 *+29−17* also from 2001Ga25. Relative Iγ=2.5 *8* (1981Lu01).
		608.0 *2*	100 *10*	662.10	(13/2$^-$)	D+Q	−2.04 *11*	E_γ: other: 607.6 (2001Ga25). I_γ: from 2001Ga25 and 1981Lu01. δ: others: −2.9 *+9−18* from $\gamma(\theta)$ in 1981Lu01, −2.62 from $\gamma(\theta)$

^{123}Te(^{3}He,3nγ) 2001Ga25,1981Lu01 (continued)

$\gamma(^{123}Xe)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[&]	δ[&]	Comments
								in 1997Sa09.
								A_2=−0.48 *7*, A_4=+0.17 *11* (1981Lu01); A_2=−0.68 *12* (1997Sa09).
								Relative Iγ=5.0 *5* (1981Lu01), 15.0 (1997Sa09).

$^{123}_{54}Xe_{69}$-105

^{123}Te(^{3}He,3nγ) 2001Ga25,1981Lu01 (continued)

$\gamma(^{123}Xe)$ (continued)

E_i(level)	J_i^π	E_γ [†]	I_γ [‡]	E_f	J_f^π	Mult.[&]	δ[&]	Comments
1278.0		501.3		776.66	(5/2,7/2,9/2$^+$)			
		546.7		731.29	(9/2$^+$)			
1293.97	(17/2$^-$)	574.7 *2*	73 *7*	719.19	(15/2$^-$)	D+Q	−0.41 *18*	E_γ: other: 574.8 (2001Ga25). 547.8 in Table 3 of 2001Ga25 is a misprint. I_γ: weighted average of 79 *8* from 2001Ga25 and 68 *7* from 1981Lu01. δ: unweighted average of −0.58 *4* (2001Ga25) and −0.23 6 (1981Lu01). Other: −1.94 *+27−16* in 2001Ga25. A_2=−0.52 *1*, A_4=+0.06 *2* (1981Lu01). Relative Iγ=5.0 *5* (1981Lu01).
		631.9 *2*	100 *10*	662.10	(13/2$^-$)	E2(+M3)[a]	−0.05 *+6−3*	E_γ: other: 631.7 (2001Ga25). I_γ: other: 100 *11* from 1981Lu01. Mult.: α(K)exp=0.0042 *9* for 630.2γ+631.9γ (1981Lu01). δ: other: −3.05 *+81−55* also from 2001Ga25. A_2=+0.31 *1*, A_4=−0.07 *1* (1981Lu01). Relative Iγ=7.4 *8* (1981Lu01).
1325.4		448.3		877.27	(13/2$^-$)			
		663.2		662.10	(13/2$^-$)			
1336.21	(19/2$^-$)	617.0 *2*	100	719.19	(15/2$^-$)	Q(+O)	−0.05 *6*	E_γ: other: 616.9 (2001Ga25). Mult.: other: mult=Q from $\gamma(\theta)$ in 1981Lu01. δ: other: 2.8 *3* also from 2001Ga25. A_2=+0.27 *4*, A_4=−0.07 *1* (1981Lu01); A_2=+0.33 *3* (1997Sa09). Relative Iγ=18.0 *18* (1981Lu01), 56.7 (1997Sa09).
1338.9		287.9		1051.16	(9/2$^+$,11/2$^+$)			
		571.3		767.63	(11/2$^+$)			
		607.5		731.29	(9/2$^+$)			
		820.5		518.47	(9/2$^+$)			
1384.3		520.4	100	863.9	(5/2$^+$,7/2$^+$)			
1397.79	(15/2$^+$)	315.5	6 *1*	1082.17	(13/2$^+$)			
		630.2 *2*	100 *10*	767.63	(11/2$^+$)	E2[a]		E_γ: other: 630.0 (2001Ga25). Mult.: α(K)exp=0.0042 *9* for 630.2γ +631.9γ (1981Lu01). A_2=+0.33 *1*, A_4=−0.02 *1* (1981Lu01); A_2=+0.26 *5* for 630γ+632γ (1997Sa09). Relative Iγ=5.5 *6* (1981Lu01), 23.0 for 630γ+632γ (1997Sa09).
		735.6	22 *2*	662.10	(13/2$^-$)			
1430.8	(13/2$^+$)	379.5	25 *4*	1051.16	(9/2$^+$,11/2$^+$)			
		633.2	100 *12*	797.87	(9/2$^+$)	Q(+O)	−0.02 *+6−10*	δ: 2.10 *+65−43* also from 2001Ga25.
		663.0	40 *5*	767.63	(11/2$^+$)			

^{123}Te(^{3}He,3nγ) 2001Ga25,1981Lu01 (continued)

$\gamma(^{123}Xe)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[&]	δ[&]	Comments
1519.9		374.7		1145.2				
		752.2		767.63	$(11/2^+)$			
		1001.4		518.47	$(9/2^+)$			
1521.91	$(17/2^-)$	251.9	6 *1*	1270.02	$(15/2^-)$			
		644.7 *2*	100 *11*	877.27	$(13/2^-)$			E_γ: other: 644.5 (2001Ga25). I_γ: other: 100 *30* (1981Lu01). Relative Iγ=4.7 *14* (1981Lu01).
		802.7 *2*	49 *15*	719.19	$(15/2^-)$	D+Q	<−16	E_γ: other: 802.6 (2001Ga25). I_γ: unweighted average of 63 *7* from 2001Ga25 and 34 *11* from 1981Lu01. δ: other: −0.02 *3* also from 2001Ga25. Relative Iγ=1.6 *5* (1981Lu01.
1541.11	$(15/2^-)$	247.1[d]	17 *10*	1293.97	$(17/2^-)$			
		499.6	8 *5*	1041.5	$(11/2^-)$			
		570.1	80 *11*	971.0	$(11/2^-)$			
		664.0	45 *7*	877.27	$(13/2^-)$			
		673.2	19 *8*	867.8	$(11/2^-)$			
		821.9	37 *7*	719.19	$(15/2^-)$			
		879.0 *2*	100 *12*	662.10	$(13/2^-)$	D+Q[a]	−2.2[a] *+6−7*	E_γ: other: 878.9 (2001Ga25). δ: others: −1.67 *6* or −0.58 *11* from $\gamma\gamma(\theta)$ in 2001Ga25. A_2=−0.58 *5*, A_4=+0.11 *8* (1981Lu01). Relative Iγ=1.4 *4* (1981Lu01).
1554.2	$(15/2^+)$	619.4 *2*	100	934.85	$(11/2^+)$	Q[a]		E_γ: other: 619.2 (2001Ga25). A_2=+0.22 *4*, A_4=−0.10 *5* (1981Lu01). Relative Iγ=3.5 *11* (1981Lu01).
1580.6		320.3	<30	1260.29	$(13/2^-)$			
		539.0	33 *9*	1041.5	$(11/2^-)$			
		861.4	46 *11*	719.19	$(15/2^-)$			
		918.2	100 *15*	662.10	$(13/2^-)$			
1618.5		572.2	100	1046.31	$(7/2^+)$			
1696.4		1034.3	100	662.10	$(13/2^-)$			
1733.1		650.9		1082.17	$(13/2^+)$			
		682.0		1051.16	$(9/2^+,11/2^+)$			
1758.0	$(17/2^+)$	675.7	100 *11*	1082.17	$(13/2^+)$			
		1038.9	37 *4*	719.19	$(15/2^-)$	D(+Q)	0.05 *6*	δ: other: >8 also from 2001Ga25.
1759.0		1321.4	100	437.57	$7/2^{(+)}$			
1827.8	$(17/2^-)$	491.6		1336.21	$(19/2^-)$			
		533.7		1293.97	$(17/2^-)$			
		557.9		1270.02	$(15/2^-)$	D+Q		δ: −0.52 *11* or −1.56 *21* (2001Ga25).
		567.4		1260.29	$(13/2^-)$			
		950.6		877.27	$(13/2^-)$			
		1108.4		719.19	$(15/2^-)$			
1841.6		443.9		1397.79	$(15/2^+)$			

$^{123}_{54}Xe_{69}$-107

^{123}Te(^{3}He,3nγ) 2001Ga25,1981Lu01 (continued)

$\gamma(^{123}Xe)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[&]	δ[&]	Comments
1841.6		696.4		1145.2				
		759.3		1082.17	(13/2$^+$)			
		1179.5		662.10	(13/2$^-$)			
1947.6	(15/2$^-$)	1285.5	100	662.10	(13/2$^-$)	D(+Q)	−0.02 *3*	
1949.3		368.7		1580.6				
		427.5		1521.91	(17/2$^-$)			
		679.4		1270.02	(15/2$^-$)			
		689.0		1260.29	(13/2$^-$)			
1953.5		431.6	14 *3*	1521.91	(17/2$^-$)			
		617.3	<57	1336.21	(19/2$^-$)			
		659.4	30 *4*	1293.97	(17/2$^-$)			
		683.6	100 *11*	1270.02	(15/2$^-$)			
2063.1	(21/2$^-$)	727.1	69 *10*	1336.21	(19/2$^-$)	D+Q	−0.38 *+7−11*	δ: other: −2.50 *+40−55* also in 2001Ga25.
		769.1 *2*	100 *13*	1293.97	(17/2$^-$)	Q[a]		E_γ: other: 769.0 (2001Ga25). A_2=+0.26 *3*, A_4=−0.01 *4* (1981Lu01). Relative Iγ=2.5 *8* (1981Lu01).
2089.6	(23/2$^-$)	753.3 *2*	100	1336.21	(19/2$^-$)	E2[a]		E_γ: other: 753.4 (2001Ga25). Mult.: α(K)exp=0.0024 *5* (1981Lu01). A_2=+0.24 *6*, A_4=−0.12 *8* (1981Lu01); A_2=+0.12 *4* (1997Sa09). Relative Iγ=3.0 *9* (1981Lu01), 45.5 (1997Sa09).
2112.7	(19/2$^+$)	714.9 *2*	100	1397.79	(15/2$^+$)	(Q)[a]		E_γ: other: 714.7 (2001Ga25). Mult.: A_2=+0.25 *2*, A_4=−0.09 *3*, half of the intensity from 715.2γ in ^{122}Xe (1981Lu01). Relative Iγ=2.0 *6* (1981Lu01).
		818.7		1293.97	(17/2$^-$)			
2144.7		714.0		1430.8	(13/2$^+$)			
		746.8		1397.79	(15/2$^+$)			
2197.0		927.2		1270.02	(15/2$^-$)			
		1477.6		719.19	(15/2$^-$)			
2209.9		668.9		1541.11	(15/2$^-$)			
		873.8		1336.21	(19/2$^-$)			
		915.9		1293.97	(17/2$^-$)			
		1490.7		719.19	(15/2$^-$)			
2226.0		684.9		1541.11	(15/2$^-$)			
		932.0		1293.97	(17/2$^-$)			
2230.8	(19/2$^+$)	676.7	100[#] *11*	1554.2	(15/2$^+$)			
		936.8	24[#] *4*	1293.97	(17/2$^-$)			
2248.8		668.1		1580.6				
		954.9		1293.97	(17/2$^-$)			
		1529.6		719.19	(15/2$^-$)			
2284.3		762.6	100[#] *11*	1521.91	(17/2$^-$)			
		948.1	32[#] *8*	1336.21	(19/2$^-$)			

$^{123}_{54}Xe_{69}$-108

^{123}Te(^{3}He,3nγ) 2001Ga25,1981Lu01 (continued)

$\gamma(^{123}Xe)$ (continued)

E_i(level)	J_i^π	E_γ †	I_γ ‡	E_f	J_f^π
2416.4?		1080.2 *d*	100	1336.21	(19/2$^-$)
2422.6	(19/2$^+$)	1128.7	100	1293.97	(17/2$^-$)
2497.8	(21/2$^+$)	739.7	100# *10*	1758.0	(17/2$^+$)
		1161.5	48# *5*	1336.21	(19/2$^-$)
2689.5	(21/2$^+$)	267.1	19# *3*	2422.6	(19/2$^+$)
		1353.4	100# *11*	1336.21	(19/2$^-$)
2770.4		816.9	100	1953.5	
2822.5	(23/2$^+$)	591.8@	21# *2*	2230.8	(19/2$^+$)
		709.8	100# *10*	2112.7	(19/2$^+$)
2882.8	(23/2$^+$)	652.1@	50# *6*	2230.8	(19/2$^+$)
		770.2	100# *11*	2112.7	(19/2$^+$)
		819.6	77# *9*	2063.1	(21/2$^-$)
2951.5		861.8	39# *5*	2089.6	(23/2$^-$)
		888.5	100# *11*	2063.1	(21/2$^-$)
2964.5	(23/2$^+$)	275.0@	29# *3*	2689.5	(21/2$^+$)
		541.9	75# *8*	2422.6	(19/2$^+$)
		733.7	100# *11*	2230.8	(19/2$^+$)
2965.7	(27/2$^-$)	876.1	100	2089.6	(23/2$^-$)
3152.5		868.3	100# *3*	2284.3	
		1062.7@	21# *5*	2089.6	(23/2$^-$)
3169.5	(25/2$^+$)	205.1@	20# *2*	2964.5	(23/2$^+$)
		286.8@	13# *1*	2882.8	(23/2$^+$)
		347.1@	3# *1*	2822.5	(23/2$^+$)
		480.2@	16# *2*	2689.5	(21/2$^+$)
		671.6@	76# *8*	2497.8	(21/2$^+$)
		1079.9	100# *10*	2089.6	(23/2$^-$)
3210.8	(25/2$^+$)	713.0	100# *12*	2497.8	(21/2$^+$)
		1121.1	50# *7*	2089.6	(23/2$^-$)
3349.9	(27/2$^+$)	139.0	15# *2*	3210.8	(25/2$^+$)
		180.5	100# *10*	3169.5	(25/2$^+$)
		385.5	14# *1*	2964.5	(23/2$^+$)
		467.0	10# *1*	2882.8	(23/2$^+$)
3479.5	(27/2$^+$)	657.0	100#	2822.5	(23/2$^+$)

† Values are mostly from 2001Ga25 with no uncertainties, and values with uncertainties are from 1998Sc23, unless otherwise noted.

‡ Quoted values are branching ratios from 2001Ga25, unless otherwise noted. Relative intensities to Iγ(97γ)=1000 are available with uncertainties in 1981Lu01 and without uncertainties in 1997Sa09, and given under comments (renormalized to Iγ(97γ)=100 by the evaluator). Where available, weighted average are taken from values in 2001Ga25 and values converted from relative intensities in 1981Lu01. The uncertainties of relative intensities in 1981Lu01 are assigned as follows by the evaluator based on a general statement of 10% for larger peaks and 30% for small peaks: 10% for I$\gamma\geq$5 and 30% for Iγ<5, relative to Iγ=100 for 97γ.

2001Ga25 state that the value is from 1998Sc23. But no intensity data are quoted by 1998Sc23.

@ 2001Ga25 state that the value (quoted as nearest tenth of a keV) is from 1998Sc23. However, the values of Eγ are the nearest keV in 1998Sc23.

& From $\gamma\gamma(\theta)$ in 2001Ga25 with ΔJ=1 for D+Q and ΔJ=2 for Q, unless otherwise noted. For some transitions, α(K)exp data in 1981Lu01 are used to determine the electric or magnetic nature. $\gamma(\theta)$ data are also available in 1981Lu01 with A_2 and A_4 values given under comments. No A_2 and A_4 values of $\gamma\gamma(\theta)$ are given in 2001Ga25. Other δ values from 2001Ga25 given under comments are those not adopted by the authors.

a From $\gamma(\theta)$ in 1981Lu01, with ΔJ=1 (except for 0 for 215γ) for D+Q and ΔJ=2 for Q. Where available, α(K)exp data in 1981Lu01 are used to determine the electric or magnetic nature.

b Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

c Multiply placed with intensity suitably divided.

d Placement of transition in the level scheme is uncertain.

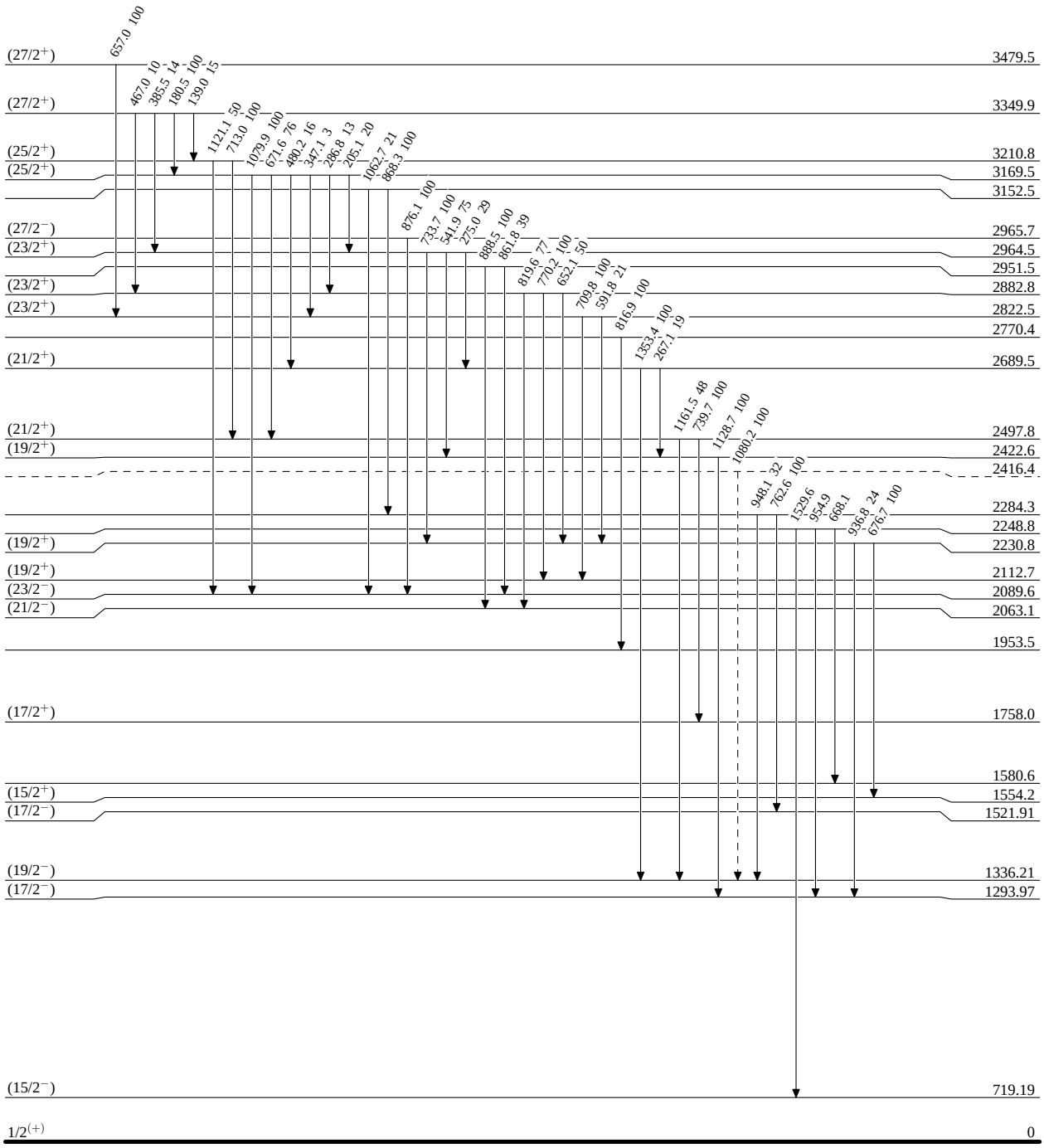
^{123}Te(^{3}He,3nγ) 2001Ga25,1981Lu01

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

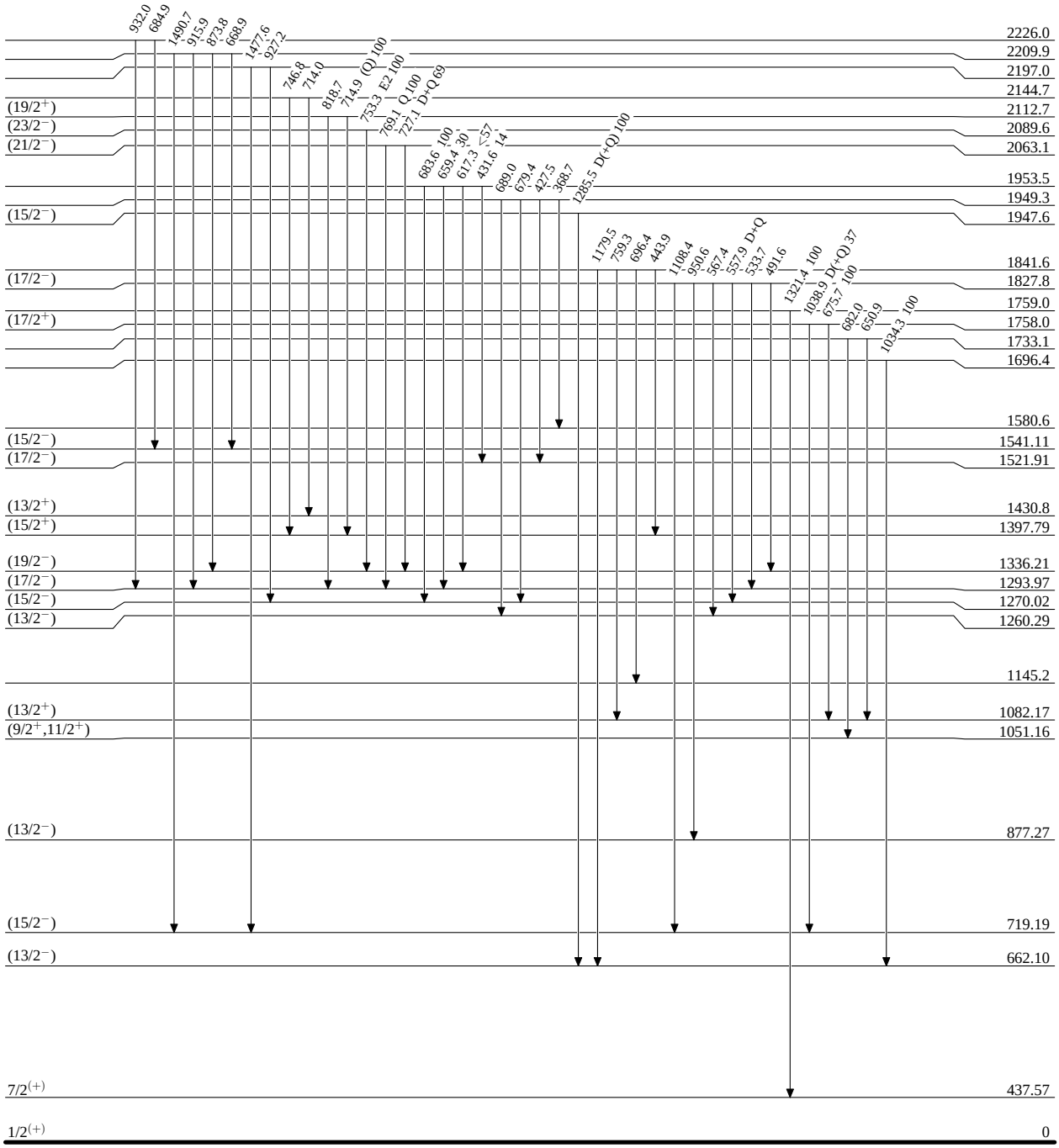


$^{123}_{54}Xe_{69}$

^{123}Te(^{3}He,3nγ) 2001Ga25,1981Lu01

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{123}_{54}Xe_{69}$

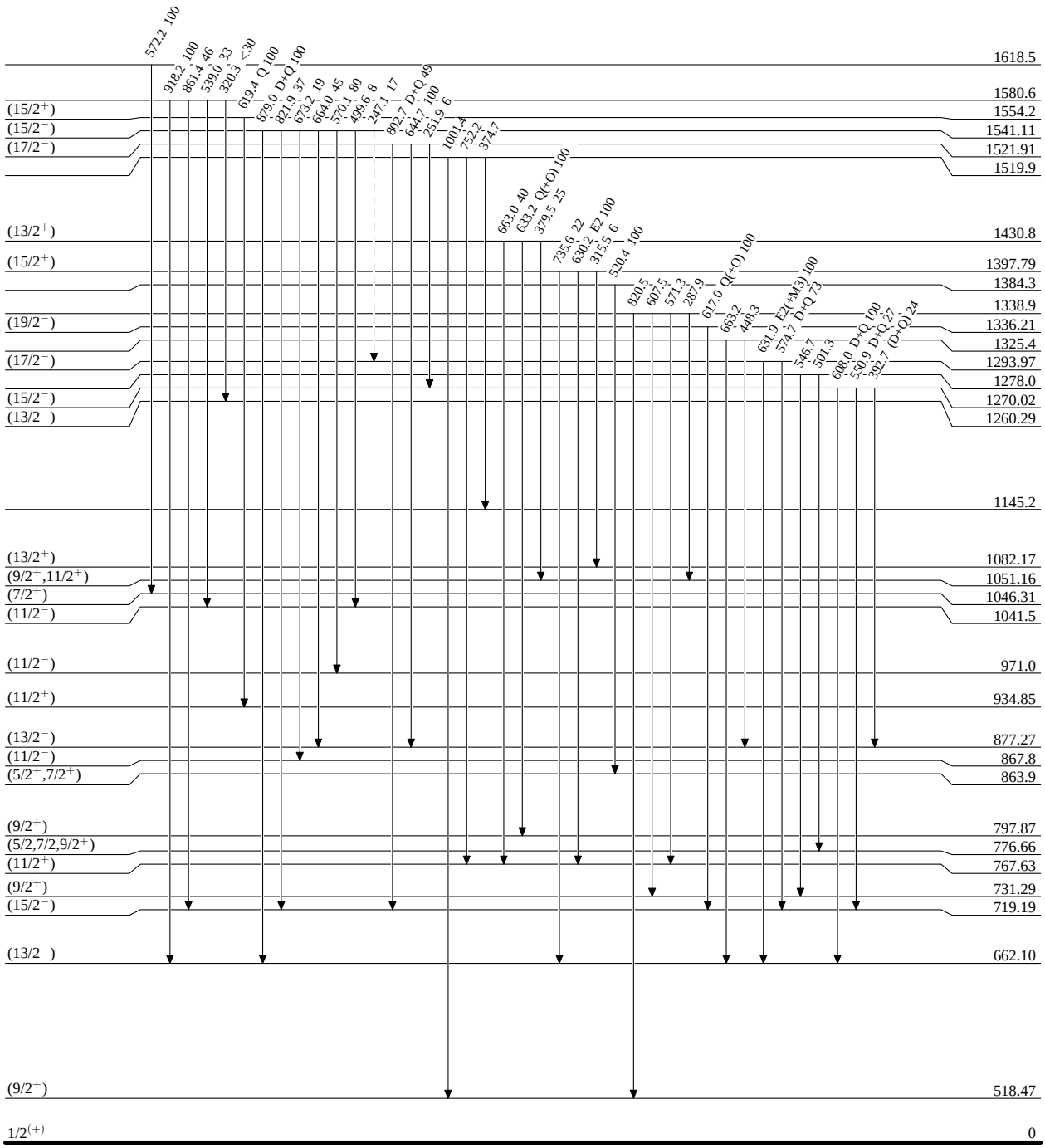
^{123}Te(^{3}He,3nγ) 2001Ga25,1981Lu01

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

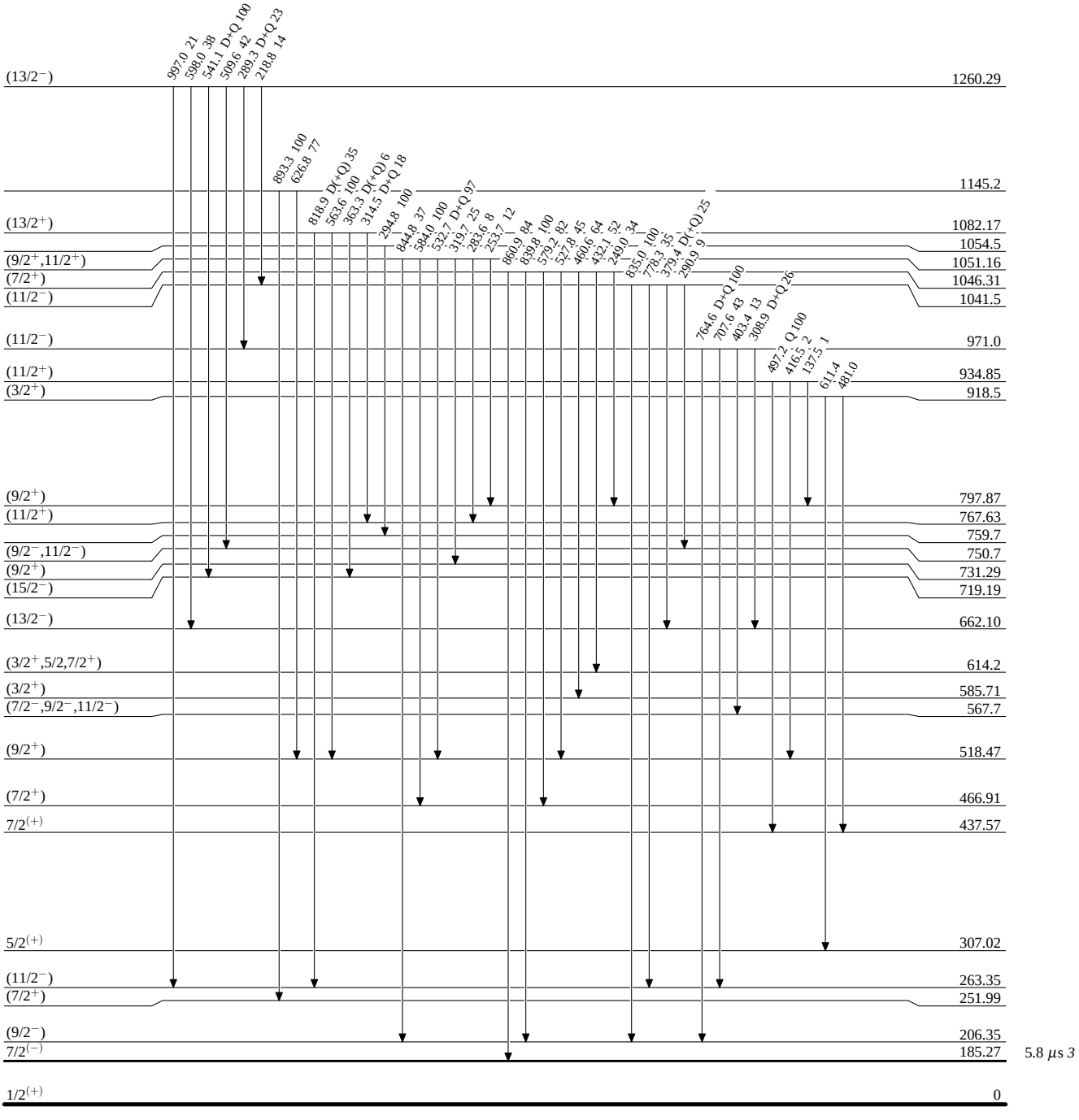


$^{123}_{54}Xe_{69}$

^{123}Te(^{3}He,3nγ) 2001Ga25,1981Lu01

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{123}_{54}Xe_{69}$

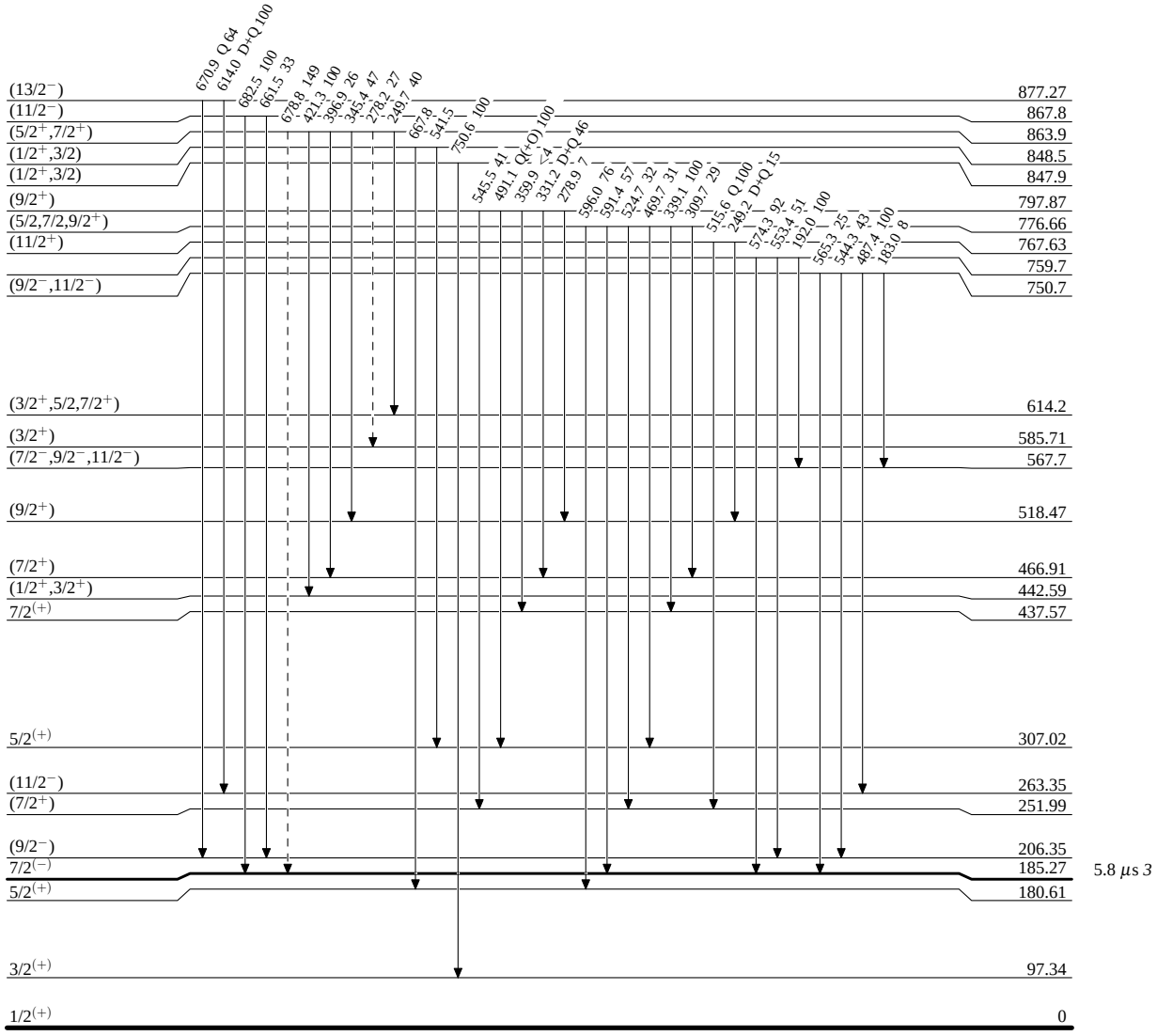
^{123}Te(^{3}He,3nγ) 2001Ga25,1981Lu01

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{123}_{54}Xe_{69}$

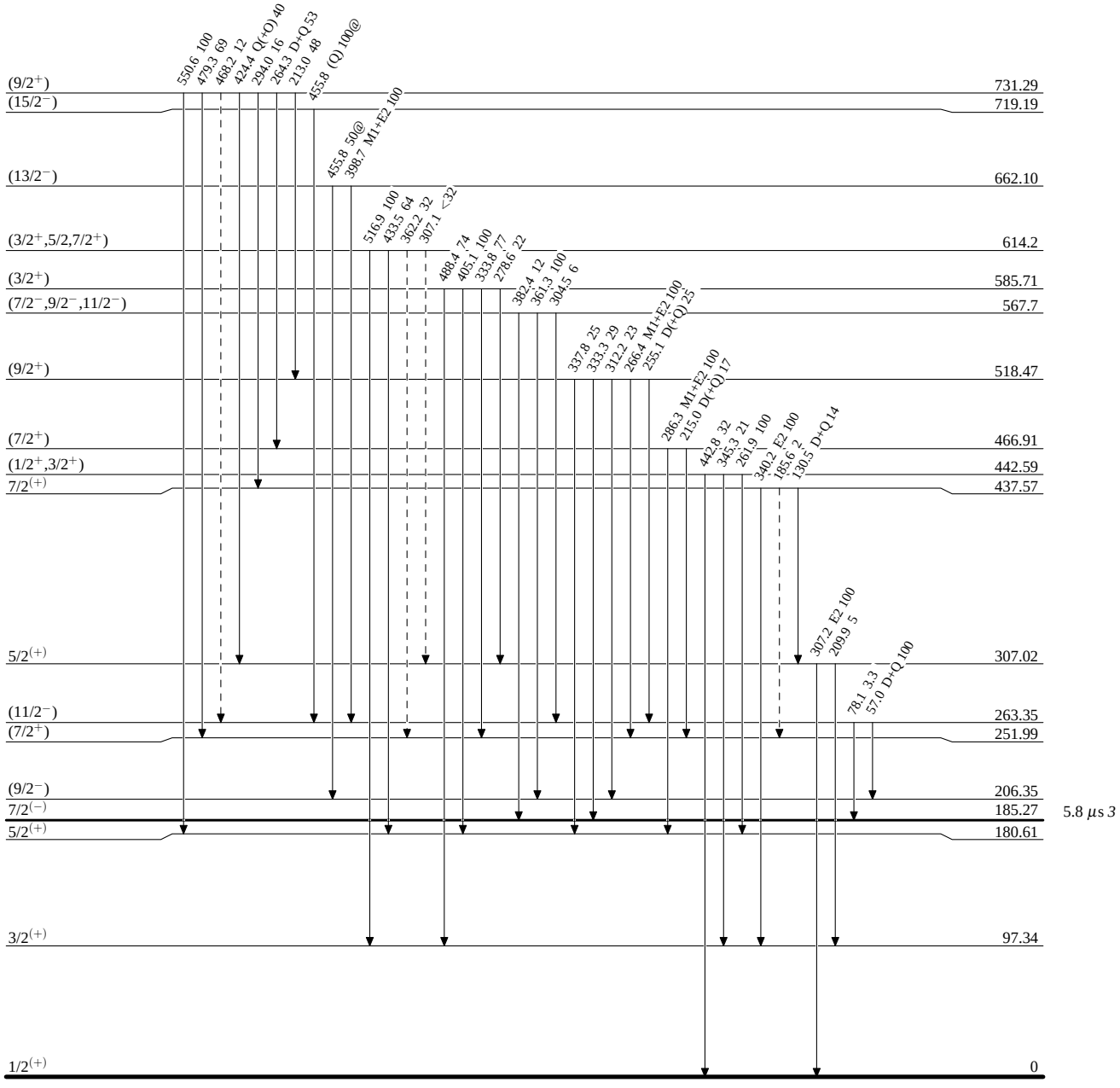
^{123}Te(^{3}He,3nγ) 2001Ga25,1981Lu01

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided

γ Decay (Uncertain)



$^{123}_{54}Xe_{69}$

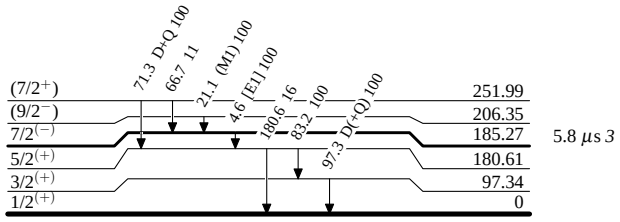
^{123}Te(^{3}He,3nγ) 2001Ga25,1981Lu01

Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided

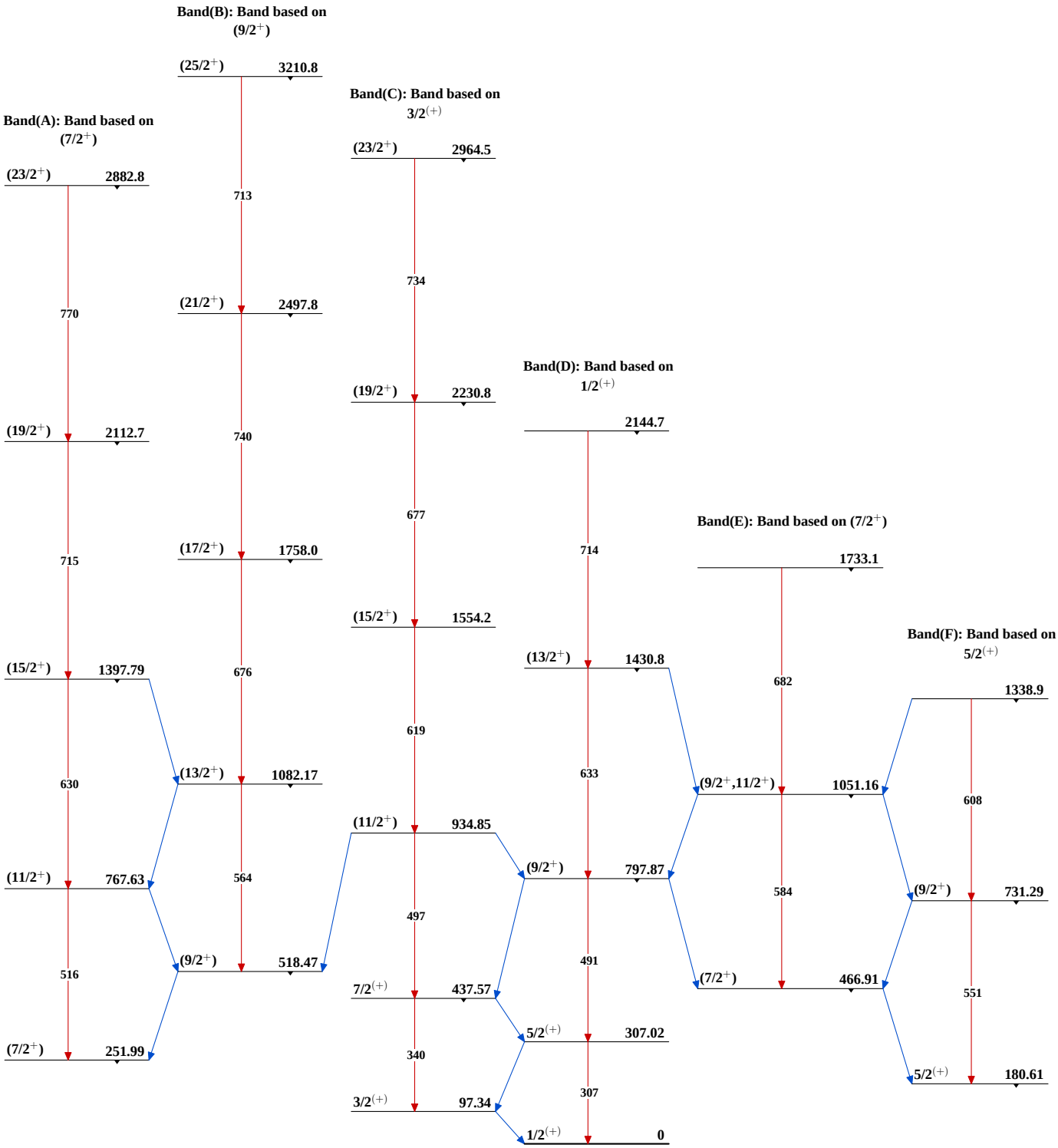
Legend

γ Decay (Uncertain)



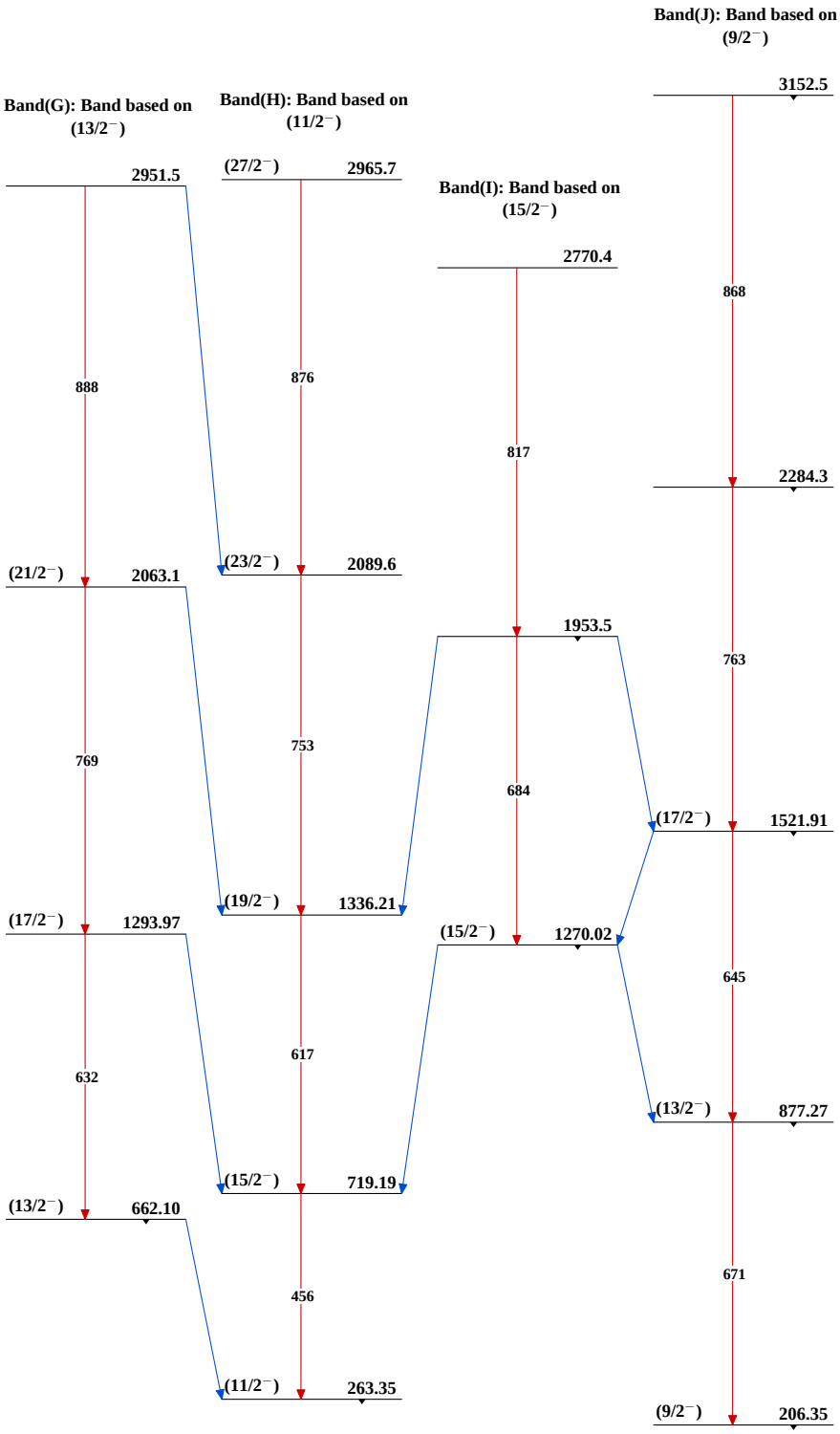
$^{123}_{54}Xe_{69}$

^{123}Te(^{3}He,3nγ) 2001Ga25,1981Lu01



$^{123}_{54}Xe_{69}$

^{123}Te(^{3}He,3nγ) 2001Ga25,1981Lu01 (continued)



$^{123}_{54}Xe_{69}$

Adopted Levels, Gammas

Q(β^-)=−5389 *17*; S(n)=10970 *40*; S(p)=2978 *16*; Q(α)=309 *25* 2021Wa16
S(2n)=20084 *19*, S(2p)=9376 *13* (2021Wa16).
Mass measurements: Mass excess=−81049 *15* keV (1990St25), −81048 *12* keV (1999Am05).

^{123}Cs Levels

($7/2^+$) level in $\pi g_{7/2}$ band and ($9/2^+$) level in $\pi g_{9/2}$ band: 1992Hu02 in (^{19}F,4nγ) propose that the ($9/2^+$) level (bandhead of $\pi g_{9/2}$ band) is at 296 keV (also proposed by 1979Ga02 in (^{10}B,3nγ)) and is de-excited by 201γ and 137γ with the latter assigned mult=E1 based on $\gamma(\theta)$ data and level scheme, and the ($7/2^+$) level in $\pi g_{7/2}$ band is at a higher energy and linked to the 296 level by an unobserved and highly-converted low-energy transition. However, 2000Gi12 observed a preponderant M1 character for 137γ based on their ce data from ^{123}Ba ε decay. Together with the observations of both prompt and delayed transitions of 137γ and 201γ in their measurement of ^{115}In(^{12}C,4nγ), 2000Gi12 propose that the 137γ and 201γ de-excite a level at 231 keV with $J^\pi=(7/2^+)$, which is fed by an isomer at 231.7+x (x a few keV) with $T_{1/2}$=114 ns as the $\pi g_{9/2}$ bandhead. Later, 2004Si26 in ^{100}Mo(^{28}Si,4npγ) and 2004Si27 in ^{64}Ni(^{64}Ni,4npγ) propose the 328-keV level (proposed by 2000Gi12 as a separate level) to be the isomeric ($9/2^+$) bandhead, based on the intensity balance of the feeding and de-exciting γ transitions (96.5γ and 233.5γ de-exciting the 328-keV level are seen in 2004Si26 with a thick target but not seen in 2004Si27 with a thin target due to ^{123}Cs nuclei recoiling into vacuum after reaction and decaying out of the detectors, supporting the 328-keV level being an isomer).
The level scheme adopted here is based on that of 2000Gi12, 2004Si27 and 2005Si31. Band assignments are from 2004Si27 and 2005Si31.

Cross Reference (XREF) Flags

A	^{123}Ba ε decay	E	^{96}Zr(^{32}S,p4nγ)
B	^{123}Cs IT decay	F	^{100}Mo(^{28}Si,p4nγ)
C	^{64}Ni(^{64}Ni,p4nγ)	G	^{108}Pd(^{19}F,4nγ),^{109}Ag(^{18}O,4nγ)
D	^{92}Mo(^{34}S,3pγ)	H	^{116}Sn(^{10}B,3nγ),^{114}Sn(^{12}C,p2nγ)

E(level)[†]	J^π	$T_{1/2}$	XREF	Comments
0.0	$1/2^{(+)}$	5.86 min *10*	ABC FGH	%ε+%β^+=100 μ=+1.377 *7* (1981Th06,2014StZZ) J^π: spin from atomic-beam magnetic resonance on mass-separated ^{123}Cs (1977Ek02,1978Ek05); $1/2^+$ is favored from systematics of neighboring odd-mass Cs isotopes. $T_{1/2}$: unweighted average of 5.87 min *5* (1993Al03), 6.08 min *7* (1981So06), 5.87 min *5* (1969Ch18), and 5.6 min *1* (1966Da09). Others: 6 min (1954Ma54), 8.0 min *5* (1962Pr09). μ: from laser spectroscopy on thermal atomic beam, relative to 2.582 *1* of ^{133}Cs (1981Th06). Other: 1.389 *16* from atomic-beam magnetic resonance relative to 2.582069 *9* of ^{133}Cs (1977Ek02,1978Ek05). See also 2014StZZ compilation. Isotope shift $\delta\nu^{133,A}$=362.6 MHz *14* (1981Th06), 259 *12* (1978Hu08), relative to that of ^{133}Cs. Nuclear rms charge radius=4.782 fm *7* (2013An02).
30.59[i] *4*	$(3/2^+)$		ABC FGH	J^π: 201.0γ E2 from ($7/2^+$), 116.2γ M1+E2 from $5/2^{(+)}$, 30.6γ to $1/2^{(+)}$.
94.57 *3*	$5/2^{(+)}$	9 ns *3*	ABC FGH	J^π: 94.6γ E2 to $1/2^{(+)}$. $T_{1/2}$: from β^+−94.6γ(t) (1976Be11) in ^{123}Ba ε decay.
123.52 *4*	$(3/2^+)$		A	J^π: 123.6γ M1+E2 to $1/2^{(+)}$, 108.1γ E2 from ($7/2^+$).
146.80 *4*	$5/2^{(+)}$		A	J^π: 146.8γ E2 to $1/2^{(+)}$.
156.27[a] *5*	$11/2^{(-)}$	1.7 s *2*	ABCDEFGH	%IT=100 J^π: 61.7γ E3 to $5/2^{(+)}$; $11/2^-$ from systematics of neighboring odd-mass Cs isotope; bandhead of $1h_{11/2}$ band. $T_{1/2}$: weighted average of 1.7 s 2 (1981Ma01) and 1.6 s 2 (1972Dr06) in ^{123}Cs IT decay.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{123}Cs Levels (continued)

E(level)[†]	Jπ	$T_{1/2}$	XREF	Comments
214.56 *5*	$7/2^{(-)}$		A	Jπ: 58.3γ E2 to $11/2^{(-)}$, 120.0γ E1 to $5/2^{(+)}$.
231.63[i] *6*	$(7/2^+)$		A C FGH	Jπ: 137.0γ M1+E2 to $5/2^{(+)}$; band assignment.
328.08[g] *8*	$(9/2^+)$	114 ns *5*	A CD FGH	%IT=100 E(level): see comments above about this level as the $(9/2^+)$ bandhead. Jπ: 96.5γ M1 to $(7/2^+)$; bandhead of the $1g_{9/2}$ band. $T_{1/2}$: from γ(t) in 2000Gi12 with ^{115}In(^{12}C,4nγ), in the dataset of (^{10}B,3nγ).
467.57 *14*	$(3/2^+,5/2^+,7/2^+)$		A	Jπ: 236.0γ M1,E2 to $(7/2^+)$, 373.1γ M1(+E2) to $5/2^{(+)}$.
474.88 *10*	$3/2^{(-)}$		A	Jπ: 260.3γ E2 to $7/2^{(-)}$, 444.5γ (E1) to $(3/2^+)$, 380.3γ to $5/2^{(+)}$.
476.76[a] *19*	$(15/2^-)$	40[‡] ps *2*	CDEFGH	Jπ: 320.5γ E2 to $11/2^{(-)}$; band assignment.
494.05 *9*	$(3/2^+,5/2^+)$		A	Jπ: 347.3γ M1+E2 to $5/2^{(+)}$, 370.6γ M1 to $(3/2^+)$.
524.69 *17*	$(1/2^+,3/2^+,5/2^+)$		A	Jπ: 401.3γ M1 to $(3/2^+)$, 524.4γ M1,E2 to $1/2^{(+)}$.
557.51 *18*	$(1/2^+,3/2^+,5/2^+)$		A	Jπ: 410.8γ M1,E2 to $5/2^{(+)}$, 557.4γ to $1/2^{(+)}$.
588.52 *18*	$(^+)$		A	Jπ: 494.0γ M1,E2 to $5/2^{(+)}$.
596.96[h] *18*	$(11/2^+)$	6.2[#] ps *14*	CD FGH	Jπ: 268.9γ M1+E2, ΔJ=1 to $(9/2^+)$; no transitions to $3/2^+$ and $5/2^+$ levels; band assignment.
620.90 *13*	$(5/2^+)$		A	Jπ: 389.0γ M1 to $(7/2^+)$, 621.0γ to $1/2^{(+)}$.
659.80[i] *19*	$(11/2^+)$	18[#] ps *3*	C FGH	Jπ: 428.1γ E2 to $(7/2^+)$; band assignment.
699.12 *18*	$(5/2^+,7/2^+,9/2^+)$		A	Jπ: 484.2γ E1 to $7/2^{(-)}$.
728.0 *4*	$(1/2 \text{ to } 7/2)^{(+)}$		A	Jπ: 633.5γ to $5/2^{(+)}$, 697.3γ to $(3/2^+)$.
749.64 *17*	$(1/2^+,3/2^+,5/2^+)$		A	Jπ: 749.7γ to $1/2^{(+)}$, 718.8γ M1(+E2) to $(3/2^+)$.
784.37 *22*	$(3/2^-,5/2^-,7/2^-)$		A	Jπ: 569.8γ M1,E2 to $7/2^{(-)}$, 309.5γ to $3/2^{(-)}$.
811.17 *13*	$(3/2^+,5/2^+)$		A	Jπ: 811.0γ to $1/2^{(+)}$, 716.6γ M1+E2 to $5/2^{(+)}$.
817.15 *20*	$(3/2^+,5/2^+)$		A	Jπ: 670.6γ M1+E2 to $5/2^{(+)}$, 816.8γ to $1/2^{(+)}$.
866.46 *14*	$(3/2^+,5/2^+)$		A	Jπ: 866.5γ to $1/2^{(+)}$, 635.1γ to $(7/2^+)$, 718.8γ M1(+E2) to $5/2^{(+)}$.
869.7 *3*	$(5/2^+,7/2^+,9/2^+)$		A	Jπ: 541.6γ M1,E2 to $(9/2^+)$, 723.1γ to $5/2^{(+)}$.
900.49[g] *20*	$(13/2^+)$	1.8[#] ps *8*	CD FGH	Jπ: 572.5γ E2 to $(9/2^+)$, 303.5γ M1+E2, ΔJ=1 to $(11/2^+)$; band assignment.
905.43 *14*	$(3/2^+,5/2^+)$		A	Jπ: 905.5γ to $1/2^{(+)}$, 673.8γ to $(7/2^+)$.
999.07[a] *24*	$(19/2^-)$	3.2[‡] ps *+3–6*	CDEFGH	Jπ: 522.4γ E2 to $(15/2^-)$; band assignment.
1021.68 *16*	$(3/2^-)$		A	Jπ: 546.8γ M1,E2 to $3/2^{(-)}$, 1021.9γ to $1/2^{(+)}$, 807.1γ to $7/2^{(-)}$.
1048.75 *22*	$(3/2^+,5/2^+)$		A	Jπ: 428.3γ M1,E2 to $(5/2^+)$, 1048.5γ to $1/2^{(+)}$, 816.8γ to $(7/2^+)$.
1159.6[&] *3*	$(17/2^-)$		C FGH	Jπ: 682.6γ D+Q, ΔJ=1 to $(15/2^-)$; band assignment.
1237.24[h] *22*	$(15/2^+)$		CD FGH	Jπ: 640.4γ Q to $(11/2^+)$; 336.8γ D+Q, ΔJ=1 to $(13/2^+)$; band assignment.
1260.2[i] *3*	$(15/2^+)$		C FGH	Jπ: 600.3γ Q to $(11/2^+)$; band assignment.
1593.4[b] *3*	$(19/2^-)$		C FGH	Jπ: 433.6γ D, ΔJ=1 to $(17/2^-)$, 1116.6γ to $(15/2^-)$; band assignment.
1605.16[g] *24*	$(17/2^+)$		CD FGH	Jπ: 704.6γ Q to $(13/2^+)$, 367.7γ D to $(15/2^+)$; band assignment.
1684.6[a] *3*	$(23/2^-)$	1.2[‡] ps *6*	CDEFGH	Jπ: 685.5γ E2 to $(19/2^-)$; band assignment.
1729.7[&] *3*	$(21/2^-)$	≤1.7[‡] ps	C FGH	Jπ: 730.6γ M1+E2, ΔJ=1 to $(19/2^-)$, 570.0γ to E2 to $(17/2^-)$; band assignment.
1994.71[h] *24*	$(19/2^+)$		CD FGH	Jπ: 757.9γ and 734.4γ Q to $(15/2^+)$, 389.2γ D to $(17/2^+)$; band assignment.
2003.7[i] *3*	$(19/2^+)$		C FG	Jπ: 743.4γ Q to $(15/2^+)$, 398.6γ D to $(17/2^+)$; band

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{123}Cs Levels (continued)

E(level)[†]	Jπ	$T_{1/2}$	XREF	Comments
				assignment.
2196.4[b] *3*	(23/2⁻)		C FG	Jπ: 1197.6γ Q to (19/2⁻), 466.6γ to (21/2⁻); band assignment.
2219.6 *5*	(19/2⁺)		C	Jπ: proposed by 2004Si27 in (^{64}Ni,p4nγ) based on band structures.
2410.7[g] *3*	(21/2⁺)		C FG	Jπ: 805.6γ Q to (17/2⁺), 406.7γ to (19/2⁺); band assignment.
2436.3[&] *3*	(25/2⁻)		C FG	Jπ: 706.8γ Q to (21/2⁻), 751.7γ D to (23/2⁻); band assignment.
2446.2 *6*	(21/2⁺)		F	Jπ: proposed by 2005Si31 in (^{28}Si,p4nγ) based on band structures.
2485.2[a] *3*	(27/2⁻)	0.34 ps *6*	CDEFGH	Jπ: 800.5γ E2 to (23/2⁻); band assignment. $T_{1/2}$: from DSAM in (^{32}S,p4nγ). Other: ≤1.4 ps from RDM in (^{19}F,4nγ).
2706.3 *4*	(23/2⁺)		C F	Jπ: 486.7γ Q to (19/2⁺), 1021.9γ D to (23/2⁻).
2821.4[h] *3*	(23/2⁺)		C FG	Jπ: 826.7γ to (19/2⁺), 410.6γ to (21/2⁺); band assignment.
2843.6[i] *4*	(23/2⁺)		C F	Jπ: 849.1γ to (19/2⁺), 432.7γ to (21/2⁺); band assignments.
2917.5[b] *3*	(27/2⁻)		C FG	Jπ: 721.0γ and 1233.1γ Q to (23/2⁻); band assignment.
2973.3[c] *4*	(25/2⁺)		C F	Jπ: 1288.5γ D to (23/2⁻); band assignment.
3045.5 *3*	(25/2⁺)		C F	Jπ: 224.1γ D, ΔJ=1 to (23/2⁺), 1360.9γ D, ΔJ=1 to (23/2⁻), 599.5γ to (21/2⁺).
3227.0[&] *4*	(29/2⁻)		C FG	Jπ: 790.9γ Q to (25/2⁻), 741.8γ D to (27/2⁻); band assignment.
3304.8[d] *4*	(27/2⁺)		C F	Jπ: 259.3γ and 331.5γ D to (25/2⁺), 598.5γ Q to (23/2⁺); band assignment.
3329.8[e] *4*	(27/2⁺)		C F	Jπ: 623.5γ Q to (23/2⁺), 284.3γ D to (25/2⁺); band assignment.
3353.5[a] *4*	(31/2⁻)	0.23[@] ps *4*	CDEFGH	Jπ: 868.3γ E2 to (27/2⁻); band assignment.
3618.0[c] *4*	(29/2⁺)		C F	Jπ: 644.7γ Q to (25/2⁺), 313.2γ D to (27/2⁺); band assignment.
3728.9[b] *4*	(31/2⁻)		C FG	Jπ: 1243.7γ Q to (27/2⁻); band assignment.
3995.1[d] *4*	(31/2⁺)		C F	Jπ: 377.1γ D, ΔJ=1 to (29/2⁺), 690.3γ to (27/2⁺); band assignment.
4045.4[e] *5*	(31/2⁺)		C F	Jπ: 715.6γ Q to (27/2⁺); band assignment.
4055.3[&] *4*	(33/2⁻)		C FG	Jπ: 828.4γ Q to (29/2⁻), 701.7γ D to (31/2⁻); band assignment.
4258.2[a] *4*	(35/2⁻)	0.22[@] ps *+4–5*	CDEFG	Jπ: 904.6γ E2 to (31/2⁻); band assignment.
4408.4[c] *5*	(33/2⁺)		C F	Jπ: 790.4γ Q to (29/2⁺), 413.2γ D to (31/2⁺); band assignment.
4620.7[b] *5*	(35/2⁻)		C FG	Jπ: 891.8γ to (31/2⁻); band assignment.
4834.1[d] *6*	(35/2⁺)		C F	Jπ: 838.9γ Q to (31/2⁺), 425.8γ D to (33/2⁺); band assignment.
4863.3[e] *6*	(35/2⁺)		C F	Jπ: 817.9γ Q to (31/2⁺); band assignment.
4933.6[&] *5*	(37/2⁻)		C F	Jπ: 878.3γ (E2) to (33/2⁻), 675.6γ D to (35/2⁻); band assignment.
5213.9[a] *4*	(39/2⁻)	0.30[@] ps *5*	CDEFG	Jπ: 955.7γ E2 to (35/2⁻); band assignment.
5246.4 *7*			C	
5334.4[c] *6*	(37/2⁺)		C	Jπ: 926.0γ to (33/2⁺), 500.4γ to (35/2⁺); band assignment.
5596.9[b] *8*	(39/2⁻)		C F	Jπ: 976.2γ to (35/2⁻); band assignment.
5751.8[e] *6*	(39/2⁺)		C F	Jπ: 888.5γ Q to (35/2⁺); band assignment.
5792.9[d] *7*	(39/2⁺)		C	Jπ: 958.9γ to (35/2⁺), 458.5γ to (37/2⁺); band assignment.
5905.5[&] *6*	(41/2⁻)		C F	Jπ: 971.9γ Q to (37/2⁻), 691.7γ to (39/2⁻); band assignment.
6239.5[a] *6*	(43/2⁻)	0.18[@] ps *3*	CDEFG	Jπ: 1025.5γ E2 to (39/2⁻), 334.2γ to (41/2⁻); band assignment.
6296.8 *10*			C	
6670.7[e] *7*	(43/2⁺)		C F	Jπ: 918.9γ Q to (39/2⁺); band assignment.
6678.8[b] *10*	(43/2⁻)		C	Jπ: 1081.9γ to (39/2⁻); band assignment.
6981.2[&] *7*	(45/2⁻)		C	Jπ: 1075.8γ Q to (41/2⁻), 741.6γ to (43/2⁻); band assignment.
7352.5[a] *7*	(47/2⁻)	0.10[@] ps *3*	CDEFG	Jπ: 1112.9γ E2 to (43/2⁻), 371.3γ to (45/2⁻); band assignment.
7413.8 *11*			C	
7646.9[e] *9*	(47/2⁺)		C F	Jπ: 976.2γ Q to (43/2⁺); band assignment.
7837.5[b] *12*	(47/2⁻)		C	Jπ: 1158.7γ to (43/2⁻); band assignment.
8159.2[&] *7*	(49/2⁻)		C	Jπ: 1178.9γ Q to (45/2⁻), 806.7γ to (47/2⁻); band assignment.

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Adopted Levels, Gammas (continued)

^{123}Cs Levels (continued)

E(level)[†]	J$^\pi$	T$_{1/2}$	XREF	Comments
8559.2[a] *7*	(51/2$^-$)	0.10[@] ps *+2−3*	CDE G	XREF: G(8549.5). J$^\pi$: 1206.7γ E2 to (47/2$^-$), 400.0γ to (49/2$^-$); band assignment.
8699.9[e] *10*	(51/2$^+$)		C F	J$^\pi$: 1053.0γ Q to (47/2$^+$); band assignment.
9435.8[&] *8*	(53/2$^-$)		C	J$^\pi$: 1276.6γ Q to (49/2$^-$), 876.7γ to (51/2$^-$); band assignment.
9862.3[a] *8*	(55/2$^-$)		CD	XREF: D(?). J$^\pi$: 1303.1γ Q to (51/2$^-$), 426.5γ to (53/2$^-$); band assignment.
9888.3[e] *12*	(55/2$^+$)		C F	J$^\pi$: 1188.3γ Q to (51/2$^+$); band assignment.
10772.8[&] *10*	(57/2$^-$)		C	J$^\pi$: 1337.0γ to (53/2$^-$); band assignment.
11021.1[f] *14*	(59/2$^+$)		C	J$^\pi$: 1132.8γ Q to (55/2$^+$); band assignment.
11213.7[e] *14*	(59/2$^+$)		C	J$^\pi$: 1325.4γ Q to (55/2$^+$); band assignment.
11233.5 *10*	(59/2$^-$)		CD	XREF: D(?). J$^\pi$: proposed by 2004Si27 in (^{64}Ni,p4nγ) from 1371.3γ Q to (55/2$^-$).
11252.7[a] *10*	(59/2$^-$)		C	J$^\pi$: 1390.3γ Q to (55/2$^-$); band assignment.
11270.8? *12*	(59/2$^-$)		C	E(level): the level is at 11271 or 11795 depending on the ordering of the 1022-498 cascade (2004Si27). J$^\pi$: proposed by 2004Si27 in (^{64}Ni,p4nγ) from 498.0γ D+Q to (57/2$^-$).
11916.6 *11*	(61/2$^-$)		C	J$^\pi$: proposed by 2004Si27 in (^{64}Ni,p4nγ) from 663.9γ D+Q to (59/2$^-$).
12293.2 *10*	(63/2$^-$)		C	J$^\pi$: proposed by 2004Si27 in (^{64}Ni,p4nγ) from 1059.8γ Q to (59/2$^-$).
12431.0[a] *11*	(63/2$^-$)		C	J$^\pi$: 1178.3γ to (59/2$^-$); band assignment.
12469.5[f] *15*	(63/2$^+$)		C	J$^\pi$: 1448.4γ Q to (59/2$^+$); band assignment.
12609.6[e] *15*	(63/2$^+$)		C	J$^\pi$: 1395.9γ to (59/2$^+$); band assignment.
13165.1[f] *16*	(67/2$^+$)		C	J$^\pi$: 695.6γ Q to (59/2$^+$); band assignment.
13533.7[a] *11*	(67/2$^-$)		C	J$^\pi$: 1240.5γ Q to (63/2$^-$); band assignment.
13870.1[f] *17*	(71/2$^+$)		C	J$^\pi$: 705.0γ Q to (67/2$^+$); band assignment.
14955.4[a] *12*	(71/2$^-$)		C	J$^\pi$: 1421.7γ Q to (67/2$^-$); band assignment.

[†] From a least-squares fit to γ-ray energies, unless otherwise noted.
[‡] From recoil-distance method (RDM) in (^{19}F,4nγ) (1992Dr05).
[#] Effective half-life by RDM, not corrected for feeding lifetime (1992Dr05).
[@] From Doppler-shift attenuation method (DSAM) in (^{32}S,p4nγ) (2013Se14).
[&] Band(A): (17/2$^-$) band, α=+1/2. $\pi h_{11/2}$ at low spins; $\pi h_{11/2}\otimes\nu h^6_{11/2}$ at high spins. See also 2004Si27 for detailed discussion of configurations at high spins. Nilsson configuration=π1/2[550], α=+1/2 (2005Si31).
[a] Band(a): 11/2$^{(-)}$ band, α=−1/2. See comment for α=+1/2 signature partner. Nilsson configuration=π1/2[550], α=−1/2 (2005Si31).
[b] Band(B): γ-vibrational band built on favored signature partner π1/2[550], α=−1/2 (2005Si31).
[c] Band(C): (25/2$^+$) band, α=+1/2. $\pi g^{-1}_{9/2}\otimes\nu h^2_{11/2}$ is most favored although $\pi(g^{-1}_{9/2}h^1_{11/2})\otimes\nu h^1_{11/2}$ is not ruled out (2004Si27). Nilsson configuration=(π1/2[550], α=−1/2)⊗ν(7/2[404] or 5/2[402], α=−1/2)⊗(ν7/2[523], α=−1/2) (2005Si31).
[d] Band(c): (27/2$^+$) band, α=−1/2. See comment for α=+1/2 signature partner.
[e] Band(D): (27/2$^+$) band. See 2004Si27 and 2005Si31 for detailed discussion of configurations.
[f] Band(E): (59/2$^+$) band. Forking of (27/2$^+$) band at 55/2$^+$ (2004Si27).
[g] Band(F): $\pi g_{9/2}$ band, α=+1/2. Nilsson configuration=π9/2[404] (2005Si31).
[h] Band(f): $\pi g_{9/2}$ band, α=−1/2. Nilsson configuration=π9/2[404] (2005Si31).
[i] Band(G): $\pi g_{7/2}$ band, α=−1/2. Nilsson configuration=π3/2[422] (2005Si31).

Adopted Levels, Gammas (continued)

γ(^{123}Cs)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.†	δ‡	α#	Comments
30.59	(3/2$^+$)	30.6 *5*	100	0.0	1/2$^{(+)}$				E_γ: other: 30.5 *7* from (^{28}Si,p4nγ).
94.57	5/2$^{(+)}$	63.97 *3*	16.6 *1*	30.59	(3/2$^+$)	M1		3.26	B(M1)(W.u.)=3.9×10^{-4} *+21−10* E_γ,I_γ: other: Eγ=64.0 *7*, Iγ=15 *2* from (^{28}Si,p4nγ). Mult.: also supported by ce data in ^{123}IT decay.
		94.57 *3*	100	0.0	1/2$^{(+)}$	E2		2.28	B(E2)(W.u.)=57 *+30−15* E_γ: others: 94.6 *1* from ^{123}Cs IT decay, 94.5 *7* from (^{28}Si,p4nγ), 95.0 *3* from (^{19}F,4nγ), and 94.7 *3* from (^{10}B,3nγ). Mult.: from ce data in ^{123}Cs IT decay (1981Ma01,1972Dr06); also supported by ce data in ^{123}Ba ε decay (2000Gi12).
123.52	(3/2$^+$)	29.0 *1*		94.57	5/2$^{(+)}$				I_γ: weak.
		92.92 *3*	85.8 *18*	30.59	(3/2$^+$)	M1+E2	0.35 *5*	1.25 *5*	
		123.6 *1*	100.0 *9*	0.0	1/2$^{(+)}$	M1+E2	0.19 *+9−13*	0.508 *17*	
146.80	5/2$^{(+)}$	23.2 *1*		123.52	(3/2$^+$)				
		52.20 *5*	3.4 *2*	94.57	5/2$^{(+)}$				
		116.2 *1*	100 *11*	30.59	(3/2$^+$)	M1+E2	0.77 *+40−23*	0.78 *11*	
		146.8 *1*	17 *5*	0.0	1/2$^{(+)}$	E2		0.483	
156.27	11/2$^{(-)}$	61.70 *5*		94.57	5/2$^{(+)}$	E3		289	B(E3)(W.u.)=0.81 *+13−10* E_γ: other: 61.7 *2* from ^{123}Cs IT decay. Mult.: from ce data in ^{123}Cs IT decay (1981Ma01).
214.56	7/2$^{(-)}$	58.30 *5*	13.5 *5*	156.27	11/2$^{(-)}$	E2		13.19	
		67.75 *5*	5.5 *5*	146.80	5/2$^{(+)}$	[E1]		0.644	
		120.0 *1*	100 *5*	94.57	5/2$^{(+)}$	E1		0.1320	
231.63	(7/2$^+$)	84.8 *1*	4.7 *4*	146.80	5/2$^{(+)}$				
		108.1 *1*	1.3 *2*	123.52	(3/2$^+$)	E2		1.416	
		137.0 *1*	38.7 *10*	94.57	5/2$^{(+)}$	M1(+E2)	−0.04 *10*	0.371 *7*	E_γ: others: 137.0 *5* from (^{28}Si,p4nγ), 136.7 *3* from (^{19}F,4nγ), and 136.9 *3* from (^{10}B,3nγ). I_γ: others: 35 *3* from (^{28}Si,p4nγ), and 49 *4* from (^{19}F,4nγ). δ: from γ(θ) in (^{19}F,4nγ) (1992Hu02). Other: <0.6 from ce data in ^{123}Ba ε decay.
		201.0 *1*	100 *6*	30.59	(3/2$^+$)	E2		0.1636	E_γ: others: 201.0 *5* from (^{28}Si,p4nγ), 200.7 *3* from (^{19}F,4nγ), and 201.2 *3* from (^{10}B,3nγ). I_γ: others: 100 *5* from (^{28}Si,p4nγ), 100 *7* from (^{19}F,4nγ). Mult.: also supported by γγ(DCO) in (^{28}Si,p4nγ) and γ(θ) in (^{19}F,4nγ) and (^{10}B,3nγ).
328.08	(9/2$^+$)	96.46 *6*	100 *3*	231.63	(7/2$^+$)	M1		0.998	B(M1)(W.u.)=9.20×10^{-5} *46* E_γ: other: 96.5 *7* from (^{28}Si,p4nγ).
		233.5 *2*	31 *5*	94.57	5/2$^{(+)}$	[E2]		0.0987	B(E2)(W.u.)=0.026 *6*

Adopted Levels, Gammas (continued)

γ(^{123}Cs) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.†	δ‡	α#	Comments
467.57	(3/2$^+$,5/2$^+$,7/2$^+$)	236.0 *2*	17 *1*	231.63	(7/2$^+$)	M1,E2			
		373.1 *2*	100 *3*	94.57	5/2$^{(+)}$	M1(+E2)	<1.2	0.0243 *11*	
474.88	3/2$^{(-)}$	260.3 *1*	100 *8*	214.56	7/2$^{(-)}$	E2		0.0689	
		351.3 *3*	10.8 *15*	123.52	(3/2$^+$)				
		380.3 *5*	20 *8*	94.57	5/2$^{(+)}$				
		444.5 *4*	46 *5*	30.59	(3/2$^+$)	(E1)		0.00408	
476.76	(15/2$^-$)	320.5 *2*	100	156.27	11/2$^{(-)}$	E2		0.0353	B(E2)(W.u.)=111 *6* E_γ: weighted average of 320.4 *2* from (^{64}Ni,p4nγ), 321 *1* from (^{34}S,3pγ), 320.6 *5* from (^{28}Si,p4nγ), 320.6 *2* from (^{19}F,4nγ), and 320.5 *3* from (^{10}B,3nγ). Mult.: also supported by γ(θ) in (^{10}B,3nγ) and (^{19}F,4nγ), and γ anisotropy in (^{34}S,3pγ).
494.05	(3/2$^+$,5/2$^+$)	262.0 *2*	7.1 *14*	231.63	(7/2$^+$)				
		347.3 *2*	28.9 *23*	146.80	5/2$^{(+)}$	M1+E2	>0.2	0.0289 *15*	
		370.6 *2*	100 *6*	123.52	(3/2$^+$)	M1		0.0257	
		399.6 *2*	20.3 *3*	94.57	5/2$^{(+)}$	M1,E2			
		463.7 *2*	18.0 *9*	30.59	(3/2$^+$)	M1,E2			
		494.0@ *2*	<125	0.0	1/2$^{(+)}$	M1,E2			Mult.: for a doublet.
524.69	(1/2$^+$,3/2$^+$,5/2$^+$)	401.3 *2*	34 *4*	123.52	(3/2$^+$)	M1		0.0210	
		524.4 *3*	100 *9*	0.0	1/2$^{(+)}$	M1,E2			
557.51	(1/2$^+$,3/2$^+$,5/2$^+$)	410.8 *2*	100 *2*	146.80	5/2$^{(+)}$	M1,E2			
		526.5@ *5*	<70	30.59	(3/2$^+$)	M1,E2			Mult.: for a doublet.
		557.4 *5*	11 *2*	0.0	1/2$^{(+)}$				
588.52	($^+$)	441.5 *4*	6.7 *13*	146.80	5/2$^{(+)}$				
		494.0@ *2*	100 *1*	94.57	5/2$^{(+)}$	M1,E2			I_γ,Mult.: for a doublet.
596.96	(11/2$^+$)	268.9 *2*	100	328.08	(9/2$^+$)	M1+E2	+0.17 *2*	0.0593	B(M1)(W.u.)=0.17 *+5−3*; B(E2)(W.u.)=47 *+29−17* E_γ: weighted average of 268.8 *2* from (^{64}Ni,p4nγ), 269 *1* from (^{34}S,3pγ), 268.9 *5* from (^{28}Si,p4nγ), 269.0 *2* from (^{19}F,4nγ), and 269.0 *3* from (^{10}B,3nγ). Mult.,δ: from γ(θ) in (^{19}F,4nγ) and RUL; ΔJ=1 from γγ(DCO) in (^{64}Ni,p4nγ) and (^{28}Si,p4nγ), and γ-anisotropy in (^{34}S,3pγ) Other: δ=≈0.2 from γ(θ) in (^{10}B,3nγ).
620.90	(5/2$^+$)	389.0 *5*	8.1 *13*	231.63	(7/2$^+$)	M1		0.0228	
		474.8 *5*	10.0 *13*	146.80	5/2$^{(+)}$				
		497.4 *2*	100 *13*	123.52	(3/2$^+$)	M1,E2			
		526.5@ *5*	56 *3*	94.57	5/2$^{(+)}$	M1,E2			Mult.: for a doublet.
		590.4 *3*	57 *3*	30.59	(3/2$^+$)	M1,E2			

Adopted Levels, Gammas (continued)

γ(^{123}Cs) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.†	δ‡	α#	Comments
620.90	(5/2$^+$)	621.0 *3*	19 *2*	0.0	1/2$^{(+)}$	(E2)		0.00528	Mult.: M1,E2 from ce data in ^{123}Ba ε decay; (E2) assumed from level scheme.
659.80	(11/2$^+$)	428.1 *2*	100	231.63	(7/2$^+$)	E2		0.01464	B(E2)(W.u.)=59 *+12−9* E_γ: weighted average of 428.0 *2* from (^{64}Ni,p4nγ), 428.2 *5* from (^{28}Si,p4nγ), 428.3 *2* from (^{19}F,4nγ), and 428.0 *3* from (^{10}B,3nγ). Mult.: also supported by γ(θ) in (^{10}B,3nγ).
699.12	(5/2$^+$,7/2$^+$,9/2$^+$)	231.7 *2*	30 *3*	467.57	(3/2$^+$,5/2$^+$,7/2$^+$)				
		467.5 *5*	37 *5*	231.63	(7/2$^+$)				
		484.2 *3*	100 *17*	214.56	7/2$^{(-)}$	E1		0.00334	
728.0	(1/2 to 7/2)$^{(+)}$	633.5 *5*	100 *20*	94.57	5/2$^{(+)}$				
		697.3 *5*	≈20	30.59	(3/2$^+$)				
749.64	(1/2$^+$,3/2$^+$,5/2$^+$)	602.8 *5*	84 *10*	146.80	5/2$^{(+)}$				
		626.3 *3*	60 *10*	123.52	(3/2$^+$)				
		718.8@ *3*	<460	30.59	(3/2$^+$)	M1(+E2)			Mult.: for a doublet.
		749.7 *3*	100 *10*	0.0	1/2$^{(+)}$				
784.37	(3/2$^-$,5/2$^-$,7/2$^-$)	309.5 *3*	35 *3*	474.88	3/2$^{(-)}$				
		569.8 *3*	100 *8*	214.56	7/2$^{(-)}$	M1,E2			
811.17	(3/2$^+$,5/2$^+$)	336.2 *3*	11 *1*	474.88	3/2$^{(-)}$				
		664.5 *5*	6 *3*	146.80	5/2$^{(+)}$				
		688.1 *5*	16 *2*	123.52	(3/2$^+$)				
		716.6 *3*	100 *3*	94.57	5/2$^{(+)}$	M1+E2			
		780.8 *3*	37 *1*	30.59	(3/2$^+$)				
		811.0@ *2*	<48	0.0	1/2$^{(+)}$				
817.15	(3/2$^+$,5/2$^+$)	670.6 *3*	100 *7*	146.80	5/2$^{(+)}$	M1+E2	<2.0	0.0053 *7*	
		786.8 *5*	12 *3*	30.59	(3/2$^+$)				
		816.8@ *3*	<30	0.0	1/2$^{(+)}$				
866.46	(3/2$^+$,5/2$^+$)	635.1 *4*	100 *5*	231.63	(7/2$^+$)				
		718.8@ *3*	<230	146.80	5/2$^{(+)}$	M1(+E2)			Mult.: for a doublet.
		771.8 *4*	10 *3*	94.57	5/2$^{(+)}$				
		836.2 *2*	20 *2*	30.59	(3/2$^+$)				
		866.5 *5*	20 *5*	0.0	1/2$^{(+)}$				
869.7	(5/2$^+$,7/2$^+$,9/2$^+$)	541.6 *3*	100 *8*	328.08	(9/2$^+$)	M1,E2			
		723.1 *5*	≈8	146.80	5/2$^{(+)}$				
900.49	(13/2$^+$)	303.5 *2*	100 *9*	596.96	(11/2$^+$)	M1+E2	+0.14 *4*	0.0431	B(M1)(W.u.)=0.33 *+30−12*; B(E2)(W.u.)=5×10^1 *+10−3* E_γ: weighted average of 303.5 *2* from (^{64}Ni,p4nγ), 304 *1* from (^{34}S,3pγ), 303.5 *5*

Adopted Levels, Gammas (continued)

γ(^{123}Cs) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.†	δ‡	α#	Comments
									from (^{28}Si,p4nγ), 303.7 *3* from (^{19}F,4nγ), and 303.3 *3* from (^{10}B,3nγ). I_γ: from (^{64}Ni,p4nγ). Others: 100 *11* from (^{28}Si,p4nγ), 100 *7* from (^{19}F,4nγ), 9.5 from (^{34}S,3pγ), 56 from (^{10}Be,3nγ). Mult.,δ: from γ(θ) in (^{19}F,4nγ) and RUL; ΔJ=1 from γγ(DCO) in (^{64}Ni,p4nγ) and (^{28}Si,p4nγ), γ anisotropy in (^{34}S,3pγ). Other: δ≈+0.2 from γ(θ) in (^{10}Be,3nγ).
900.49	(13/2$^+$)	572.5 *3*	26 *4*	328.08	(9/2$^+$)	E2		0.00652	B(E2)(W.u.)=28 *+33−12* E_γ: weighted average of 572.3 *4* from (^{64}Ni,p4nγ), 572 *1* from (^{34}S,3pγ), 572.4 *7* from (^{28}Si,p4nγ), 572.4 *3* from (^{19}F,4nγ), and 572.8 *3* from (^{10}B,3nγ). I_γ: from (^{64}Ni,p4nγ). Others: 27 *5* from (^{28}Si,p4nγ), <7 from (^{19}F,4nγ). Mult.: also supported by γ(θ) in (^{10}Be,3nγ).
905.43	(3/2$^+$,5/2$^+$)	673.8 *5*	≈17	231.63	(7/2$^+$)				
		757.8 *3*	70 *7*	146.80	5/2$^{(+)}$				
		782.4 *3*	100 *10*	123.52	(3/2$^+$)				
		811.0@ *2*	<257	94.57	5/2$^{(+)}$				
		874.8 *5*	43 *17*	30.59	(3/2$^+$)				
		905.5 *5*	33 *10*	0.0	1/2$^{(+)}$				
999.07	(19/2$^-$)	522.4 *2*	100	476.76	(15/2$^-$)	E2		0.00834	B(E2)(W.u.)=124 *+29−11* E_γ: weighted average of 522.3 *2* from (^{64}Ni,p4nγ), 522 *1* from (^{34}S,3pγ), 522.3 *5* from (^{28}Si,p4nγ), 522.5 *2* from (^{19}F,4nγ), and 522.2 *3* from (^{10}B,3nγ).
1021.68	(3/2$^-$)	546.8 *3*	100 *6*	474.88	3/2$^{(-)}$	M1,E2			
		807.1 *3*	28 *1*	214.56	7/2$^{(-)}$				
		898.0 *3*	30 *6*	123.52	(3/2$^+$)				
		991.3 *4*	38 *3*	30.59	(3/2$^+$)				
		1021.9 *6*	20 *3*	0.0	1/2$^{(+)}$				
1048.75	(3/2$^+$,5/2$^+$)	428.3 *3*	100 *25*	620.90	(5/2$^+$)	M1,E2			
		816.8@ *3*	<110	231.63	(7/2$^+$)				
		1017.0 *10*	35 *10*	30.59	(3/2$^+$)				
		1048.5 *10*	60 *15*	0.0	1/2$^{(+)}$				
1159.6	(17/2$^-$)	682.6 *3*	100	476.76	(15/2$^-$)	(M1+E2)	−0.36 *2*	0.00549	E_γ: weighted average of 682.7 *4* from (^{64}Ni,p4nγ), 682.7 *5* from (^{28}Si,p4nγ), 682.7 *3* from (^{19}F,4nγ), and 682.5 *3* from (^{10}B,3nγ). Mult.,δ: from γ(θ) in (^{19}F,4nγ); magnetic/electric character from level scheme. ΔJ=1 from γγ(DCO) in (^{28}Si,p4nγ).
1237.24	(15/2$^+$)	336.8 *2*	100 *11*	900.49	(13/2$^+$)	(M1+E2)	+0.18 *5*	0.0328	E_γ: weighted average of 336.7 *2* from (^{64}Ni,p4nγ), 337 *1*

$^{123}_{55}Cs_{68}$-8

Adopted Levels, Gammas (continued)

γ(^{123}Cs) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.†	δ‡	α#	Comments
									from (^{34}S,3pγ), 336.9 *5* from (^{28}Si,p4nγ), 336.9 *3* from (^{19}F,4nγ), and 337.0 *3* from (^{10}B,3nγ). Mult.,δ: from γ(θ) in (^{19}F,4nγ); ΔJ=1 from γγ(DCO) in (^{64}Ni,p4nγ) and (^{28}Si,p4nγ), γ anisotropy in (^{34}S,3pγ). Other: δ≈+0.2 from γ(θ) in (^{10}Be,3nγ).
1237.24	(15/2$^+$)	640.4 *3*	33 *11*	596.96	(11/2$^+$)	(E2)		0.00488	E_γ: weighted average of 640.2 *4* from (^{64}Ni,p4nγ), 642 *1* from (^{34}S,3pγ), 640.5 *5* from (^{28}Si,p4nγ), 640.5 *3* from (^{19}F,4nγ), and 640.3 *3* from (^{10}B,3nγ). Mult.: Q from γγ(DCO) in (^{28}Si,p4nγ), supported by γ(θ) in (^{10}B,3nγ).
1260.2	(15/2$^+$)	600.3 *3*	100	659.80	(11/2$^+$)	(E2)		0.00576	
1593.4	(19/2$^-$)	433.6 *3*	100	1159.6	(17/2$^-$)	(M1)		0.01729	
		1116.6 *3*	25	476.76	(15/2$^-$)	[E2]		1.35×10^{-3}	
1605.16	(17/2$^+$)	367.7 *3*	100 *25*	1237.24	(15/2$^+$)	(M1)		0.0263	E_γ: weighted average of 367.8 *4* from (^{64}Ni,p4nγ), 368 *1* from (^{34}S,3pγ), 368.0 *5* from (^{28}Si,p4nγ), 367.9 *3* from (^{19}F,4nγ), and 367.4 *3* from (^{10}B,3nγ). I_γ: from (^{64}Ni,p4nγ) and (^{28}Si,p4nγ). Other: 100 *25* from (^{19}F,4nγ).
		704.6 *3*	66 *7*	900.49	(13/2$^+$)	(E2)		0.00384	E_γ: weighted average of 704.5 *4* from (^{64}Ni,p4nγ), 706 *1* from (^{34}S,3pγ), 704.5 *5* from (^{28}Si,p4nγ), and 704.5 *3* from (^{19}F,4nγ). I_γ: weighted average of 66 *8* from (^{64}Ni,p4nγ), 67 *7* from (^{28}Si,p4nγ), and 50 *25* from (^{19}F,4nγ).
1684.6	(23/2$^-$)	685.5 *2*	100	999.07	(19/2$^-$)	E2		0.00411	B(E2)(W.u.)=9×10^{1} +9−3 E_γ: weighted average of 685.5 *2* from (^{64}Ni,p4nγ), 686 *1* from (^{34}S,3pγ), 685.5 *5* from (^{28}Si,p4nγ), 685.6 *2* from (^{19}F,4nγ), and 685.2 *3* from (^{10}B,3nγ).
1729.7	(21/2$^-$)	570.0 *3*	31 *5*	1159.6	(17/2$^-$)	E2		0.00660	E_γ: weighted average of 570.0 *6* from (^{64}Ni,p4nγ), 570.3 *7* from (^{28}Si,p4nγ), and 570.0 *3* from (^{19}F,4nγ). I_γ: weighted average of 30 *5* from (^{64}Ni,p4nγ), 33 *7* from (^{28}Si,p4nγ), and 40 *20* from (^{19}F,4nγ).
		730.6 *2*	100 *8*	999.07	(19/2$^-$)	M1+E2	≈−0.27	≈0.00473	E_γ: weighted average of 730.4 *4* from (^{64}Ni,p4nγ), 730.9 *5* from (^{28}Si,p4nγ), 730.7 *2* from (^{19}F,4nγ), and 730.2 *3* from (^{10}B,3nγ). I_γ: from (^{64}Ni,p4nγ). Others: 100 *11* from (^{28}Si,p4nγ), and 100 *20* from (^{19}F,4nγ). Mult.,δ: from γ(θ) in (^{10}B,3nγ) and RUL. ΔJ=1 from γγ(DCO) in (^{64}Ni,p4nγ) and (^{28}Si,p4nγ).
1994.71	(19/2$^+$)	389.2 *3*	89 *12*	1605.16	(17/2$^+$)	(M1)		0.0227	E_γ: weighted average of 389.7 *4* from (^{64}Ni,p4nγ), 389 *1* from (^{34}S,3pγ), 389.5 *7* from (^{28}Si,p4nγ), 389.5 *3* from

$^{123}_{55}Cs_{68}$-9

Adopted Levels, Gammas (continued)

γ(^{123}Cs) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.†	α#	Comments
								(^{19}F,4nγ), and 388.6 *3* from (^{10}B,3nγ). I_γ: weighted average of 72 *4* from (^{28}Si,p4nγ) and 97 *10* from (^{64}Ni,p4nγ). Others: 100 *50* from (^{19}F,4nγ), 200 from (^{34}S,3pγ).
1994.71	(19/2$^+$)	734.4 *3*	44 *8*	1260.2	(15/2$^+$)	(E2)	0.00347	E_γ: weighted average of 734.6 *4* from (^{64}Ni,p4nγ), 734.9 *7* from (^{28}Si,p4nγ), and 734.2 *3* from (^{19}F,4nγ). I_γ: from (^{28}Si,p4nγ). Others: 102 *20* from (^{64}Ni,p4nγ), 250 *100* from (^{19}F,4nγ) seem discrepant.
		757.9 *3*	100 *11*	1237.24	(15/2$^+$)	(E2)	0.00322	E_γ: weighted average of 757.5 *4* from (^{64}Ni,p4nγ), 757 *1* from (^{34}S,3pγ), 757.5 *5* from (^{28}Si,p4nγ), and 757.9 *3* from (^{19}F,4nγ). I_γ: from (^{28}Si,p4nγ). Others: 100 *12* from (^{64}Ni,p4nγ), 100 *50* from (^{19}F,4nγ), 100 from (^{34}S,3pγ).
2003.7	(19/2$^+$)	398.6 *4*	92 *8*	1605.16	(17/2$^+$)	(M1)		E_γ: weighted average of 398.6 *4* from (^{64}Ni,p4nγ) and 398.4 *7* from (^{28}Si,p4nγ). I_γ: from (^{64}Ni,p4nγ). Other: 159 *33* from (^{28}Si,p4nγ).
		743.4 *3*	100 *19*	1260.2	(15/2$^+$)	(E2)	0.00337	E_γ: weighted average of 743.5 *4* from (^{64}Ni,p4nγ), 744.0 *7* from (^{28}Si,p4nγ), and 743.2 *3* from (^{19}F,4nγ). I_γ: from (^{64}Ni,p4nγ). Other: 100 *20* from (^{28}Si,p4nγ).
		766.5 *6*	49 *11*	1237.24	(15/2$^+$)			E_γ: weighted average of 766.5 *6* from (^{64}Ni,p4nγ) and 766.4 *7* from (^{28}Si,p4nγ). I_γ: weighted average of 51 *11* from (^{64}Ni,p4nγ) and 46 *13* from (^{28}Si,p4nγ).
2196.4	(23/2$^-$)	466.6 *3*	24 *6*	1729.7	(21/2$^-$)			E_γ: weighted average of 466.5 *6* from (^{64}Ni,p4nγ), 466.9 *7* from (^{28}Si,p4nγ), and 466.6 *3* from (^{19}F,4nγ). I_γ: from (^{64}Ni,p4nγ). Others: 100 *24* from (^{28}Si,p4nγ), and ≈50 from (^{19}F,4nγ).
		602.9 *3*	100 *18*	1593.4	(19/2$^-$)			E_γ: weighted average of 603.0 *6* from (^{64}Ni,p4nγ), 603.0 *7* from (^{28}Si,p4nγ), and 602.9 *3* from (^{19}F,4nγ). I_γ: from (^{64}Ni,p4nγ). Others: 100 *24* from (^{28}Si,p4nγ), and 100 *50* from (^{19}F,4nγ).
		1197.6 *3*	65 *18*	999.07	(19/2$^-$)	(E2)	1.18×10^{-3}	E_γ: weighted average of 1196.9 *6* from (^{64}Ni,p4nγ), 1198.0 *7* from (^{28}Si,p4nγ), and 1197.7 *3* from (^{19}F,4nγ). I_γ: from (^{64}Ni,p4nγ). Others: 118 *24* from (^{28}Si,p4nγ), and ≈50 from (^{19}F,4nγ).
2219.6	(19/2$^+$)	1060.0 *6*	100 *22*	1159.6	(17/2$^-$)			
		1220.4 *6*	86 *22*	999.07	(19/2$^-$)			
2410.7	(21/2$^+$)	406.7 *6*	49 *80*	2003.7	(19/2$^+$)			E_γ: weighted average of 406.9 *6* from (^{64}Ni,p4nγ) and 406.5 *7* from (^{28}Si,p4nγ). I_γ: weighted average of 60 *10* from (^{64}Ni,p4nγ) and 42 *8* from (^{28}Si,p4nγ).
		416.0 *3*	43 *18*	1994.71	(19/2$^+$)			E_γ: weighted average of 415.8 *6* from (^{64}Ni,p4nγ), 415.4 *7* from

$^{123}_{55}Cs_{68}$-10

Adopted Levels, Gammas (continued)

γ(^{123}Cs) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.†	α#	Comments
								(^{28}Si,p4nγ), and 416.2 *3* from (^{19}F,4nγ). I_γ: unweighted average of 60 *10* from (^{64}Ni,p4nγ) and 25 *8* from (^{28}Si,p4nγ). Other: ≈50 from (^{19}F,4nγ).
2410.7	(21/2$^+$)	805.6 *3*	100 *15*	1605.16	(17/2$^+$)	(E2)	0.00279	E_γ: weighted average of 805.5 *6* from (^{64}Ni,p4nγ), 804.9 *7* from (^{28}Si,p4nγ), and 805.7 *3* from (^{19}F,4nγ). I_γ: from (^{64}Ni,p4nγ). Others: 100 *21* from (^{28}Si,p4nγ), 100 *50* from (^{19}F,4nγ).
2436.3	(25/2$^-$)	706.8 *3*	71 *13*	1729.7	(21/2$^-$)	(E2)	0.00381	E_γ: weighted average of 706.9 *4* from (^{64}Ni,p4nγ), 706.6 *5* from (^{28}Si,p4nγ), and 706.9 *3* from (^{19}F,4nγ). I_γ: unweighted average of 52 *6* from (^{64}Ni,p4nγ), 95 *9* from (^{28}Si,p4nγ), and 67 *34* from (^{19}F,4nγ).
		751.7 *3*	100 *9*	1684.6	(23/2$^-$)	(M1)	0.00450	E_γ: weighted average of 751.8 *4* from (^{64}Ni,p4nγ), 751.9 *5* from (^{28}Si,p4nγ), and 751.5 *3* from (^{19}F,4nγ). I_γ: from (^{28}Si,p4nγ). Others: 100 *11* from (^{64}Ni,p4nγ), 100 *34* from (^{19}F,4nγ).
2446.2	(21/2$^+$)	1447.3 *7*	100	999.07	(19/2$^-$)			
2485.2	(27/2$^-$)	800.5 *2*	100	1684.6	(23/2$^-$)	E2	0.00283	B(E2)(W.u.)=139 *+30−21* E_γ: weighted average of 800.5 *2* from (^{64}Ni,p4nγ), 801 *1* from (^{34}S,3pγ), 800.5 *5* from (^{28}Si,p4nγ), 800.6 *3* from (^{19}F,4nγ), and 800.1 *3* from (^{10}B,3nγ).
2706.3	(23/2$^+$)	486.7 *6*	100 *22*	2219.6	(19/2$^+$)	(E2)	0.01014	
		711.6 *6*	44 *11*	1994.71	(19/2$^+$)			
		976.7 *6*		1729.7	(21/2$^-$)			
		1021.9 *6*	89 *22*	1684.6	(23/2$^-$)	(E1)	0.000693 *10*	E_γ: weighted average of 1021.6 *6* from (^{64}Ni,p4nγ) and 1022.2 *7* from (^{28}Si,p4nγ).
2821.4	(23/2$^+$)	410.6 *3*	73 *17*	2410.7	(21/2$^+$)			E_γ: weighted average of 410.8 *6* from (^{64}Ni,p4nγ), 411.0 *7* from (^{28}Si,p4nγ), and 410.5 *3* from (^{19}F,4nγ). I_γ: unweighted average of 90 *10* from (^{64}Ni,p4nγ) and 56 *12* from (^{28}Si,p4nγ).
		817.8 *6*	80 *16*	2003.7	(19/2$^+$)			E_γ: weighted average of 817.7 *6* from (^{64}Ni,p4nγ) and 818.0 *7* from (^{28}Si,p4nγ). I_γ: from (^{28}Si,p4nγ).
		826.7 *3*	100 *13*	1994.71	(19/2$^+$)			E_γ: weighted average of 826.6 *6* from (^{64}Ni,p4nγ), 826.5 *7* from (^{28}Si,p4nγ), and 826.7 *3* from (^{19}F,4nγ). I_γ: from (^{64}Ni,p4nγ). Other: 100 *20* from (^{28}Si,p4nγ).
2843.6	(23/2$^+$)	433.0 *6*	63 *13*	2410.7	(21/2$^+$)			E_γ: weighted average of 432.7 *6* from (^{64}Ni,p4nγ) and 433.5 *7* from (^{28}Si,p4nγ). I_γ: from (^{64}Ni,p4nγ). Other: 100 *21* from (^{28}Si,p4nγ).
		839.7 *6*	56 *13*	2003.7	(19/2$^+$)			E_γ: weighted average of 839.6 *6* from (^{64}Ni,p4nγ) and 839.8 *7* from (^{28}Si,p4nγ). I_γ: from (^{64}Ni,p4nγ). Other: 159 *30* from (^{28}Si,p4nγ).

$^{123}_{55}Cs_{68}$-11

Adopted Levels, Gammas (continued)

γ(^{123}Cs) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.†	α#	Comments
2843.6	(23/2$^+$)	849.1 *6*	100 *19*	1994.71	(19/2$^+$)			E_γ: weighted average of 848.6 *6* from (^{64}Ni,p4nγ) and 849.8 *7* from (^{28}Si,p4nγ). I_γ: from (^{64}Ni,p4nγ). Other: 100 *21* from (^{28}Si,p4nγ).
2917.5	(27/2$^-$)	721.0 *3*	100 *20*	2196.4	(23/2$^-$)	(E2)	0.00363	E_γ: weighted average of 721.0 *6* from (^{64}Ni,p4nγ), 720.9 *7* from (^{28}Si,p4nγ), and 721.0 *3* from (^{19}F,4nγ). I_γ: (^{64}Ni,p4nγ). Others: 100 *22* from (^{28}Si,p4nγ), 100 *50* from (^{19}F,4nγ).
		1233.1 *3*	55 *11*	1684.6	(23/2$^-$)	(E2)	1.11×10^{-3}	E_γ: weighted average of 1232.4 *6* from (^{64}Ni,p4nγ), 1233.0 *7* from (^{28}Si,p4nγ), and 1233.3 *3* from (^{19}F,4nγ). I_γ: weighted average of 70 *20* from (^{64}Ni,p4nγ) and 50 *11* from (^{28}Si,p4nγ). Other: ?50 from (^{19}F,4nγ).
2973.3	(25/2$^+$)	1288.6 *4*	100	1684.6	(23/2$^-$)	(E1)	0.000531 *8*	E_γ: weighted average of 1288.5 *4* from (^{64}Ni,p4nγ) and 1288.7 *5* from (^{28}Si,p4nγ).
3045.5	(25/2$^+$)	202.0 *7*		2843.6	(23/2$^+$)			E_γ: from (^{28}Si,p4nγ) only.
		224.1 *4*	69 *10*	2821.4	(23/2$^+$)	(M1)	0.0962	E_γ: weighted average of 224.2 *4* from (^{64}Ni,p4nγ) and 223.9 *7* from (^{28}Si,p4nγ). I_γ: weighted average of 65 *10* from (^{64}Ni,p4nγ) and 80 *16* from (^{28}Si,p4nγ).
		599.5 *7*	32 *8*	2446.2	(21/2$^+$)			E_γ,I_γ: from (^{28}Si,p4nγ) only.
		1360.9 *4*	100 *12*	1684.6	(23/2$^-$)	(E1)	0.000534 *8*	I_γ: from (^{64}Ni,p4nγ). Other: 100 *20* from (^{28}Si,p4nγ).
3227.0	(29/2$^-$)	741.8 *3*	58 *13*	2485.2	(27/2$^-$)	(M1)	0.00465	E_γ: weighted average of 742.0 *4* from (^{64}Ni,p4nγ), 742.9 *7* from (^{28}Si,p4nγ), and 741.4 *3* from (^{19}F,4nγ). I_γ: from (^{28}Si,p4nγ). Others: 143 *17* from (^{64}Ni,p4nγ), ≈50 from (^{19}F,4nγ).
		790.9 *3*	100 *11*	2436.3	(25/2$^-$)	(E2)	0.00291	E_γ: weighted average of 790.7 *4* from (^{64}Ni,p4nγ), 790.8 *5* from (^{28}Si,p4nγ), and 791.0 *3* from (^{19}F,4nγ). I_γ: from (^{28}Si,p4nγ). Others: 100 *16* from (^{64}Ni,p4nγ), 100 *20* from (^{19}F,4nγ).
3304.8	(27/2$^+$)	259.3 *6*	100 *16*	3045.5	(25/2$^+$)	(M1)	0.0652	E_γ: weighted average of 259.2 *6* from (^{64}Ni,p4nγ) and 259.5 *7* from (^{28}Si,p4nγ). I_γ: from (^{64}Ni,p4nγ). Other: 100 *22* from (^{28}Si,p4nγ).
		331.5 *6*	109 *16*	2973.3	(25/2$^+$)	(M1)	0.0343	E_γ: weighted average of 331.6 *6* from (^{64}Ni,p4nγ) and 331.3 *7* from (^{28}Si,p4nγ). I_γ: from (^{64}Ni,p4nγ), normalized to I(259.3γ)=100. Other: 32 *7* from (^{28}Si,p4nγ).
		483.4 *6*	59 *13*	2821.4	(23/2$^+$)			I_γ: from (^{64}Ni,p4nγ) only, normalized to I(259.3γ)=100.
		598.5 *6*	125 *25*	2706.3	(23/2$^+$)	(E2)	0.00580	I_γ: from (^{64}Ni,p4nγ) only, normalized to I(259.3γ)=100.
3329.8	(27/2$^+$)	284.3 *6*	116 *40*	3045.5	(25/2$^+$)	(M1)	0.0512	E_γ: weighted average of 284.2 *6* from (^{64}Ni,p4nγ) and 284.5 *7*

$^{123}_{55}Cs_{68}$-12

Adopted Levels, Gammas (continued)

γ(^{123}Cs) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	α[#]	Comments
								from (^{28}Si,p4nγ).
								I_γ: unweighted average of 76 *10* from (^{64}Ni,p4nγ) and 156 *31* from (^{28}Si,p4nγ), normalized to I(623.5γ)=100.
3329.8	(27/2$^+$)	356.3 *6*	23 *9*	2973.3	(25/2$^+$)	(M1)	0.0285	E_γ: weighted average of 356.5 *6* from (^{64}Ni,p4nγ) and 356.0 *7* from (^{28}Si,p4nγ).
								I_γ: unweighted average of 14 *4* from (^{64}Ni,p4nγ) and 31 *6* from (^{28}Si,p4nγ).
		508.4 *6*	24 *7*	2821.4	(23/2$^+$)			E_γ,I_γ: from (^{64}Ni,p4nγ) only.
		623.5 *6*	100 *14*	2706.3	(23/2$^+$)	(E2)	0.00522	E_γ: weighted average of 623.5 *6* from (^{64}Ni,p4nγ) and 623.5 *7* from (^{28}Si,p4nγ).
								I_γ: from (^{64}Ni,p4nγ). Other: 100 *19* from (^{28}Si,p4nγ).
3353.5	(31/2$^-$)	868.3 *2*	100	2485.2	(27/2$^-$)	E2	0.00235	B(E2)(W.u.)=137 *+29−21*
								E_γ: weighted average of 868.3 *2* from (^{64}Ni,p4nγ), 869 *1* from (^{34}S,3pγ), 868.4 *5* from (^{28}Si,p4nγ), 868.3 *3* from (^{19}F,4nγ), and 868.0 *4* from (^{10}B,3nγ).
3618.0	(29/2$^+$)	288.3 *6*	28 *9*	3329.8	(27/2$^+$)			E_γ: weighted average of 288.2 *6* from (^{64}Ni,p4nγ) and 288.5 *7* from (^{28}Si,p4nγ).
								I_γ: unweighted average of 19 *4* from (^{64}Ni,p4nγ) and 36 *8* from (^{28}Si,p4nγ).
		313.2 *4*	91 *11*	3304.8	(27/2$^+$)	(M1)	0.0397	E_γ: weighted average of 313.2 *4* from (^{64}Ni,p4nγ) and 313.0 *7* from (^{28}Si,p4nγ).
								I_γ: weighted average of 90 *11* from (^{64}Ni,p4nγ) and 96 *20* from (^{28}Si,p4nγ).
		644.7 *4*	100 *11*	2973.3	(25/2$^+$)	(E2)	0.00480	E_γ: weighted average of 644.7 *4* from (^{64}Ni,p4nγ) and 644.5 *7* from (^{28}Si,p4nγ).
								I_γ: from (^{64}Ni,p4nγ). Other: 100 *20* from (^{28}Si,p4nγ).
		1132.9 *4*	63 *11*	2485.2	(27/2$^-$)	(E1)	0.000580 *9*	E_γ: weighted average of 1132.8 *4* from (^{64}Ni,p4nγ) and 1133.1 *7* from (^{28}Si,p4nγ).
								I_γ: weighted average of 65 *11* from (^{64}Ni,p4nγ) and 60 *12* from (^{28}Si,p4nγ).
3728.9	(31/2$^-$)	811.4 *3*	100 *24*	2917.5	(27/2$^-$)			E_γ: weighted average of 811.5 *6* from (^{64}Ni,p4nγ), 811.1 *7* from (^{28}Si,p4nγ), and 811.4 *3* from (^{19}F,4nγ).
								I_γ: from (^{64}Ni,p4nγ) and (^{28}Si,p4nγ).
		1243.7 *3*	63 *18*	2485.2	(27/2$^-$)	(E2)	1.10×10^{-3}	E_γ: weighted average of 1243.4 *6* from (^{64}Ni,p4nγ), 1243.2 *7* from (^{28}Si,p4nγ), and 1243.8 *3* from (^{19}F,4nγ).
								I_γ: weighted average of 50 *13* from (^{64}Ni,p4nγ) and 88 *18* from (^{28}Si,p4nγ).
3995.1	(31/2$^+$)	377.1 *4*	100 *9*	3618.0	(29/2$^+$)	(M1)	0.0246	E_γ: weighted average of 377.1 *4* from (^{64}Ni,p4nγ) and 377.3 *7* from (^{28}Si,p4nγ).
								I_γ: from (^{64}Ni,p4nγ). Other: 100 *19* from (^{28}Si,p4nγ).

$^{123}_{55}Cs_{68}$-13

Adopted Levels, Gammas (continued)

γ(^{123}Cs) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	α[#]	Comments
3995.1	(31/2$^+$)	690.3 *4*	73 *9*	3304.8	(27/2$^+$)			E_γ: weighted average of 690.3 *4* from (^{64}Ni,p4nγ) and 690.3 *7* from (^{28}Si,p4nγ). I_γ: weighted average of 74 *9* from (^{64}Ni,p4nγ) and 69 *15* from (^{28}Si,p4nγ).
4045.4	(31/2$^+$)	715.6 *4*	100 *15*	3329.8	(27/2$^+$)	(E2)	0.00370	
		740.6 *6*	17 *5*	3304.8	(27/2$^+$)			E_γ,I_γ: from (^{64}Ni,p4nγ) only.
4055.3	(33/2$^-$)	701.7 *3*	100 *14*	3353.5	(31/2$^-$)	(M1)	0.00531	E_γ: weighted average of 701.9 *4* from (^{64}Ni,p4nγ), 701.5 *7* from (^{28}Si,p4nγ), and 701.7 *3* from (^{19}F,4nγ). I_γ: from (^{64}Ni,p4nγ). Other: 100 *24* from (^{28}Si,p4nγ).
		828.4 *3*	75 *12*	3227.0	(29/2$^-$)	(E2)	0.00261	E_γ: weighted average of 828.2 *6* from (^{64}Ni,p4nγ), 828.5 *7* from (^{28}Si,p4nγ), and 828.4 *3* from (^{19}F,4nγ). I_γ: weighted average of 68 *11* from (^{64}Ni,p4nγ) and 94 *18* from (^{28}Si,p4nγ).
4258.2	(35/2$^-$)	904.64 *3*	100	3353.5	(31/2$^-$)	E2	0.00214	B(E2)(W.u.)=117 *+34−18* E_γ: weighted average of 904.9 *2* from (^{64}Ni,p4nγ), 906 *1* from (^{34}S,3pγ), 904.8 *5* from (^{28}Si,p4nγ), and 904.63 *3* from (^{19}F,4nγ).
4408.4	(33/2$^+$)	413.2 *6*	100 *15*	3995.1	(31/2$^+$)	(M1)	0.0195	E_γ: weighted average of 413.0 *6* from (^{64}Ni,p4nγ) and 413.4 *7* from (^{28}Si,p4nγ). I_γ: from (^{64}Ni,p4nγ). Other: 100 *24* from (^{28}Si,p4nγ).
		790.4 *6*	103 *21*	3618.0	(29/2$^+$)	(E2)	0.00292	E_γ: weighted average of 790.1 *6* from (^{64}Ni,p4nγ) and 790.8 *7* from (^{28}Si,p4nγ). I_γ: unweighted average of 123 *19* from (^{64}Ni,p4nγ) and 82 *18* from (^{28}Si,p4nγ).
4620.7	(35/2$^-$)	891.8 *3*	100	3728.9	(31/2$^-$)			E_γ: weighted average of 892.0 *6* from (^{64}Ni,p4nγ), 891.9 *7* from (^{28}Si,p4nγ), and 891.8 *3* from (^{19}F,4nγ).
4834.1	(35/2$^+$)	425.8 *6*	48 *16*	4408.4	(33/2$^+$)	(M1)	0.0181	E_γ: weighted average of 425.6 *6* from (^{64}Ni,p4nγ) and 426.0 *7* from (^{28}Si,p4nγ). I_γ: unweighted average of 64 *12* from (^{64}Ni,p4nγ) and 32 *11* from (^{28}Si,p4nγ).
		838.9 *6*	100 *16*	3995.1	(31/2$^+$)	(E2)	0.00254	E_γ: weighted average of 838.6 *6* from (^{64}Ni,p4nγ) and 839.4 *7* from (^{28}Si,p4nγ). I_γ: from (^{64}Ni,p4nγ). Other: 100 *21* from (^{28}Si,p4nγ).
4863.3	(35/2$^+$)	817.9 *4*	100	4045.4	(31/2$^+$)	(E2)	0.00269	E_γ: weighted average of 817.8 *4* from (^{64}Ni,p4nγ) and 818.0 *5* from (^{28}Si,p4nγ).
4933.6	(37/2$^-$)	675.6 *6*	100 *14*	4258.2	(35/2$^-$)	(M1)	0.00581	E_γ: weighted average of 675.5 *6* from (^{64}Ni,p4nγ) and 675.8 *7* from (^{28}Si,p4nγ). I_γ: from (^{64}Ni,p4nγ). Other: 100 *24* from (^{28}Si,p4nγ).
		878.3 *6*	75 *12*	4055.3	(33/2$^-$)	(E2)	0.00229	E_γ: weighted average of 878.5 *6* from (^{64}Ni,p4nγ) and 878.0 *7* from (^{28}Si,p4nγ). I_γ: weighted average of 89 *14* from (^{64}Ni,p4nγ) and 65 *12* from (^{28}Si,p4nγ).
5213.9	(39/2$^-$)	280.3 *6*	5.5 *14*	4933.6	(37/2$^-$)			E_γ,I_γ: from (^{64}Ni,p4nγ) only.
		955.7 *2*	100	4258.2	(35/2$^-$)	E2	0.00189	B(E2)(W.u.)=62 *+14−10*

$^{123}_{55}Cs_{68}$-14

Adopted Levels, Gammas (continued)

γ(^{123}Cs) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.†	α#	Comments
								E_γ: weighted average of 955.8 *2* from (^{64}Ni,p4nγ), 955 *1* from (^{34}S,3pγ), 955.0 *7* from (^{28}Si,p4nγ), and 955.5 *3* from (^{19}F,4nγ).
5246.4		988.2 *6*	100	4258.2	(35/2$^-$)			
5334.4	(37/2$^+$)	500.4 *6*	86 *22*	4834.1	(35/2$^+$)			
		926.0 *6*	100 *22*	4408.4	(33/2$^+$)			
5596.9	(39/2$^-$)	976.2 *6*	100	4620.7	(35/2$^-$)			E_γ: weighted average of 976.0 *6* from (^{64}Ni,p4nγ) and 976.4 *7* from (^{28}Si,p4nγ).
5751.8	(39/2$^+$)	888.5 *4*	100 *14*	4863.3	(35/2$^+$)	(E2)	0.00223	E_γ: weighted average of 888.4 *4* from (^{64}Ni,p4nγ) and 889.0 *7* from (^{28}Si,p4nγ).
		917.8 *6*	23 *5*	4834.1	(35/2$^+$)			E_γ,I_γ: from (^{64}Ni,p4nγ) only.
5792.9	(39/2$^+$)	458.5 *6*	33 *11*	5334.4	(37/2$^+$)			
		958.9 *6*	100 *22*	4834.1	(35/2$^+$)			
5905.5	(41/2$^-$)	691.7 *6*	95 *15*	5213.9	(39/2$^-$)			E_γ,I_γ: from (^{64}Ni,p4nγ) only.
		971.9 *6*	100 *20*	4933.6	(37/2$^-$)	(E2)	0.00182	E_γ: weighted average of 971.8 *6* from (^{64}Ni,p4nγ) and 972.1 *7* from (^{28}Si,p4nγ).
6239.5	(43/2$^-$)	334.2 *6*	2.9 *10*	5905.5	(41/2$^-$)			E_γ,I_γ: from (^{64}Ni,p4nγ) only.
		1025.5 *5*	100 *8*	5213.9	(39/2$^-$)	E2	1.62×10^{-3}	B(E2)(W.u.)=74 *+16−12* E_γ: unweighted average of 1025.9 *2* from (^{64}Ni,p4nγ), 1026 *1* from (^{34}S,3pγ), 1026.0 *7* from (^{28}Si,p4nγ), and 1024.0 *3* from (^{19}F,4nγ). I_γ: from (^{64}Ni,p4nγ).
6296.8		1050.4 *6*	100	5246.4				
6670.7	(43/2$^+$)	918.9 *4*	100	5751.8	(39/2$^+$)	(E2)	0.00206	E_γ: weighted average of 918.9 *4* from (^{64}Ni,p4nγ) and 919.0 *7* from (^{28}Si,p4nγ).
6678.8	(43/2$^-$)	1081.9 *6*	100	5596.9	(39/2$^-$)			
6981.2	(45/2$^-$)	741.6 *6*	81 *19*	6239.5	(43/2$^-$)			
		1075.8 *6*	100 *25*	5905.5	(41/2$^-$)	(E2)	1.46×10^{-3}	
7352.5	(47/2$^-$)	371.3 *6*	2.9 *15*	6981.2	(45/2$^-$)			E_γ,I_γ: from (^{64}Ni,p4nγ) only.
		1112.9 *4*	100 *9*	6239.5	(43/2$^-$)	E2	1.36×10^{-3} *2*	B(E2)(W.u.)=89 *+40−22* E_γ: weighted average of 1112.9 *4* from (^{64}Ni,p4nγ), 1113 *1* from (^{34}S,3pγ), and 1113.0 *7* from (^{28}Si,p4nγ). Other: 1108 from (^{19}F,4nγ). I_γ: from (^{64}Ni,p4nγ).
7413.8		1117.0 *6*	100	6296.8				
7646.9	(47/2$^+$)	976.2 *4*	100	6670.7	(43/2$^+$)	(E2)	0.00181	E_γ: weighted average of 976.3 *4* from (^{64}Ni,p4nγ) and 976.0 *7* from (^{28}Si,p4nγ).
7837.5	(47/2$^-$)	1158.7 *6*	100	6678.8	(43/2$^-$)			
8159.2	(49/2$^-$)	806.7 *6*	32 *11*	7352.5	(47/2$^-$)			
		1178.0 *6*	100 *21*	6981.2	(45/2$^-$)	(E2)	1.21×10^{-3}	
8559.2	(51/2$^-$)	400.0 *6*	3.4 *17*	8159.2	(49/2$^-$)			E_γ,I_γ: from (^{64}Ni,p4nγ) only.
		1206.7 *4*	100 *9*	7352.5	(47/2$^-$)	(E2)	1.16×10^{-3}	B(E2)(W.u.)=59 *+27−11* E_γ: weighted average of 1206.8 *4* from (^{64}Ni,p4nγ) and 1206 *1* from

Adopted Levels, Gammas (continued)

γ(^{123}Cs) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	α[#]	Comments
								(^{34}S,3pγ).
								I_γ: from (^{64}Ni,p4nγ).
8699.9	(51/2$^+$)	1053.0 *6*	100	7646.9	(47/2$^+$)	(E2)	1.53×10^{-3}	E_γ: weighted average of 1052.9 *6* from (^{64}Ni,p4nγ) and 1053.2 *7* from (^{28}Si,p4nγ).
9435.8	(53/2$^-$)	876.7 *6*	43 *14*	8559.2	(51/2$^-$)			
		1276.6 *6*	100 *22*	8159.2	(49/2$^-$)	(E2)	1.04×10^{-3}	
9862.3	(55/2$^-$)	426.5 *6*	4.9 *25*	9435.8	(53/2$^-$)			E_γ,I_γ: from (^{64}Ni,p4nγ) only.
		1303.1 *4*	100 *10*	8559.2	(51/2$^-$)	(E2)	1.01×10^{-3}	E_γ: from (^{64}Ni,p4nγ). Other: 1303 *1* from (^{34}S,3pγ).
9888.3	(55/2$^+$)	1188.3 *6*	100	8699.9	(51/2$^+$)	(E2)	1.19×10^{-3}	E_γ: weighted average of 1188.3 *6* from (^{64}Ni,p4nγ) and 1188.2 *7* from (^{28}Si,p4nγ).
10772.8	(57/2$^-$)	1337.0 *6*	100	9435.8	(53/2$^-$)			
11021.1	(59/2$^+$)	1132.8 *6*	100	9888.3	(55/2$^+$)	(E2)	1.31×10^{-3}	
11213.7	(59/2$^+$)	1325.4 *6*	100	9888.3	(55/2$^+$)	(E2)	0.000979 *14*	
11233.5	(59/2$^-$)	1371.3 *6*	100	9862.3	(55/2$^-$)	(E2)	0.000928 *13*	E_γ: weighted average of 1371.0 *6* from (^{64}Ni,p4nγ) and 1372 *1* from (^{34}S,3pγ).
11252.7	(59/2$^-$)	1390.3 *6*	100	9862.3	(55/2$^-$)	(E2)	0.000909 *13*	
11270.8?	(59/2$^-$)	498.0 *6*	100	10772.8	(57/2$^-$)	(M1+E2)		
11916.6	(61/2$^-$)	663.9 *6*	100	11252.7	(59/2$^-$)	(M1)	0.00606	
12293.2	(63/2$^-$)	1022.3[&] *6*		11270.8?	(59/2$^-$)			
		1040.5 *6*	71 *14*	11252.7	(59/2$^-$)			
		1059.8 *6*	100 *30*	11233.5	(59/2$^-$)	(E2)	1.51×10^{-3}	
12431.0	(63/2$^-$)	1178.3 *6*	100	11252.7	(59/2$^-$)			
12469.5	(63/2$^+$)	1448.4 *6*	100	11021.1	(59/2$^+$)	(E2)	0.000860 *12*	
12609.6	(63/2$^+$)	1395.9 *6*	100	11213.7	(59/2$^+$)			
13165.1	(67/2$^+$)	695.6 *6*	100	12469.5	(63/2$^+$)	(E2)	0.00397	
13533.7	(67/2$^-$)	1102.7 *6*	50 *13*	12431.0	(63/2$^-$)			
		1240.5 *6*	100 *25*	12293.2	(63/2$^-$)	(E2)	1.10×10^{-3}	
13870.1	(71/2$^+$)	705.0 *6*	100	13165.1	(67/2$^+$)	(E2)	0.00384	
14955.4	(71/2$^-$)	1421.7 *6*	100	13533.7	(67/2$^-$)	(E2)	0.000881 *13*	

[†] For transitions from low-spin states (J<11/2), values are from ^{123}Ba ε decay (2000Gi12) with Mult. based on ce data; for those from high-spin states (J≥11/2), values are from (^{28}Si,p4nγ) (2005Si31) and/or (^{64}Ni,p4nγ) (2004Si27) with Mult. based on γγ(DCO) data and RUL where $T_{1/2}$ data available or level scheme from band assignments (for latter, Mult. placed in parentheses since D or Q can only be deduced from DCO data), unless otherwise noted.

[‡] Deduced by the evaluator from ce data in ^{123}Ba ε decay (2000Gi12) using the BrIccMixing code, unless otherwise noted.

[#] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

[@] Multiply placed.

[&] Placement of transition in the level scheme is uncertain.

$^{123}_{55}Cs_{68}$-16

Adopted Levels, Gammas

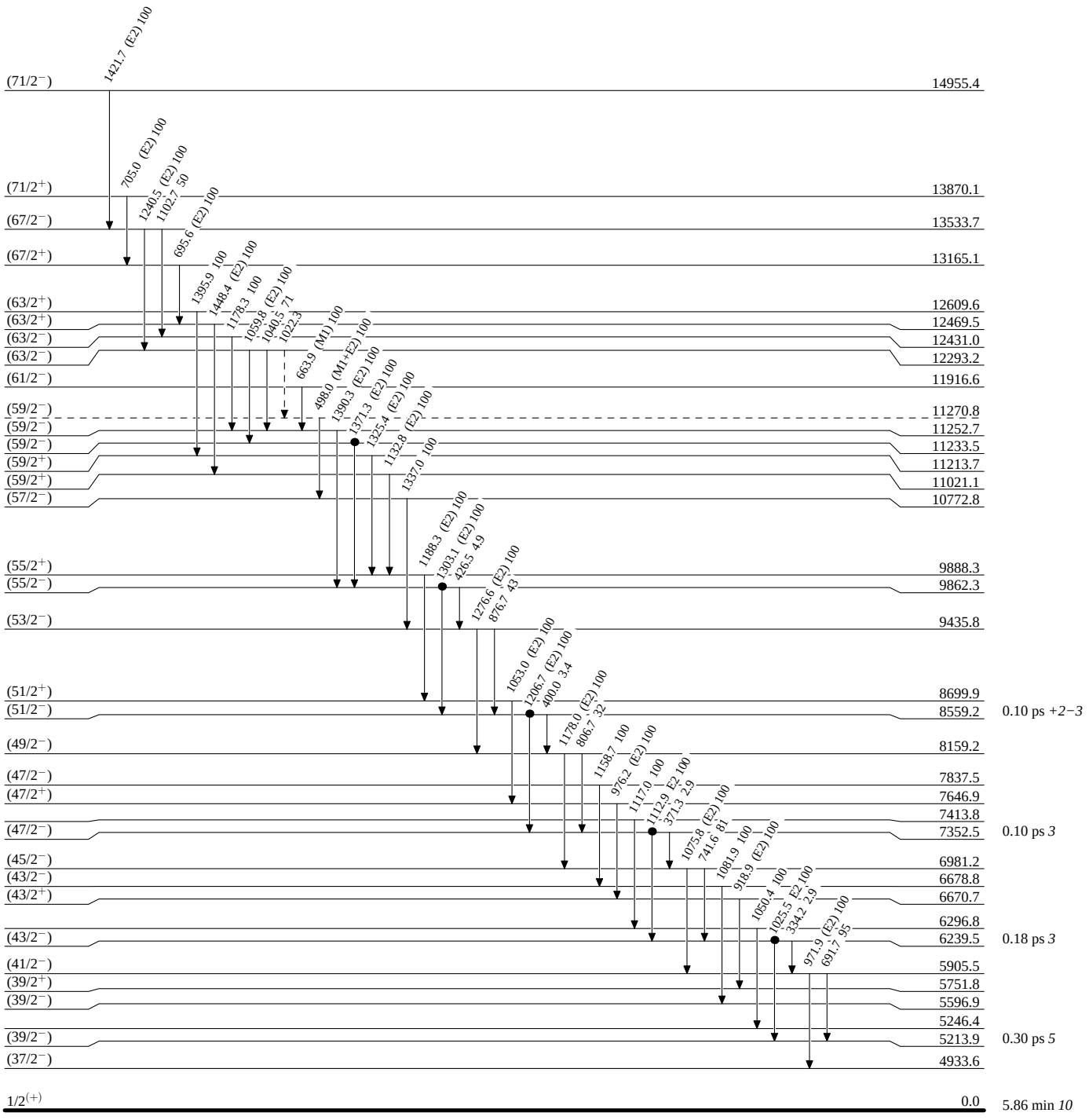
Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

Coincidence



$^{123}_{55}Cs_{68}$

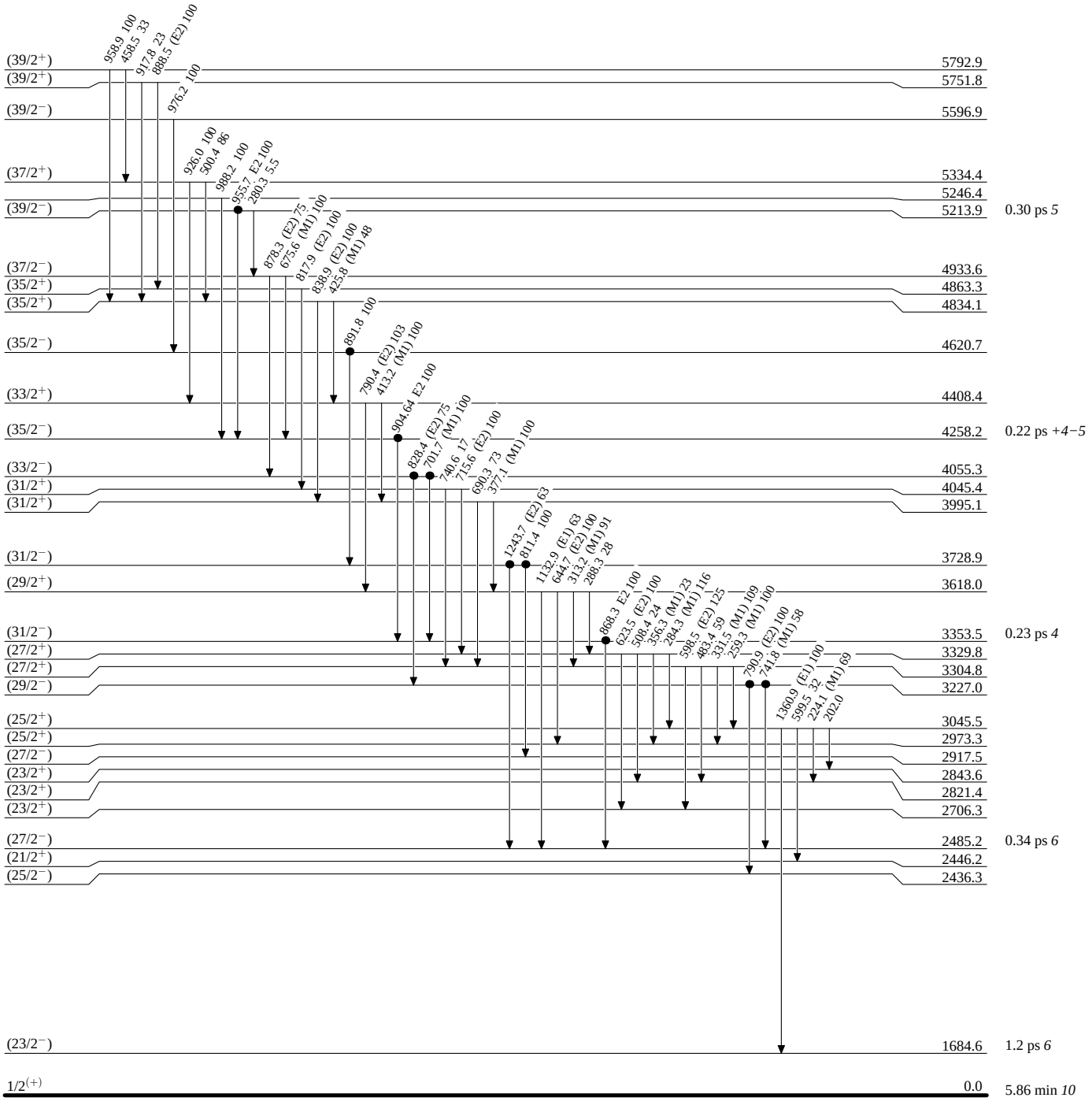
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

● Coincidence



$^{123}_{55}Cs_{68}$

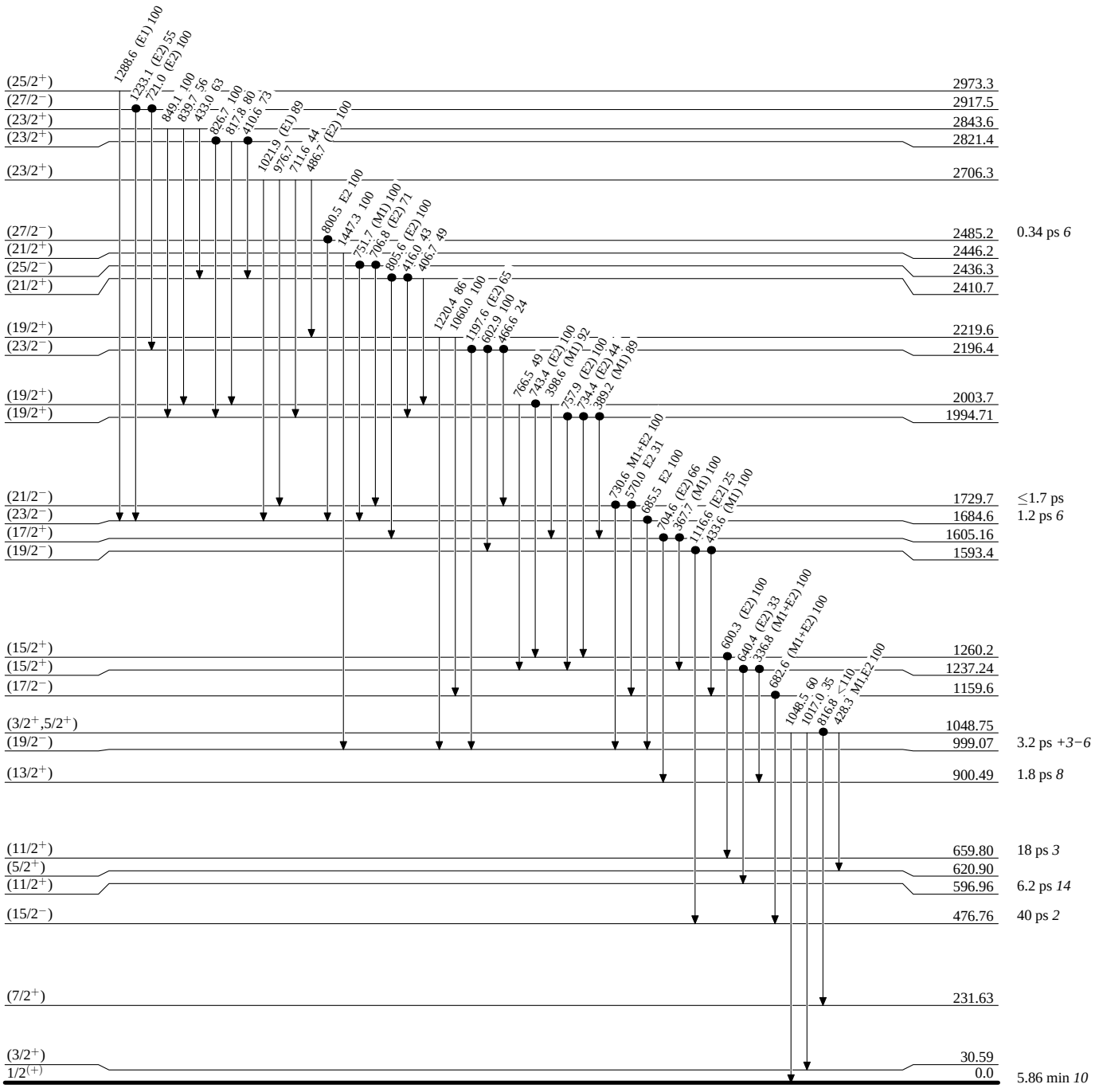
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

● Coincidence



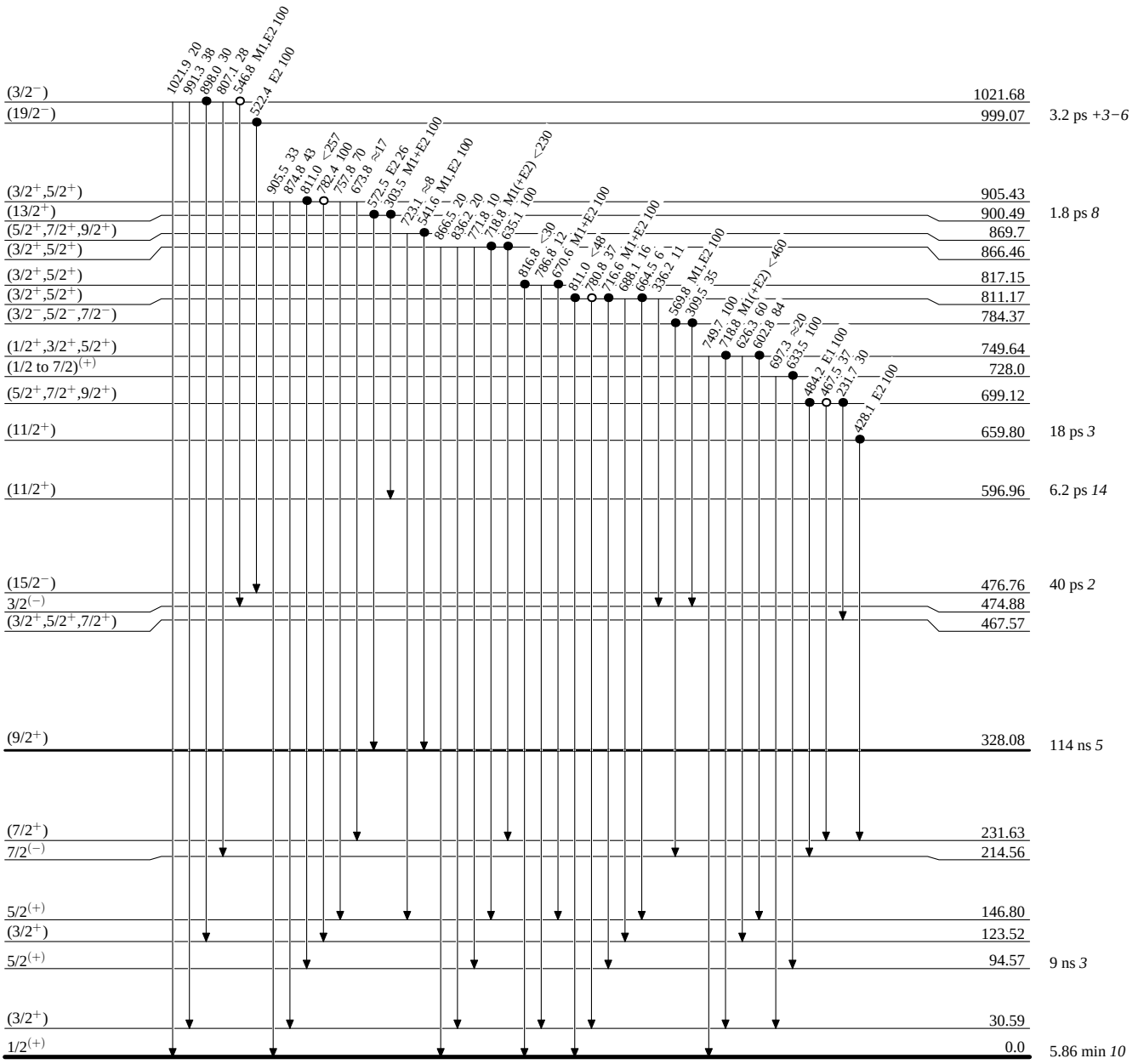
$^{123}_{55}Cs_{68}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

Legend
● Coincidence
○ Coincidence (Uncertain)



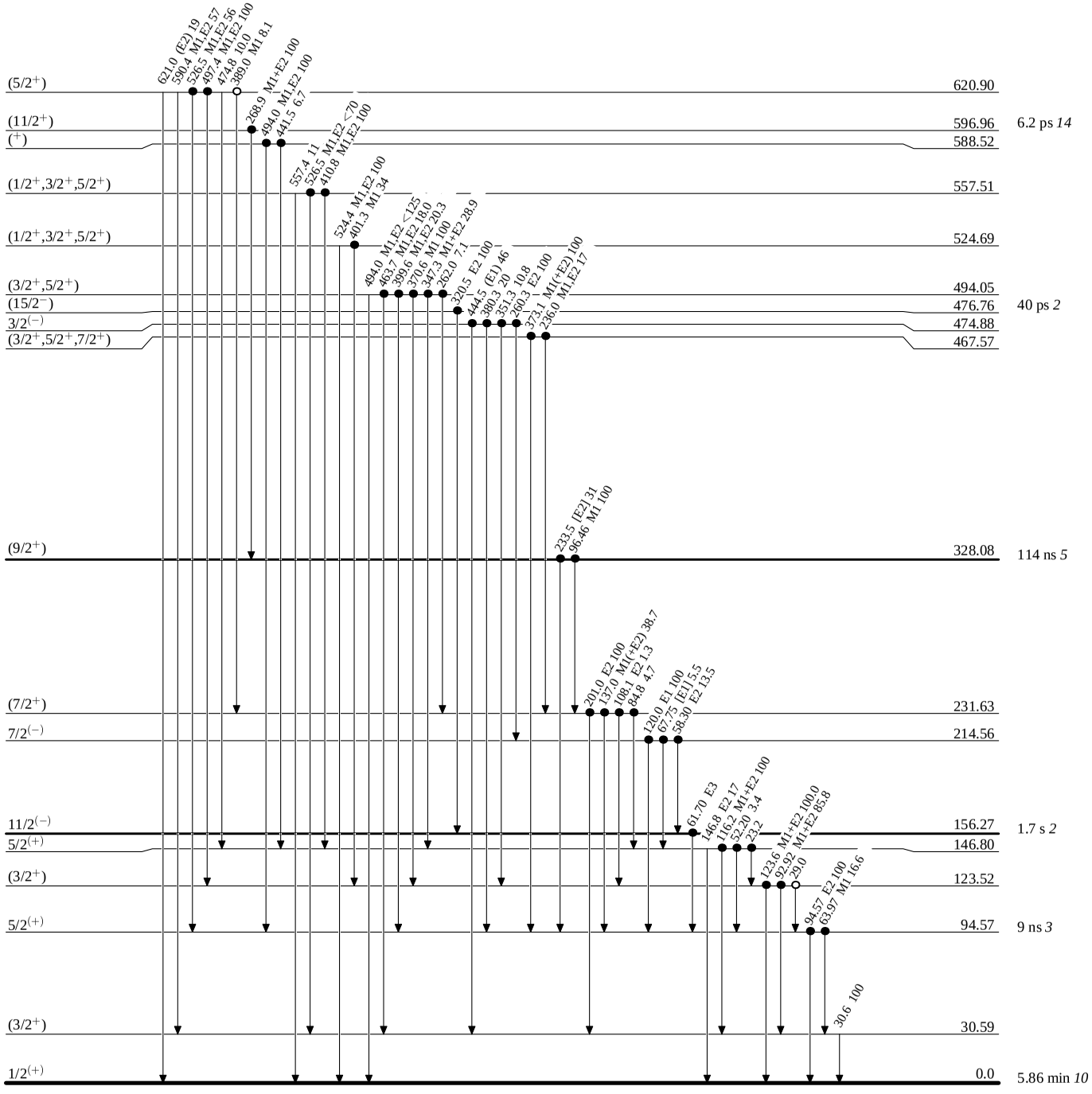
$^{123}_{55}Cs_{68}$

Adopted Levels, Gammas

Level Scheme (continued)

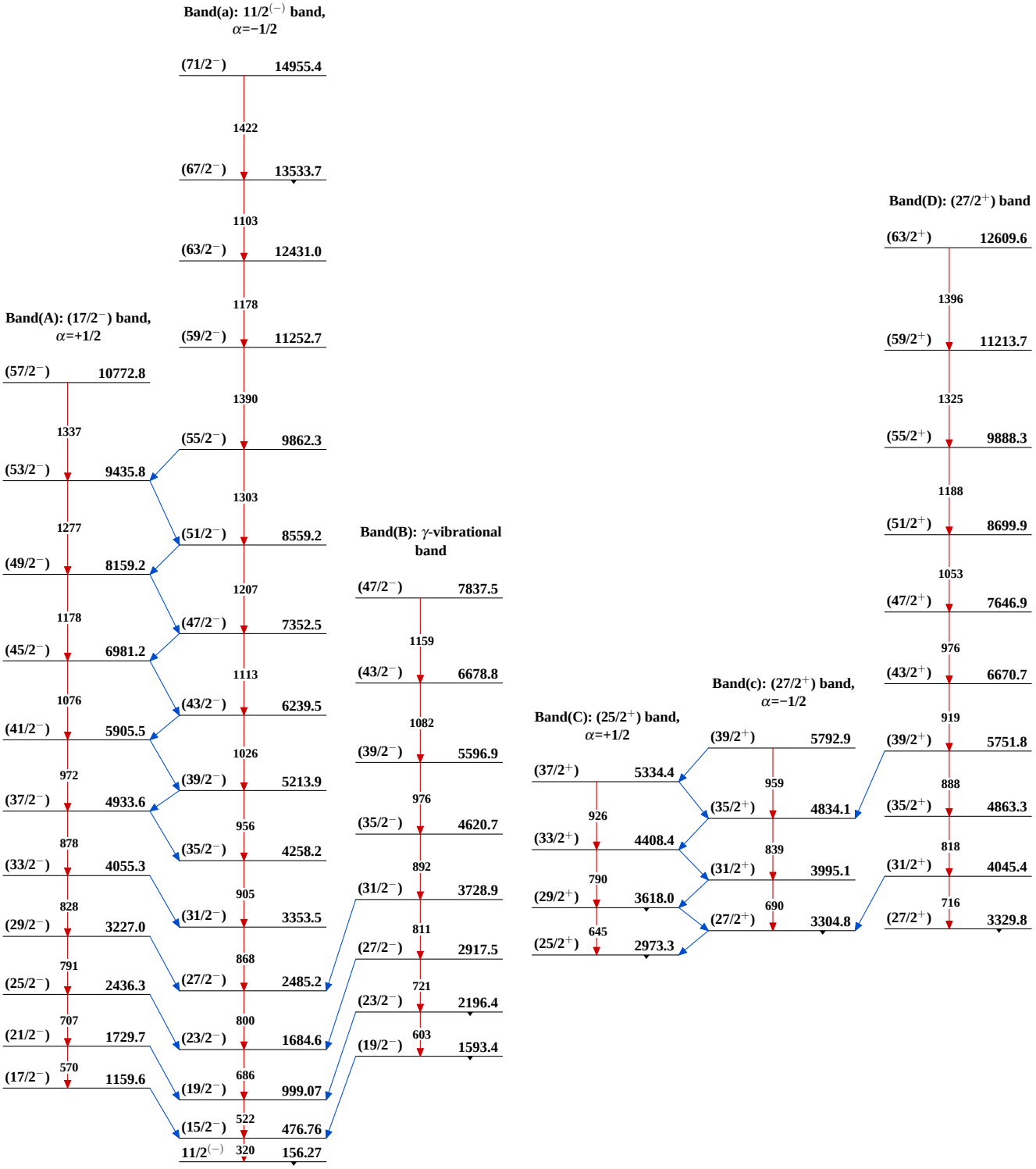
Intensities: Relative photon branching from each level

Legend
● Coincidence
○ Coincidence (Uncertain)

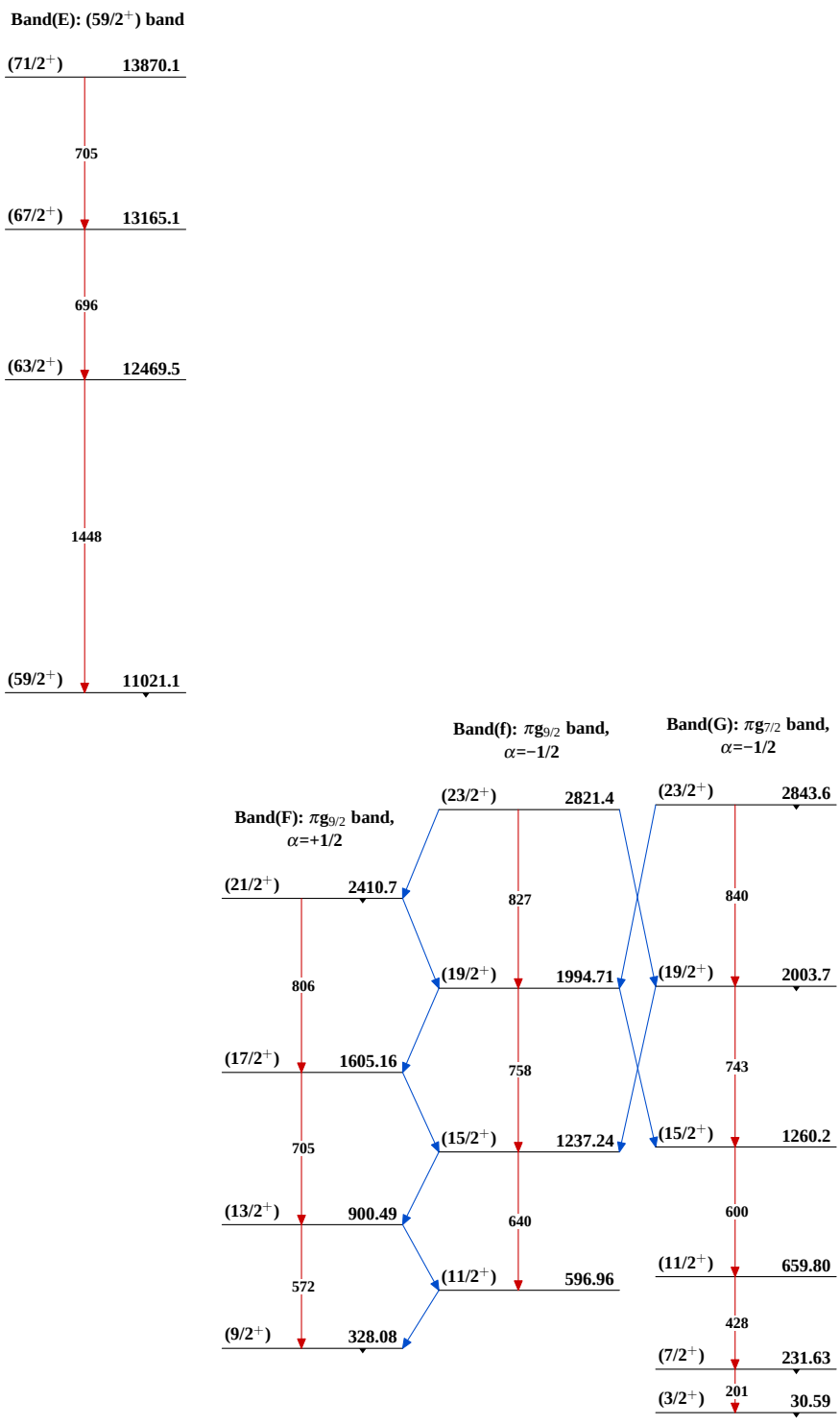


$^{123}_{55}Cs_{68}$

Adopted Levels, Gammas



Adopted Levels, Gammas (continued)



$^{123}_{55}Cs_{68}$

^{123}Ba ε decay 2000Gi12

Parent: ^{123}Ba: E=0.0; $J^{\pi}=5/2^{(+)}$; $T_{1/2}=2.4$ min *4*; Q(ε)=5389 *17*; %ε+%β^+ decay=100

^{123}Ba-J^{π},$T_{1/2}$: From Adopted Levels of ^{123}Ba.

^{123}Ba-Q(ε): From 2021Wa16.

2000Gi12: ^{123}Ba source was produced via La(^{3}He,X) with E=280 MeV ^{3}He beam from the Synchrocyclotron facility at Orsay, on thick molten lanthanum metallic targets. Ions were separated by the ISOCELE2 separator and collected on aluminized mylar tape. γ rays were detected with a low-energy and high-resolution HPGe detector and a Ge detector; conversion electrons were detected with a Si detector (FWHM=2 keV). Measured Eγ, Iγ, E(x ray),I(x ray), $\gamma\gamma$-coin, x-γ-coin, E(ce), I(ce), γ-ce-coin, (x ray)-ce-coin. Deduced levels, J, π, conversion coefficients, γ-ray multipolarities. Systematics of neighboring odd- mass Cs isotopes. Comparisons with theoretical calculations.

1975Ar31: ^{123}Ba source was produced via ^{114}Sn(^{12}C,3n) with E=65 MeV ^{12}C beam provided by the U-300 cyclotron at JINR, Dubna, on a self-supporting target of ^{114}Sn. γ rays were detected with a Ge(Li) detector (FWHM=0.7 keV at Eγ=100 keV). Measured Eγ, Iγ, γ(t). Deduced levels, parent $T_{1/2}$.

1978Bo32: ^{123}Ba source was produced via ^{96,98}Ru(^{32}S,X) with E=190 MeV ^{32}S beam from the U-300 cyclotron at JNIR, Dubna, on enriched (over 90%) Ru targets. γ rays were detected with a high- resolution Ge(Li) spectrometer and β particles were detected with a plastic β-counter. Measured Eγ, Iγ, $\beta\gamma$-coin.

Others:

1996Os04: measured Eγ, $\gamma\gamma$-coin, γ-gated β spectra. Deduced end-point energies, Q(ε).

1962Pr09: measured decay curve. Deduced parent $T_{1/2}$.

1976Be11: measured $\beta\gamma$(t).

1975BaXJ: measured $\beta\gamma$(t).

The decay scheme is proposed by 2000Gi12, which is considered incomplete due to a large gap between the highest observed level and the Q-value. As stated by 2000Gi12, the absolute normalization of γ-ray intensities and thus estimation of the (β^++ε) feeding cannot be done because the γ-intensity balance cannot be precisely estimated for the 30.6-keV level and the decay scheme is incomplete.

^{123}Cs Levels

E(level)[†]	J^{π}[‡]	$T_{1/2}$[‡]	Comments
0.0	$1/2^{(+)}$	5.86 min *10*	
30.59 *4*	$(3/2^+)$		
94.57 *3*	$5/2^{(+)}$	9 ns *3*	$T_{1/2}$: adopted value from β^+−94.6γ(t) in 1976Be11.
123.52 *4*	$(3/2^+)$		
146.80 *4*	$5/2^{(+)}$		
156.27 *5*	$11/2^{(-)}$	1.7 s *2*	
214.56 *5*	$7/2^{(-)}$		
231.63 *6*	$(7/2^+)$		
328.09 *8*	$(9/2^+)$	114 ns *5*	
467.57 *14*	$(3/2^+,5/2^+,7/2^+)$		J^{π}: $9/2^+$ proposed by 2000Gi12 contradicts to 373.1γ M1(+E2) to $5/2^{(+)}$ in 2000Gi12.
474.88 *10*	$3/2^{(-)}$		
494.05 *9*	$(3/2^+,5/2^+)$		
524.69 *17*	$(1/2^+,3/2^+,5/2^+)$		
557.51 *18*	$(1/2^+,3/2^+,5/2^+)$		
588.52 *18*	$(^+)$		
620.90 *13*	$(5/2^+)$		
699.12 *18*	$(5/2^+,7/2^+,9/2^+)$		
728.0 *4*	$(1/2$ to $7/2)^{(+)}$		
749.64 *17*	$(1/2^+,3/2^+,5/2^+)$		
784.37 *22*	$(3/2^-,5/2^-,7/2^-)$		
811.17 *13*	$(3/2^+,5/2^+)$		
817.15 *20*	$(3/2^+,5/2^+)$		
866.46 *14*	$(3/2^+,5/2^+)$		
869.7 *3*	$(5/2^+,7/2^+,9/2^+)$		

Continued on next page (footnotes at end of table)

^{123}Ba ε decay 2000Gi12 (continued)

^{123}Cs Levels (continued)

E(level)[†]	J^{π}[‡]
905.43 *14*	$(3/2^+,5/2^+)$
1021.68 *16*	$(3/2^-)$
1048.75 *22*	$(3/2^+,5/2^+)$

[†] From a least-squares fit to γ-ray energies.
[‡] From Adopted Levels.

γ(^{123}Cs)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult.@	δ&	α[a]	Comments
23.2‡ *1*	‡#	146.80	5/2(+)	123.52	(3/2+)				
29.0‡ *1*	‡#	123.52	(3/2+)	94.57	5/2(+)				
30.6 *5*	66 *13*	30.59	(3/2+)	0.0	1/2(+)				E_γ: from 1978Bo32. Not seen in 2000Gi12. I_γ: from Iγ/I(K x-ray) ratios of 30.6γ and 63.97γ in 1978Bo32 and I(63.97γ)=16.6 *1* in 2000Gi12. I(30.6γ)/I(K x-ray)=0.10 *2* (1978Bo32).
52.20 *5*	1.5 *1*	146.80	5/2(+)	94.57	5/2(+)				
58.30 *5*	2.7 *1*	214.56	7/2(−)	156.27	11/2(−)	E2		13.19	E_γ: 58.3 *5* from 1978Bo32. Mult.: α(L)exp=4.5 *9*; K/L<1. Iγ(58.3γ)/I(K x-ray)=0.004 *1* (1978Bo32).
61.70 *5*	#	156.27	11/2(−)	94.57	5/2(+)	E3		289	Mult.: adopted assignment based on ce data in ^{123}Cs IT decay (1981Ma01).
63.97 *3*	16.6 *1*	94.57	5/2(+)	30.59	(3/2+)	M1			E_γ: others: 64.1 *5* from 1978Bo32, 63.9 *6* (1975Ar31). I_γ: Other: 14 *4* (1975Ar31). Mult.: α(K)exp=3.5 *4*; K/L>9. Iγ(63.9γ)/I(K x-ray)=0.025 *5* (1978Bo32).
67.75 *5*	1.1 *1*	214.56	7/2(−)	146.80	5/2(+)				
84.8 *1*	2.5 *2*	231.63	(7/2+)	146.80	5/2(+)				
92.92 *3*	47 *1*	123.52	(3/2+)	30.59	(3/2+)	M1+E2	0.35 *5*		E_γ: other: 92.7 *6* (1975Ar31). I_γ: other: 51 *5* (1975Ar31). Mult.: α(K)exp=0.85 *4*; K/L=4.6 *4*.
94.57 *3*	100	94.57	5/2(+)	0.0	1/2(+)	E2		2.28	E_γ: other: 94.5 *6* (1975Ar31). I_γ: other: 100 (1975Ar31). Mult.: E2 from Adopted Gammas, based on ce data in ^{123}Cs IT decay; E2(+M1) proposed in 2000Gi12 based on α(K)exp=1.2 *1* and K/L=3 *1*.
96.46 *6*	11.3 *3*	328.09	(9/2+)	231.63	(7/2+)	M1		0.998	Mult.: α(K)exp=0.66 *8*; K/L>5.
108.1 *1*	0.7 *1*	231.63	(7/2+)	123.52	(3/2+)	E2		1.416	Mult.: α(K)exp=1.1 *2*.
116.2 *1*	43.5 *5*	146.80	5/2(+)	30.59	(3/2+)	M1+E2	0.77 *+40−23*		E_γ: other: 116.1 *6* (1975Ar31). I_γ: other: 54 *8* (1975Ar31). Mult.: α(K)exp=0.65 *7*; K/L=4.6 *8*.
120.0 *1*	20 *1*	214.56	7/2(−)	94.57	5/2(+)	E1		0.1320	E_γ: other: 120.0 *6* (1975Ar31). I_γ: other: 27 *4* (1975Ar31). Mult.: α(K)exp=0.11 *2*.
123.6 *1*	54.8 *5*	123.52	(3/2+)	0.0	1/2(+)	M1+E2	0.19 *+9−13*		E_γ: other: 123.5 *6* (1975Ar31). I_γ: other: 69 *6* (1975Ar31). Mult.: α(K)exp=0.41 *2*; K/L=6.8 *5*.
137.0 *1*	20.5 *5*	231.63	(7/2+)	94.57	5/2(+)	M1(+E2)	−0.04 *10*		E_γ: other: 137.0 *6* (1975Ar31). I_γ: other: 23 *7* (1975Ar31). Mult.: α(K)exp=0.35 *5*; K/L=8 *2*.

γ(^{123}Cs) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult. @	δ &	α a	Comments
									δ: from Adopted Gammas. Other: δ<0.6 from ce data in 2000Gi12.
146.8 *1*	7.3 *2*	146.80	5/2(+)	0.0	1/2(+)	E2		0.483	Mult.: α(K)exp=0.32 *3*; K/L=3.6 *5*.
201.0 *1*	53 *3*	231.63	(7/2+)	30.59	(3/2+)	E2		0.1636	Mult.: α(K)exp=0.13 1; K/L=4.7 2.
231.7 *2*	1.8 *2*	699.12	(5/2+,7/2+,9/2+)	467.57	(3/2+,5/2+,7/2+)				
233.5 *2*	3.5 *5*	328.09	(9/2+)	94.57	5/2(+)				
236.0 *2*	3.2 *2*	467.57	(3/2+,5/2+,7/2+)	231.63	(7/2+)	M1,E2			Mult.: α(K)exp=0.067 *15*.
260.3 *1*	6.5 *5*	474.88	3/2(−)	214.56	7/2(−)	E2		0.0689	Mult.: α(K)exp=0.063 *10*; K/L=5 *1*.
262.0 *2*	2.5 *5*	494.05	(3/2+,5/2+)	231.63	(7/2+)				
309.5 *3*	2.1 *2*	784.37	(3/2−,5/2−,7/2−)	474.88	3/2(−)				
336.2 *3*	1.7 *2*	811.17	(3/2+,5/2+)	474.88	3/2(−)				
347.3 *2*	10.1 *8*	494.05	(3/2+,5/2+)	146.80	5/2(+)	M1+E2	>0.2		Mult.: α(K)exp=0.036 *6*; K/L=6 *1*.
351.3 *3*	0.7 *1*	474.88	3/2(−)	123.52	(3/2+)				
370.6 *2*	35 *2*	494.05	(3/2+,5/2+)	123.52	(3/2+)	M1		0.0257	Mult.: α(K)exp=0.029 *5*; K/L>8.
373.1 *2*	18.5 *5*	467.57	(3/2+,5/2+,7/2+)	94.57	5/2(+)	M1(+E2)	<1.2		Mult.: α(K)exp=0.025 *4*.
380.3 *5*	1.3 *5*	474.88	3/2(−)	94.57	5/2(+)				
389.0 *5*	1.3 *2*	620.90	(5/2+)	231.63	(7/2+)	M1		0.0228	Mult.: α(K)exp=0.030 *10*.
399.6 *2*	7.1 *1*	494.05	(3/2+,5/2+)	94.57	5/2(+)	M1,E2			Mult.: α(K)exp=0.020 *5*; K/L=8 *2*.
401.3 *2*	2.0 *2*	524.69	(1/2+,3/2+,5/2+)	123.52	(3/2+)	M1			Mult.: α(K)exp=0.026 *10*; M1+E2 proposed in 2000Gi12.
410.8 *2*	13.6 *2*	557.51	(1/2+,3/2+,5/2+)	146.80	5/2(+)	M1,E2			Mult.: α(K)exp=0.016 *2*; K/L=8 *2*.
428.3 *3*	2.0 *5*	1048.75	(3/2+,5/2+)	620.90	(5/2+)	M1,E2			Mult.: α(K)exp=0.021 *10*.
441.5 *4*	2.6 *5*	588.52	(+)	146.80	5/2(+)				
444.5 *4*	3.0 *3*	474.88	3/2(−)	30.59	(3/2+)	(E1)		0.00408	Mult.: α(K)exp<0.01.
463.7 *2*	6.3 *3*	494.05	(3/2+,5/2+)	30.59	(3/2+)	M1,E2			Mult.: α(K)exp=0.011 *3*.
467.5 *5*	2.2 *3*	699.12	(5/2+,7/2+,9/2+)	231.63	(7/2+)				
474.8 *5*	1.6 *2*	620.90	(5/2+)	146.80	5/2(+)				
484.2 *3*	6 *1*	699.12	(5/2+,7/2+,9/2+)	214.56	7/2(−)	E1		0.00334	Mult.: α(K)exp=0.004 *2*.
494.0 b *2*	38.8 b *5*	494.05	(3/2+,5/2+)	0.0	1/2(+)	M1,E2			Mult.: α(K)exp=0.0085 *6*; K/L=8 *2* for a doublet.
494.0 b *2*	38.8 b *5*	588.52	(+)	94.57	5/2(+)	M1,E2			Mult.: α(K)exp=0.0085 *6*; K/L=8 *2* for a doublet.
497.4 *2*	16 *2*	620.90	(5/2+)	123.52	(3/2+)	M1,E2		0.0109 *14*	Mult.: α(K)exp=0.008 *2*; K/L=6 *2*.
524.4 *3*	5.8 *5*	524.69	(1/2+,3/2+,5/2+)	0.0	1/2(+)	M1,E2			Mult.: α(K)exp=0.006 *2*.
526.5 b *5*	9.0 b *5*	557.51	(1/2+,3/2+,5/2+)	30.59	(3/2+)	M1,E2			Mult.: α(K)exp=0.007 *2* for a doublet.
526.5 b *5*	9.0 b *5*	620.90	(5/2+)	94.57	5/2(+)	M1,E2			Mult.: α(K)exp=0.007 *2* for a doublet.
541.6 *3*	6.0 *5*	869.7	(5/2+,7/2+,9/2+)	328.09	(9/2+)	M1,E2			Mult.: α(K)exp=0.008 *2*.
546.8 *3*	8.9 *5*	1021.68	(3/2−)	474.88	3/2(−)	M1,E2			Mult.: α(K)exp=0.009 *3*.
557.4 *5*	1.5 *3*	557.51	(1/2+,3/2+,5/2+)	0.0	1/2(+)				
569.8 *3*	6.0 *5*	784.37	(3/2−,5/2−,7/2−)	214.56	7/2(−)	M1,E2			Mult.: α(K)exp=0.006 *2*.
590.4 *3*	9.2 *5*	620.90	(5/2+)	30.59	(3/2+)	M1,E2			Mult.: α(K)exp=0.008 *2*; K/L=6 *2*.
602.8 *5*	4.2 *5*	749.64	(1/2+,3/2+,5/2+)	146.80	5/2(+)				

γ(^{123}Cs) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult.@	δ&	α[a]	Comments
621.0 *3*	3.0 *3*	620.90	(5/2$^+$)	0.0	1/2$^{(+)}$	(E2)		0.00528	Mult.: M1,E2 from α(K)exp=0.005 *2* in 2000Gi12; (E2) is assumed from level scheme.
626.3 *3*	3.0 *5*	749.64	(1/2$^+$,3/2$^+$,5/2$^+$)	123.52	(3/2$^+$)				
633.5 *5*	2.5 *5*	728.0	(1/2 to 7/2)$^{(+)}$	94.57	5/2$^{(+)}$				
635.1 *4*	10.0 *5*	866.46	(3/2$^+$,5/2$^+$)	231.63	(7/2$^+$)				
664.5 *5*	1.0 *5*	811.17	(3/2$^+$,5/2$^+$)	146.80	5/2$^{(+)}$				
670.6 *3*	7.3 *5*	817.15	(3/2$^+$,5/2$^+$)	146.80	5/2$^{(+)}$	M1+E2	<2.0		Mult.: α(K)exp=0.005 *1*.
673.8 *5*	≈0.5	905.43	(3/2$^+$,5/2$^+$)	231.63	(7/2$^+$)				
688.1 *5*	2.5 *3*	811.17	(3/2$^+$,5/2$^+$)	123.52	(3/2$^+$)				
697.3 *5*	≈0.5	728.0	(1/2 to 7/2)$^{(+)}$	30.59	(3/2$^+$)				
716.6 *3*	16.1 *5*	811.17	(3/2$^+$,5/2$^+$)	94.57	5/2$^{(+)}$	M1+E2			Mult.: α(K)exp=0.0045 *6*; K/L≈7.
718.8[b] *3*	22.5[b] *5*	749.64	(1/2$^+$,3/2$^+$,5/2$^+$)	30.59	(3/2$^+$)	M1(+E2)			Mult.: α(K)exp=0.0048 *6*; K/L≈8 for a doublet.
718.8[b] *3*	22.5[b] *5*	866.46	(3/2$^+$,5/2$^+$)	146.80	5/2$^{(+)}$	M1(+E2)			Mult.: α(K)exp=0.0048 *6*; K/L≈8 for a doublet.
723.1 *5*	≈0.5	869.7	(5/2$^+$,7/2$^+$,9/2$^+$)	146.80	5/2$^{(+)}$				
749.7 *3*	5.0 *5*	749.64	(1/2$^+$,3/2$^+$,5/2$^+$)	0.0	1/2$^{(+)}$				
757.8 *3*	2.1 *2*	905.43	(3/2$^+$,5/2$^+$)	146.80	5/2$^{(+)}$				
771.8 *4*	1.0 *3*	866.46	(3/2$^+$,5/2$^+$)	94.57	5/2$^{(+)}$				
780.8 *3*	6 *1*	811.17	(3/2$^+$,5/2$^+$)	30.59	(3/2$^+$)				
782.4 *3*	3.0 *3*	905.43	(3/2$^+$,5/2$^+$)	123.52	(3/2$^+$)				
786.8 *5*	0.9 *2*	817.15	(3/2$^+$,5/2$^+$)	30.59	(3/2$^+$)				
807.1 *3*	2.5 *1*	1021.68	(3/2$^-$)	214.56	7/2$^{(-)}$				
811.0[b] *2*	7.5[b] *2*	811.17	(3/2$^+$,5/2$^+$)	0.0	1/2$^{(+)}$				
811.0[b] *2*	7.5[b] *2*	905.43	(3/2$^+$,5/2$^+$)	94.57	5/2$^{(+)}$				
816.8[b] *3*	2.0[b] *2*	817.15	(3/2$^+$,5/2$^+$)	0.0	1/2$^{(+)}$				
816.8[b] *3*	2.0[b] *2*	1048.75	(3/2$^+$,5/2$^+$)	231.63	(7/2$^+$)				
836.2 *2*	2.0 *2*	866.46	(3/2$^+$,5/2$^+$)	30.59	(3/2$^+$)				
866.5 *5*	2.0 *5*	866.46	(3/2$^+$,5/2$^+$)	0.0	1/2$^{(+)}$				
874.8 *5*	1.3 *5*	905.43	(3/2$^+$,5/2$^+$)	30.59	(3/2$^+$)				
[x]894.8 *3*	3.0 *5*								
898.0 *3*	2.7 *5*	1021.68	(3/2$^-$)	123.52	(3/2$^+$)				
905.5 *5*	1.0 *3*	905.43	(3/2$^+$,5/2$^+$)	0.0	1/2$^{(+)}$				
[x]932.3 *5*	1.7 *4*								
[x]956.0 *5*	2.9 *3*								
991.3 *4*	3.4 *3*	1021.68	(3/2$^-$)	30.59	(3/2$^+$)				
1017.0 *10*	0.7 *2*	1048.75	(3/2$^+$,5/2$^+$)	30.59	(3/2$^+$)				
1021.9 *6*	1.8 *3*	1021.68	(3/2$^-$)	0.0	1/2$^{(+)}$				
1048.5 *10*	1.2 *3*	1048.75	(3/2$^+$,5/2$^+$)	0.0	1/2$^{(+)}$				

$\gamma(^{123}Cs)$ (continued)

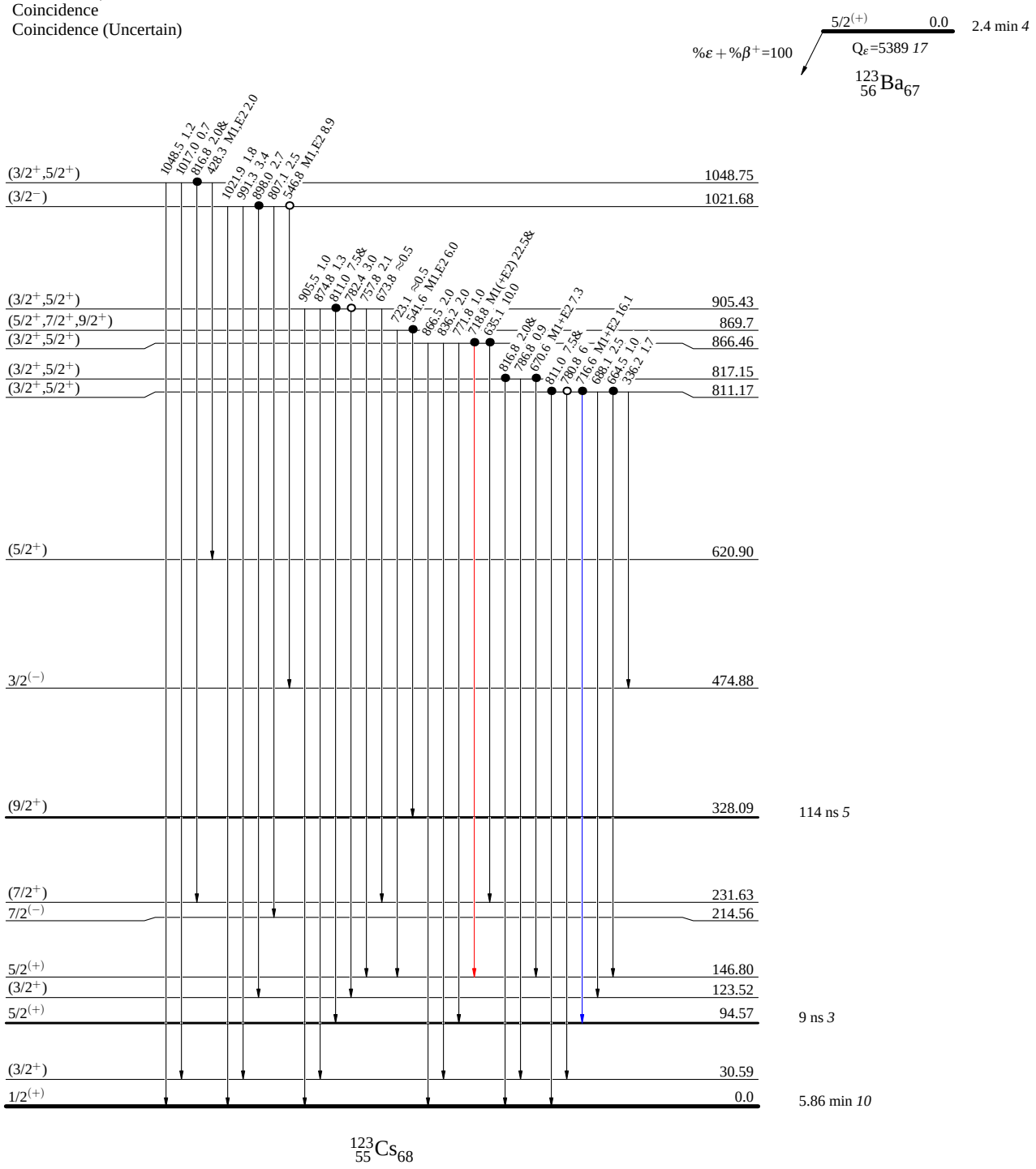
† From 2000Gi12, unless otherwise noted.
‡ Observed only in x-γ-coin and (x ray)-ce-coin; intensity is weak (2000Gi12).
# Weak.
@ From ce data (given in comments) in 2000Gi12 , unless otherwise noted. The same assignments are adopted in Adopted Gammas. Some M1+E2 assignments are changed to M1,E2 (by the evaluator) when experimental conversion coefficients overlap with theoretical values of both M1 and E2.
& Deduced by the evaluator from ce data in ^{123}Ba ε decay (2000Gi12) using the BrIccMixing code, unless otherwise noted. The same values are adopted in Adopted Gammas.
a Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
b Multiply placed with undivided intensity.
x γ ray not placed in level scheme.

^{123}Ba ε decay 2000Gi12

Decay Scheme

Intensities: Relative I_γ
& Multiply placed: undivided intensity given

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
Coincidence
Coincidence (Uncertain)

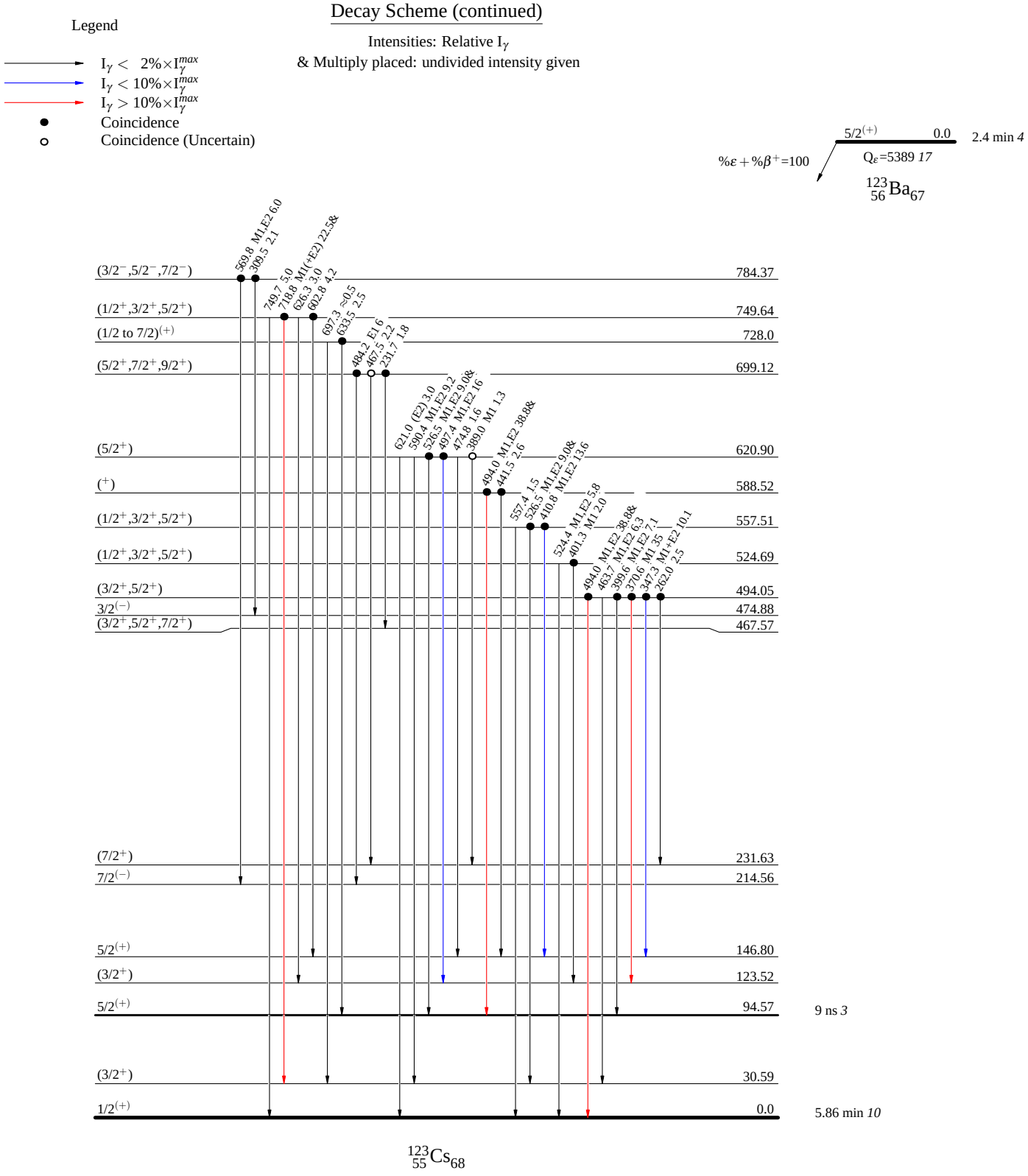


$^{123}_{55}Cs_{68}$

^{123}Ba ε decay 2000Gi12

Decay Scheme (continued)

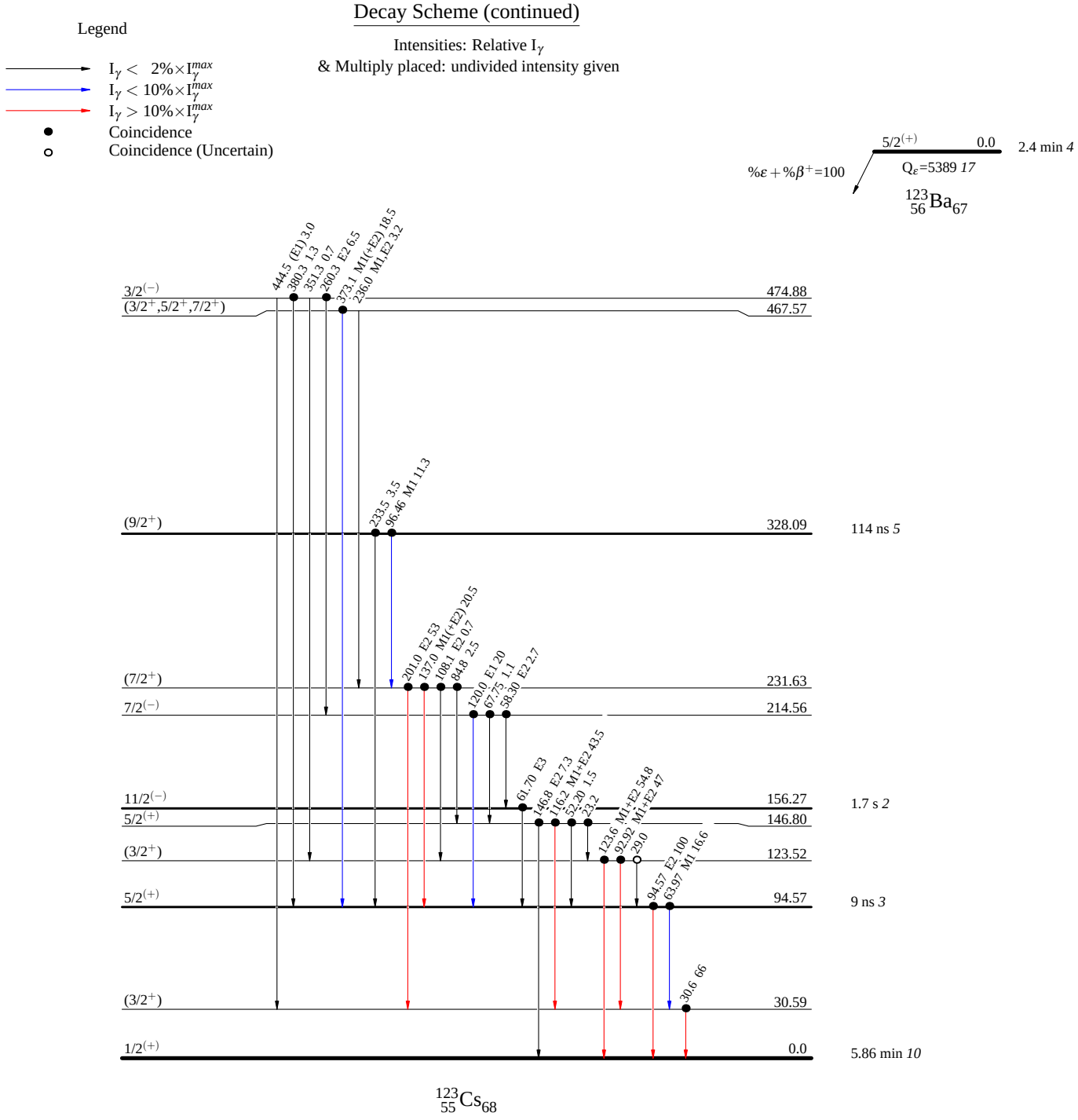
Intensities: Relative I_γ
& Multiply placed: undivided intensity given



^{123}Ba ε decay 2000Gi12

Decay Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given



^{123}Cs IT decay 1981Ma01

Parent: ^{123}Cs: E=156.30 *23*; $J^{\pi}=11/2^{(-)}$; $T_{1/2}=1.7$ s *2*; %IT decay=100

1981Ma01: ^{123}Cs isotopes were produced via ^{139}La(p,3p14n) with E=600 MeV proton provided by the CERN synchro-cyclotron and separated by the ISOLDE separator. Separated ions were implanted into a aluminum-coated mylar tape. γ rays were detected with Ge(Li) detectors and conversion electrons were detected with a Si(Li) detector. Measured Eγ, Iγ, $\gamma\gamma$-coin, γ(t), E(ce), I(ce), γ-ce-coin. Deduced levels, $T_{1/2}$, conversion coefficients, γ-ray multipolarities. Comparisons with theoretical calculations.

1972Dr06: ^{123}Cs isotopes were produced via ^{115}In(^{12}C,4n) and ^{109}Ag(^{18}O,4n) reactions with ^{12}C and ^{18}O beams provided by the U-300 heavy-ion cyclotron at the Joint Institute for Nuclear Research at Dubna. γ rays were detected with a Ge(Li) and a NaI(Tl) spectrometers and conversion electrons were detected with a magnetic β-ray spectrometer. Measured Eγ, Iγ, E(ce), I(ce), excitation functions. Deduced levels, conversion coefficients, γ-ray multipolarities.

^{123}Cs Levels

E(level)†	J^{π}‡	$T_{1/2}$‡	Comments
0.0	$1/2^{(+)}$	5.86 min *10*	
30.60 *14*	$(3/2^{+})$		
94.60 *10*	$5/2^{(+)}$		
156.30 *23*	$11/2^{(-)}$	1.7 s *2*	$T_{1/2}$: adopted value from weighted average of 1.7 s *2* (1981Ma01) and 1.6 s *2* (1972Dr06).

† From a least-squares fit to γ-ray energies.
‡ From Adopted Levels.

γ(^{123}Cs)

Iγ normalization: From I(γ+ce)(61.7γ)=100.
I(K x ray)=1300 *200*, relative to I(94.6γ)=1000 (1981Ma01).

E_{γ}†	I_{γ}†#	E_i(level)	J_i^{π}	E_f	J_f^{π}	Mult.‡	α@	$I_{(\gamma+ce)}$#	Comments
(30.6)		30.60	$(3/2^{+})$	0.0	$1/2^{(+)}$			6.4×10^{2} *9*	E_{γ}: transition not observed, but expected from proposed decay scheme (1981Ma01). $I_{(\gamma+ce)}$: from intensity balance.
61.7 *2*	12 *2*	156.30	$11/2^{(-)}$	94.60	$5/2^{(+)}$	E3	289 *7*		Mult.: α(K)exp=30 *10*, α(L)exp=260 *60*, α(M)exp=87 *40* (1981Ma01).
64.0 *1*	150 *20*	94.60	$5/2^{(+)}$	30.60	$(3/2^{+})$	M1	3.25 *5*		E_{γ}: other: 63 (1972Dr06). I_{γ}: other: 345 *+182−88* from I(95γ/62γ)=2.9 *10* (1972Dr06) seems discrepant. Mult.: D or M1+E2 ($\delta\leq0.47$) from α(L)exp<1.5 and intensity balance (1981Ma01). I(ce(L))(64γ)/I(ce(K))(95γ)=1.6 *5* (1972Dr06).
94.6 *1*	1000	94.60	$5/2^{(+)}$	0.0	$1/2^{(+)}$	E2	2.274 *33*		E_{γ}: other: 95.5 (1972Dr06). Mult.: E2 from α(K)exp=1.4 *5*, α(L)exp=0.6 *1*, α(M)exp=0.16 *6* (1981Ma01), and K/L=2.5 *10* (1972Dr06). I(K x ray)/I(95γ)=2.5 *6* (1972Dr06), 1.3 *2* (1981Ma01).

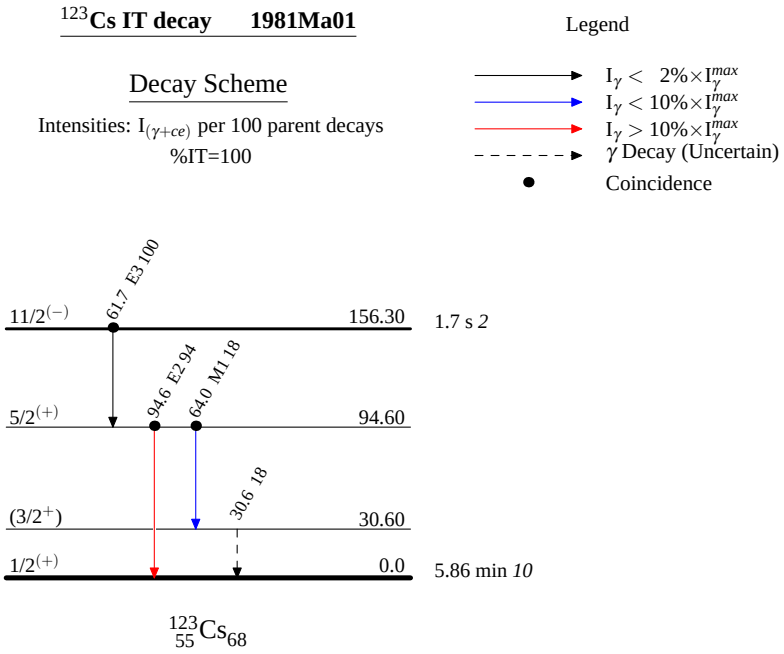
† From 1981Ma01, unless otherwise noted.

Continued on next page (footnotes at end of table)

^{123}Cs IT decay 1981Ma01 (continued)

$\gamma(^{123}Cs)$ (continued)

‡ From Adopted Gammas. Supporting arguments or assignments (if different) from ce data in this study are given under comments.
# For absolute intensity per 100 decays, multiply by 0.0287 *48*.
@ Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.



^{64}Ni(^{64}Ni,p4nγ) 2004Si27

2004Si27: E=265 MeV ^{64}Ni beam was produced from the 88-inch cyclotron at LBNL. Target was a thin foil of 0.476 mg/cm^2 ^{64}Ni (96.5% enriched). γ rays were detected with the Gammasphere spectrometer array, consisting of 100 Compton-suppressed Ge detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma$(DCO). Deduced levels, J, π, band structures, configurations, γ-ray multipolarities. Comparisons with cranked Nilsson-Strutinsky calculations for high-spin states.

^{123}Cs Levels

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$[#]	Comments
0.0	1/2$^+$		
30.6 *8*	3/2$^+$		
94.6 *8*	5/2$^+$		
156.3[&] *10*	11/2$^-$	1.7 s *2*	
231.6[h] *9*	7/2$^+$		
328.1[f] *10*	9/2$^+$	114 ns *5*	E(level): 2004Si26 in ^{100}Mo(^{28}Si,4npγ) and 2004Si27 in ^{64}Ni(^{64}Ni,4npγ) propose the 328-keV level (proposed as a separate level by 2000Gi12 in ^{123}Ba ε decay) to be the isomeric (9/2$^+$) bandhead (proposed at 231.7+x by 2000Gi12), based on the intensity balance of the feeding and de-exciting γ transitions (96.5γ and 233.5γ de-exciting the 328-keV level are seen in 2004Si26 with a thick target but not seen in 2004Si27 with a thin target due to ^{123} Cs nuclei recoiling into vacuum after reaction and decaying out of the detectors, supporting the 328-keV level being an isomer).
476.7[&] *10*	15/2$^-$		
596.9[g] *10*	11/2$^+$		
659.6[h] *9*	11/2$^+$		
900.4[f] *10*	13/2$^+$		
999.0[&] *10*	19/2$^-$		
1159.4[@] *10*	17/2$^-$		
1237.1[g] *10*	15/2$^+$		
1260.0[h] *10*	15/2$^+$		
1592.9[a] *11*	19/2$^-$		
1604.9[f] *10*	17/2$^+$		
1684.5[&] *10*	23/2$^-$		
1729.4[@] *10*	21/2$^-$		
1994.6[g] *10*	19/2$^+$		
2003.5[h] *10*	19/2$^+$		
2195.9[a] *11*	23/2$^-$		
2219.4 *11*	19/2$^+$		
2410.4[f] *10*	21/2$^+$		
2436.3[@] *10*	25/2$^-$		
2485.0[&] *10*	27/2$^-$		
2706.1 *10*	23/2$^+$		
2821.2[g] *10*	23/2$^+$		
2843.1[h] *10*	23/2$^+$		
2916.9[a] *11*	27/2$^-$		
2973.1[b] *10*	25/2$^{(+)}$		
3045.4 *10*	25/2$^{(+)}$		
3227.0[@] *10*	29/2$^-$		
3304.6[c] *10*	27/2$^{(+)}$		
3329.6[d] *10*	27/2$^+$		
3353.3[&] *10*	31/2$^-$		
3617.8[b] *10*	29/2$^{(+)}$		

Continued on next page (footnotes at end of table)

^{64}Ni(^{64}Ni,p4nγ) 2004Si27 (continued)

^{123}Cs Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	Comments
3728.4[a] *11*	31/2$^-$	
3994.9[c] *10*	31/2$^{(+)}$	
4045.2[d] *11*	31/2$^+$	
4055.2[@] *11*	33/2$^-$	
4258.2[&] *11*	35/2$^-$	
4407.9[b] *11*	33/2$^{(+)}$	
4620.4[a] *13*	35/2$^-$	
4833.6[c] *11*	35/2$^{(+)}$	
4863.0[d] *11*	35/2$^+$	
4933.8[@] *11*	37/2$^-$	
5214.0[&] *11*	39/2$^-$	
5246.4 *12*		
5333.9[b] *11*	37/2$^{(+)}$	
5596.5[a] *14*	39/2$^-$	
5751.4[d] *11*	39/2$^+$	
5792.5[c] *12*	39/2$^{(+)}$	
5905.7[@] *11*	41/2$^-$	
6239.9[&] *11*	43/2$^-$	
6296.8 *14*		
6670.3[d] *12*	43/2$^+$	
6678.4[a] *15*	43/2$^-$	
6981.5[@] *11*	45/2$^-$	
7352.8[&] *11*	47/2$^-$	
7413.8 *12*		
7646.6[d] *13*	47/2$^+$	
7837.1[a] *17*	47/2$^-$	
8159.6[@] *12*	49/2$^-$	
8559.6[&] *12*	51/2$^-$	
8699.5[d] *14*	51/2$^+$	
9436.2[@] *12*	53/2$^-$	
9862.7[&] *12*	55/2$^-$	
9887.8[d] *15*	55/2$^+$	
10773.2[@] *13*	57/2$^-$	
11020.6[e] *16*	59/2$^+$	
11213.2[d] *16*	59/2$^+$	
11233.7 *13*	59/2$^-$	
11253.0[&] *13*	59/2$^-$	
11271.2? *13*	(59/2$^-$)	E(level): the level is at 11271 or 11795 depending on the ordering of the 1022-498 cascade.
11916.9 *14*	61/2$^{(-)}$	
12293.5 *13*	63/2$^-$	
12431.3[&] *14*	63/2$^-$	
12469.0[e] *18*	63/2$^+$	
12609.1[d] *18*	63/2$^+$	
13164.6[e] *19*	67/2$^+$	
13534.0[&] *14*	67/2$^-$	
13869.6[e] *20*	(71/2$^+$)	
14955.7[&] *15*	71/2$^-$	

Continued on next page (footnotes at end of table)

^{64}Ni(^{64}Ni,p4nγ) 2004Si27 (continued)

^{123}Cs Levels (continued)

† From least-squares fit γ-ray energies.
‡ Proposed by 2004Si27 based on measured $\gamma\gamma$(DCO) and band assignments.
# From Adopted Levels.
@ Band(A): $17/2^-$ band, α=+1/2. $\pi h_{11/2}$ at low spins; $\pi h_{11/2}\otimes\nu h^6_{11/2}$ at high spins. See also 2004Si27 for detailed discussion of configurations at high spins.
& Band(a): $11/2^-$ band, α=−1/2. See comment for α=+1/2 signature partner.
a Band(B): $19/2^-$ band.
b Band(C): $25/2^{(+)}$ band, α=+1/2. $\pi g^{-1}_{9/2}\otimes\nu h^2_{11/2}$ is most favored although $\pi(g^{-1}_{9/2}h^1_{11/2})\otimes\nu h^1_{11/2}$ is not ruled out.
c Band(c): $27/2^{(+)}$ band, α=−1/2. See comment for α=+1/2 signature partner.
d Band(D): $27/2^+$ band, α=−1/2. See 2004Si27 detailed discussion of configurations.
e Band(d): $59/2^+$ band, α=−1/2. Forking of $27/2^+$ band at $55/2^+$.
f Band(E): $9/2^+$ band, α=+1/2. $\pi g^{-1}_{9/2}$.
g Band(e): $11/2^+$ band, α=−1/2. $\pi g^{-1}_{9/2}$.
h Band(F): $\pi g_{7/2}$ based on $7/2^+$, α=−1/2.

γ(^{123}Cs)

R(DCO)=I($\gamma_2^{35^\circ}$, gated on $\gamma_1^{90^\circ}$)/I($\gamma_2^{90^\circ}$, gated on $\gamma_1^{35^\circ}$) (2004Si27).
All DCO values correspond to gates on ΔJ=2, quadrupole transitions. Typical values of the DCO ratio are 1.0 and 0.5 for ΔJ=2, stretched quadrupole and ΔJ=1, dipole transitions, respectively (2004Si27).

E_γ †	I_γ &	E_i(level)	J^π_i	E_f	J^π_f	Mult. b	Comments
30.6‡		30.6	$3/2^+$	0.0	$1/2^+$		
61.7‡		156.3	$11/2^-$	94.6	$5/2^+$	[E3]	
64.0‡		94.6	$5/2^+$	30.6	$3/2^+$		
94.6‡		94.6	$5/2^+$	0.0	$1/2^+$		
96.5‡#		328.1	$9/2^+$	231.6	$7/2^+$		
137.0‡		231.6	$7/2^+$	94.6	$5/2^+$		
201.0‡		231.6	$7/2^+$	30.6	$3/2^+$		
224.2 *4*	3.2 *5*	3045.4	$25/2^{(+)}$	2821.2	$23/2^+$	M1c	DCO=0.53 *9*
233.5‡#		328.1	$9/2^+$	94.6	$5/2^+$		
259.2 *6*	2.4 *4*	3304.6	$27/2^{(+)}$	3045.4	$25/2^{(+)}$	M1	DCO=0.62 *6*
268.8 *2*	21.8 *17*	596.9	$11/2^+$	328.1	$9/2^+$	M1	DCO=0.75 *9*
280.3 *6*	0.8 *2*	5214.0	$39/2^-$	4933.8	$37/2^-$		
284.2 *6*	2.2 *3*	3329.6	$27/2^+$	3045.4	$25/2^{(+)}$	M1	DCO=0.52 *7*
288.2 *6*	0.9 *2*	3617.8	$29/2^{(+)}$	3329.6	$27/2^+$		
303.5 *2*	15.0 *13*	900.4	$13/2^+$	596.9	$11/2^+$	M1c	DCO=0.62 *7*
313.2 *4*	4.3 *5*	3617.8	$29/2^{(+)}$	3304.6	$27/2^{(+)}$	M1	DCO=0.60 *6*
320.4 *2*	100.0	476.7	$15/2^-$	156.3	$11/2^-$	E2	DCO=0.93 *5*
331.6 *6*	2.6 *4*	3304.6	$27/2^{(+)}$	2973.1	$25/2^{(+)}$		
334.2 *6*	0.3 *1*	6239.9	$43/2^-$	5905.7	$41/2^-$		
336.7 *2*	13.3 *10*	1237.1	$15/2^+$	900.4	$13/2^+$	M1c	DCO=0.69 *12*
356.5 *6*	0.4 *1*	3329.6	$27/2^+$	2973.1	$25/2^{(+)}$	M1c	DCO=0.57 *7*
367.8 *4*	8.5 *8*	1604.9	$17/2^+$	1237.1	$15/2^+$		
371.3 *6*	0.2 *1*	7352.8	$47/2^-$	6981.5	$45/2^-$		
377.1 *4*	4.6 *4*	3994.9	$31/2^{(+)}$	3617.8	$29/2^{(+)}$	M1	DCO=0.66 *5*
389.7 *4*	4.0 *4*	1994.6	$19/2^+$	1604.9	$17/2^+$		

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^{64}Ni(^{64}Ni,p4nγ) 2004Si27 (continued)

$\gamma(^{123}Cs)$ (continued)

E_γ[†]	I_γ[&]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[b]	Comments
398.6 *4*	3.4 *3*	2003.5	19/2$^+$	1604.9	17/2$^+$		
400.0 *6*	0.2 *1*	8559.6	51/2$^-$	8159.6	49/2$^-$		
406.9 *6*	1.2 *2*	2410.4	21/2$^+$	2003.5	19/2$^+$		
410.8 *6*	2.7 *3*	2821.2	23/2$^+$	2410.4	21/2$^+$		
413.0 *6*	2.1 *3*	4407.9	33/2$^{(+)}$	3994.9	31/2$^{(+)}$	M1	DCO=0.64 *7*
415.8 *6*	1.2 *2*	2410.4	21/2$^+$	1994.6	19/2$^+$		
425.6 *6*	1.6 *3*	4833.6	35/2$^{(+)}$	4407.9	33/2$^{(+)}$	M1	DCO=0.62 *8*
426.5 *6*	0.2 *1*	9862.7	55/2$^-$	9436.2	53/2$^-$		
428.0 *2*	16.0 *15*	659.6	11/2$^+$	231.6	7/2$^+$		
432.7 *6*	1.0 *2*	2843.1	23/2$^+$	2410.4	21/2$^+$		
433.5 *4*	3.3 *5*	1592.9	19/2$^-$	1159.4	17/2$^-$	M1	DCO=0.76 *6*
458.5 *6*	0.6 *2*	5792.5	39/2$^{(+)}$	5333.9	37/2$^{(+)}$		
466.5 *6*	0.4 *1*	2195.9	23/2$^-$	1729.4	21/2$^-$		
483.4 *6*	1.4 *3*	3304.6	27/2$^{(+)}$	2821.2	23/2$^+$		
486.7 *6*	1.8 *4*	2706.1	23/2$^+$	2219.4	19/2$^+$	E2	DCO=0.90 *11*
498.0[@] *6*	0.5 *1*	11271.2?	(59/2$^-$)	10773.2	57/2$^-$	M1+E2[c]	DCO=0.98 *15*
500.4 *6*	1.2 *3*	5333.9	37/2$^{(+)}$	4833.6	35/2$^{(+)}$		
508.4 *6*	0.7 *2*	3329.6	27/2$^+$	2821.2	23/2$^+$		
522.3 *2*	79 *3*	999.0	19/2$^-$	476.7	15/2$^-$	E2	DCO=0.95 *10*
570.0 *6*	3.0 *5*	1729.4	21/2$^-$	1159.4	17/2$^-$		
572.3 *4*	3.9 *6*	900.4	13/2$^+$	328.1	9/2$^+$		
598.5 *6*	3.0 *6*	3304.6	27/2$^{(+)}$	2706.1	23/2$^+$	E2	DCO=1.16 *13*
600.4 *2*	11.0 *3*	1260.0	15/2$^+$	659.6	11/2$^+$		
603.0 *6*	1.7 *3*	2195.9	23/2$^-$	1592.9	19/2$^-$		
623.5 *6*	2.9 *4*	3329.6	27/2$^+$	2706.1	23/2$^+$	E2	DCO=0.99 *9*
640.2 *4*	6.8 *11*	1237.1	15/2$^+$	596.9	11/2$^+$		
644.7 *4*	4.8 *5*	3617.8	29/2$^{(+)}$	2973.1	25/2$^{(+)}$	E2	DCO=0.99 *10*
663.9 *6*	0.5 *1*	11916.9	61/2$^{(-)}$	11253.0	59/2$^-$	M1[c]	DCO=0.77 *10*
675.5 *6*	2.8 *4*	4933.8	37/2$^-$	4258.2	35/2$^-$	M1[c]	DCO=0.56 *6*
682.7 *4*	4.5 *6*	1159.4	17/2$^-$	476.7	15/2$^-$		
685.5 *2*	62.8 *25*	1684.5	23/2$^-$	999.0	19/2$^-$	E2	DCO=0.98 *10*
690.3 *4*	3.4 *4*	3994.9	31/2$^{(+)}$	3304.6	27/2$^{(+)}$		
691.7 *6*	1.9 *3*	5905.7	41/2$^-$	5214.0	39/2$^-$		
695.6 *6*	0.5 *1*	13164.6	67/2$^+$	12469.0	63/2$^+$	E2[c]	DCO=1.59 *25*
701.9 *4*	3.7 *5*	4055.2	33/2$^-$	3353.3	31/2$^-$	M1	DCO=0.58 *6*
704.5 *4*	5.6 *7*	1604.9	17/2$^+$	900.4	13/2$^+$		
705.0 *6*	0.4 *1*	13869.6	(71/2$^+$)	13164.6	67/2$^+$	E2[c]	DCO=1.4 *3*
706.9 *4*	3.3 *4*	2436.3	25/2$^-$	1729.4	21/2$^-$	E2	DCO=1.28 *22*
711.6 *6*	0.8 *2*	2706.1	23/2$^+$	1994.6	19/2$^+$		
715.6 *4*	6.6 *10*	4045.2	31/2$^+$	3329.6	27/2$^+$	E2	DCO=0.96 *6*
721.0 *6*	1.0 *2*	2916.9	27/2$^-$	2195.9	23/2$^-$		
730.4 *4*	9.9 *8*	1729.4	21/2$^-$	999.0	19/2$^-$	M1	DCO=0.47 *7*
734.6 *4*	4.2 *8*	1994.6	19/2$^+$	1260.0	15/2$^+$		
740.6 *6*	1.1 *3*	4045.2	31/2$^+$	3304.6	27/2$^{(+)}$		
741.6 *6*	1.3 *3*	6981.5	45/2$^-$	6239.9	43/2$^-$		
742.0 *4*	5.7 *7*	3227.0	29/2$^-$	2485.0	27/2$^-$	M1	DCO=0.48 *9*
743.5 *4*	3.7 *7*	2003.5	19/2$^+$	1260.0	15/2$^+$		
751.8 *4*	6.4 *7*	2436.3	25/2$^-$	1684.5	23/2$^-$	M1	DCO=0.35 *6*
757.5 *4*	4.1 *5*	1994.6	19/2$^+$	1237.1	15/2$^+$		
766.5 *6*	1.9 *4*	2003.5	19/2$^+$	1237.1	15/2$^+$		
790.1 *6*	2.6 *4*	4407.9	33/2$^{(+)}$	3617.8	29/2$^{(+)}$	E2	DCO=1.00 *10*
790.7 *4*	4.0 *6*	3227.0	29/2$^-$	2436.3	25/2$^-$	E2	DCO=1.35 *15*
800.5 *2*	38.9 *18*	2485.0	27/2$^-$	1684.5	23/2$^-$	E2	DCO=1.03 *8*
805.5 *6*	2.0 *3*	2410.4	21/2$^+$	1604.9	17/2$^+$		

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^{64}Ni(^{64}Ni,p4nγ) 2004Si27 (continued)

γ(^{123}Cs) (continued)

E_γ [†]	I_γ [&]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [b]	Comments
806.7 *6*	0.6 *2*	8159.6	49/2$^-$	7352.8	47/2$^-$		
811.5 *6*	0.8 *2*	3728.4	31/2$^-$	2916.9	27/2$^-$		
817.7 *6*	[a]	2821.2	23/2$^+$	2003.5	19/2$^+$		
817.8 *4*	7.4 *9*	4863.0	35/2$^+$	4045.2	31/2$^+$	E2	DCO=1.12 *7*
826.6 *6*	3.0 *4*	2821.2	23/2$^+$	1994.6	19/2$^+$		
828.2 *6*	2.5 *4*	4055.2	33/2$^-$	3227.0	29/2$^-$	E2	DCO=1.15 *14*
838.6 *6*	2.5 *4*	4833.6	35/2$^{(+)}$	3994.9	31/2$^{(+)}$	E2	DCO=1.44 *21*
839.6 *6*	0.9 *2*	2843.1	23/2$^+$	2003.5	19/2$^+$		
848.6 *6*	1.6 *3*	2843.1	23/2$^+$	1994.6	19/2$^+$		
868.3 *2*	27.0 *14*	3353.3	31/2$^-$	2485.0	27/2$^-$	E2	DCO=1.10 *8*
876.7 *6*	0.6 *2*	9436.2	53/2$^-$	8559.6	51/2$^-$		
878.5 *6*	2.5 *4*	4933.8	37/2$^-$	4055.2	33/2$^-$	E2	DCO=1.13 *19*
888.4 *4*	5.7 *8*	5751.4	39/2$^+$	4863.0	35/2$^+$	E2	DCO=1.11 *9*
892.0 *6*	0.6 *2*	4620.4	35/2$^-$	3728.4	31/2$^-$		
904.9 *2*	19.7 *10*	4258.2	35/2$^-$	3353.3	31/2$^-$	E2	DCO=1.09 *8*
917.8 *6*	1.3 *3*	5751.4	39/2$^+$	4833.6	35/2$^{(+)}$		
918.9 *4*	4.1 *6*	6670.3	43/2$^+$	5751.4	39/2$^+$	E2	DCO=1.10 *10*
926.0 *6*	1.4 *3*	5333.9	37/2$^{(+)}$	4407.9	33/2$^{(+)}$		
955.8 *2*	14.5 *9*	5214.0	39/2$^-$	4258.2	35/2$^-$		DCO=0.95 *8*
958.9 *6*	1.8 *4*	5792.5	39/2$^{(+)}$	4833.6	35/2$^{(+)}$		
971.8 *6*	2.0 *4*	5905.7	41/2$^-$	4933.8	37/2$^-$	E2	DCO=1.4 *3*
976.0 *6*	0.5 *1*	5596.5	39/2$^-$	4620.4	35/2$^-$		
976.3 *4*	3.8 *5*	7646.6	47/2$^+$	6670.3	43/2$^+$	E2	DCO=0.94 *8*
976.7 *6*	[a]	2706.1	23/2$^+$	1729.4	21/2$^-$		
988.2 *6*	0.8 *2*	5246.4		4258.2	35/2$^-$		
1021.6 *6*	1.6 *4*	2706.1	23/2$^+$	1684.5	23/2$^-$	E1	DCO=1.02 *15*
1022.3[@] *6*	[a]	12293.5	63/2$^-$	11271.2?	(59/2$^-$)		
1025.9 *2*	10.4 *8*	6239.9	43/2$^-$	5214.0	39/2$^-$	E2	DCO=1.20 *10*
1040.5 *6*	0.5 *1*	12293.5	63/2$^-$	11253.0	59/2$^-$		
1050.4 *6*	0.5 *1*	6296.8		5246.4			
1052.9 *6*	2.7 *4*	8699.5	51/2$^+$	7646.6	47/2$^+$	E2	DCO=1.05 *9*
1059.8 *6*	0.7 *2*	12293.5	63/2$^-$	11233.7	59/2$^-$	E2[c]	DCO=1.42 *17*
1060.0 *6*	1.4 *3*	2219.4	19/2$^+$	1159.4	17/2$^-$		
1075.8 *6*	1.6 *4*	6981.5	45/2$^-$	5905.7	41/2$^-$	E2	DCO=0.95 *19*
1081.9 *6*	0.3 *1*	6678.4	43/2$^-$	5596.5	39/2$^-$		
1102.7 *6*	0.4 *1*	13534.0	67/2$^-$	12431.3	63/2$^-$		
1112.9 *4*	6.8 *6*	7352.8	47/2$^-$	6239.9	43/2$^-$	E2	DCO=1.03 *12*
1116.2 *6*	2.5 *5*	1592.9	19/2$^-$	476.7	15/2$^-$		
1117.0[d] *6*	<0.2	7413.8		6296.8			
1132.8 *4*	3.1 *5*	3617.8	29/2$^{(+)}$	2485.0	27/2$^-$	[c]	
1132.8 *6*	1.4 *3*	11020.6	59/2$^+$	9887.8	55/2$^+$	E2	DCO=1.42 *21*
1158.7 *6*	0.2 *1*	7837.1	47/2$^-$	6678.4	43/2$^-$		
1178.0 *6*	1.9 *4*	8159.6	49/2$^-$	6981.5	45/2$^-$	E2	DCO=1.18 *15*
1178.3 *6*	0.7 *2*	12431.3	63/2$^-$	11253.0	59/2$^-$		
1188.3 *6*	1.8 *3*	9887.8	55/2$^+$	8699.5	51/2$^+$	E2[c]	DCO=1.56 *22*
1196.9 *6*	1.1 *3*	2195.9	23/2$^-$	999.0	19/2$^-$		
1206.8 *4*	5.8 *5*	8559.6	51/2$^-$	7352.8	47/2$^-$	E2	DCO=1.13 *11*
1220.4 *6*	1.2 *3*	2219.4	19/2$^+$	999.0	19/2$^-$		
1232.4 *6*	0.7 *2*	2916.9	27/2$^-$	1684.5	23/2$^-$		
1240.5 *6*	0.8 *2*	13534.0	67/2$^-$	12293.5	63/2$^-$	E2[c]	DCO=1.61 *23*
1243.4 *6*	0.4 *1*	3728.4	31/2$^-$	2485.0	27/2$^-$		
1276.6 *6*	1.4 *3*	9436.2	53/2$^-$	8159.6	49/2$^-$	E2	DCO=1.2 *3*
1288.5 *4*	7.0 *9*	2973.1	25/2$^{(+)}$	1684.5	23/2$^-$	E1	DCO=0.63 *7*
1303.1 *4*	4.1 *4*	9862.7	55/2$^-$	8559.6	51/2$^-$	E2	DCO=1.10 *15*

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^{64}Ni(^{64}Ni,p4nγ) 2004Si27 (continued)

γ(^{123}Cs) (continued)

E_γ [†]	I_γ [&]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [b]	Comments
1325.4 *6*	0.9 *2*	11213.2	59/2$^+$	9887.8	55/2$^+$	E2	DCO=1.4 *3*
1337.0 *6*	0.8 *2*	10773.2	57/2$^-$	9436.2	53/2$^-$		
1360.9 *4*	4.9 *6*	3045.4	25/2$^{(+)}$	1684.5	23/2$^-$	E1	DCO=0.66 *8*
1371.0 *6*	2.2 *3*	11233.7	59/2$^-$	9862.7	55/2$^-$	E2	DCO=1.19 *7*
1390.3 *6*	1.7 *2*	11253.0	59/2$^-$	9862.7	55/2$^-$	E2	DCO=0.97 *9*
1395.9 *6*	0.6 *2*	12609.1	63/2$^+$	11213.2	59/2$^+$		
1421.7 *6*	0.5 *1*	14955.7	71/2$^-$	13534.0	67/2$^-$	E2 [c]	DCO=1.63 *24*
1448.4 *6*	1.1 *3*	12469.0	63/2$^+$	11020.6	59/2$^+$	E2 [c]	DCO=1.7 *3*

† From a general comment by 2004Si27 that the uncertainty is between 0.2 and 0.6 keV depending on intensity, the following have been assigned (by the evaluator): 0.2 keV for Iγ>10; 0.4 keV for Iγ=3-10 and 0.6 keV for Iγ<3.

‡ From level scheme in Fig.2 of 2004Si27 but not in Table I. Quoted values are rounded values from Adopted Levels.

2004Si27 claim that due to the use of a thin target and the isomeric halflife of the 328-keV level, the de-exciting 96.5γ and 233.5γ are not expected to be seen because the ^{123}Cs nuclei recoil into vacuum after reaction and decay out of focal plane of the collimated detectors. The non-observation of prompt γ rays for these transitions, on the other hand, support the 328-keV being an isomer.

@ The ordering of the 498.0 and 1022.3 transitions is tentative.

& Quoted values are original values in 2004Si27 scaled down by a factor of 10.

[a] Due to overlapping peaks, no intensity and DCO were possible.

[b] From 2004Si27 based on measured $\gamma\gamma$(DCO) and level scheme, unless otherwise noted. When considered in Adopted Gammas, D for E1 or M1 and Q for E2 will be used since there is no experimental evidence for electric or magnetic character, which cannot be determined by $\gamma\gamma$(DCO).

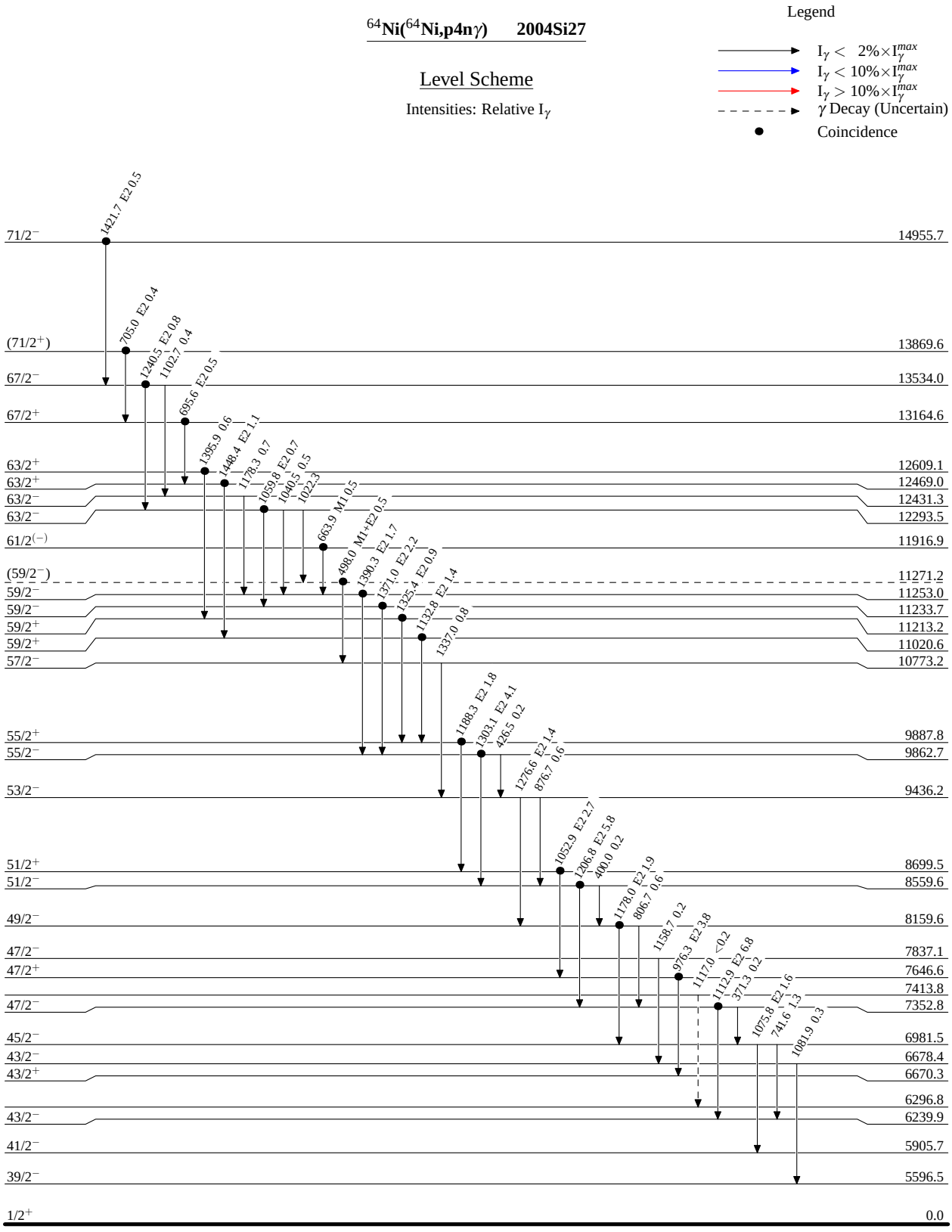
[c] DCO ratio value obtained from angular distribution matrices.

[d] Placement of transition in the level scheme is uncertain.

^{64}Ni(^{64}Ni,p4nγ) 2004Si27

Level Scheme

Intensities: Relative I_γ



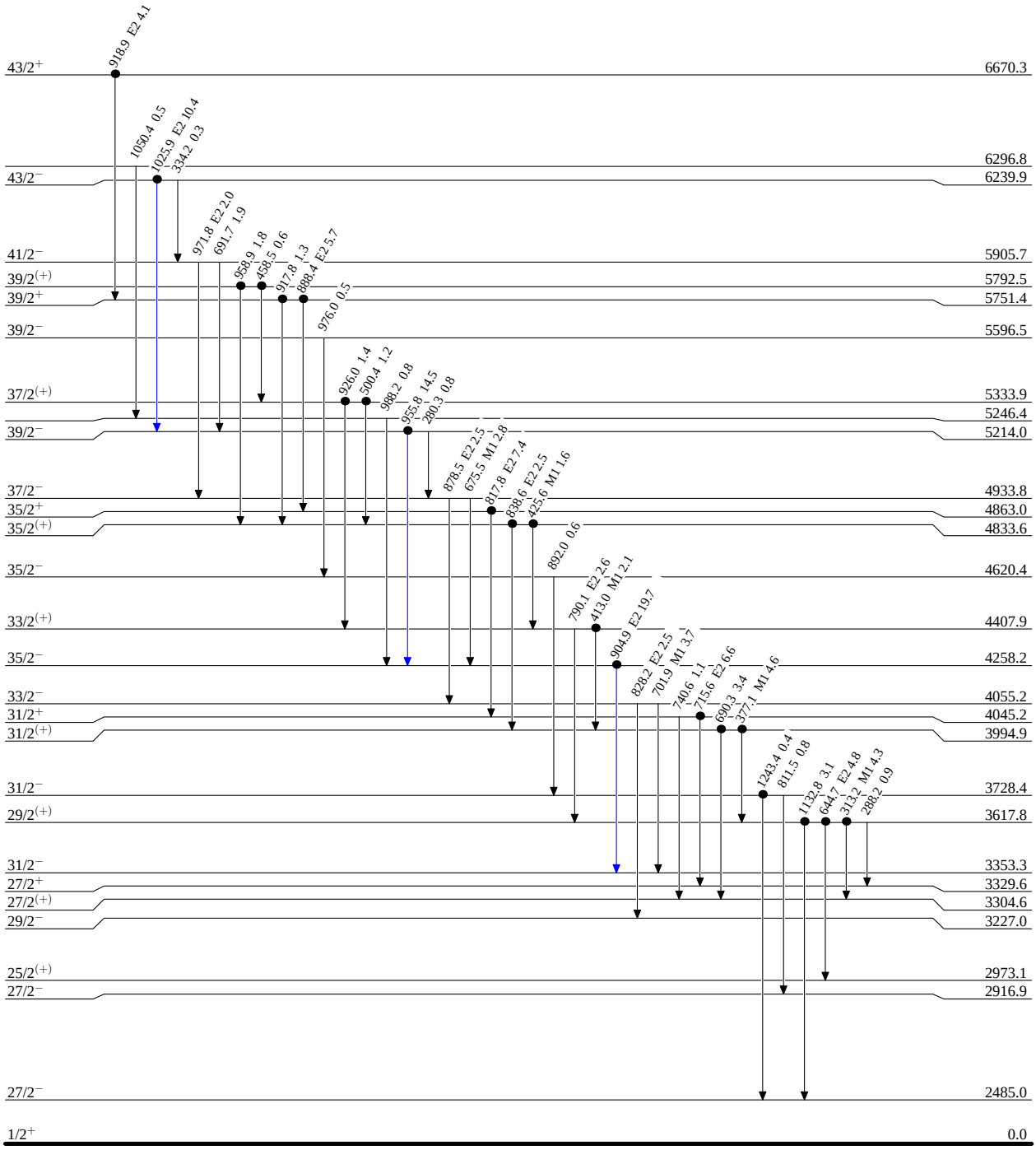
$^{123}_{55}Cs_{68}$

^{64}Ni(^{64}Ni,p4nγ) 2004Si27

Level Scheme (continued)

Intensities: Relative I_γ

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- Coincidence



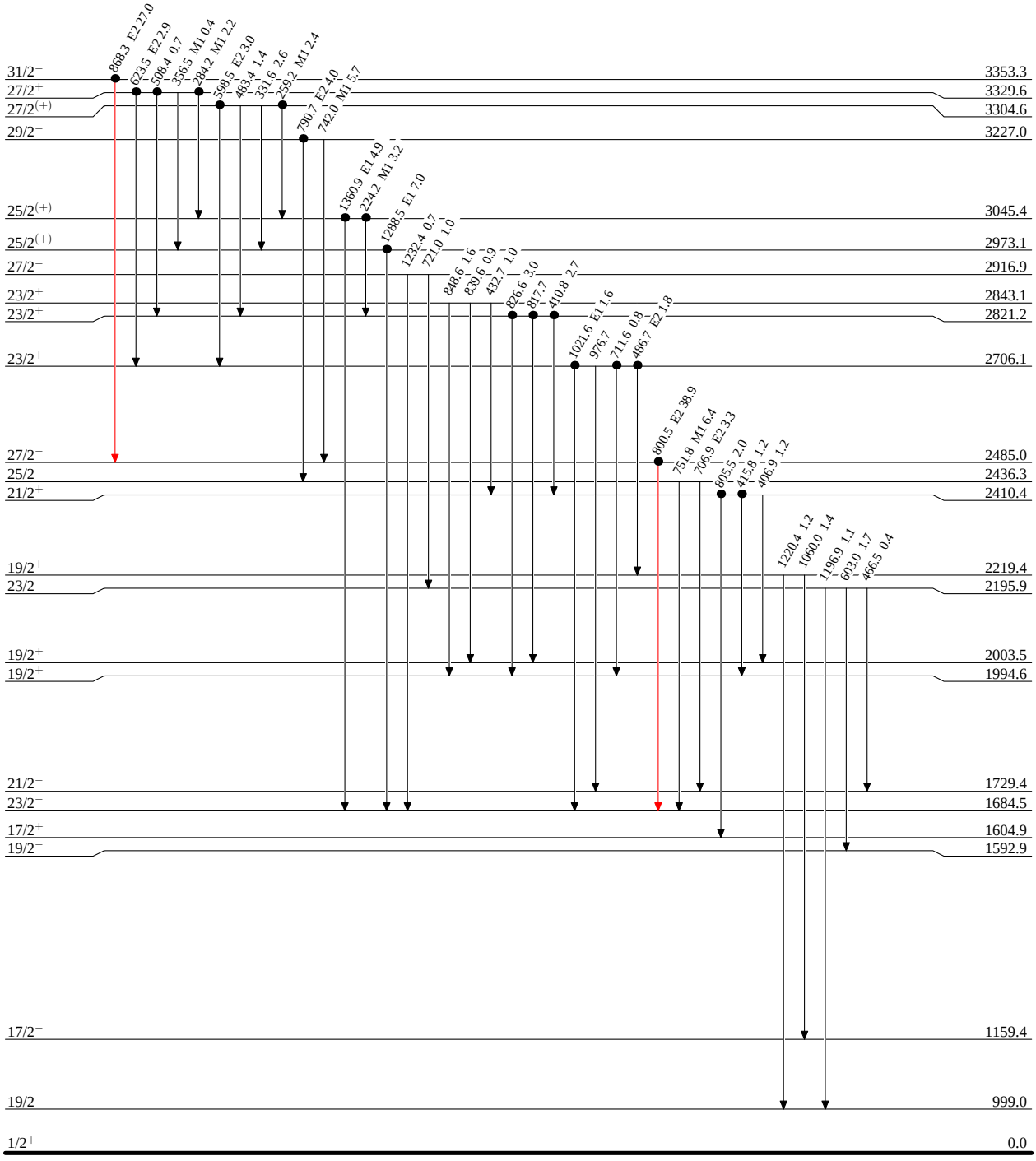
$^{123}_{55}Cs_{68}$

^{64}Ni(^{64}Ni,p4nγ) 2004Si27

Level Scheme (continued)

Intensities: Relative I_γ

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- Coincidence



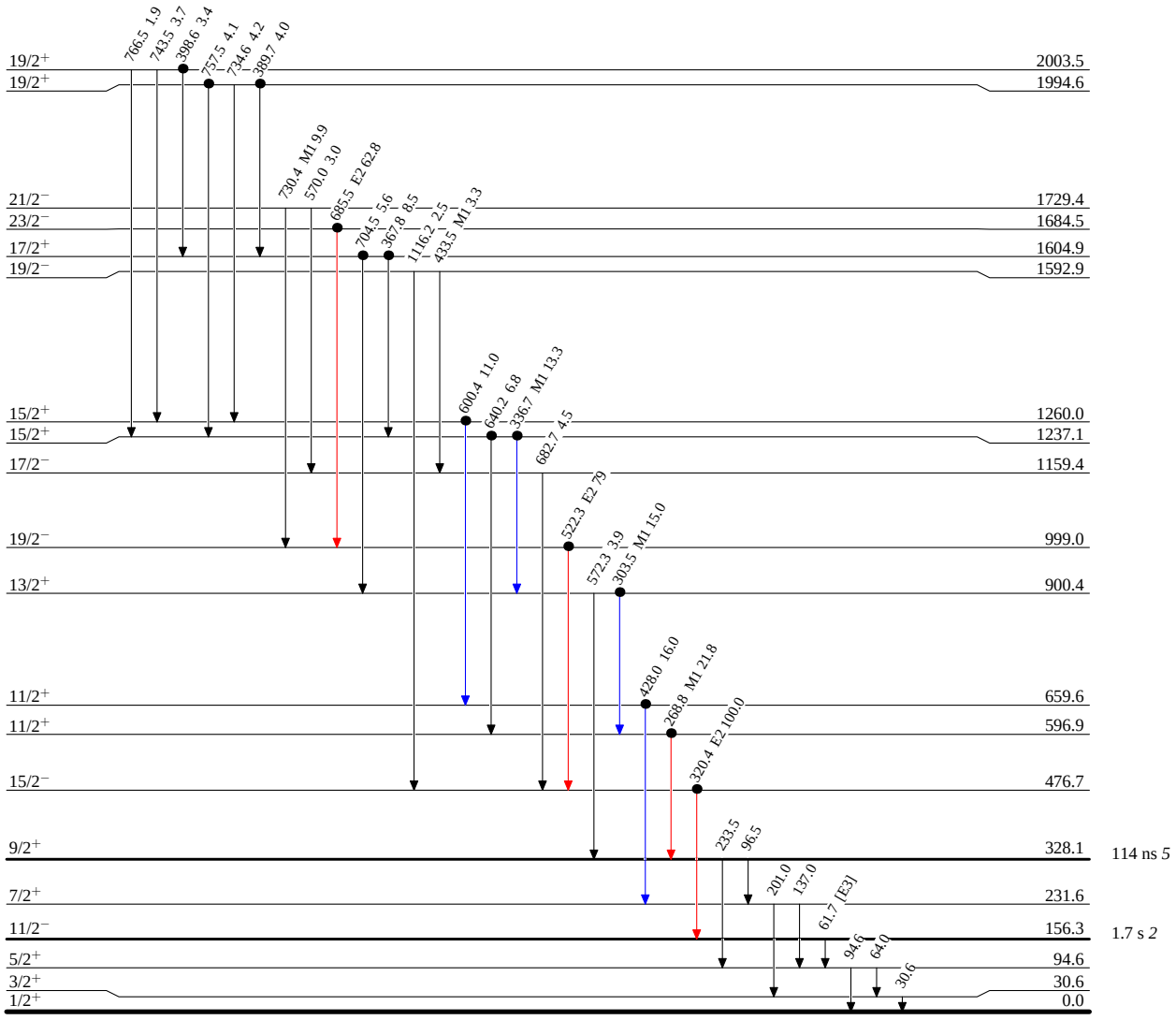
$^{123}_{55}Cs_{68}$

^{64}Ni(^{64}Ni,p4nγ) 2004Si27

Level Scheme (continued)

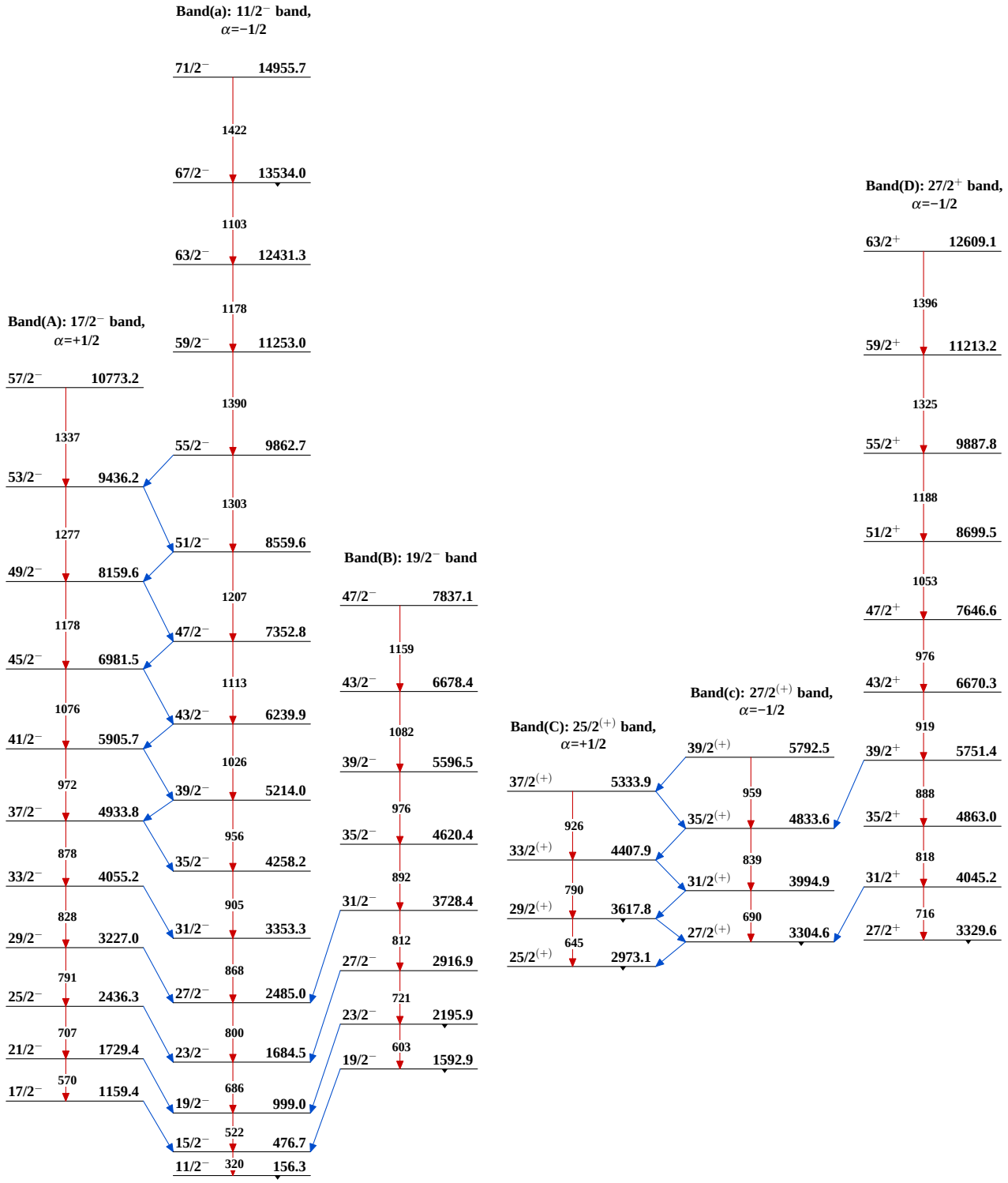
Intensities: Relative I_γ

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- Coincidence



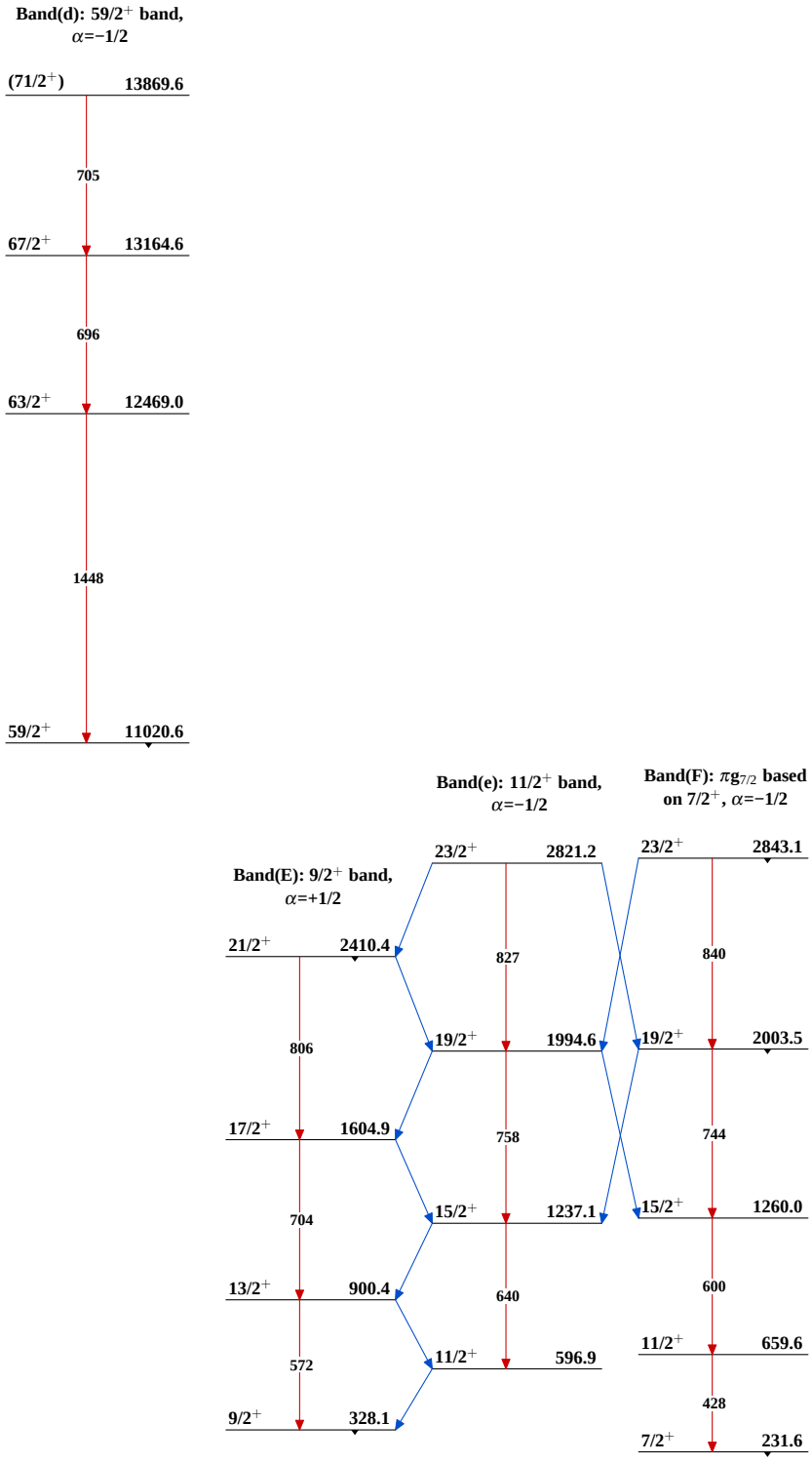
$^{123}_{55}Cs_{68}$

^{64}Ni(^{64}Ni,p4nγ) 2004Si27



$^{123}_{55}Cs_{68}$

^{64}Ni(^{64}Ni,p4nγ) 2004Si27 (continued)



$^{123}_{55}Cs_{68}$

^{96}Zr(^{32}S,p4nγ) 2013Se14

2013Se14: E=140 MeV ^{32}S beam was produced from the 15UD Pelletron accelerator at IUAC facility. Target was 1 mg/cm^2 ^{96}Zr on a 10 mg/cm^2 Pb backing. γ rays were detected with the INGA array consisting of 17 Compton-suppressed Ge clover detectors. Measured Eγ, $\gamma\gamma$-coin, Doppler-shift attenuation. Deduced lifetimes of excited states, transition quadrupole moments, deformation parameters. Comparisons with cranking shell model calculations.

^{123}Cs Levels

Q(transition) values given under comments are deduced for axially-symmetric shape by 2013Se14 from measured lifetimes, with 15% systematic uncertainty in lifetimes due to nuclear stopping power not included.

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$[#]	Comments
156.3[‡@]	11/2$^{(-)}$		
476.8[‡@]	(15/2$^-$)		
999.1[‡@]	(19/2$^-$)		
1684.6[‡@]	(23/2$^-$)		
2485.3[@] *5*	(27/2$^-$)	0.34 ps *6*	Q(transition)=3.82 *+9−20*.
3353.5[@] *7*	(31/2$^-$)	0.23 ps *4*	Q(transition)=3.81 *+19−16*.
4258.3[@] *9*	(35/2$^-$)	0.22 ps *+4−5*	Q(transition)=3.43 *+19−6*.
5213.5[@] *10*	(39/2$^-$)	0.30 ps *5*	Q(transition)=2.60 *3*.
6239.8[@] *12*	(43/2$^-$)	0.18 ps *3*	Q(transition)=2.87 *+20−15*.
7353.2[@] *13*	(47/2$^-$)	0.10 ps *3*	Q(transition)=2.96 *+29−28*.
8559.0[@] *14*	(51/2$^-$)	0.10 ps *+2−3*	Q(transition)=2.40 *+29−17*.

[†] From a least-squares fit to γ-ray energies, assuming $\Delta E\gamma$=0.5 keV, unless otherwise noted.
[‡] From Adopted Levels. Energies are rounded values.
[#] From DSAM in 2013Se14. A 15% systematic uncertainty due to stopping powers has been added (by the evaluator), according to a general comment by 2013Se14.
[@] Band(A): Band based on 11/2$^{(-)}$, α=−1/2.

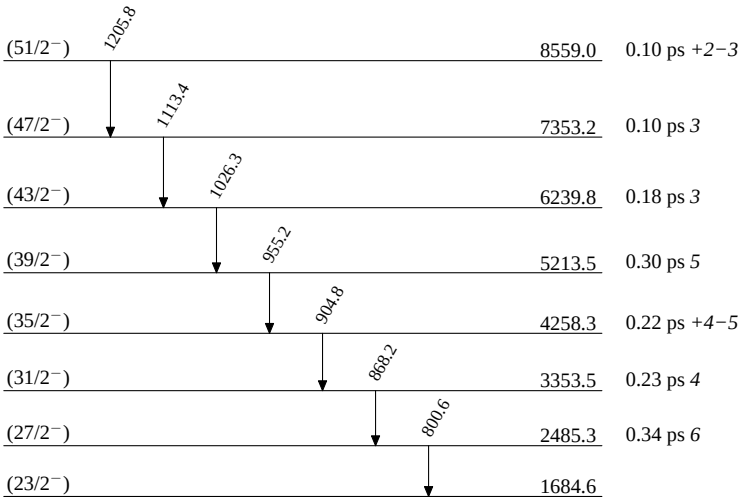
γ(^{123}Cs)

E$_\gamma$[†]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$
800.6	2485.3	(27/2$^-$)	1684.6	(23/2$^-$)
868.2	3353.5	(31/2$^-$)	2485.3	(27/2$^-$)
904.8	4258.3	(35/2$^-$)	3353.5	(31/2$^-$)
955.2	5213.5	(39/2$^-$)	4258.3	(35/2$^-$)
1026.3	6239.8	(43/2$^-$)	5213.5	(39/2$^-$)
1113.4	7353.2	(47/2$^-$)	6239.8	(43/2$^-$)
1205.8	8559.0	(51/2$^-$)	7353.2	(47/2$^-$)

[†] From 2013Se14.

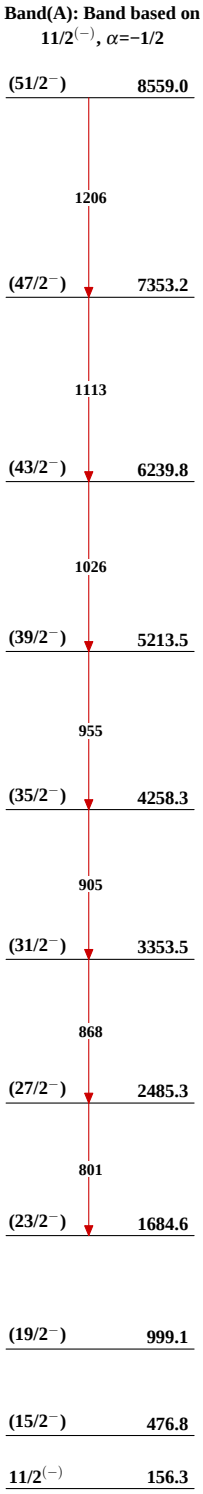
^{96}Zr(^{32}S,p4nγ) 2013Se14

Level Scheme



$^{123}_{55}Cs_{68}$

$^{96}Zr(^{32}S,p4n\gamma)$ 2013Se14



$^{123}_{55}Cs_{68}$

^{92}Mo(^{34}S,3pγ) 1992Li22

Also includes ^{106}Cd(^{19}F,2p2nγ) from 1992Li22.
Measurements of ^{92}Mo(^{34}S,3pγ) and ^{106}Cd(^{19}F,2p2nγ):
1992Li22: for the first measurement, E=150 and 155 MeV ^{34}S beam were produced at the Nuclear Structure Facility at Daresbury Laboratory. Target was a stacked of two self-supporting ^{92}Mo foils each with a thickness of 0.4 mg/cm^2. γ rays were detected with the TESSA3 spectrometer with a BGO ball. Measured Eγ, Iγ, $\gamma\gamma$-coin. For the second experiment, E=95 MeV ^{19}F beam was produced from the Tandem van de Graaff at the Niels Bohr Institute (NBI), Riso, Denmark. Target was a self-supporting foil of ^{106}Cd with a thickness of 1.2 mg/cm^2. γ rays were detected with the NORDBALL array of 15 Compton-suppressed HPGe detectors and charged particles were detected with a plastic phoswich scintillator ball HYSTRIX. Measured Eγ, Iγ, particle-$\gamma\gamma$-coin, $\gamma\gamma$ anisotropy. Deduced levels, J, π, band structures.

^{123}Cs Levels

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$[‡]	E(level)[†]	J$^\pi$[‡]	E(level)[†]	J$^\pi$[‡]
156.3[‡@]	11/2$^{(-)}$	1.7 s *2*	1606.4[&] *11*	(17/2$^+$)	5217[@] *3*	(39/2$^-$)
328.1[‡&]	(9/2$^+$)	114 ns *5*	1685.7[@] *18*	(23/2$^-$)	6243[@] *3*	(43/2$^-$)
477.7[@] *10*	(15/2$^-$)		1995.3[a] *12*	(19/2$^+$)	7356[@] *3*	(47/2$^-$)
596.6[a] *8*	(11/2$^+$)		2393?[#&]	(21/2$^+$)[#]	8562[@] *4*	(51/2$^-$)
900.6[&] *8*	(13/2$^+$)		2486.7[@] *20*	(27/2$^-$)	9861?[@]	(55/2$^-$)
999.7[@] *15*	(19/2$^-$)		3355.7[@] *23*	(31/2$^-$)	11233?[@]	(59/2$^-$)
1238.2[a] *10*	(15/2$^+$)		4261.7[@] *25*	(35/2$^-$)		

[†] From a least-squares fit to γ-ray energies, unless otherwise noted.
[‡] From Adopted Levels, unless otherwise noted. Energies are rounded values.
[#] Proposed by 1992Li22 based on band assignments. This level is not confirmed in other high-spin studies and thus not adopted in Adopted Levels.
[@] Band(A): π1/2[550], α=−1/2.
[&] Band(B): π9/2[404], α=+1/2.
[a] Band(b): π9/2[404], α=−1/2.

γ(^{123}Cs)

Anisotropy ratio R given under comments are from 1992Li22, obtained by R=Iγ(37°)/Iγ(79°) (1992Li22), with typical values of ≈1 for dipole transitions and ≈1.5 for quadrupole transitions.

E$_\gamma$[†]	I$_\gamma$[†]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[‡]	Comments
269 *1*	14	596.6	(11/2$^+$)	328.1	(9/2$^+$)	D+Q	Anisotropy R=1.15 *7*.
304 *1*	21	900.6	(13/2$^+$)	596.6	(11/2$^+$)	D+Q	Anisotropy R=1.08 *5*.
321 *1*	100	477.7	(15/2$^-$)	156.3	11/2$^{(-)}$	Q	Anisotropy R=1.45 *2*.
337 *1*	14	1238.2	(15/2$^+$)	900.6	(13/2$^+$)	D+Q	Anisotropy R=1.12 *6*.
368 *1*	10	1606.4	(17/2$^+$)	1238.2	(15/2$^+$)		
389 *1*	4	1995.3	(19/2$^+$)	1606.4	(17/2$^+$)		
398[#] *1*	2	2393?	(21/2$^+$)	1995.3	(19/2$^+$)		
522 *1*	59	999.7	(19/2$^-$)	477.7	(15/2$^-$)	Q	Anisotropy R=1.63 *3*.
572 *1*	2	900.6	(13/2$^+$)	328.1	(9/2$^+$)		
642 *1*	3	1238.2	(15/2$^+$)	596.6	(11/2$^+$)		
686 *1*	36	1685.7	(23/2$^-$)	999.7	(19/2$^-$)	Q	Anisotropy R=1.43 *5*.
706 *1*	3	1606.4	(17/2$^+$)	900.6	(13/2$^+$)		
757 *1*	2	1995.3	(19/2$^+$)	1238.2	(15/2$^+$)		

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^{92}Mo(^{34}S,3pγ) 1992Li22 (continued)

$\gamma(^{123}Cs)$ (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
787[#] *1*	1	2393?	$(21/2^+)$	1606.4	$(17/2^+)$		
801 *1*	11	2486.7	$(27/2^-)$	1685.7	$(23/2^-)$	Q	Anisotropy R=1.48 *9*.
869 *1*	10	3355.7	$(31/2^-)$	2486.7	$(27/2^-)$	(Q)	Anisotropy R=1.2 *1*.
906 *1*	6	4261.7	$(35/2^-)$	3355.7	$(31/2^-)$		
955 *1*	4	5217	$(39/2^-)$	4261.7	$(35/2^-)$		
1026 *1*	5	6243	$(43/2^-)$	5217	$(39/2^-)$		
1113 *1*	2	7356	$(47/2^-)$	6243	$(43/2^-)$		
1206 *1*	≈1	8562	$(51/2^-)$	7356	$(47/2^-)$		
1303[#] *1*	≈1	9861?	$(55/2^-)$	8562	$(51/2^-)$		
1372[#] *1*	≈1	11233?	$(59/2^-)$	9861?	$(55/2^-)$		

[†] From 1992Li22, unless otherwise noted.
[‡] Deduced by the evaluator from γ anisotropy ratios in 1992Li22.
[#] Placement of transition in the level scheme is uncertain.

^{92}Mo(^{34}S,3pγ) 1992Li22

Level Scheme

Intensities: Relative I_γ

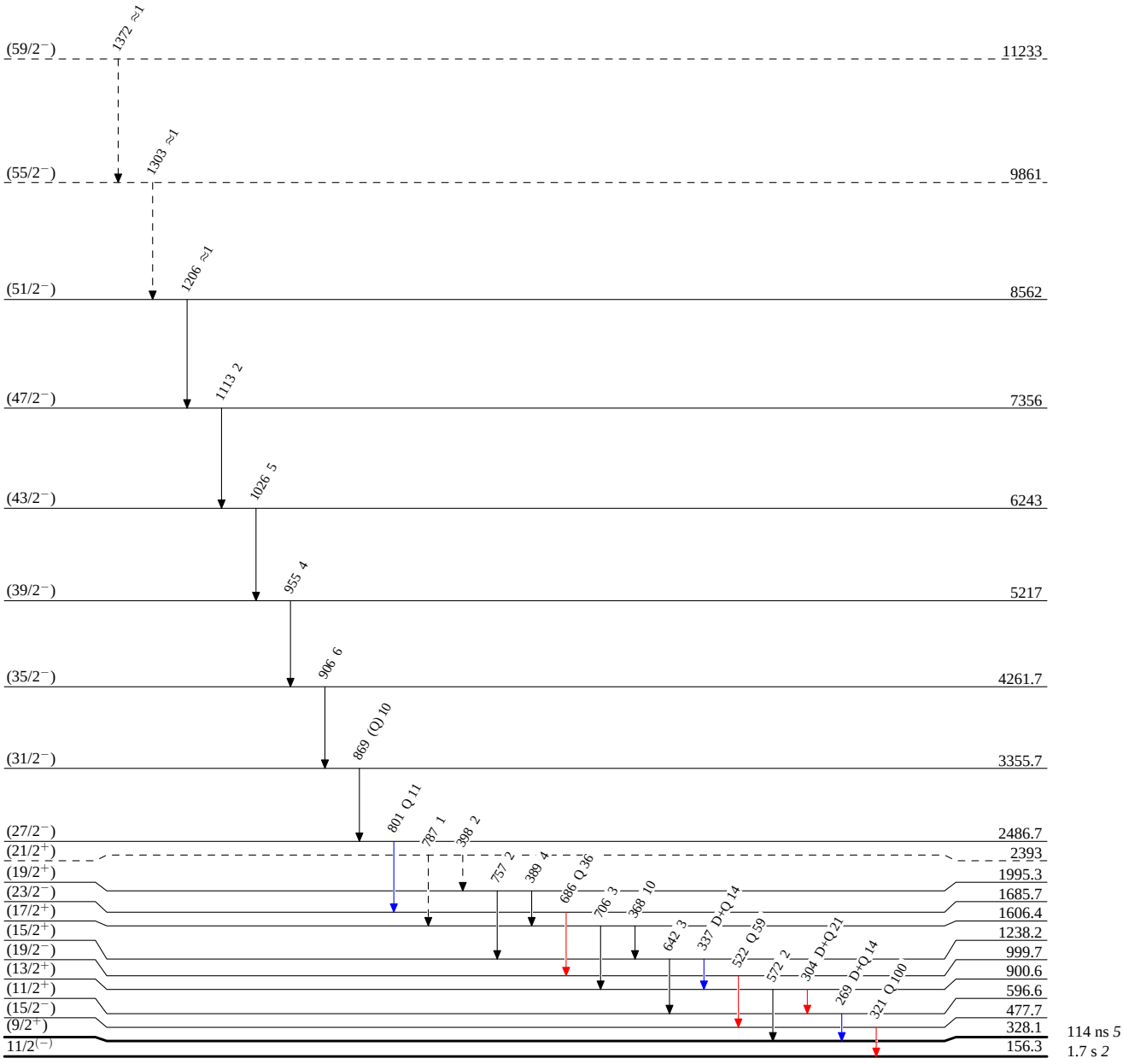
Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

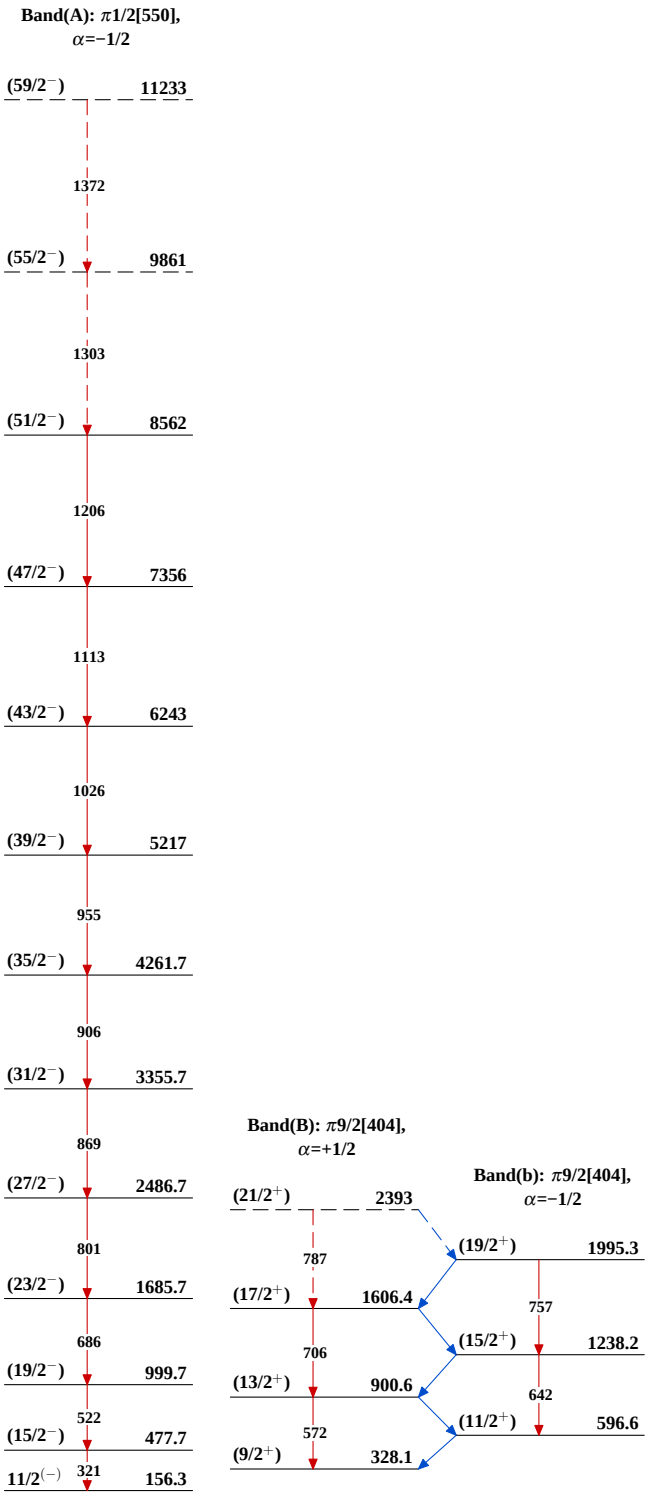
$I_\gamma > 10\% \times I_\gamma^{max}$

γ Decay (Uncertain)



$^{123}_{55}Cs_{68}$

^{92}Mo(^{34}S,3pγ) 1992Li22



$^{123}_{55}Cs_{68}$

^{100}Mo(^{28}Si,p4nγ) 2005Si31,2004Si26

2005Si31 (also 2004Si26): E=130 MeV ^{28}Si beam was produced from the 15-UD pelletron accelerator at the Nuclear Science Centre (NSC), New Delhi. Target was a 3 mg/cm^2 foil of enriched ^{100}Mo on a 15 mg/cm^2 Pb foil. γ rays were detected with the INGA array of eight Compton-suppressed clover detectors with each consisting of four HPGe crystals. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma$(DCO). Deduced levels, J, π, band structures, configurations, γ-ray multipolarities. Comparisons with Total Routhian Surface (TRS) calculations.

^{123}Cs Levels

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$[#]	Comments
0.0[b]	1/2$^+$		
30.5[a] 6	3/2$^+$		
94.5[b] 6	5/2$^+$		
156.3[d] 10	11/2$^-$	1.7 s 2	
231.5[a] 6	7/2$^+$		
328.1[@] 7	9/2$^+$	114 ns 5	E(level): 2004Si26 in ^{100}Mo(^{28}Si,4npγ) and 2004Si27 in ^{64}Ni(^{64}Ni,4npγ) propose the 328-keV level (proposed as a separate level by 2000Gi12 in ^{123}Ba ε decay) to be the isomeric (9/2$^+$) bandhead (proposed at 231.7+x by 2000Gi12), based on the intensity balance of the feeding and de-exciting γ transitions (96.5γ and 233.5γ de-exciting the 328-keV level are seen in 2004Si26 with a thick target but not seen in 2004Si27 with a thin target due to ^{123} Cs nuclei recoiling into vacuum after reaction and decaying out of the detectors, supporting the 328-keV level being an isomer).
477.0[d] 10	15/2$^-$		
597.0[&] 8	11/2$^+$		
659.6[a] 8	11/2$^+$		
900.6[@] 8	13/2$^+$		
999.2[d] 10	19/2$^-$		
1159.7[c] 10	17/2$^-$		
1237.4[&] 8	15/2$^+$		
1260.0[a] 8	15/2$^+$		
1593.9[e] 10	19/2$^-$		
1605.3[@] 8	17/2$^+$		
1684.8[d] 10	23/2$^-$		
1730.1[c] 10	21/2$^-$		
1994.9[&] 8	19/2$^+$		
2003.9[a] 8	19/2$^+$		
2197.0[e] 10	23/2$^-$		
2410.4[@] 9	21/2$^+$		
2436.8[c] 10	25/2$^-$		
2446.4 10	(21/2$^+$)		
2485.3[d] 10	27/2$^-$		
2706.8 11	(23/2$^+$)		
2821.6[&] 9	23/2$^+$		
2844.0[a] 9	23/2$^+$		
2917.8[e] 11	27/2$^-$		
2973.8[f] 10	25/2$^{(+)}$		
3045.7 9	25/2$^{(+)}$		
3227.7[c] 11	29/2$^-$		
3305.2[g] 10	27/2$^+$		
3330.0[h] 10	27/2$^{(+)}$		
3353.8[d] 11	31/2$^-$		
3618.3[f] 10	29/2$^{(+)}$		

Continued on next page (footnotes at end of table)

^{100}Mo(^{28}Si,p4nγ) 2005Si31,2004Si26 (continued)

^{123}Cs Levels (continued)

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
3728.7[e] *11*	31/2$^-$	4409.1[f] *11*	33/2$^{(+)}$	5213.5[d] *14*	39/2$^-$	6672.0[h] *16*	43/2$^{(+)}$
3995.6[g] *11*	31/2$^{(+)}$	4620.6[e] *13*	35/2$^-$	5597.0[e] *15*	39/2$^-$	7352.5[d] *17*	47/2$^-$
4046.0[h] *11*	31/2$^{(+)}$	4835.0[g] *12*	35/2$^{(+)}$	5753.0[h] *14*	39/2$^{(+)}$	7648.0[h] *17*	47/2$^{(+)}$
4055.9[c] *11*	33/2$^-$	4864.0[h] *12*	35/2$^{(+)}$	5906.2[c] *14*	41/2$^-$	8701.2[h] *19*	51/2$^{(+)}$
4258.5[d] *12*	35/2$^-$	4934.1[c] *12*	37/2$^-$	6239.5[d] *15*	43/2$^-$	9889.5[h] *20*	55/2$^{(+)}$

† From least-squares fit γ-ray energies.
‡ Proposed by 2005Si31 based on measured $\gamma\gamma$(DCO) and band assignments.
# From Adopted Levels.
@ Band(A): π9/2[404], α=+1/2.
& Band(a): π9/2[404], α=−1/2.
a Band(B): π3/2[422], α=−1/2.
b Band(C): π1/2[420], α=+1/2.
c Band(D): π1/2[550], α=+1/2.
d Band(d): π1/2[550], α=−1/2.
e Band(E): γ-vibrational band built on favored signature partner π1/2[550], α=−1/2.
f Band(F): Band based on 25/2$^{(+)}$. Configuration=(π1/2[550], α=−1/2)⊗ν(7/2[404] or 5/2[402], α=−1/2)⊗(ν7/2[523], α=−1/2),
g Band(f): Band based on 27/2$^+$. Configuration=(π1/2[550], α=−1/2)⊗ν(7/2[404] or 5/2[402], α=−1/2)⊗(ν7/2[523], α=−1/2).
h Band(G): (π3/2[422], α=−1/2)⊗(π1/2[550], α=−1/2)⊗(π1/2[550], α=+1/2). Upper portion of this band is a five-quasiparticle structure involving (ν7/2[523], α=−1/2)⊗(ν7/2[523], α=+1/2) (2005Si31).

γ(^{123}Cs)

R(DCO) values were extracted using an asymmetric matrix made by sorting data with 141° detectors on one axis and 81° detectors on the other axis (2005Si31).
All DCO values correspond to gates on ΔJ=2, quadrupole transitions. Typical values of the DCO ratio are 1.0 and 0.5 for ΔJ=2, stretched quadrupole and ΔJ=1, dipole transitions, respectively. See 2004Si27 in ^{64}Ni(^{64}Ni,4npγ) of the same group.

E_γ†	I_γ‡	E_i(level)	J_i^π	E_f	J_f^π	Mult.#	Comments
30.5 *7*		30.5	3/2$^+$	0.0	1/2$^+$		
61.7		156.3	11/2$^-$	94.5	5/2$^+$	[E3]	E_γ: rounded value from Adopted Gammas; not seen in 2005Si31.
64.0 *7*		94.5	5/2$^+$	30.5	3/2$^+$		
94.5 *7*		94.5	5/2$^+$	0.0	1/2$^+$		
96.5 *7*		328.1	9/2$^+$	231.5	7/2$^+$		
137.0 *5*	7.3 *7*	231.5	7/2$^+$	94.5	5/2$^+$		
201.0 *5*	20.9 *11*	231.5	7/2$^+$	30.5	3/2$^+$	E2	DCO=1.21 *19*
202.0 *7*		3045.7	25/2$^{(+)}$	2844.0	23/2$^+$		
223.9 *7*	2.0 *4*	3045.7	25/2$^{(+)}$	2821.6	23/2$^+$	M1	DCO=0.58 *10*
233.5 *7*		328.1	9/2$^+$	94.5	5/2$^+$		
259.5 *7*	2.8 *6*	3305.2	27/2$^+$	3045.7	25/2$^{(+)}$	M1	DCO=0.60 *8*
268.9 *5*	14.1 *7*	597.0	11/2$^+$	328.1	9/2$^+$	M1	DCO=0.78 *15*
284.5 *7*	2.5 *5*	3330.0	27/2$^{(+)}$	3045.7	25/2$^{(+)}$	M1	DCO=0.68 *12*
288.5 *7*	0.9 *2*	3618.3	29/2$^{(+)}$	3330.0	27/2$^{(+)}$		
303.5 *5*	9.6 *10*	900.6	13/2$^+$	597.0	11/2$^+$	M1	DCO=0.62 *8*

Continued on next page (footnotes at end of table)

^{100}Mo(^{28}Si,p4nγ) 2005Si31,2004Si26 (continued)

$\gamma(^{123}Cs)$ (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [#]	Comments
313.0 *7*	2.4 *5*	3618.3	$29/2^{(+)}$	3305.2	$27/2^+$		
320.6 *5*	100.0	477.0	$15/2^-$	156.3	$11/2^-$	E2	DCO=1.06 *8*
331.3 *7*	0.9 *2*	3305.2	$27/2^+$	2973.8	$25/2^{(+)}$	M1	DCO=0.60 *12*
336.9 *5*	8.6 *9*	1237.4	$15/2^+$	900.6	$13/2^+$	M1	DCO=0.60 *7*
356.0 *7*	0.5 *1*	3330.0	$27/2^{(+)}$	2973.8	$25/2^{(+)}$	M1	DCO=0.60 *12*
368.0 *5*	5.8 *6*	1605.3	$17/2^+$	1237.4	$15/2^+$	M1	DCO=0.65 *8*
377.3 *7*	2.6 *5*	3995.6	$31/2^{(+)}$	3618.3	$29/2^{(+)}$	M1	DCO=0.51 *10*
389.5 *7*	2.6 *5*	1994.9	$19/2^+$	1605.3	$17/2^+$	M1	DCO=0.63 *8*
398.4 *7*	2.4 *5*	2003.9	$19/2^+$	1605.3	$17/2^+$	M1	DCO=0.61 *9*
406.5 *7*	1.0 *2*	2410.4	$21/2^+$	2003.9	$19/2^+$		
411.0 *7*	1.4 *3*	2821.6	$23/2^+$	2410.4	$21/2^+$		
413.4 *7*	1.7 *4*	4409.1	$33/2^{(+)}$	3995.6	$31/2^{(+)}$	M1	DCO=0.46 *12*
415.4 *7*	0.6 *2*	2410.4	$21/2^+$	1994.9	$19/2^+$		
426.0 *7*	0.6 *2*	4835.0	$35/2^{(+)}$	4409.1	$33/2^{(+)}$		
428.2 *5*	6.6 *7*	659.6	$11/2^+$	231.5	$7/2^+$	E2	DCO=1.14 *16*
433.5 *7*	1.0 *2*	2844.0	$23/2^+$	2410.4	$21/2^+$		
434.1 *7*	2.5 *5*	1593.9	$19/2^-$	1159.7	$17/2^-$	M1	DCO=0.56 *8*
466.9 *7*	1.7 *4*	2197.0	$23/2^-$	1730.1	$21/2^-$		
522.3 *5*	78.8 *40*	999.2	$19/2^-$	477.0	$15/2^-$	E2	DCO=1.02 *8*
570.3 *7*	2.8 *6*	1730.1	$21/2^-$	1159.7	$17/2^-$	E2	DCO=0.75 *24*
572.4 *7*	2.6 *5*	900.6	$13/2^+$	328.1	$9/2^+$	E2	DCO=1.02 *12*
599.5 *7*	0.8 *2*	3045.7	$25/2^{(+)}$	2446.4	$(21/2^+)$		
600.6 *5*	3.8 *4*	1260.0	$15/2^+$	659.6	$11/2^+$	E2	DCO=1.12 *15*
603.0 *7*	1.7 *4*	2197.0	$23/2^-$	1593.9	$19/2^-$		
623.5 *7*	1.6 *3*	3330.0	$27/2^{(+)}$	2706.8	$(23/2^+)$	E2	DCO=0.83 *20*
640.5 *5*	3.8 *4*	1237.4	$15/2^+$	597.0	$11/2^+$	E2	DCO=0.88 *15*
644.5 *7*	2.5 *5*	3618.3	$29/2^{(+)}$	2973.8	$25/2^{(+)}$	E2	DCO=0.87 *20*
675.8 *7*	1.7 *4*	4934.1	$37/2^-$	4258.5	$35/2^-$		
682.7 *5*	12.9 *7*	1159.7	$17/2^-$	477.0	$15/2^-$	M1	DCO=0.47 *9*
685.5 *5*	49.9 *25*	1684.8	$23/2^-$	999.2	$19/2^-$	E2	DCO=0.94 *10*
690.3 *7*	1.8 *4*	3995.6	$31/2^{(+)}$	3305.2	$27/2^+$		
701.5 *7*	1.7 *4*	4055.9	$33/2^-$	3353.8	$31/2^-$	M1	DCO=0.57 *12*
704.5 *5*	3.9 *4*	1605.3	$17/2^+$	900.6	$13/2^+$	E2	DCO=0.89 *15*
706.6 *5*	4.1 *4*	2436.8	$25/2^-$	1730.1	$21/2^-$	E2	DCO=1.04 *15*
716.0 *5*	3.4 *4*	4046.0	$31/2^{(+)}$	3330.0	$27/2^{(+)}$	E2	DCO=0.95 *10*
720.9 *7*	2.8 *6*	2917.8	$27/2^-$	2197.0	$23/2^-$	E2	DCO=0.82 *20*
730.9 *5*	8.6 *9*	1730.1	$21/2^-$	999.2	$19/2^-$	M1	DCO=0.45 *9*
734.9 *7*	1.6 *3*	1994.9	$19/2^+$	1260.0	$15/2^+$	E2	DCO=0.94 *18*
742.9 *7*	2.2 *5*	3227.7	$29/2^-$	2485.3	$27/2^-$	M1	DCO=0.47 *7*
744.0 *7*	1.5 *3*	2003.9	$19/2^+$	1260.0	$15/2^+$	E2	DCO=1.12 *18*
751.9 *5*	4.3 *4*	2436.8	$25/2^-$	1684.8	$23/2^-$	M1	DCO=0.45 *8*
757.5 *5*	3.6 *4*	1994.9	$19/2^+$	1237.4	$15/2^+$	E2	DCO=1.24 *20*
766.4 *7*	0.7 *2*	2003.9	$19/2^+$	1237.4	$15/2^+$		
790.8 *5*	3.8 *4*	3227.7	$29/2^-$	2436.8	$25/2^-$	E2	DCO=0.93 *15*
790.8 *7*	1.4 *3*	4409.1	$33/2^{(+)}$	3618.3	$29/2^{(+)}$		
800.5 *5*	23.3 *12*	2485.3	$27/2^-$	1684.8	$23/2^-$	E2	DCO=0.93 *10*
804.9 *7*	2.4 *5*	2410.4	$21/2^+$	1605.3	$17/2^+$	E2	DCO=1.02 *21*
811.1 *7*	1.7 *4*	3728.7	$31/2^-$	2917.8	$27/2^-$		
818.0 *7*	2.0 *4*	2821.6	$23/2^+$	2003.9	$19/2^+$		
818.0 *5*	3.5 *4*	4864.0	$35/2^{(+)}$	4046.0	$31/2^{(+)}$	E2	DCO=1.06 *20*
826.5 *7*	2.5 *5*	2821.6	$23/2^+$	1994.9	$19/2^+$		
828.5 *7*	1.6 *3*	4055.9	$33/2^-$	3227.7	$29/2^-$		
839.4 *7*	1.9 *4*	4835.0	$35/2^{(+)}$	3995.6	$31/2^{(+)}$		
839.8 *7*	1.6 *3*	2844.0	$23/2^+$	2003.9	$19/2^+$		

Continued on next page (footnotes at end of table)

^{100}Mo(^{28}Si,p4nγ) 2005Si31,2004Si26 (continued)

$\gamma(^{123}Cs)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Comments
849.8 *7*	1.0 *2*	2844.0	$23/2^+$	1994.9	$19/2^+$		
868.4 *5*	10.8 *6*	3353.8	$31/2^-$	2485.3	$27/2^-$	E2	DCO=0.86 *15*
878.0 *7*	1.1 *2*	4934.1	$37/2^-$	4055.9	$33/2^-$		
889.0 *7*	2.4 *5*	5753.0	$39/2^{(+)}$	4864.0	$35/2^{(+)}$	E2	DCO=0.96 *15*
891.9 *7*	1.4 *3*	4620.6	$35/2^-$	3728.7	$31/2^-$		
904.8 *5*	5.0 *5*	4258.5	$35/2^-$	3353.8	$31/2^-$	E2	DCO=0.87 *15*
919.0 *7*	1.8 *4*	6672.0	$43/2^{(+)}$	5753.0	$39/2^{(+)}$	E2	DCO=0.92 *25*
955.0 *7*	2.9 *6*	5213.5	$39/2^-$	4258.5	$35/2^-$	E2	DCO=0.84 *15*
972.1 *7*	0.5 *1*	5906.2	$41/2^-$	4934.1	$37/2^-$		
976.0 *7*	1.5 *3*	7648.0	$47/2^{(+)}$	6672.0	$43/2^{(+)}$		
976.4 *7*	0.8 *2*	5597.0	$39/2^-$	4620.6	$35/2^-$		
1022.2 *7*	2.1 *4*	2706.8	$(23/2^+)$	1684.8	$23/2^-$		
1026.0 *7*	1.5 *3*	6239.5	$43/2^-$	5213.5	$39/2^-$		
1053.2 *7*	0.7 *2*	8701.2	$51/2^{(+)}$	7648.0	$47/2^{(+)}$		
1113.0 *7*	1.0 *2*	7352.5	$47/2^-$	6239.5	$43/2^-$		
1116.9 *5*	5.2 *5*	1593.9	$19/2^-$	477.0	$15/2^-$		
1133.1 *7*	1.5 *3*	3618.3	$29/2^{(+)}$	2485.3	$27/2^-$	E1	DCO=0.62 *8*
1188.2 *7*	0.4 *1*	9889.5	$55/2^{(+)}$	8701.2	$51/2^{(+)}$		
1198.0 *7*	2.0 *4*	2197.0	$23/2^-$	999.2	$19/2^-$	E2	DCO=1.18 *25*
1233.0 *7*	1.4 *3*	2917.8	$27/2^-$	1684.8	$23/2^-$	E2	DCO=0.80 *25*
1243.2 *7*	1.5 *3*	3728.7	$31/2^-$	2485.3	$27/2^-$	E2	DCO=0.77 *25*
1288.7 *5*	4.5 *5*	2973.8	$25/2^{(+)}$	1684.8	$23/2^-$	E1	DCO=0.57 *7*
1360.9 *7*	2.5 *5*	3045.7	$25/2^{(+)}$	1684.8	$23/2^-$	E1	DCO=0.70 *12*
1447.3 *7*	1.4 *3*	2446.4	$(21/2^+)$	999.2	$19/2^-$		

[†] From a general comment by 2005Si31 that the uncertainty is 0.5 keV for strong transitions and increases to 0.7 keV for weaker ones ($I\gamma<3.0$, relative to $I\gamma=100$ for 320.6γ).

[‡] Quoted values are original values in 2005Si31 scaled down by a factor of 10. From a general comment by 2005Si31 that uncertainty in values range from 5-20%, the following uncertainties have been assigned (by the evaluator): 5% for $I\gamma\geq10$, 10% for $I\gamma\geq3$, and 20% for $I\gamma<3$, relative to $I\gamma=100$ for 320.6γ.

[#] From 2005Si31 based on measured $\gamma\gamma$(DCO) and level scheme, unless otherwise noted. When considered in Adopted Gammas, D for E1 or M1 and Q for E2 will be used since there is no experimental evidence for electric or magnetic character, which cannot be determined by $\gamma\gamma$(DCO).

^{100}Mo(^{28}Si,p4nγ) 2005Si31,2004Si26

Level Scheme

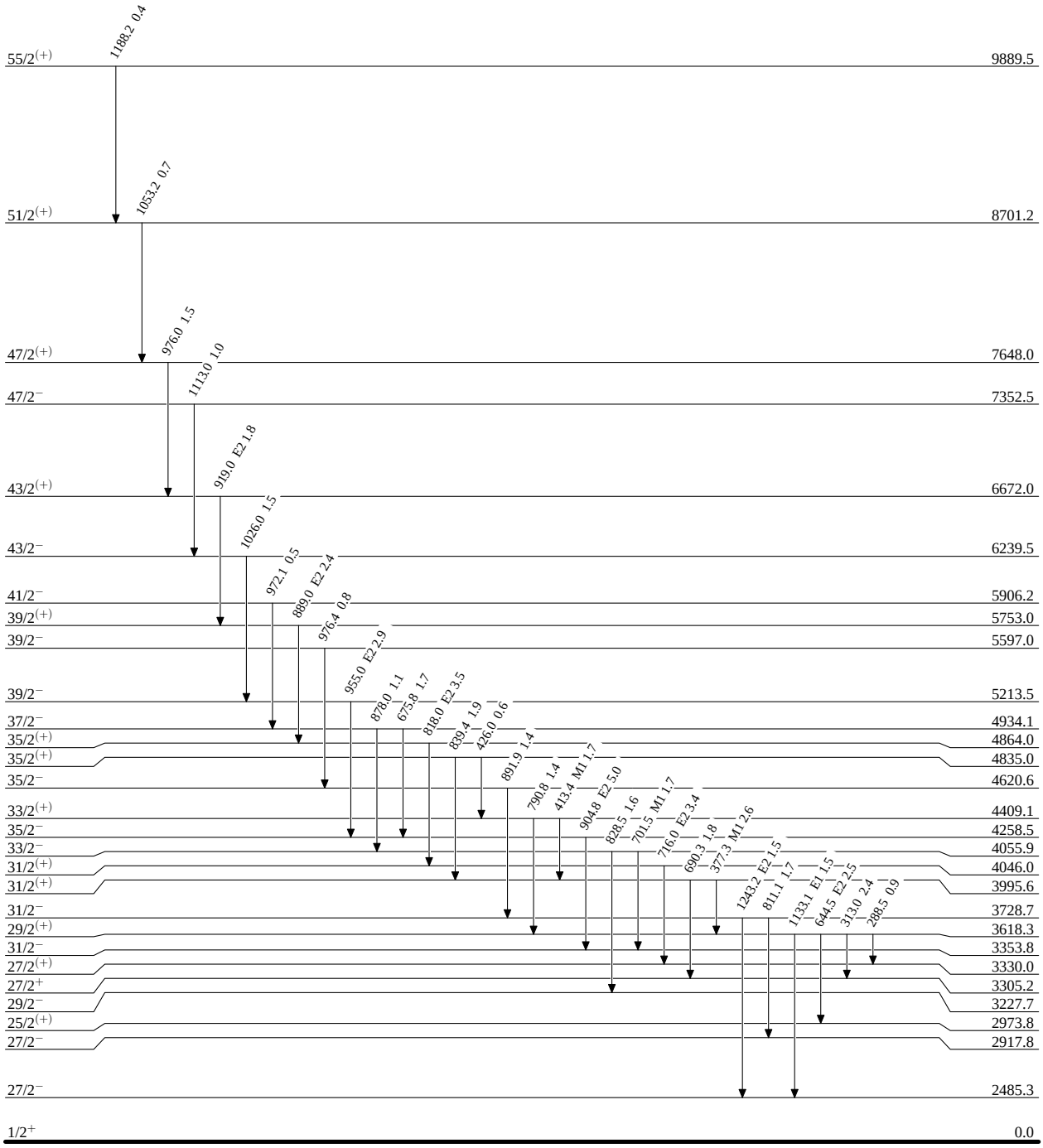
Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

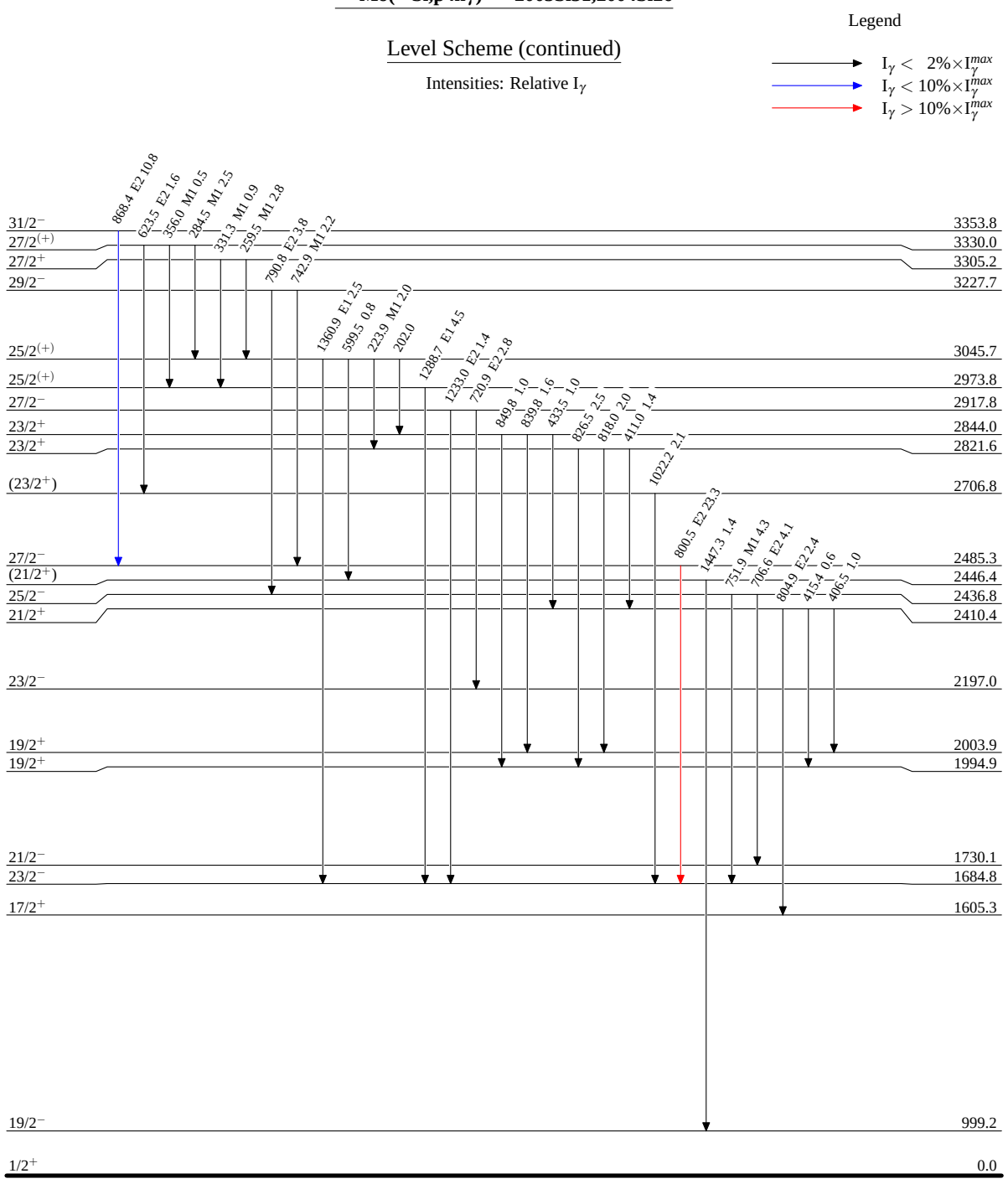


$^{123}_{55}Cs_{68}$

^{100}Mo(^{28}Si,p4nγ) 2005Si31,2004Si26

Level Scheme (continued)

Intensities: Relative I_γ



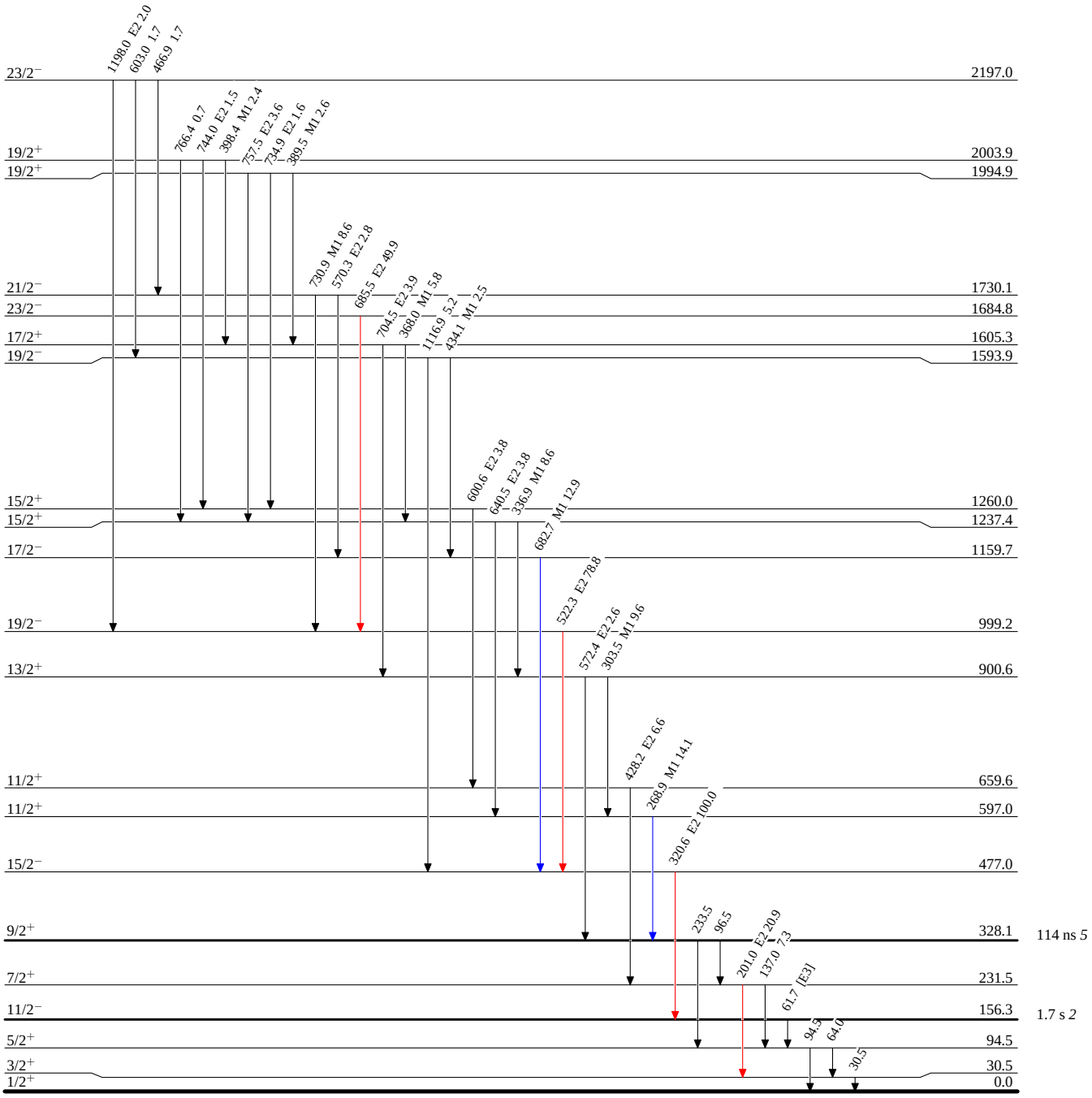
$^{123}_{55}Cs_{68}$

^{100}Mo(^{28}Si,p4nγ) 2005Si31,2004Si26

Level Scheme (continued)

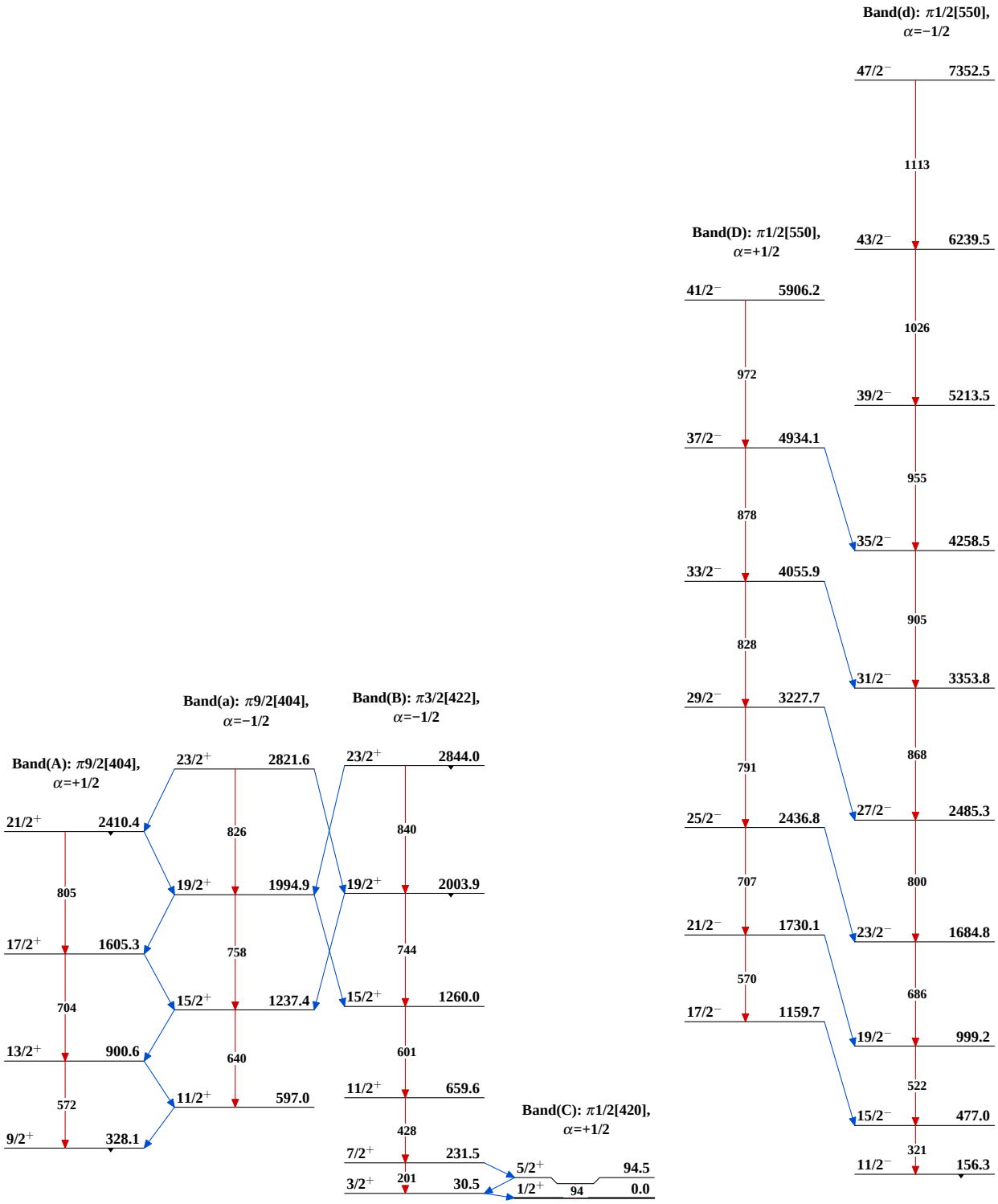
Intensities: Relative I_γ

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



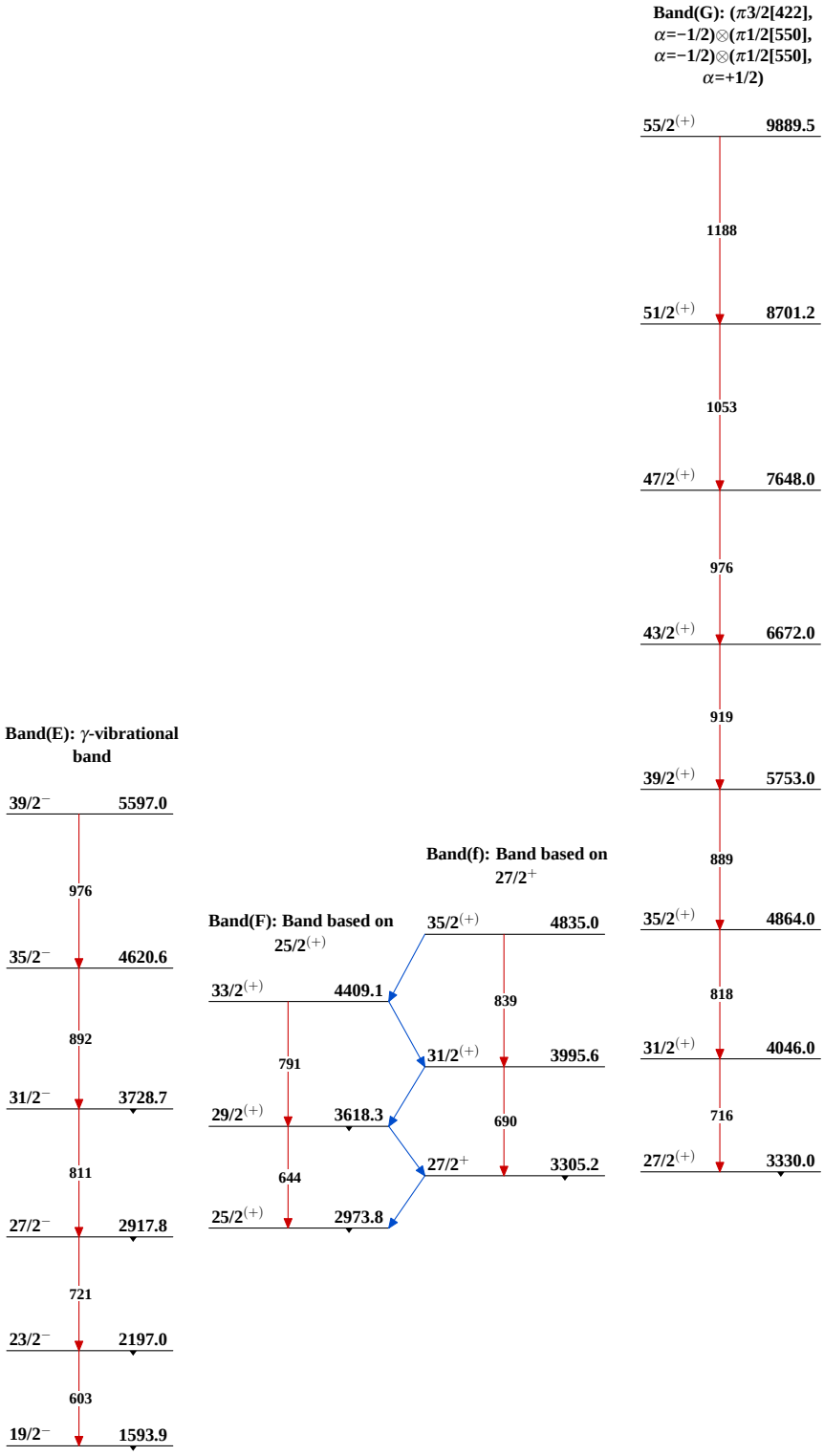
$^{123}_{55}Cs_{68}$

^{100}Mo(^{28}Si,p4nγ) 2005Si31,2004Si26



$^{123}_{55}Cs_{68}$

^{100}Mo(^{28}Si,p4nγ) 2005Si31,2004Si26 (continued)



^{108}Pd(^{19}F,4nγ),^{109}Ag(^{18}O,4nγ) 1992Hu02,1992Dr05

Measurements of ^{108}Pd(^{19}F,4nγ):

1992Hu02: E=76 MeV ^{19}F beam was produced from the Stony Brook FN tandem accelerator. Target was 2.5 mg/cm^2 ^{108}Pd rolled onto a Pb backing of 50 mg/cm^2. γ rays were detected with an array of six Ge detectors with BGO shields. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma(\theta)$. Deduced levels, J, π, band structures, configurations, γ ray multipolarities, mixing ratios. Comparisons with cranked-shell-model (CSM) calculations.

Measurements of ^{109}Ag(^{18}O,4nγ):

1992Dr05: E= 78 MeV ^{18}O beam was from the VICKSI accelerator at the Hahn-Meitner Institute. Target was 0.66 mg/cm^2 self-supporting ^{109}Ag (up to 99.4% enriched). Measured Doppler-shift recoil distance. Deduced $T_{1/2}$. Comparisons with theoretical calculations.

1987Ha03: E=82 MeV ^{18}O beam was from the Tandem van de Graaff in Riso, Denmark. γ rays were detected with four Compton-suppressed Ge detectors. Measured Eγ, $\gamma\gamma$-coin. Deduced yrast band.

Others: 1986ChZG, 1985ChZQ, 1984ChZV.

^{123}Cs Levels

$(7/2)^+$ bandhead of Band 1 and $(9/2^+)$ bandhead of Band 2: 1992Hu02 propose that the $(9/2^+)$ level (bandhead of Band 2) is at 296 keV and is de-excited by 201γ and 137γ with the latter assigned mult=E1 based on $\gamma(\theta)$ data and level scheme, and the $(7/2)^+$ level (bandhead of Band 1) is at a higher energy and linked to the 296 level by an unobserved and highly-converted low-energy transition. However, 2000Gi12 observed a preponderant M1 character for 137γ based on their ce data from ^{123}Ba ε decay. Together with the observations of both prompt and delayed transitions of 137γ and 201γ in their measurement of ^{115}In(^{12}C,4nγ), 2000Gi12 propose that the 137γ and 201γ de-excite a level at 231 keV with $J^\pi=7/2^+$, which is fed by an isomer at 231.7+x (x a few keV) with $T_{1/2}$=114 ns as the $(9/2^+)$ bandhead of Band 2. Later, 2004Si26 in ^{100}Mo(^{28}Si,4npγ) and 2004Si27 in ^{64}Ni(^{64}Ni,4npγ) propose the 328-keV level (proposed by 2000Gi12 as a separate level) to be the isomeric $(9/2^+)$ bandhead, based on the intensity balance of the feeding and de-exciting γ transitions (96.5γ and 233.5γ de-exciting the 328-keV level are seen in 2004Si26 with a thick target but not seen in 2004Si27 with a thin target due to ^{123}Cs nuclei recoiling into vacuum after reaction and decaying out of the detectors, supporting the 328-keV level being an isomer).

The level scheme here is based on that of 2000Gi12, 2004Si26 and 2004Si27, that is adopted in Adopted Levels, Gammas.

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$[#]	Comments
0.0	$1/2^+$		
31.0 *6*	$(3/2,5/2)^+$		
95.0 *3*	$(5/2)^+$		
156.7[c] *11*	$(11/2)^-$	1.7 s *2*	$T_{1/2}$: from Adopted Levels.
231.7[&] *5*	$(7/2)^+$		E(level): see comments above. In 1992Hu02, this level feeds the $(9/2^+)$ level and has unknown energy.
327.5[a] *7*	$(9/2^+)$	114 ns *5*	E(level): bandhead of the band based on $1g_{9/2}$. 1992Hu02 propose the $(9/2^+)$ bandhead at a 296 level (also 1979Ga02 in ^{116}Sn(^{10}B,3nγ)), de-excited by the 137γ and 201γ. See detailed comments above. $T_{1/2}$: from Adopted Levels.
477.3[c] *11*	$(15/2^-)$	40 ps *2*	
596.5[b] *7*	$(11/2^+)$	6.2[@] ps *14*	
660.0[&] *5*	$(11/2)^+$	18[@] ps *3*	
900.1[a] *7*	$(13/2^+)$	1.8[@] ps *8*	
999.7[c] *11*	$(19/2)^-$	3.2 ps *+3−6*	
1160.2[d] *11*	$(17/2^-)$		
1236.9[b] *7*	$(15/2^+)$		
1260.3[&] *6*	$(15/2^+)$		
1594.0[e] *11*	$(19/2^-)$		
1604.8[a] *7*	$(17/2^+)$		
1685.3[c] *11*	$(23/2)^-$	1.2 ps *6*	

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^{108}Pd(^{19}F,4nγ),^{109}Ag(^{18}O,4nγ) 1992Hu02,1992Dr05 (continued)

^{123}Cs Levels (continued)

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$[#]	Comments
1730.3[d] *11*	(21/2$^-$)	≤1.7 ps	
1994.5[b] *7*	(19/2$^+$)		
2003.5[&] *7*	(19/2$^+$)		
2197.1[e] *11*	(23/2$^-$)		
2410.6[a] *7*	(21/2$^+$)		
2436.9[d] *11*	(25/2$^-$)		
2486.1[c] *11*	(27/2)$^-$	≤1.4 ps	
2821.2[b] *7*	(23/2$^+$)		
2918.4[e] *11*	(27/2$^-$)		
3227.7[d] *12*	(29/2$^-$)		
3354.4[c] *12*	(31/2$^-$)		
3729.8[e] *12*	(31/2$^-$)		
4056.1[d] *12*	(33/2$^-$)		
4259.0[c] *12*	(35/2$^-$)		
4621.6[e] *12*	(35/2$^-$)		
5214.5[c] *12*	(39/2$^-$)		
6238.5[c] *12*	(43/2$^-$)		
7346.5[c] *16*	(47/2$^-$)		E(level),J$^\pi$: level from 1987Ha03.
8549.5[c] *19*	(51/2$^-$)		E(level),J$^\pi$: level from 1987Ha03.

[†] From a least-squares fit to γ-ray energies, unless otherwise noted.
[‡] Proposed in 1992Hu02, based on $\gamma(\theta)$, band assignments and RUL, unless otherwise noted.
[#] From recoil-distance method in 1992Dr05, unless otherwise noted.
[@] Effective half-life, not corrected for feeding lifetime (1992Dr05).
[&] Band(A): Band 1 based on 1g$_{7/2}$ (1992Hu02).
[a] Band(B): Band 2 based on 1g$_{9/2}$, α=+1/2 (1992Hu02).
[b] Band(b): Band 3 based on 1g$_{9/2}$, α=−1/2 (1992Hu02).
[c] Band(C): Band 4 based on 1h$_{11/2}$, α=−1/2 (1992Hu02).
[d] Band(c): Band 5 based on 1h$_{11/2}$, α=+1/2 (1992Hu02).
[e] Band(D): γ vibrational band based on 1h$_{11/2}$ (1992Hu02).

γ(^{123}Cs)

A$_2$ and A$_4$ under comments are from 1992Hu02.

E$_\gamma$[†]	I$_\gamma$[†]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[@]	δ[@]	α[&]	Comments
61.7		156.7	(11/2)$^-$	95.0	(5/2)$^+$	[E3]			E$_\gamma$: rounded value from Adopted Gammas; not observed in 1992Hu02.
95.0 *3*	20 *5*	95.0	(5/2)$^+$	0.0	1/2$^+$				
96.5[#]		327.5	(9/2$^+$)	231.7	(7/2)$^+$				
136.7[‡] *3*	27 *2*	231.7	(7/2)$^+$	95.0	(5/2)$^+$	D+Q	−0.04 *10*		Mult.: A$_2$=−0.09 *8*, A$_4$=0.03 *10*.
200.7[‡] *3*	55 *4*	231.7	(7/2)$^+$	31.0	(3/2,5/2)$^+$	(E2)		0.1640	Mult.: Q from A$_2$=+0.184 *57*, A$_4$=−0.038 *70*.
233.5[#]		327.5	(9/2$^+$)	95.0	(5/2)$^+$				

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^{108}Pd(^{19}F,4nγ),^{109}Ag(^{18}O,4nγ) 1992Hu02,1992Dr05 (continued)

$\gamma(^{123}Cs)$ (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult.@	δ@	α&	Comments
269.0 *2*	25 *1*	596.5	$(11/2^+)$	327.5	$(9/2^+)$	D+Q	+0.17 *2*		E_γ: from 1992Dr05. Other: 269.0 *3* (1992Hu02). Mult.: A_2=+0.027 *47*, A_4=+0.030 *97*.
303.7 *3*	14 *1*	900.1	$(13/2^+)$	596.5	$(11/2^+)$	D+Q	+0.14 *4*		E_γ: weighted average of 303.8 *3* (1992Hu02) and 303.6 *4* (1992Dr05). Mult.: A_2=−0.013 *49*, A_4=+0.039 *63*.
320.6 *2*	100	477.3	$(15/2^-)$	156.7	$(11/2)^-$	E2		0.0354	E_γ: weighted average of 320.5 *3* (1992Hu02) and 320.7 *2* (1992Dr05). Mult.: Q from A_2=+0.297 *28*, A_4=−0.043 *45*; M2 ruled out by RUL.
336.9 *3*	9 *1*	1236.9	$(15/2^+)$	900.1	$(13/2^+)$	D+Q	+0.18 *5*		Mult.: A_2=+0.044 *64*, A_4=+0.052 *81*.
367.9 *3*	4 *1*	1604.8	$(17/2^+)$	1236.9	$(15/2^+)$				
389.5 *3*	2 *1*	1994.5	$(19/2^+)$	1604.8	$(17/2^+)$				
410.5 *3*	1	2821.2	$(23/2^+)$	2410.6	$(21/2^+)$				
416.2 *3*	≈1	2410.6	$(21/2^+)$	1994.5	$(19/2^+)$				
428.3 *2*	34 *3*	660.0	$(11/2)^+$	231.7	$(7/2)^+$			0.0147	E_γ: from 1992Dr05. Other: 428.3 *3* (1992Hu02).
433.6 *3*	4 *1*	1594.0	$(19/2^-)$	1160.2	$(17/2^-)$				
466.6 *3*	≈1	2197.1	$(23/2^-)$	1730.3	$(21/2^-)$				
522.5 *2*	68 *3*	999.7	$(19/2)^-$	477.3	$(15/2^-)$	E2		0.00844	E_γ: from 1992Dr05. Other: 522.6 *3* (1992Hu02). Mult.: Q from A_2=+0.280 *40*, A_4=−0.024 *46*; M2 ruled out by RUL.
570.0 *3*	2 *1*	1730.3	$(21/2^-)$	1160.2	$(17/2^-)$				
572.4 *3*	<1	900.1	$(13/2^+)$	327.5	$(9/2^+)$				
600.3 *3*	30 *3*	1260.3	$(15/2^+)$	660.0	$(11/2)^+$				
602.9 *3*	2 *1*	2197.1	$(23/2^-)$	1594.0	$(19/2^-)$				
640.5 *3*	3 *1*	1236.9	$(15/2^+)$	596.5	$(11/2^+)$				
682.7 *3*	11 *2*	1160.2	$(17/2^-)$	477.3	$(15/2^-)$	D+Q	−0.36 *2*		Mult.: A_2=−0.653 *49*, A_4=+0.006 *67*.
685.6 *2*	43 *1*	1685.3	$(23/2)^-$	999.7	$(19/2)^-$	E2			E_γ: weighted average of 303.8 *3* (1992Hu02) and 303.6 *4* (1992Dr05). Mult.: Q from A_2=+0.429 *45*, A_4=+0.033 *51*; M2 ruled out by RUL.
701.7 *3*	≈1	4056.1	$(33/2^-)$	3354.4	$(31/2^-)$				
704.5 *3*	2 *1*	1604.8	$(17/2^+)$	900.1	$(13/2^+)$				
706.9 *3*	2 *1*	2436.9	$(25/2^-)$	1730.3	$(21/2^-)$				
721.0 *3*	2 *1*	2918.4	$(27/2^-)$	2197.1	$(23/2^-)$				
730.7 *2*	5 *1*	1730.3	$(21/2^-)$	999.7	$(19/2)^-$				E_γ: weighted average of 730.4 *3* (1992Hu02) and 730.9 *2* (1992Dr05).
734.2 *3*	5 *2*	1994.5	$(19/2^+)$	1260.3	$(15/2^+)$				E_γ: placed from a different $(19/2^+)$ level by 1992Hu02.
741.4 *3*	≈1	3227.7	$(29/2^-)$	2486.1	$(27/2)^-$				
743.2 *3*	6 *2*	2003.5	$(19/2^+)$	1260.3	$(15/2^+)$				
751.5 *3*	3 *1*	2436.9	$(25/2^-)$	1685.3	$(23/2)^-$				
757.9 *3*	2 *1*	1994.5	$(19/2^+)$	1236.9	$(15/2^+)$				
791.0 *3*	2 *1*	3227.7	$(29/2^-)$	2436.9	$(25/2^-)$				
800.6 *3*	18 *1*	2486.1	$(27/2)^-$	1685.3	$(23/2)^-$	E2			E_γ: 800.6 *2* (1992Dr05). Mult.: Q from A_2=+0.355 *51*, A_4=−0.043 *58*; M2 ruled out by RUL.
805.7 *3*	2 *1*	2410.6	$(21/2^+)$	1604.8	$(17/2^+)$				
811.4 *3*	≈1	3729.8	$(31/2^-)$	2918.4	$(27/2^-)$				
826.7 *3*	≈1	2821.2	$(23/2^+)$	1994.5	$(19/2^+)$				
828.4 *3*	≈1	4056.1	$(33/2^-)$	3227.7	$(29/2^-)$				
868.3 *3*	8 *1*	3354.4	$(31/2^-)$	2486.1	$(27/2)^-$	(E2)			Mult.: Q from A_2=+0.458 *48*, A_4=−0.057 *59*.

Continued on next page (footnotes at end of table)

^{108}Pd(^{19}F,4nγ),^{109}Ag(^{18}O,4nγ) 1992Hu02,1992Dr05 (continued)

γ(^{123}Cs) (continued)

E_γ [†]	I_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	Comments
891.8 *3*	<1	4621.6	(35/2$^-$)	3729.8	(31/2$^-$)	
904.63 *3*	3 *1*	4259.0	(35/2$^-$)	3354.4	(31/2$^-$)	
955.5 *3*	≈1	5214.5	(39/2$^-$)	4259.0	(35/2$^-$)	
1024.0 *3*	<1	6238.5	(43/2$^-$)	5214.5	(39/2$^-$)	
1108		7346.5	(47/2$^-$)	6238.5	(43/2$^-$)	E_γ: from 1987Ha03.
1116.6 *3*	≈1	1594.0	(19/2$^-$)	477.3	(15/2$^-$)	
1197.7 *3*	≈1	2197.1	(23/2$^-$)	999.7	(19/2)$^-$	
1203		8549.5	(51/2$^-$)	7346.5	(47/2$^-$)	E_γ: from 1987Ha03.
1233.3 *3*	≈1	2918.4	(27/2$^-$)	1685.3	(23/2)$^-$	
1243.8 *3*	≈1	3729.8	(31/2$^-$)	2486.1	(27/2)$^-$	

† From 1992Hu02, unless otherwise noted.
‡ This γ is placed from a 296-keV level by 1992Hu02 and the placement here is from 2000Gi12.
# Rounded values from Adopted Gammas. These γ rays are not reported by 1992Hu02, but unlabelled small peaks around these energies can be seen in the $\gamma\gamma$-coin spectrum gated on 304γ in Fig.1 of 1992Hu02, which match the peaks of these γ rays in the $\gamma\gamma$-coin spectrum gated on 304γ in Fig.2 of 2004Si26 in ^{100}Mo(^{28}Si,4npγ).
@ From 1992Hu02, based on $\gamma(\theta)$ and RUL (where $T_{1/2}$ available), unless otherwise noted.
& Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

^{108}Pd(^{19}F,4nγ),^{109}Ag(^{18}O,4nγ) 1992Hu02,1992Dr05

Level Scheme

Intensities: Relative I_γ

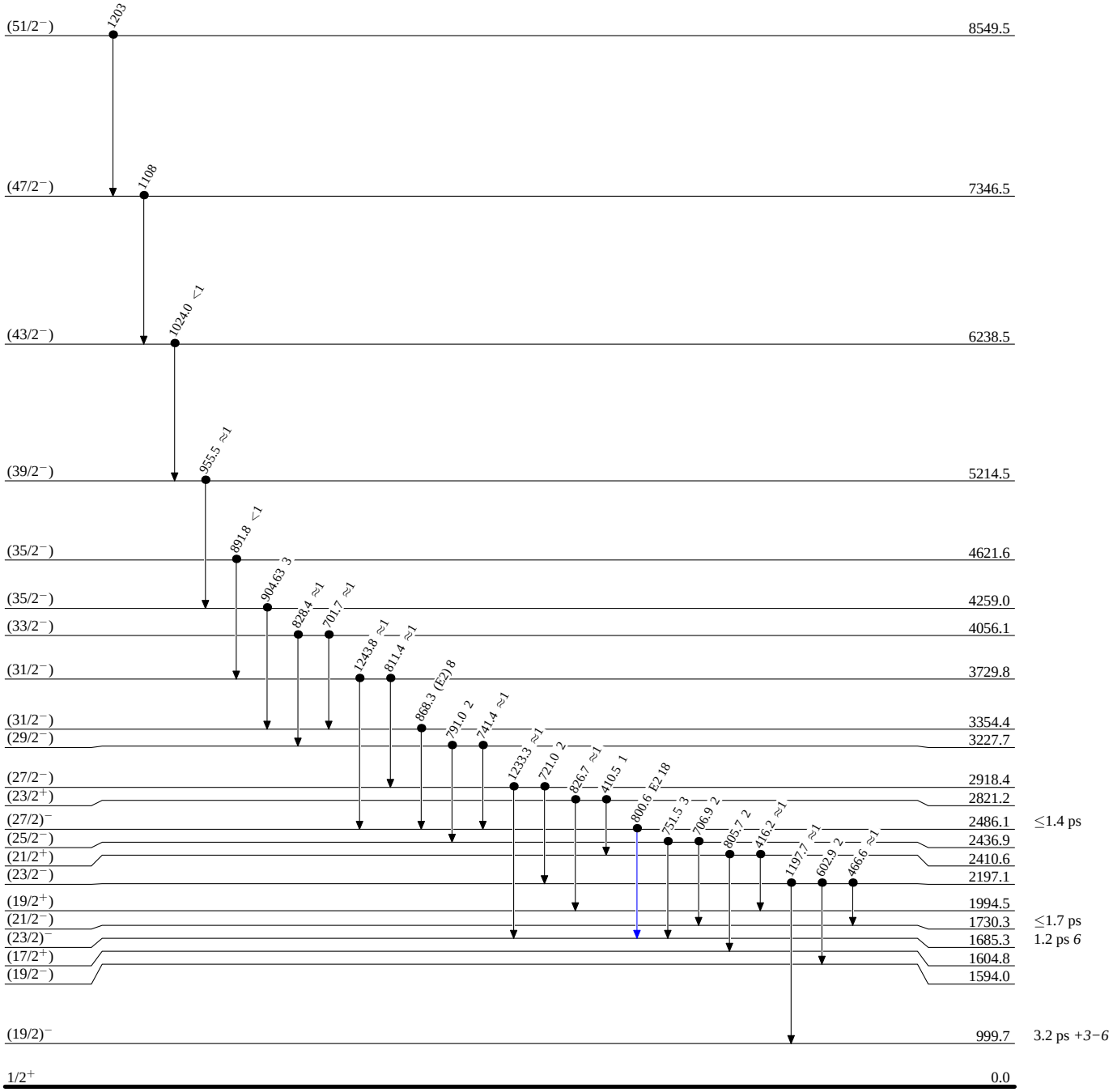
Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

Coincidence



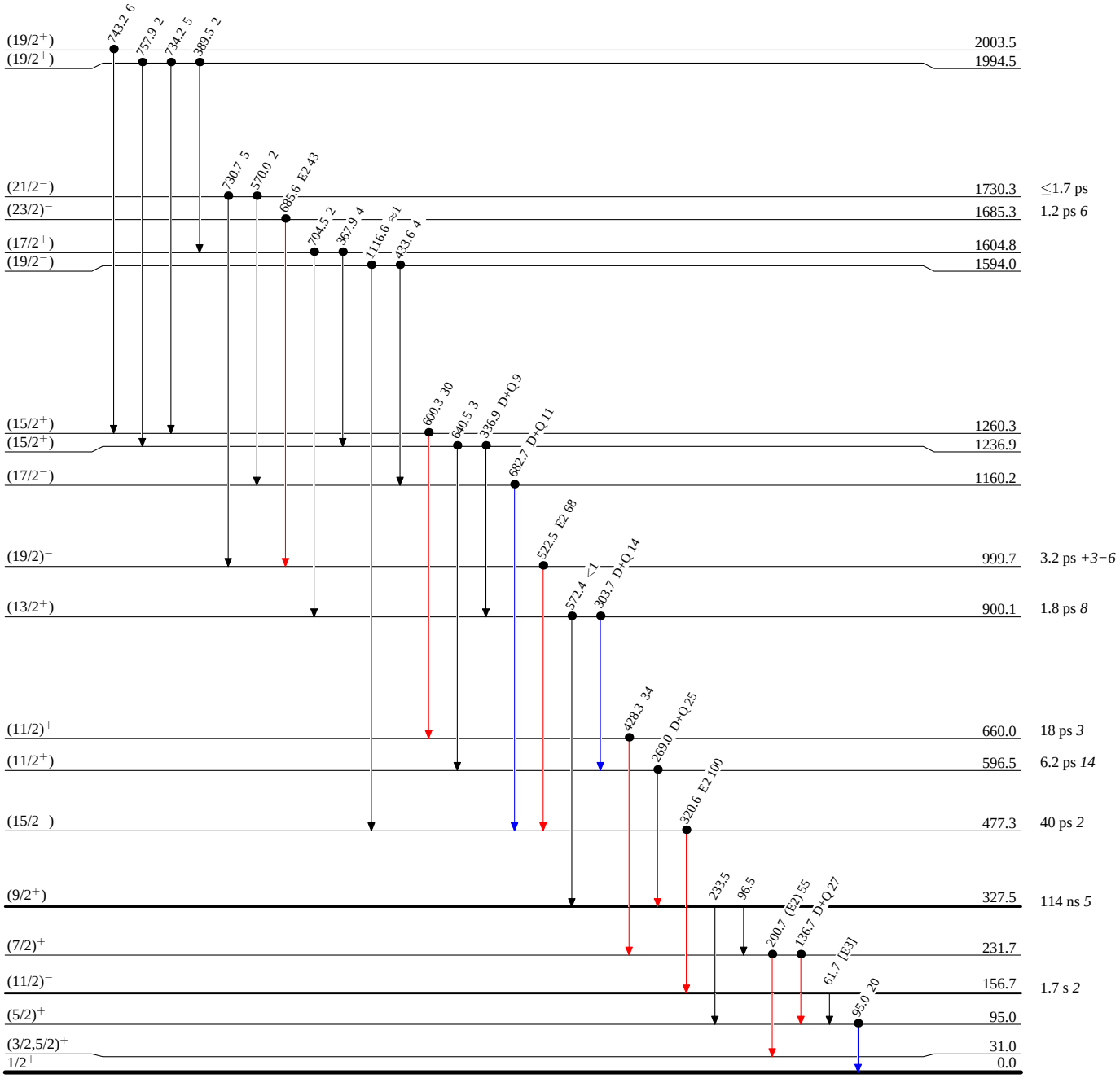
$^{123}_{55}Cs_{68}$

^{108}Pd(^{19}F,4nγ),^{109}Ag(^{18}O,4nγ) 1992Hu02,1992Dr05

Level Scheme (continued)

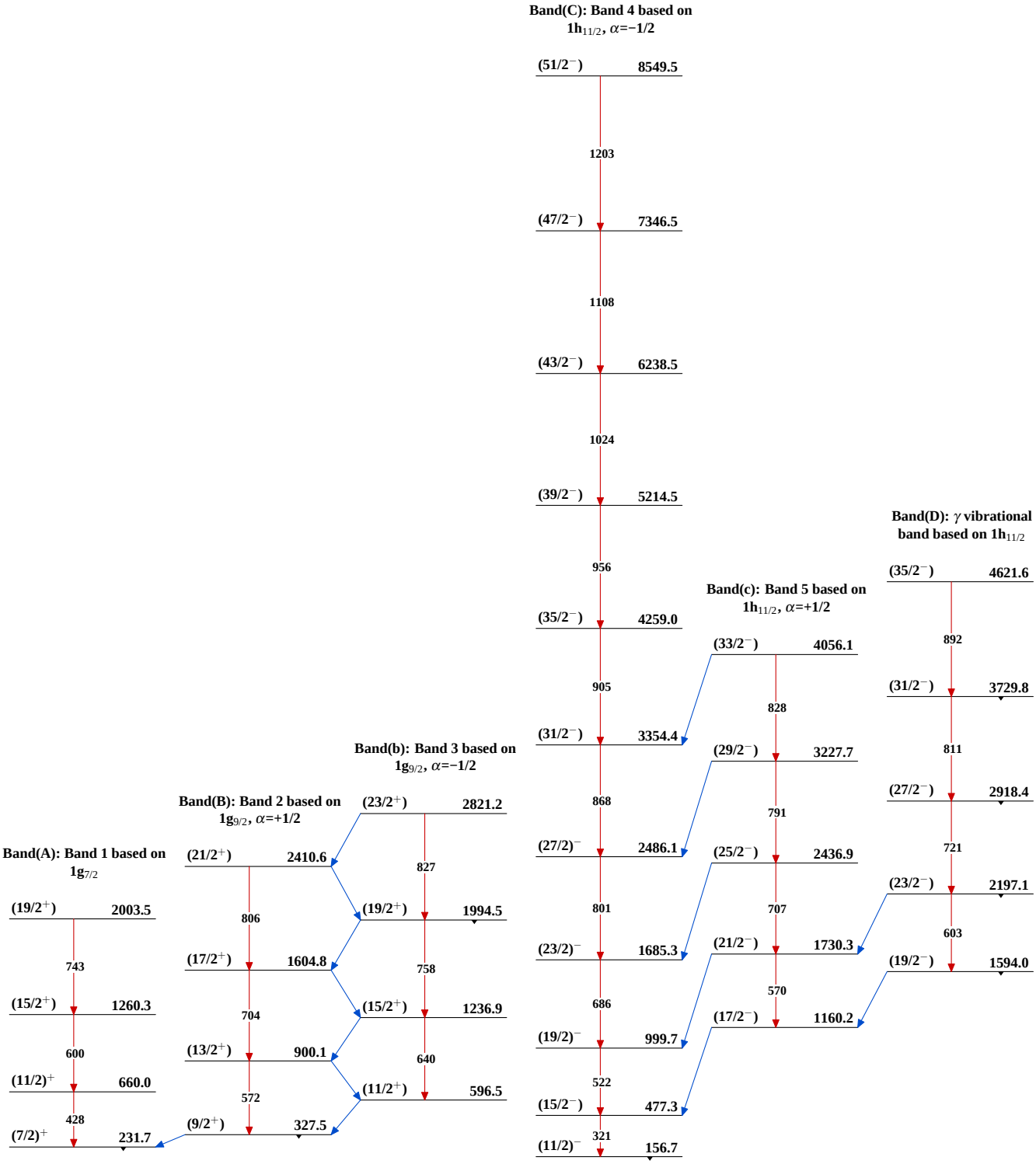
Intensities: Relative I_γ

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- Coincidence



$^{123}_{55}Cs_{68}$

^{108}Pd(^{19}F,4nγ),^{109}Ag(^{18}O,4nγ) 1992Hu02,1992Dr05



$^{123}_{55}Cs_{68}$

^{116}Sn(^{10}B,3nγ),^{114}Sn(^{12}C,p2nγ) 1979Ga02,1978Yo03,2000Gi12

Also includes ^{115}In(^{12}C,4nγ) from 1978Ti01 and 2000Gi12, and ^{112}Cd(^{14}N,3nγ) from 1979Ga02.

1979Ga02: ^{116}Sn(^{10}B,3nγ) E=44 MeV ^{10}B beam and 10.0 mg/cm^2 ^{116}Sn target; ^{112}Cd(^{14}N,3nγ) E=58 MeV ^{14}N beam and 3.0 mg/cm^2 ^{112}Cd target. Beams were produced from the Stony Brook FN tandem Van de Graaff accelerator. γ rays were detected with Ge(Li) detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma(\theta)$, excitation functions. Deduced levels, J, π, band structures, γ-ray multipolarities. Level scheme is based on results from ^{116}Sn(^{10}B,3nγ) as indicated in Fig.4 of 1979Ga02.

1978Yo03: ^{114}Sn(^{12}C,p2nγ) E=55-63 MeV ^{12}C beams were produced from the Grenoble variable-energy cyclotron. Targets were about 2 mg/cm^2 metallic ^{114}Sn (66.5% enriched) on lead backings. γ rays were detected with two coaxial Ge(Li) detectors and charged particles were detected with a silicon detector. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma(\theta)$, particle-γ-coin, excitation functions. Deduced levels, J, π, band structures.

1978Ti01: ^{115}In(^{12}C,4nγ) E=72 MeV ^{12}C beam was produced from the University of Michigan cyclotron. Target was about 15 mg/cm^2 thick self-supporting natural indium (enriched 95.7% in ^{115}In). γ rays were detected with two coaxial Ge(Li) detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma(\theta)$. Deduced levels, band structure.

2000Gi12: ^{115}In(^{12}C,4nγ) E=57 MeV ^{12}C beam was produced from the Orsay MP-Tandem accelerator. Target was a thin self-supporting natural indium of 400 μg/cm^2 thickness. Recoiling ions were collected on a thin aluminum catcher placed 7 cm downstream from the target (corresponding to a time of flight of 27 ns). Prompt γ rays were detected with two Ge detectors close to the target and delayed γ rays were detected with a Ge detector placed near to the catcher, both started by a halo of six BaF_2 fast scintillators surrounding the target, which detected the burst of γ rays following each heavy-ion reaction. Measured Eγ, Iγ, $\gamma\gamma$-coin, γ(t). Deduced halflife of a new isomer.

^{123}Cs Levels

$(7/2)^+$ bandhead of Band 1 and $(9/2^+)$ bandhead of Band 2: 1979Ga02 propose that the $(9/2^+)$ level (bandhead of Band 2) is at 296 keV and is de-excited by 201γ and 137γ (also proposed by 1992Hu02 in ^{118}Pd(^{19}F,4nγ). However, with the observations of both prompt and delayed transitions of 137γ and 201γ in their measurement of ^{115}In(^{12}C,4nγ), 2000Gi12 propose that the 137γ and 201γ de-excite a level at 231 keV with $J^\pi=7/2^+$, which is fed by an isomer at 231.7+x (x a few keV) with $T_{1/2}$=114 ns as the $(9/2^+)$ bandhead of Band 2. Later, 2004Si26 in ^{100}Mo(^{28}Si,4npγ) and 2004Si27 in ^{64}Ni(^{64}Ni,4npγ) propose the 328-keV level (proposed by 2000Gi12 as a separate level) to be the isomeric $(9/2^+)$ bandhead, based on the intensity balance of the feeding and de-exciting γ transitions (96.5γ and 233.5γ de-exciting the 328-keV level are seen in 2004Si26 with a thick target but not seen in 2004Si27 with a thin target due to ^{123}Cs nuclei recoiling into vacuum after reaction and decaying out of the detectors, supporting the 328-keV level being an isomer).

The level scheme here is based on that of 2000Gi12, 2004Si26 and 2004Si27, that is adopted in Adopted Levels, Gammas.

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	Comments
0.0	$1/2^{(+)}$		
30.4 *6*	$(3/2^+)$		E(level): Rounded value from Adopted Levels.
94.7 *3*	$5/2^{(+)}$		
156.4[a] *11*	$11/2^{(-)}$	1.7 s *2*	$T_{1/2}$: from Adopted Levels.
231.6[#] *5*	$(7/2^+)$		E(level): level proposed by 2000Gi12. This level is not reported in 1979Ga02 and other studies in this dataset. The de-exciting 137γ and 201γ are placed from a 296-keV level as the bandhead of the band based on $1g_{9/2}$ by 1979Ga02. see detailed comments above.
328.2[@] *8*	$(9/2^+)$	114 ns *5*	E(level): bandhead of the band based on $1g_{9/2}$. 1979Ga02 propose the $(9/2^+)$ bandhead at a 296 level (also 1992Hu02 in ^{108}Pd(^{19}F,4nγ)), de-excited by the 137γ and 201γ; 2000Gi12 proposed this bandhead at a 231.6+x level with an isomeric halflife; 2004Si26 and 2004Si27 propose the isomeric bandhead is the same level as the 328 level also seen in 2000Gi12. See detailed comments above. $T_{1/2}$: from 137γ(t) and 201γ(t) for the 231.6+x isomer in 2000Gi12.
476.9[a] *11*	$(15/2^-)$		
597.3[&] *9*	$(11/2^+)$		
659.6[#] *6*	$(11/2^+)$		
900.8[@] *9*	$(13/2^+)$		

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^{116}Sn(^{10}B,3nγ),^{114}Sn(^{12}C,p2nγ) 1979Ga02,1978Yo03,2000Gi12 (continued)

^{123}Cs Levels (continued)

E(level)[†]	J$^\pi$[‡]	Comments
999.1[a] *12*	(19/2$^-$)	
1159.4 *12*	(17/2$^-$)	
1237.7[&] *9*	(15/2$^+$)	
1258.6[#] *12*	(15/2$^+$)	
1593.4 *12*	(19/2$^-$)	
1605.2[@] *9*	(17/2$^+$)	
1684.3[a] *12*	(23/2$^-$)	
1729.3 *12*	(21/2$^-$)	
1993.9[&] *10*	(19/2$^+$)	
2298?		
2484.4[a] *12*	(27/2$^-$)	
3352.4[a] *13*	(31/2$^-$)	E(level): level from 1978Yo03, not reported in 1979Ga02.

[†] From a least-squares fit to γ-ray energies, unless otherwise noted.
[‡] From Adopted Levels. Energies are rounded values.
[#] Band(A): Band 1 based on (7/2$^+$). 1979Ga02 constructed this band based on a 296-keV level from which they claim the 137γ and 201γ are from. Now the bandhead is adopted to be the 232 level that is deexcited by the 137γ and 201γ. See detailed comments for the 232 and 328 levels.
[@] Band(B): Band 2 based on (9/2$^+$), α=+1/2. 1979Ga02 constructed this band based on a 296-keV level. Now the bandhead is adopted to be the 328 level.
[&] Band(b): Band 3 based on (9/2$^+$), α=−1/2.
[a] Band(C): Band 4 based on 11/2$^{(-)}$.

γ(^{123}Cs)

E$_\gamma$[†]	I$_\gamma$[†]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[‡]	δ[‡]	Comments
61.7		156.4	11/2$^{(-)}$	94.7	5/2$^{(+)}$	[E3]		E$_\gamma$: from Adopted Gammas. other: 64 from 1979Ga02.
94.7 *3*		94.7	5/2$^{(+)}$	0.0	1/2$^{(+)}$			E$_\gamma$: doublet in 1979Ga02; could include the 96.5γ from 328 level.
96.5[@]		328.2	(9/2$^+$)	231.6	(7/2$^+$)			
136.9[#] *3*	10	231.6	(7/2$^+$)	94.7	5/2$^{(+)}$			A$_2$=−0.30 *5* (1979Ga02).
201.2[#] *3*	16	231.6	(7/2$^+$)	30.4	(3/2$^+$)			A$_2$=+0.30 *15*, A$_4$=+0.03 *18* (1979Ga02).
233.5[@]		328.2	(9/2$^+$)	94.7	5/2$^{(+)}$			
269.0 *3*	21	597.3	(11/2$^+$)	328.2	(9/2$^+$)	D+Q	≈+0.2	E$_\gamma$,I$_\gamma$: other: Eγ=269.1, Iγ=16 (1978Yo03). Mult.,δ: A$_2$=+0.13 *4*, A$_4$=+0.02 *5* (1979Ga02). A$_2$=+0.19 *7* (1978Yo03).
303.3 *3*	16	900.8	(13/2$^+$)	597.3	(11/2$^+$)	D+Q	≈+0.2	E$_\gamma$,I$_\gamma$: other: Eγ=303.7, Iγ=9 (1978Yo03). Mult.,δ: A$_2$=+0.08 *5*, A$_4$=−0.08 *7* (1979Ga02). A$_2$=+0.12 *6* (1978Yo03).
320.5 *3*	100	476.9	(15/2$^-$)	156.4	11/2$^{(-)}$			E$_\gamma$: weighted average of 320.6 *3* (1979Ga02) and 320.4 *4* (1978Ti01). Other: 320.6 (1978Yo03). I$_\gamma$: other: 100 (1978Yo03). A$_2$=+0.34 *8*, A$_4$=−0.04 *10* (1979Ga02). A$_2$=+0.32 *4* (1978Yo03). A$_2$=+0.50 *10*, A$_4$=−0.22 *13* (1978Ti01).
337.0 *3*	12	1237.7	(15/2$^+$)	900.8	(13/2$^+$)	D+Q	≈+0.2	E$_\gamma$,I$_\gamma$: other: Eγ=337.0, Iγ=7 (1978Yo03). Mult.,δ: A$_2$=+0.03 *4*, A$_4$=−0.02 *6* (1979Ga02). A$_2$=+0.15 *7* (1978Yo03).

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^{116}Sn(^{10}B,3nγ),^{114}Sn(^{12}C,p2nγ) 1979Ga02,1978Yo03,2000Gi12 (continued)

γ(^{123}Cs) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	Comments
367.4 *3*	5	1605.2	(17/2$^+$)	1237.7	(15/2$^+$)			E_γ,I_γ: other: Eγ=366.3, Iγ=5 (1978Yo03). A_2=+0.08 *5* (1979Ga02).
388.6 *3*	4	1993.9	(19/2$^+$)	1605.2	(17/2$^+$)			E_γ,I_γ: other: Eγ=388.8, Iγ=3 (1978Yo03). A_2=+0.04 *3* (1979Ga02).
428.0 *3*	10	659.6	(11/2$^+$)	231.6	(7/2$^+$)			E_γ: placed from a 724, (13/2$^+$) level in 1979Ga02. A_2=+0.30 *6*, A_4=+0.01 *8* (1979Ga02).
434.0 *3*	6	1593.4	(19/2$^-$)	1159.4	(17/2$^-$)			
522.2 *3*	69	999.1	(19/2$^-$)	476.9	(15/2$^-$)			E_γ: weighted average of 522.2 *3* (1979Ga02) and 522.3 *4* (1978Ti01). Other: 522.4 (1978Yo03). I_γ: other: 71 (1978Yo03). A_2=+0.35 *4*, A_4=−0.08 *5* (1979Ga02). A_2=+0.36 *4* (1979Ga02). A_2=+0.38 *3*, A_4=−0.10 *4* (1978Ti01).
572.8 *3*	9	900.8	(13/2$^+$)	328.2	(9/2$^+$)			E_γ,I_γ: other: Eγ=572.7, Iγ=9 (1978Yo03). A_2=+0.30 *3* (1979Ga02).
599		1258.6	(15/2$^+$)	659.6	(11/2$^+$)			E_γ: doublet in 1979Ga02; placed from a 1323 level in 1979Ga02.
640.3 *3*	9	1237.7	(15/2$^+$)	597.3	(11/2$^+$)			E_γ,I_γ: other: Eγ=640, Iγ=8 (1978Yo03). A_2=+0.15 *9* (1979Ga02).
682.5 *3*	20	1159.4	(17/2$^-$)	476.9	(15/2$^-$)			A_2=−0.29 *6*, A_4=−0.02 *8* (1979Ga02).
685.2 *3*	36	1684.3	(23/2$^-$)	999.1	(19/2$^-$)			E_γ: weighted average of 685.2 *3* (1979Ga02) and 685.3 *4* (1978Ti01). Other: 685.5 (1978Yo03). I_γ: other: 36 (1978Yo03). A_2=+0.30 *4*, A_4=−0.03 *5* (1979Ga02). A_2=+0.31 *1* (1978Yo03). A_2=+0.46 *5*, A_4=−0.10 *6* (1978Ti01).
701[&]		2298?		1593.4	(19/2$^-$)			
705		1605.2	(17/2$^+$)	900.8	(13/2$^+$)			E_γ: other: 703 (1978Yo03). I_γ: I(703γ)/I(367γ)=8/5 (1978Yo03).
730.2 *3*	15	1729.3	(21/2$^-$)	999.1	(19/2$^-$)	D+Q	≈−0.27	E_γ,I_γ: other: Eγ=730.7, Iγ=14 (1978Yo03). Mult.: A_2=−0.60 *5*, A_4=+0.17 *9* (1979Ga02). A_2=−0.51 *3* (1978Yo03).
757		1993.9	(19/2$^+$)	1237.7	(15/2$^+$)			E_γ: weak γ in 1979Ga02. Other: 755 (1978Yo03). I_γ: I(755γ)/I(388.8γ)=9/3 (1978Yo03).
800.1 *3*	14	2484.4	(27/2$^-$)	1684.3	(23/2$^-$)			E_γ: weighted average of 800.0 *3* (1979Ga02) and 800.3 *4* (1978Ti01). Other: 800.7 (1978Yo03). I_γ: other: 20 (1978Yo03). A_2=+0.23 *5*, A_4=−0.09 *7* (1979Ga02). A_2=+0.13 *20* (1978Yo03). A_2=+0.40 *7*, A_4=+0.22 *9* (1978Ti01) (A_4>0 inconsistent with ΔJ=2).
868.0 *4*		3352.4	(31/2$^-$)	2484.4	(27/2$^-$)			E_γ: from 1978Ti01. Other: 870 from 1978Yo03. I_γ: 7 (1978Yo03). A_2=+0.37 *18* (1978Yo03). A_2=+0.30 *16*, A_4=+0.21 *19* (1978Ti01) (A_4>0 inconsistent with ΔJ=2).

[†] From 1979Ga02, unless otherwise noted.
[‡] From $\gamma(\theta)$ in 1979Ga02, unless otherwise noted.
[#] This γ is placed from a 296-keV level by 1979Ga02 and the placement here is from 2000Gi12.
[@] Rounded values from Adopted Gammas; not reported by 1979Ga02 and 2000Gi12.
[&] Placement of transition in the level scheme is uncertain.

^{116}Sn(^{10}B,3nγ),^{114}Sn(^{12}C,p2nγ) 1979Ga02,1978Yo03,2000Gi12

Level Scheme

Intensities: Relative I_γ

Legend

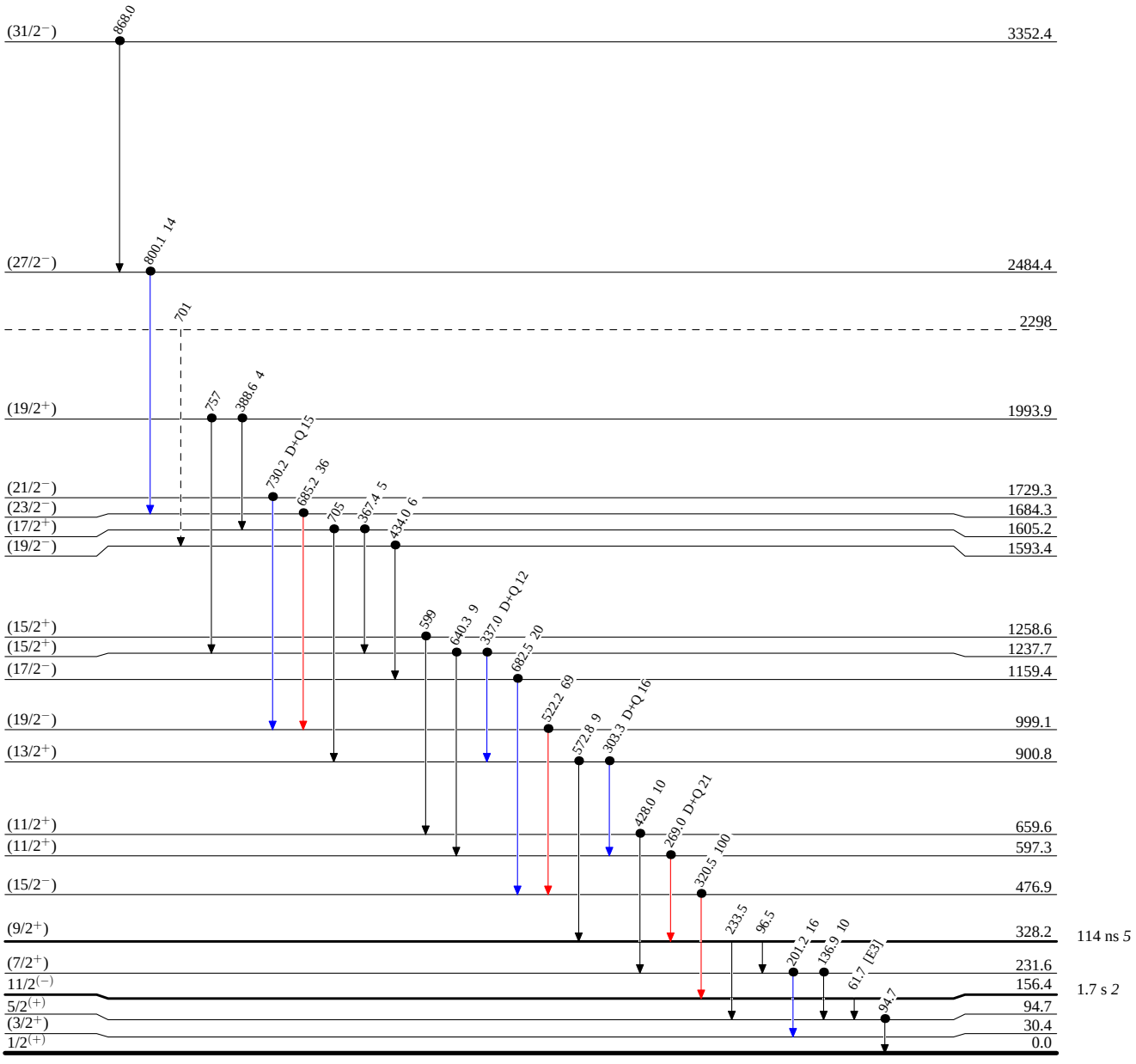
$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

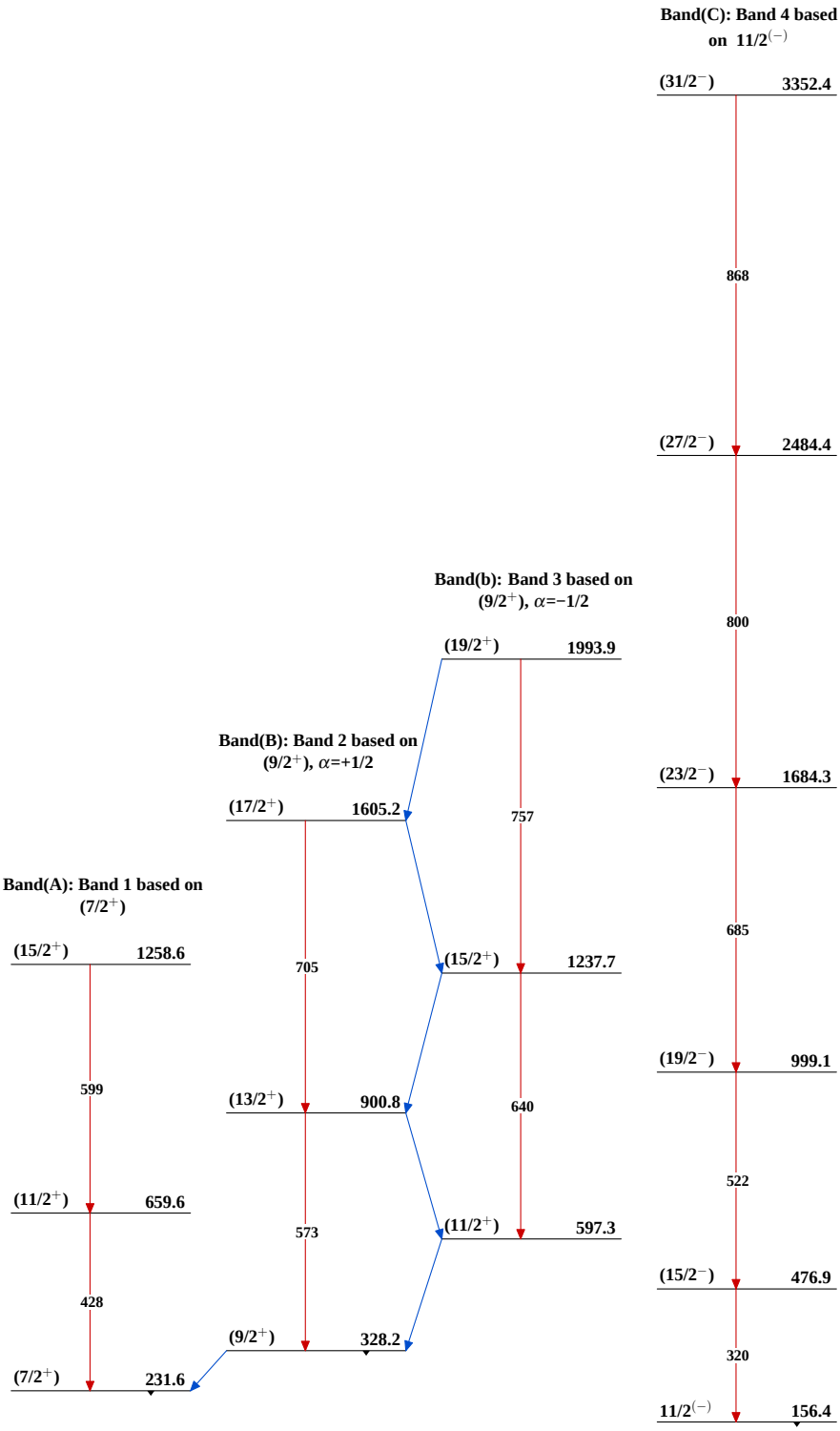
γ Decay (Uncertain)

Coincidence



$^{123}_{55}Cs_{68}$

^{116}Sn(^{10}B,3nγ),^{114}Sn(^{12}C,p2nγ) 1979Ga02,1978Yo03,2000Gi12



$^{123}_{55}Cs_{68}$

Adopted Levels, Gammas

Q(β^-)=−7000 *syst*; S(n)=9120 *30*; S(p)=4800 *40*; Q(α)=715 *16* 2021Wa16
ΔQ(β^-)=200 (syst,2021Wa16).
S(2n)=21050 *140*, S(2p)=7752 *16*, Q(εp)=2411 *16* (2021Wa16).
Mass measurement: mass excess=−75659 *13* (2000Be42, 1997Be63). Other: −75720 *100* deduced by 1996Os04 from measured Q(ε)=5330 *100* and known mass excess=−81053 *12* for ^{123}Cs.
Structure calculations: 2011Bh03, 1991Bu03, 1990Hs01, 1988Re06, 1987Al21, 1982Cu03, 1976Iv02.

^{123}Ba Levels

Band assignments are from (^{19}F,3npγ) (2016Ch30), unless otherwise noted.

Cross Reference (XREF) Flags

- A ^{123}La ε decay
- B ^{94}Mo(^{32}S,2pnγ),^{74}Se(^{52}Cr,2pnγ)
- C ^{108}Cd(^{19}F,3npγ)
- D ^{114}Sn(^{12}C,3nγ)

E(level)[†]	J$^\pi$	T$_{1/2}$	XREF	Comments
0.0[&]	5/2$^{(+)}$	2.4 min *4*	ABCD	%ε+%β^+=100 μ=−0.680 *1*; Q=+1.49 *12* Configuration=5/2$^+$[402]. J$^\pi$: spin from laser spectroscopy on atomic beam (1983Mu12); parity from systematics of magnetic moment in Te and Xe isotopes. T$_{1/2}$: weighted average of 2.7 min *4* (1975Ar31) and 2.0 min *5* (1962Pr09). μ,Q: from laser spectroscopy on atomic beam; value relative to ^{135,137}Ba (1988We14). Other: μ=−0.687 *18*, Q=1.52 *13*, from 1983Mu12 using laser spectroscopy, relative to ^{138}Ba. See also 2014StZZ and 2016St14 compilations. Isotope shift=603 MHz *9* relative to ^{138}Ba (1983Mu12). Nuclear rms charge radius=4.8135 fm *55* (2013An02).
92.68[a] *10*	(7/2$^-$)	≈40 ns	ABCD	Configuration=7/2$^-$[523]. J$^\pi$: 92.7γ ΔJ=1, D to 5/2$^{(+)}$; band assignment. T$_{1/2}$: from γ(t) in (^{12}C,3nγ).
120.98[‡] *23*	(1/2$^+$)	0.83 μs *6*	A C	%IT=100 Configuration=1/2$^+$[411]. J$^\pi$: systematics of K=1/2$^+$ band in odd-A Ba isotope. T$_{1/2}$: from $\beta\gamma$(t) in ^{123}La ε decay (1991Ii02).
153.74[#] *17*	(3/2$^+$)		A C	J$^\pi$: 153.6γ ΔJ=1, M1 to 5/2$^{(+)}$; band assignment.
169.00[@] *13*	(7/2$^+$)		ABCD	J$^\pi$: 169.0γ ΔJ=1, D to 5/2$^{(+)}$; band assignment.
202.63[b] *13*	(9/2$^-$)		ABCD	J$^\pi$: 110.0γ (D+Q) to (7/2$^-$); band assignment.
328.06[‡] *16*	(5/2$^+$)		A C	J$^\pi$: 207.0γ ΔJ=2, Q to (1/2$^+$); band assignment.
335.76[a] *17*	(11/2$^-$)		ABCD	J$^\pi$: 243.1γ ΔJ=2, Q to (7/2$^-$); band assignment.
374.23[&] *17*	(9/2$^+$)		ABCD	J$^\pi$: 205.2γ (D+Q) to (7/2$^+$); band assignment.
397.48[#] *15*	(7/2$^+$)		A C	J$^\pi$: 243.6γ M1,E2 to (3/2$^+$), 228.5γ to (7/2$^+$); band assignment.
460.9 *4*			A	J$^\pi$: (9/2$^+$) proposed by 1991Ii02 in ^{123}La ε decay.
482.30 *23*			A	
564.50 *24*			A	
582.57[b] *18*	(13/2$^-$)		ABCD	J$^\pi$: 246.8γ (D+Q) to (11/2$^-$); band assignment.
612.15[@] *19*	(11/2$^+$)		ABCD	J$^\pi$: 443.1γ ΔJ=2, Q to (7/2$^+$), 238.0γ (D+Q) to (9/2$^+$); band assignment.
695.28[‡] *22*	(9/2$^+$)		A C	J$^\pi$: 297.8γ to (7/2$^+$); band assignment.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{123}Ba Levels (continued)

E(level)†	Jπ	XREF	Comments
721.42 *21*	(7/2⁻,9/2,11/2⁻)	A	Jπ: 628.6γ to (7/2⁻), 385.8γ to (11/2⁻).
756.75[a] *22*	(15/2⁻)	BCD	Jπ: 421.3γ ΔJ=2, Q to (11/2⁻), 174.2γ (D+Q) to (13/2⁻); band assignment.
790.86[#] *24*	(11/2⁺)	A C	Jπ: 393.3γ ΔJ=2, Q to (7/2⁺); band assignment.
799.45 *24*		A	
877.70[&] *22*	(13/2⁺)	BC	Jπ: 503.4γ ΔJ=2, Q to (9/2⁺), 265.7γ to (11/2⁺); band assignment.
1091.0 *3*		A	
1136.73[b] *23*	(17/2⁻)	BCD	Jπ: 554.2γ (Q) to (13/2⁻), 380.0γ to (15/2⁻); band assignment.
1171.90[@] *22*	(15/2⁺)	BC	Jπ: 589.4γ ΔJ=2, Q to (11/2⁺), 294.1γ to (13/2⁺); band assignment.
1308.5[#] *3*	(15/2⁺)	C	Jπ: 517.6γ ΔJ=2, Q to (11/2⁺); band assignment.
1325.63[a] *25*	(19/2⁻)	BCD	Jπ: 568.9γ ΔJ=2, Q to (15/2⁻), 188.9γ to (17/2⁻); band assignment.
1480.94[&] *24*	(17/2⁺)	BC	Jπ: 603.2γ ΔJ=2, Q to (13/2⁺), 309.1γ to (15/2⁺); band assignment.
1818.4[@] *3*	(19/2⁺)	BC	Jπ: 646.5γ ΔJ=2, Q to (15/2⁺), 337.4γ to (17/2⁺); band assignment.
1830.1[b] *4*	(21/2⁻)	BCD	Jπ: 694.7γ (Q) to (17/2⁻), 504.5γ to (19/2⁻); band assignment.
1926.0[#] *4*	(19/2⁺)	C	Jπ: 617.4γ ΔJ=2, Q to (15/2⁺); band assignment.
2018.1[a] *3*	(23/2⁻)	BCD	Jπ: 692.5γ ΔJ=2, Q to (19/2⁻), 188.0γ to (21/2⁻); band assignment.
2154.47[&] *25*	(21/2⁺)	BC	Jπ: 673.5γ ΔJ=2, Q to (17/2⁺), 828.9γ to (19/2⁻); band assignment.
2515.9[@] *4*	(23/2⁺)	BC	Jπ: 697.8γ ΔJ=2, Q to (19/2⁺), 686.1γ to (21/2⁻); band assignment.
2613.2[#] *5*	(23/2⁺)	C	Jπ: 686.7γ ΔJ=2, Q to (19/2⁺); band assignment.
2614.4[b] *4*	(25/2⁻)	BC	Jπ: 784.3γ to (21/2⁻); band assignment.
2798.1[a] *4*	(27/2⁻)	BCD	Jπ: 780.0γ ΔJ=2, Q to (23/2⁻), 183.7γ to (25/2⁻); band assignment.
2863.9[&] *3*	(25/2⁺)	BC	Jπ: 709.4γ ΔJ=2, Q to (21/2⁺), 854.8γ to (23/2⁻); band assignment.
3188.9[@] *5*	(27/2⁺)	C	Jπ: 673.4γ ΔJ=2, Q to (23/2⁺), 575.2γ to (25/2⁻); band assignment.
3242? *1*		B	Jπ: (27/2⁺) from proposed band structure in (^{32}S,2pnγ).
3341.3[#] *7*	(27/2⁺)	C	Jπ: 728.1γ to (23/2⁺); band assignment.
3350.4[b] *5*	(29/2⁻)	BC	Jπ: 736.0γ to (25/2⁻), 552.3γ to (27/2⁻); band assignment.
3582?[&] *1*	(29/2⁺)	B	E(level),Jπ: band assignment from (^{32}S,2pnγ).
3591.7[a] *6*	(31/2⁻)	BC	Jπ: 793.4γ to (27/2⁻); band assignment.
4000.6[b] *7*	(33/2⁻)	BC	Jπ: 650.4γ to (29/2⁻); band assignment.
4360.7[a] *7*	(35/2⁻)	BC	Jπ: 768.9γ to (31/2⁻); band assignment.
4763.1[b] *9*	(37/2⁻)	B	Jπ: band assignment.
5210.9[a] *10*	(39/2⁻)	B	Jπ: band assignment.
5672.0[b] *11*	(41/2⁻)	B	Jπ: band assignment.
6174.0[a] *12*	(43/2⁻)	B	Jπ: band assignment.
6716.0[b] *15*	(45/2⁻)	B	Jπ: band assignment.
7243.0[a] *16*	(47/2⁻)	B	Jπ: band assignment.
7880.0[b] *18*	(49/2⁻)	B	Jπ: band assignment.
8400.0[a] *19*	(51/2⁻)	B	Jπ: band assignment.
9131?[b] *2*	(53/2⁻)	B	Jπ: band assignment.
9605.0?[a] *21*	(55/2⁻)	B	Jπ: band assignment.
10839.0?[a] *24*	(59/2⁻)	B	Jπ: band assignment.
12146[a] *3*	(63/2⁻)	B	Jπ: band assignment.
13549[a] *3*	(67/2⁻)	B	Jπ: band assignment.

† From a least-squares fit to γ-ray energies.
‡ Band(A): Band 1, configuration=$\nu s_{1/2}$, α=+1/2. Nilsson orbit=1/2[411] (1988Wy02).
# Band(a): Band 2, configuration=$\nu s_{1/2}$, α=−1/2. Nilsson orbit=1/2[411] (1988Wy02).

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Adopted Levels, Gammas (continued)

^{123}Ba Levels (continued)

@ Band(B): Band 3, configuration=$\nu(d_{5/2}+g_{7/2})$, $\alpha=-1/2$. Nilsson orbit=5/2[402] (1988Wy02).
& Band(b): Band 4, configuration=$\nu(d_{5/2}+g_{7/2})$, $\alpha=+1/2$. Nilsson orbit=5/2[402] (1988Wy02). Band assignments above $(35/2^-)$ are from (^{32}S,2pnγ) (1988Wy02).
a Band(C): Band 5, configuration=$\nu h_{11/2}$, $\alpha=-1/2$. Nilsson orbit=7/2[523] (1988Wy02). Band assignments above $(33/2^-)$ are from (^{32}S,2pnγ) (1988Wy02).
b Band(c): Band 6, configuration=$\nu h_{11/2}$, $\alpha=+1/2$. Nilsson orbit=7/2[523] (1988Wy02).

$\gamma(^{123}Ba)$

E_i(level)	J_i^π	E_γ†	I_γ†	E_f	J_f^π	Mult.#	α@	Comments
92.68	$(7/2^-)$	92.7 *1*	100	0.0	$5/2^{(+)}$	(E1)	0.282	E_γ: weighted average of 92.5 *3* from ^{123}La ε decay, 92.5 *2* from (^{19}F,3npγ), and 92.7 *1* from (^{12}C,3nγ). Mult.: D from $\gamma\gamma$(DCO) in (^{19}F,3npγ); (E1) from level scheme. Other: (D+Q) from $\gamma(\theta)$ in (^{12}C,3nγ).
120.98	$(1/2^+)$	120.9‡ *3*	100	0.0	$5/2^{(+)}$	(E2)	0.993	B(E2)(W.u.)=0.36 *3* Mult.: E2 or M1+E2 from ce data in ^{123}La ε decay; (E2) from level scheme.
153.74	$(3/2^+)$	153.6 *3*	100	0.0	$5/2^{(+)}$	M1		E_γ: weighted average of 153.6 *3* from ^{123}La ε decay and 153.6 *5* from (^{19}F,3npγ). Mult.: M1,E2 from ce data in ^{123}La ε decay; D from $\gamma\gamma$(DCO) in (^{19}F,3npγ).
169.00	$(7/2^+)$	169.0 *2*	100	0.0	$5/2^{(+)}$	(M1)		E_γ: weighted average of 169.0 *3* from ^{123}La ε decay, 169.0 *2* from (^{19}F,3npγ), and 169.6 *10* from (^{12}C,3nγ). Mult.: D from $\gamma\gamma$(DCO) in (^{19}F,3npγ); (M1) from level scheme.
202.63	$(9/2^-)$	110.0 *1*	100	92.68	$(7/2^-)$	(D+Q)		E_γ: weighted average of 109.8 *3* from ^{123}La ε decay, 109.8 *2* from (^{19}F,3npγ), and 110.0 *1* from (^{12}C,3nγ). Mult.: (D+Q) from $\gamma(\theta)$ in (^{12}C,3nγ) and $\gamma\gamma$(DCO) in (^{19}F,3npγ).
328.06	$(5/2^+)$	159.0‡ *3*	12‡ *1*	169.00	$(7/2^+)$			
		174.4‡ *2*	100‡ *12*	153.74	$(3/2^+)$	M1,E2		Mult.: from ce data in ^{123}La ε decay.
		207.0 *3*	62‡ *8*	120.98	$(1/2^+)$	Q		E_γ: weighted average of 207.0 *3* from ^{123}La ε decay and 207.0 *5* from (^{19}F,3npγ).
		328.0‡ *3*	27‡ *3*	0.0	$5/2^{(+)}$			
335.76	$(11/2^-)$	133.2 *2*	100 *7*	202.63	$(9/2^-)$	(D+Q)		E_γ: weighted average of 133.2 *3* from ^{123}La ε decay, 133.3 *2* from (^{19}F,3npγ), and 133.3 *10* from (^{12}C,3nγ). I_γ: other: 100 *13* from ^{123}La ε decay.
		243.1 *3*	32 *3*	92.68	$(7/2^-)$	Q		E_γ: weighted average of 243.1 *3* from ^{123}La ε decay and 243.1 *5* from (^{19}F,3npγ). I_γ: also from ^{123}La ε decay.
374.23	$(9/2^+)$	205.2 *2*	100 *5*	169.00	$(7/2^+)$	(D+Q)		E_γ: weighted average of 205.2 *3* from ^{123}La ε decay, 205.2 *2* from (^{19}F,3npγ), and 205.3 *2* from (^{12}C,3nγ). Mult.: from $\gamma(\theta)$ in (^{12}C,3nγ) and $\gamma\gamma$(DCO) in (^{19}F,2npγ). I_γ: other: 100 *8* from (^{12}C,3nγ).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

γ(^{123}Ba) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	Comments
374.23	(9/2$^+$)	374.3 *3*	48 *6*	0.0	5/2$^{(+)}$		E_γ: weighted average of 374.3 *3* from ^{123}La ε decay and 374.2 *5* from (^{19}F,3npγ). I_γ: unweighted average of 42 *4* from ^{123}La ε decay and 53.2 *12* from (^{19}F,3npγ).
397.48	(7/2$^+$)	69.4 *3*	7.4[‡] *7*	328.06	(5/2$^+$)		E_γ: weighted average of 69.5 *3* from ^{123}La ε decay and 69.1 *5* from (^{19}F,3npγ).
		228.5[‡] *1*	6.4[‡] *6*	169.00	(7/2$^+$)		
		243.6 *2*	100[‡] *10*	153.74	(3/2$^+$)	(E2)	E_γ: weighted average of 243.9 *3* from ^{123}La ε decay and 243.4 *2* from (^{19}F,3npγ). Mult.: M1,E2 from ce data in ^{123}La ε decay; (E2) from level scheme.
460.9		368.2[‡] *3*	100	92.68	(7/2$^-$)		
482.30		313.3[‡] *3*	18[‡] *2*	169.00	(7/2$^+$)		
		482.3[‡] *3*	100[‡] *8*	0.0	5/2$^{(+)}$		
564.50		361.9[‡] *3*	100[‡] *9*	202.63	(9/2$^-$)		
		471.8[‡] *3*	47[‡] *6*	92.68	(7/2$^-$)		
582.57	(13/2$^-$)	246.8 *2*	100 *6*	335.76	(11/2$^-$)	(D+Q)	E_γ: weighted average of 246.7 *3* from ^{123}La ε decay, 246.7 *2* from (^{19}F,3npγ), and 247.0 *3* from (^{12}C,3nγ). I_γ: others: 100 *8* from ^{123}La ε decay, 100 *14* from (^{12}C,3nγ). Mult.: from γ(θ) in (^{12}C,3nγ) and γγ(DCO) in (^{19}F,2npγ).
		380.0 *2*	62 *3*	202.63	(9/2$^-$)		E_γ: weighted average of 380.0 *3* from ^{123}La ε decay, 380.0 *2* from (^{19}F,3npγ), and 380.1 *10* from (^{12}C,3nγ). I_γ: weighted average of 71 *8* from ^{123}La ε decay and 61 *3* from (^{19}F,3npγ). Other: 123 *24* from (^{12}C,3nγ) is in disagreement.
612.15	(11/2$^+$)	238.0 *2*	92 *5*	374.23	(9/2$^+$)	(D+Q)	E_γ: weighted average of 238.4 *3* from ^{123}La ε decay, 237.7 *2* from (^{19}F,3npγ), and 238.1 *3* from (^{12}C,3nγ). I_γ: weighted average of 86 *10* from ^{123}La ε decay and 94 *5* from (^{19}F,3npγ). Mult.: from γ(θ) in (^{12}C,3nγ) and γγ(DCO) in (^{19}F,2npγ).
		409.6 *5*	48 *11*	202.63	(9/2$^-$)		
		443.1 *3*	100 *6*	169.00	(7/2$^+$)	Q	E_γ: weighted average of 443.5 *3* from ^{123}La ε decay and 442.9 *2* from (^{19}F,3npγ). I_γ: other: 100 *10* from ^{123}La ε decay.
695.28	(9/2$^+$)	297.8[‡] *3*	38[‡] *4*	397.48	(7/2$^+$)		
		367.2 *3*	100[‡] *9*	328.06	(5/2$^+$)		E_γ: weighted average of 367.2 *3* from ^{123}La ε decay and 367.2 *5* from (^{19}F,3npγ).
		526.3[‡] *3*	23[‡] *3*	169.00	(7/2$^+$)		
721.42	(7/2$^-$,9/2,11/2$^-$)	385.8[‡] *3*	100[‡] *10*	335.76	(11/2$^-$)		
		518.8[‡] *3*	69[‡] *7*	202.63	(9/2$^-$)		
		628.6[‡] *3*	69[‡] *7*	92.68	(7/2$^-$)		
756.75	(15/2$^-$)	174.2 *2*	22.2 *16*	582.57	(13/2$^-$)	(D+Q)	E_γ: weighted average of 174.2 *2* from (^{19}F,3npγ) and 174.4 *10* from (^{12}C,3nγ). I_γ: other: ≈20 in (^{12}C,3nγ).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

γ(^{123}Ba) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	Comments
756.75	(15/2$^-$)	421.3 *8*	100 *5*	335.76	(11/2$^-$)	Q	
790.86	(11/2$^+$)	393.3 *2*	100	397.48	(7/2$^+$)	Q	E_γ: weighted average of 393.4 *3* from ^{123}La ε decay and 393.3 *2* from (^{19}F,3npγ).
799.45		596.9[‡] *3*	100[‡] *10*	202.63	(9/2$^-$)		
		706.7[‡] *3*	72[‡] *7*	92.68	(7/2$^-$)		
877.70	(13/2$^+$)	265.7 *5*	39 *3*	612.15	(11/2$^+$)		
		503.4 *2*	100 *6*	374.23	(9/2$^+$)	Q	
1091.0		693.5[‡] *3*	56[‡] *6*	397.48	(7/2$^+$)		
		937.3[‡] *3*	100[‡] *10*	153.74	(3/2$^+$)		
1136.73	(17/2$^-$)	380.0 *2*	61 *11*	756.75	(15/2$^-$)		E_γ: weighted average of 380.0 *2* from (^{19}F,3npγ) and 380.1 *10* from (^{12}C,3nγ). I_γ: other: 123 *24* from (^{12}C,3nγ) is in disagreement.
		554.2 *2*	100 *7*	582.57	(13/2$^-$)	(Q)	E_γ: weighted average of 554.2 *2* from (^{19}F,3npγ) and 553.7 *6* from (^{12}C,3nγ). I_γ: other: 100 *17* from (^{12}C,3nγ).
1171.90	(15/2$^+$)	294.1 *5*	31.1 *19*	877.70	(13/2$^+$)		
		559.8 *2*	100 *6*	612.15	(11/2$^+$)	Q	
		589.4 *5*	13 *3*	582.57	(13/2$^-$)		
1308.5	(15/2$^+$)	517.6 *2*	100	790.86	(11/2$^+$)	Q	
1325.63	(19/2$^-$)	188.9 *5*	≈46	1136.73	(17/2$^-$)		E_γ: weighted average of 188.9 *5* from (^{19}F,3npγ) and 189.1 *10* from (^{12}C,3nγ). I_γ: from (^{12}C,3nγ).
		568.9 *2*	100 *15*	756.75	(15/2$^-$)	Q	E_γ: weighted average of 568.9 *2* from (^{19}F,3npγ) and 569.0 *6* from (^{12}C,3nγ). I_γ: from (^{12}C,3nγ).
1480.94	(17/2$^+$)	309.1 *5*	26.5 *21*	1171.90	(15/2$^+$)		
		603.2 *2*	100 *6*	877.70	(13/2$^+$)	Q	
1818.4	(19/2$^+$)	337.4 *5*		1480.94	(17/2$^+$)		
		646.5 *2*	100 *6*	1171.90	(15/2$^+$)	Q	
1830.1	(21/2$^-$)	504.5 *5*	72 *7*	1325.63	(19/2$^-$)		
		693.7 *5*	100 *11*	1136.73	(17/2$^-$)	(Q)	E_γ: weighted average of 693.4 *5* from (^{19}F,3npγ) and 694.7 *10* from (^{12}C,3nγ).
1926.0	(19/2$^+$)	617.4 *2*	100	1308.5	(15/2$^+$)	Q	
2018.1	(23/2$^-$)	188.0 *5*		1830.1	(21/2$^-$)		
		692.5 *2*	100 *8*	1325.63	(19/2$^-$)	Q	E_γ: other: 694.7 *10* for a doublet.
2154.47	(21/2$^+$)	336.1 *5*		1818.4	(19/2$^+$)		
		673.5 *2*	100 *14*	1480.94	(17/2$^+$)	Q	
		828.9 *5*	24 *7*	1325.63	(19/2$^-$)		
2515.9	(23/2$^+$)	361.7 *5*		2154.47	(21/2$^+$)		
		686.1 *5*	32 *10*	1830.1	(21/2$^-$)		
		697.8 *5*	100 *7*	1818.4	(19/2$^+$)	Q	
2613.2	(23/2$^+$)	686.7 *5*	100	1926.0	(19/2$^+$)	Q	
2614.4	(25/2$^-$)	596.3 *5*		2018.1	(23/2$^-$)		
		784.3 *5*	100 *15*	1830.1	(21/2$^-$)		
2798.1	(27/2$^-$)	183.7 *5*		2614.4	(25/2$^-$)		
		780.0 *2*	100 *8*	2018.1	(23/2$^-$)	Q	E_γ: weighted average of 780.0 *2* from (^{19}F,3npγ) and 780.6 *10* from (^{12}C,3nγ).
2863.9	(25/2$^+$)	349		2515.9	(23/2$^+$)		E_γ: from (^{32}S,2pnγ) only.
		709.4 *2*	97 *6*	2154.47	(21/2$^+$)	Q	
		845.8 *2*	100 *15*	2018.1	(23/2$^-$)		
3188.9	(27/2$^+$)	575.2 *5*	57 *12*	2613.2	(23/2$^+$)		
		673.4 *5*	100 *17*	2515.9	(23/2$^+$)	Q	
3242?		726[&]		2515.9	(23/2$^+$)		E_γ: from (^{32}S,2pnγ) only.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

$\gamma(^{123}Ba)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Comments
3341.3	$(27/2^+)$	728.1 *5*	100	2613.2	$(23/2^+)$	
3350.4	$(29/2^-)$	552.3 *5*		2798.1	$(27/2^-)$	
		736.0 *5*	100 *12*	2614.4	$(25/2^-)$	
3582?	$(29/2^+)$	718[&]		2863.9	$(25/2^+)$	E_γ: from (^{32}S,2pnγ) only.
3591.7	$(31/2^-)$	240[&]		3350.4	$(29/2^-)$	E_γ: from (^{32}S,2pnγ) only.
		793.4 *5*		2798.1	$(27/2^-)$	
4000.6	$(33/2^-)$	408[&]		3591.7	$(31/2^-)$	E_γ: from (^{32}S,2pnγ) only.
		650.4 *5*		3350.4	$(29/2^-)$	
4360.7	$(35/2^-)$	361[&]		4000.6	$(33/2^-)$	E_γ: from (^{32}S,2pnγ) only.
		768.9 *5*		3591.7	$(31/2^-)$	
4763.1	$(37/2^-)$	402		4360.7	$(35/2^-)$	
		763		4000.6	$(33/2^-)$	
5210.9	$(39/2^-)$	448		4763.1	$(37/2^-)$	
		850		4360.7	$(35/2^-)$	
5672.0	$(41/2^-)$	461		5210.9	$(39/2^-)$	
		909		4763.1	$(37/2^-)$	
6174.0	$(43/2^-)$	502		5672.0	$(41/2^-)$	
		963		5210.9	$(39/2^-)$	
6716.0	$(45/2^-)$	1044		5672.0	$(41/2^-)$	
7243.0	$(47/2^-)$	1069		6174.0	$(43/2^-)$	
7880.0	$(49/2^-)$	1164		6716.0	$(45/2^-)$	
8400.0	$(51/2^-)$	1157		7243.0	$(47/2^-)$	
9131?	$(53/2^-)$	1251[&]		7880.0	$(49/2^-)$	
9605.0?	$(55/2^-)$	1205[&]		8400.0	$(51/2^-)$	
10839.0?	$(59/2^-)$	1234[&]		9605.0?	$(55/2^-)$	
12146	$(63/2^-)$	1307		10839.0?	$(59/2^-)$	
13549	$(67/2^-)$	1403		12146	$(63/2^-)$	

[†] From (^{19}F,3npγ) up to 4765 level and from (^{32}S,2pnγ) above that, unless otherwise noted.
[‡] From ^{123}La ε decay.
[#] From (^{19}F,3npγ) based on measured DCO ratios with ΔJ=1 for D ΔJ=2 for Q, unless otherwise noted.
[@] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
[&] Placement of transition in the level scheme is uncertain.

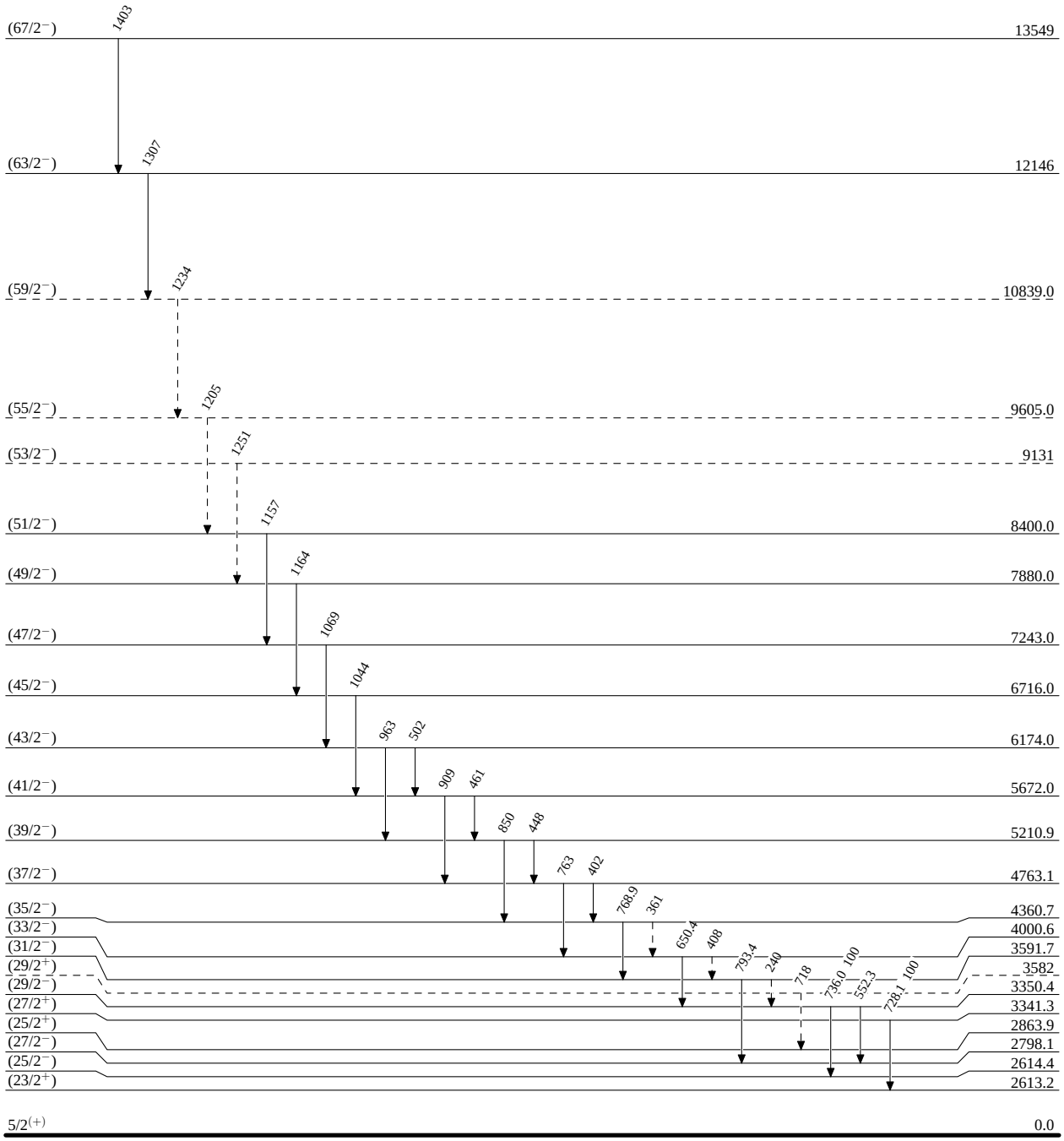
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{123}_{56}Ba_{67}$

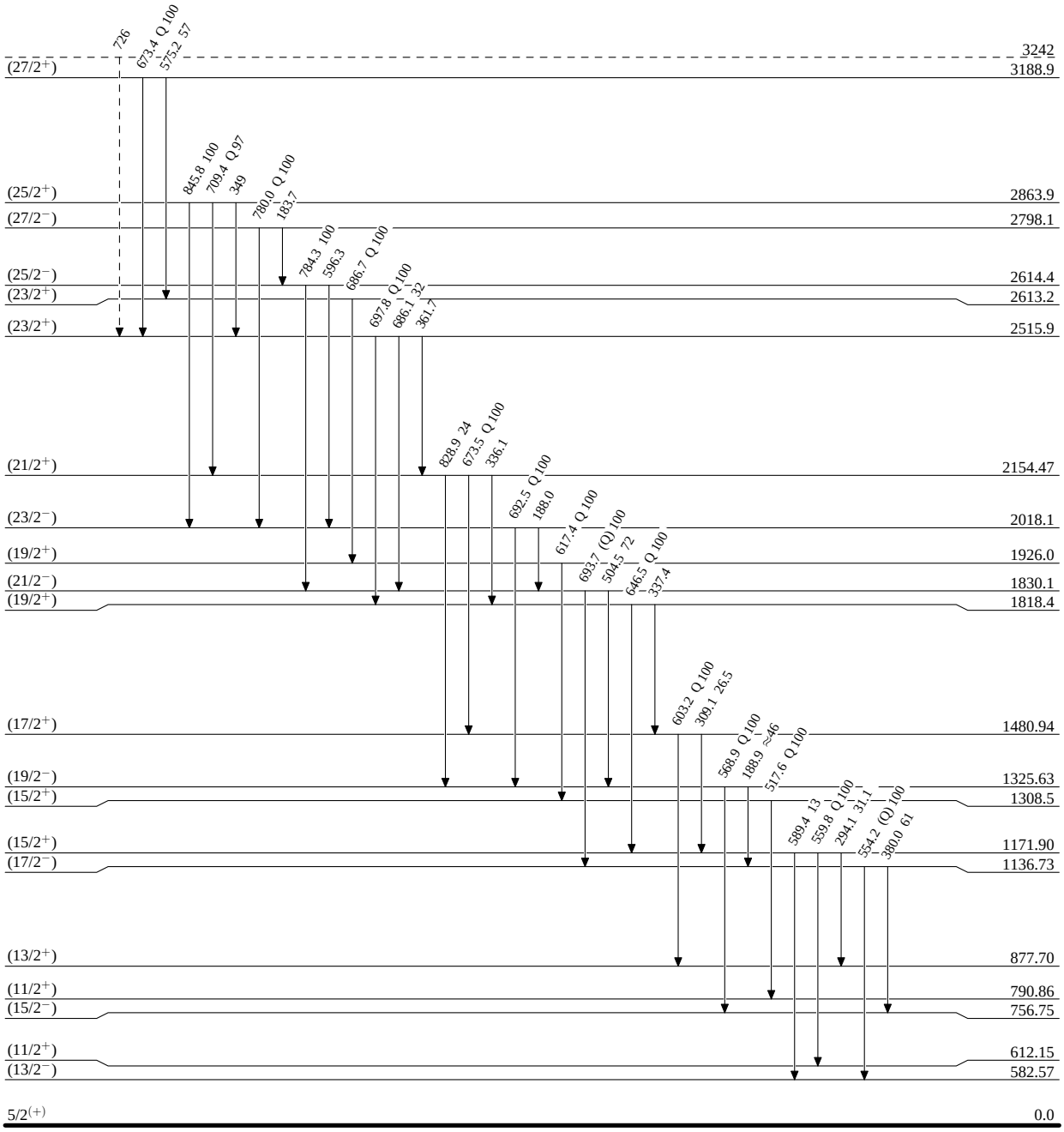
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{123}_{56}Ba_{67}$

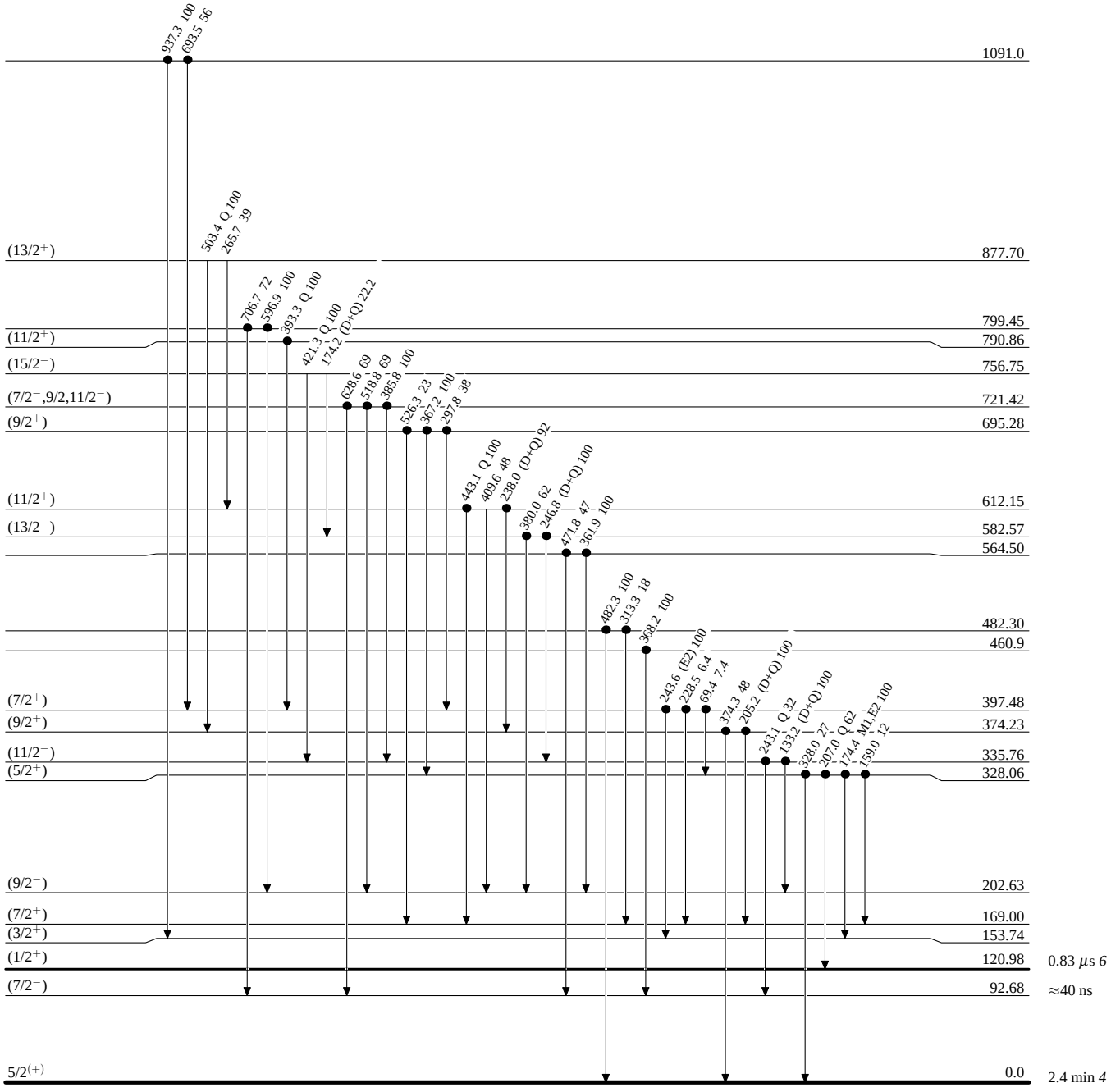
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

● Coincidence



$^{123}_{56}Ba_{67}$

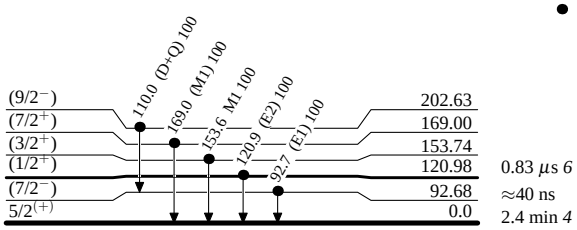
Adopted Levels, Gammas

Legend

Level Scheme (continued)

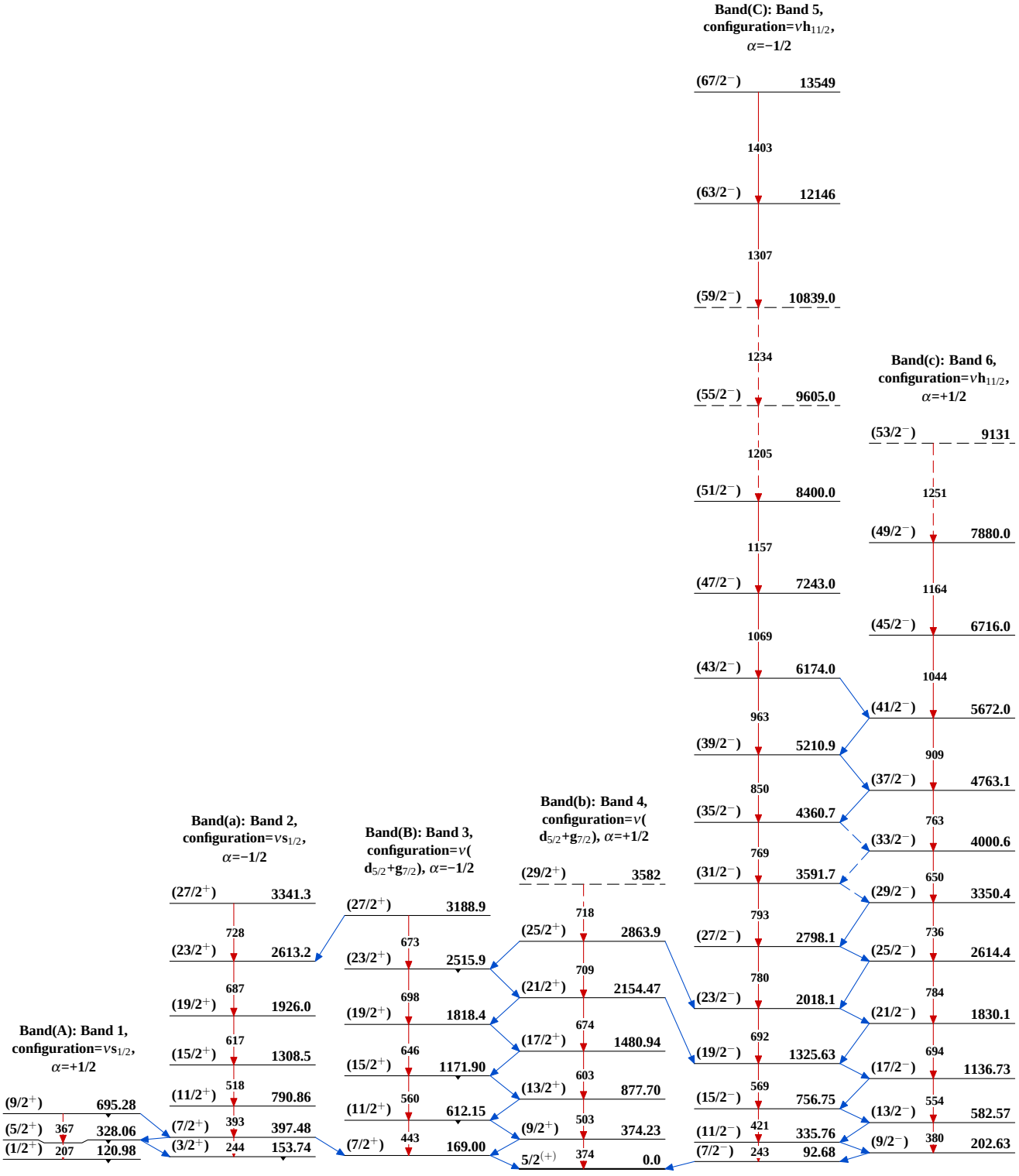
Intensities: Relative photon branching from each level

● Coincidence



$^{123}_{56}Ba_{67}$

Adopted Levels, Gammas



$^{123}_{56}Ba_{67}$

^{123}La ε decay 1991Ii02

Parent: ^{123}La: E=0.0; $T_{1/2}$=16.3 s *3*; Q(ε)=7000 *syst*; %ε+%$β^+$ decay=100

^{123}La-$T_{1/2}$: weighted average of 16.3 s *3* (1992Ic02, γ(t)), 16 s *1* (1988GeZR, γ(t)), and 17 s *3* (1978Bo32, x-ray(t)); adopted in Adopted Levels of ^{123}La.

^{123}La-Q(ε): From 2021Wa16 with ΔQ(ε)=200 (syst).

1991Ii02: ^{123}La source was produced via ^{92}Mo(^{35}Cl,2p2n) reaction with E=180 MeV ^{35}Cl beam from the tandem accelerator facility in the Japan Atomic Energy Research Institute. Reaction products were mass-separated and implanted into an aluminum-coated Mylar tape. γ rays were detected with HPGe detectors and electrons were detected with Si(Li) detectors and a plastic scintillator. Measured Eγ, Iγ, E(ce), I(ce), γγ-coin, βγ-coin, βγ(t). Deduced levels, J, π, band structures, $T_{1/2}$, conversion coefficients, γ- ray multipolarities.

1978Bo32: ^{123}La source was produced via ^{96,98}Ru(^{32}S,xnyp) reaction with E=190 MeV ^{32}S beam from the U-300 heavy-ion cyclotron of the JINR Laboratory of Nuclear Reactions at Dubna. Reaction products were separated using the on-line BEMS-2 facility. γ and x rays were detected with a high-resolution Ge(Li) spectrometer and electrons were detected with a plastic β-counter. Measured Eγ, Iγ, E(x ray), I(x ray), (x ray)β-coin.

Other: 1992Ic02, 1988GeZR.

The decay scheme is as proposed by 1991Ii02 on the basis of energy sums and γγ-coin. The decay scheme is considered incomplete since intensity imbalances suggest significant unobserved feedings to both the proposed 120.9, $1/2^+$ level and the 92.5, $7/2^-$ level.

^{123}Ba Levels

E(level)†	Jπ‡	$T_{1/2}$	Comments
0.0	$5/2^{(+)}$	2.4 min *4*	$T_{1/2}$: from Adopted Levels.
92.5 *3*	$(7/2^-)$		
120.95# *23*	$(1/2^+)$	0.83 μs *6*	$T_{1/2}$: from βγ(t) in 1991Ii02.
153.61# *21*	$(3/2^+)$		
169.01 *17*	$(7/2^+)$		
202.3 *4*	$(9/2^-)$		
328.00# *18*	$(5/2^+)$		
335.5 *4*	$(11/2^-)$		
374.22 *22*	$(9/2^+)$		
397.49# *21*	$(7/2^+)$		
460.7 *5*			Jπ: $(9/2^+)$ proposed in 1991Ii02.
482.30 *23*			
564.3 *4*			
582.3 *4*	$(13/2^-)$		
612.6 *3*	$(11/2^+)$		
695.27# *23*	$(9/2^+)$		
721.2 *4*	$(7/2^-,9/2,11/2^-)$		
790.9# *4*	$(11/2^+)$		
799.2 *4*			
1091.0 *3*			

† From a least-squares fit to γ-ray energies.
‡ From Adopted Levels.
# Band(A): 1/2[411] band (1991Ii02).

^{123}La ε decay 1991Ii02 (continued)

γ(^{123}Ba)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	α[@]	Comments
69.5 *3*	4.9 *5*	397.49	(7/2$^+$)	328.00	(5/2$^+$)			
92.5 *3*	230 *23*	92.5	(7/2$^-$)	0.0	5/2$^{(+)}$	(E1)	0.282 *5*	E_γ: other: 93 *1* from 1978Bo32. Iγ(92.5γ)/I(K x-ray)=0.25 *5* (1978Bo32).
109.8 *3*	71 *7*	202.3	(9/2$^-$)	92.5	(7/2$^-$)	(D+Q)		
120.9 *3*	72	120.95	(1/2$^+$)	0.0	5/2$^{(+)}$	(E2)	0.984 *17*	Mult.: E2 or M1+E2 from α_K(exp); M1 mixing was estimated to be 0 or very small on the basis of Weisskopt hindrance factor for the measured $T_{1/2}$ (1991Ii02).
133.2 *3*	16 *2*	335.5	(11/2$^-$)	202.3	(9/2$^-$)	(D+Q)		
153.6 *3*	100 *10*	153.61	(3/2$^+$)	0.0	5/2$^{(+)}$	M1		Mult.: M1,E2 from α_K(exp).
159.0 *3*	3.1 *3*	328.00	(5/2$^+$)	169.01	(7/2$^+$)			
169.0 *3*	59	169.01	(7/2$^+$)	0.0	5/2$^{(+)}$	(M1)		
174.4 *3*	26 *3*	328.00	(5/2$^+$)	153.61	(3/2$^+$)	M1,E2		Mult.: from α_K(exp).
205.2 *3*	13 *1*	374.22	(9/2$^+$)	169.01	(7/2$^+$)	(D+Q)		
207.0 *3*	16 *2*	328.00	(5/2$^+$)	120.95	(1/2$^+$)	Q		
228.5 *3*	4.2 *4*	397.49	(7/2$^+$)	169.01	(7/2$^+$)			
238.4 *3*	2.5 *3*	612.6	(11/2$^+$)	374.22	(9/2$^+$)	(D+Q)		
243.1 *3*	5.1 *5*	335.5	(11/2$^-$)	92.5	(7/2$^-$)	Q		
243.9 *3*	66 *7*	397.49	(7/2$^+$)	153.61	(3/2$^+$)	(E2)		Mult.: M1,E2 from α_K(exp); E2 required by level scheme.
246.7 *3*	2.4 *2*	582.3	(13/2$^-$)	335.5	(11/2$^-$)	(D+Q)		
297.8 *3*	2.4 *2*	695.27	(9/2$^+$)	397.49	(7/2$^+$)			
313.3 *3*	2.2 *2*	482.30		169.01	(7/2$^+$)			
328.0 *3*	7.1 *7*	328.00	(5/2$^+$)	0.0	5/2$^{(+)}$			
361.9 *3*	34 *3*	564.3		202.3	(9/2$^-$)			
367.2 *3*	6.4 *6*	695.27	(9/2$^+$)	328.00	(5/2$^+$)			
368.2 *3*	27 *3*	460.7		92.5	(7/2$^-$)			
374.3 *3*	5.4 *5*	374.22	(9/2$^+$)	0.0	5/2$^{(+)}$			
380.0 *3*	1.7 *2*	582.3	(13/2$^-$)	202.3	(9/2$^-$)			
385.8 *3*	6.2 *6*	721.2	(7/2$^-$,9/2,11/2$^-$)	335.5	(11/2$^-$)			
393.4 *3*	5.6 *6*	790.9	(11/2$^+$)	397.49	(7/2$^+$)	Q		
443.5 *3*	2.9 *3*	612.6	(11/2$^+$)	169.01	(7/2$^+$)	Q		
471.8 *3*	16 *2*	564.3		92.5	(7/2$^-$)			
482.3 *3*	12 *1*	482.30		0.0	5/2$^{(+)}$			
518.8 *3*	4.3 *4*	721.2	(7/2$^-$,9/2,11/2$^-$)	202.3	(9/2$^-$)			
526.3 *3*	1.5 *2*	695.27	(9/2$^+$)	169.01	(7/2$^+$)			
596.9 *3*	6.9 *7*	799.2		202.3	(9/2$^-$)			
628.6 *3*	4.3 *4*	721.2	(7/2$^-$,9/2,11/2$^-$)	92.5	(7/2$^-$)			
693.5[‡] *3*	56 *6*	1091.0		397.49	(7/2$^+$)			
706.7 *3*	5.0 *5*	799.2		92.5	(7/2$^-$)			
937.3 *3*	100 *10*	1091.0		153.61	(3/2$^+$)			

[†] From 1991Ii02, unless otherwise noted. Uncertainties are not given in 1991Ii02 and the evaluator has assigned an uncertainty of 0.3 keV for Eγ and 10% for Iγ.

[‡] Eγ=635.9 in 1991Ii02 was corrected by the evaluator.

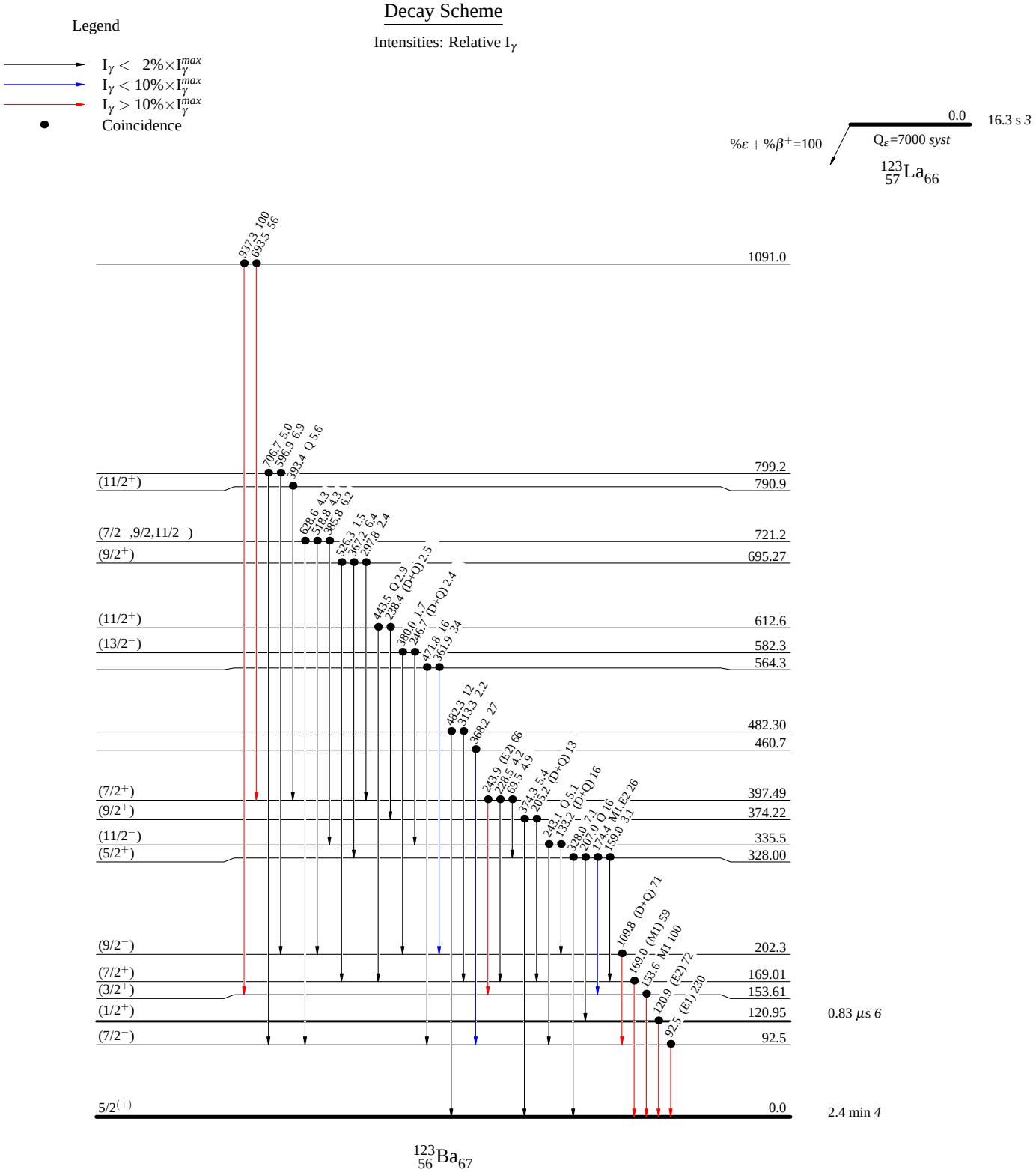
[#] From Adopted Gammas. Arguments from 1991Ii02 based on measured α_K(exp) are given under comments. Conversion coefficients are not explicitly given in 1991Ii02.

[@] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

^{123}La ε decay 1991Ii02

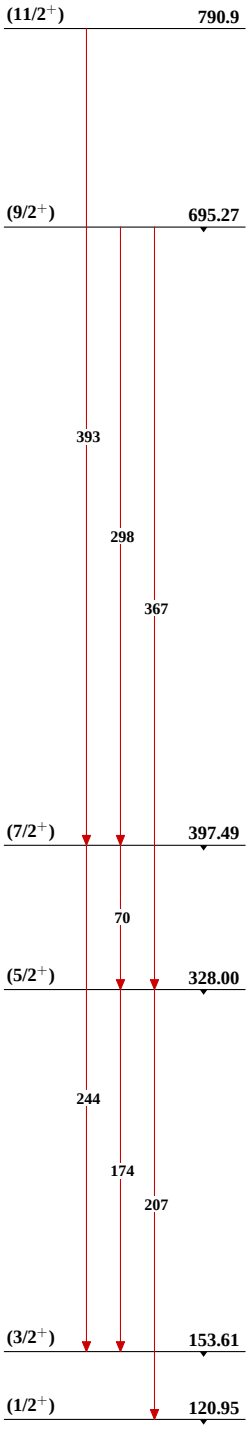
Decay Scheme

Intensities: Relative I_γ



^{123}La ε decay 1991Ii02

Band(A): 1/2[411] band (1991Ii02)



$^{123}_{56}Ba_{67}$

^{94}Mo(^{32}S,2pnγ),^{74}Se(^{52}Cr,2pnγ) 1988Wy02

1988Wy02: two measurements were performed at the Daresbury Nuclear Structure Facility: In the measurement of ^{92}Mo(^{34}S,2pnγ), E=150 and 155 MeV ^{32}S beam was incident on a ^{94}Mo target. γ rays were detected with the TESSA3 spectrometer. Measured $\gamma\gamma$-coin. In the measurement of ^{74}Se(^{52}Cr,p2nγ), E=290 MeV ^{52}Cr beam was incident on a ^{74}Se target. Reaction products were separated using the Daresbury Recoil Separator and γ rays were detected with an array of Ge detectors. Measured Eγ. Deduced levels, J, π, band structures. Comparisons with self-consistent cranking calculations.

Other (HI,xnγ) studies:

1987JaZV: ^{95}Mo(^{31}P,2npγ) E=121 MeV.

1974CoZI: ^{110}Cd(^{16}O,3nγ) E=52-66 MeV.

^{123}Ba Levels

E(level)†	J$^\pi$@	E(level)†	J$^\pi$@	E(level)†	J$^\pi$@	E(level)†	J$^\pi$@
0[c]	5/2$^{(+)}$	1172.0[d] *12*	(15/2$^+$)	3243.0?[d] *18*	(27/2$^+$)&	7244.6[a] *25*	(47/2$^-$)
93.0[a] *10*	(7/2$^-$)	1326.0[a] *16*	(19/2$^-$)	3352.3[b] *19*	(29/2$^-$)	7882[b] *3*	(49/2$^-$)
169.0[d] *8*	(7/2$^+$)	1482.0[c] *13*	(17/2$^+$)	3584.0?[#c] *19*	(29/2$^+$)	8402[a] *3*	(51/2$^-$)
203.0[b] *13*	(9/2$^-$)	1819.0[d] *13*	(19/2$^+$)	3593.4[a] *20*	(31/2$^-$)	9133?[b] *3*	(53/2$^-$)
336.0[a] *13*	(11/2$^-$)	1831.0[b] *17*	(21/2$^-$)	4001.7[b] *20*	(33/2$^-$)	9607?‡[a] *3*	(55/2$^-$)
374.0[c] *8*	(9/2$^+$)	2019.0[a] *17*	(23/2$^-$)	4362.6[a] *21*	(35/2$^-$)	10841?‡[a] *3*	(59/2$^-$)
583.0[b] *14*	(13/2$^-$)	2156.0[#c] *14*	(21/2$^+$)	4764.6[b] *21*	(37/2$^-$)	12148[a] *4*	(63/2$^-$)
612.0[d] *10*	(11/2$^+$)	2517.0[d] *15*	(23/2$^+$)	5212.6[a] *22*	(39/2$^-$)	13551[a] *4*	(67/2$^-$)
757.0[a] *15*	(15/2$^-$)	2616.0[b] *18*	(25/2$^-$)	5673.6[b] *22*	(41/2$^-$)		
878.0[c] *11*	(13/2$^+$)	2799.9[a] *18*	(27/2$^-$)	6175.6[a] *23*	(43/2$^-$)		
1137.0[b] *15*	(17/2$^-$)	2866.0[#c] *16*	(25/2$^+$)	6717.6[b] *24*	(45/2$^-$)		

† From a least-squares fit to γ-ray energies, assuming ΔEγ=1 keV.

‡ Order of 1205γ and 1234γ is not firmly established (1988Wy02).

In 1988Wy02, energies of the 2106 level and the levels at 2816 and 3534 above it in band 3 are based on a 674γ to 1482 level as labeled in Figure 1, but the level-energy difference of 2106 and 1482 is 624. In a recent measurement of ^{108}Cd(^{19}F,3npγ) by 2016Ch30, a 673.5γ is observed to feed the 1482 level. So the evaluator considers that the energies of the three levels above from 1988Wy02 are misprint instead of the 674γ being considered as a misprint in the previous evaluation by 2004Oh11 and their energies and some Eγ values from level-energy differences have been revised here accordingly.

@ From Adopted Levels, unless otherwise noted.

& Proposed by 1988Wy02 based on band assignment.

a Band(A): Band 1, configuration=7/2[523], α=−1/2.

b Band(a): Band 2, configuration=7/2[523], α=+1/2.

c Band(B): Band 3, configuration=5/2[402], α=+1/2.

d Band(b): Band 4, configuration=5/2[402], α=−1/2.

γ(^{123}Ba)

E$_\gamma$†	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	E$_\gamma$†	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$
93‡	93.0	(7/2$^-$)	0	5/2$^{(+)}$	188‡	2019.0	(23/2$^-$)	1831.0	(21/2$^-$)
110‡	203.0	(9/2$^-$)	93.0	(7/2$^-$)	189‡	1326.0	(19/2$^-$)	1137.0	(17/2$^-$)
133‡	336.0	(11/2$^-$)	203.0	(9/2$^-$)	205‡	374.0	(9/2$^+$)	169.0	(7/2$^+$)
169‡	169.0	(7/2$^+$)	0	5/2$^{(+)}$	238‡	612.0	(11/2$^+$)	374.0	(9/2$^+$)
174‡	757.0	(15/2$^-$)	583.0	(13/2$^-$)	240‡	3593.4	(31/2$^-$)	3352.3	(29/2$^-$)
184‡	2799.9	(27/2$^-$)	2616.0	(25/2$^-$)	243	336.0	(11/2$^-$)	93.0	(7/2$^-$)

Continued on next page (footnotes at end of table)

^{94}Mo(^{32}S,2pnγ),^{74}Se(^{52}Cr,2pnγ) 1988Wy02 (continued)

γ(^{123}Ba) (continued)

E_γ †	E_i(level)	J_i^π	E_f	J_f^π	E_γ †	E_i(level)	J_i^π	E_f	J_f^π
247‡	583.0	(13/2$^-$)	336.0	(11/2$^-$)	647	1819.0	(19/2$^+$)	1172.0	(15/2$^+$)
266‡	878.0	(13/2$^+$)	612.0	(11/2$^+$)	650	4001.7	(33/2$^-$)	3352.3	(29/2$^-$)
294‡	1172.0	(15/2$^+$)	878.0	(13/2$^+$)	674	2156.0	(21/2$^+$)	1482.0	(17/2$^+$)
310‡	1482.0	(17/2$^+$)	1172.0	(15/2$^+$)	693	2019.0	(23/2$^-$)	1326.0	(19/2$^-$)
337‡	1819.0	(19/2$^+$)	1482.0	(17/2$^+$)	694	1831.0	(21/2$^-$)	1137.0	(17/2$^-$)
337‡	2156.0	(21/2$^+$)	1819.0	(19/2$^+$)	698	2517.0	(23/2$^+$)	1819.0	(19/2$^+$)
349‡	2866.0	(25/2$^+$)	2517.0	(23/2$^+$)	710	2866.0	(25/2$^+$)	2156.0	(21/2$^+$)
361‡	2517.0	(23/2$^+$)	2156.0	(21/2$^+$)	718@	3584.0?	(29/2$^+$)	2866.0	(25/2$^+$)
361‡	4362.6	(35/2$^-$)	4001.7	(33/2$^-$)	726@	3243.0?	(27/2$^+$)	2517.0	(23/2$^+$)
374	374.0	(9/2$^+$)	0	5/2$^{(+)}$	736	3352.3	(29/2$^-$)	2616.0	(25/2$^-$)
380	583.0	(13/2$^-$)	203.0	(9/2$^-$)	763	4764.6	(37/2$^-$)	4001.7	(33/2$^-$)
380‡	1137.0	(17/2$^-$)	757.0	(15/2$^-$)	769	4362.6	(35/2$^-$)	3593.4	(31/2$^-$)
402‡	4764.6	(37/2$^-$)	4362.6	(35/2$^-$)	781	2799.9	(27/2$^-$)	2019.0	(23/2$^-$)
408‡	4001.7	(33/2$^-$)	3593.4	(31/2$^-$)	785	2616.0	(25/2$^-$)	1831.0	(21/2$^-$)
421	757.0	(15/2$^-$)	336.0	(11/2$^-$)	794	3593.4	(31/2$^-$)	2799.9	(27/2$^-$)
443	612.0	(11/2$^+$)	169.0	(7/2$^+$)	850	5212.6	(39/2$^-$)	4362.6	(35/2$^-$)
448‡	5212.6	(39/2$^-$)	4764.6	(37/2$^-$)	909	5673.6	(41/2$^-$)	4764.6	(37/2$^-$)
461‡	5673.6	(41/2$^-$)	5212.6	(39/2$^-$)	963	6175.6	(43/2$^-$)	5212.6	(39/2$^-$)
502‡	6175.6	(43/2$^-$)	5673.6	(41/2$^-$)	1044	6717.6	(45/2$^-$)	5673.6	(41/2$^-$)
504	878.0	(13/2$^+$)	374.0	(9/2$^+$)	1069	7244.6	(47/2$^-$)	6175.6	(43/2$^-$)
505‡	1831.0	(21/2$^-$)	1326.0	(19/2$^-$)	1157	8402	(51/2$^-$)	7244.6	(47/2$^-$)
552‡	3352.3	(29/2$^-$)	2799.9	(27/2$^-$)	1164	7882	(49/2$^-$)	6717.6	(45/2$^-$)
554	1137.0	(17/2$^-$)	583.0	(13/2$^-$)	1205#@	9607?	(55/2$^-$)	8402	(51/2$^-$)
560	1172.0	(15/2$^+$)	612.0	(11/2$^+$)	1234#@	10841?	(59/2$^-$)	9607?	(55/2$^-$)
569	1326.0	(19/2$^-$)	757.0	(15/2$^-$)	1251@	9133?	(53/2$^-$)	7882	(49/2$^-$)
597‡	2616.0	(25/2$^-$)	2019.0	(23/2$^-$)	1307	12148	(63/2$^-$)	10841?	(59/2$^-$)
604	1482.0	(17/2$^+$)	878.0	(13/2$^+$)	1403	13551	(67/2$^-$)	12148	(63/2$^-$)

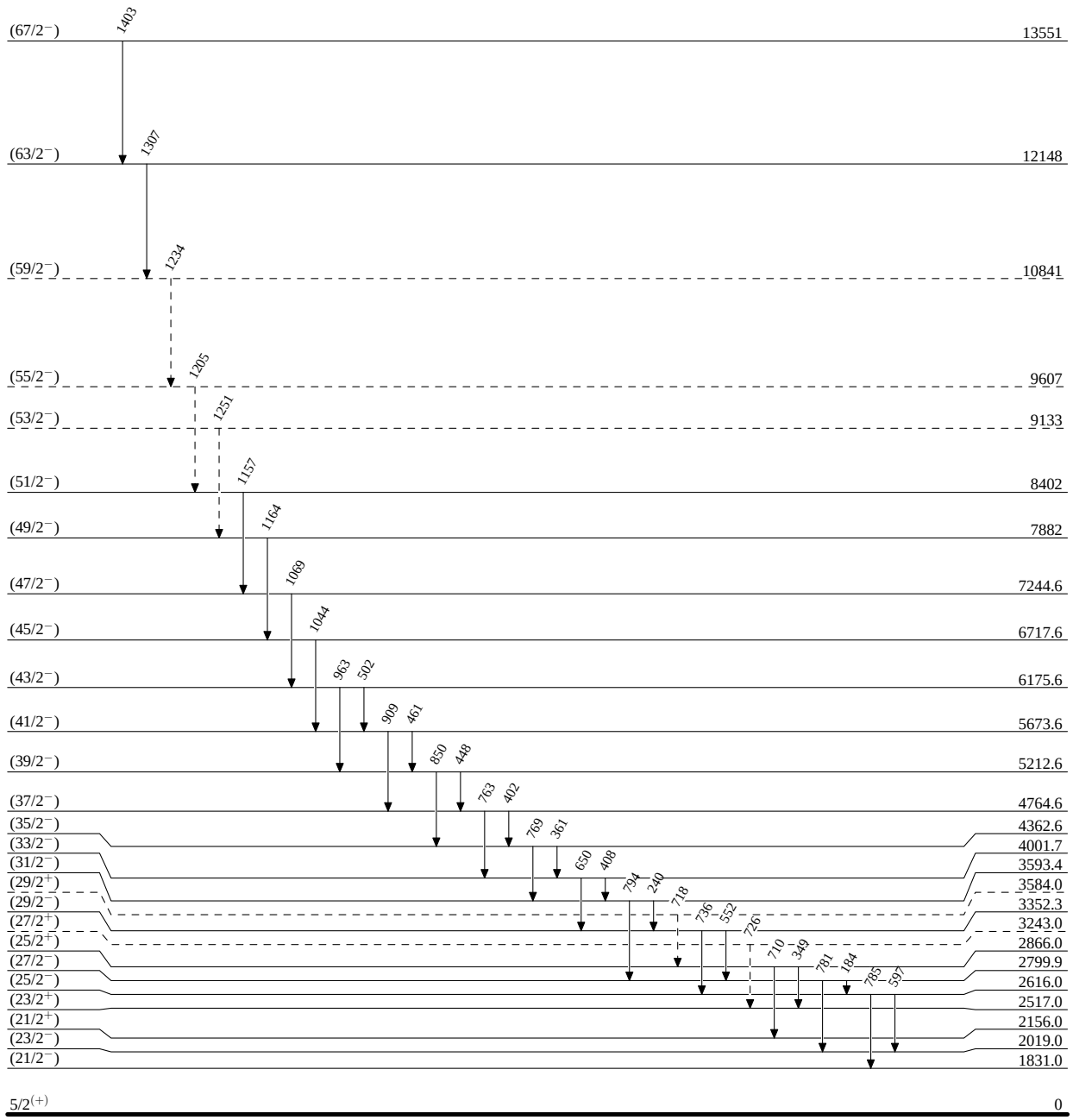
† From 1988Wy02. Values are read from Fig 1, unless otherwise noted.
‡ Transitions are indicated in Fig 1 of 1988Wy02 with no Eγ values given. Values are from level energy differences.
# Order of 1205γ and 1234γ is not firmly established (1988Wy02).
@ Placement of transition in the level scheme is uncertain.

Legend

^{94}Mo(^{32}S,2pnγ),^{74}Se(^{52}Cr,2pnγ) 1988Wy02

Level Scheme

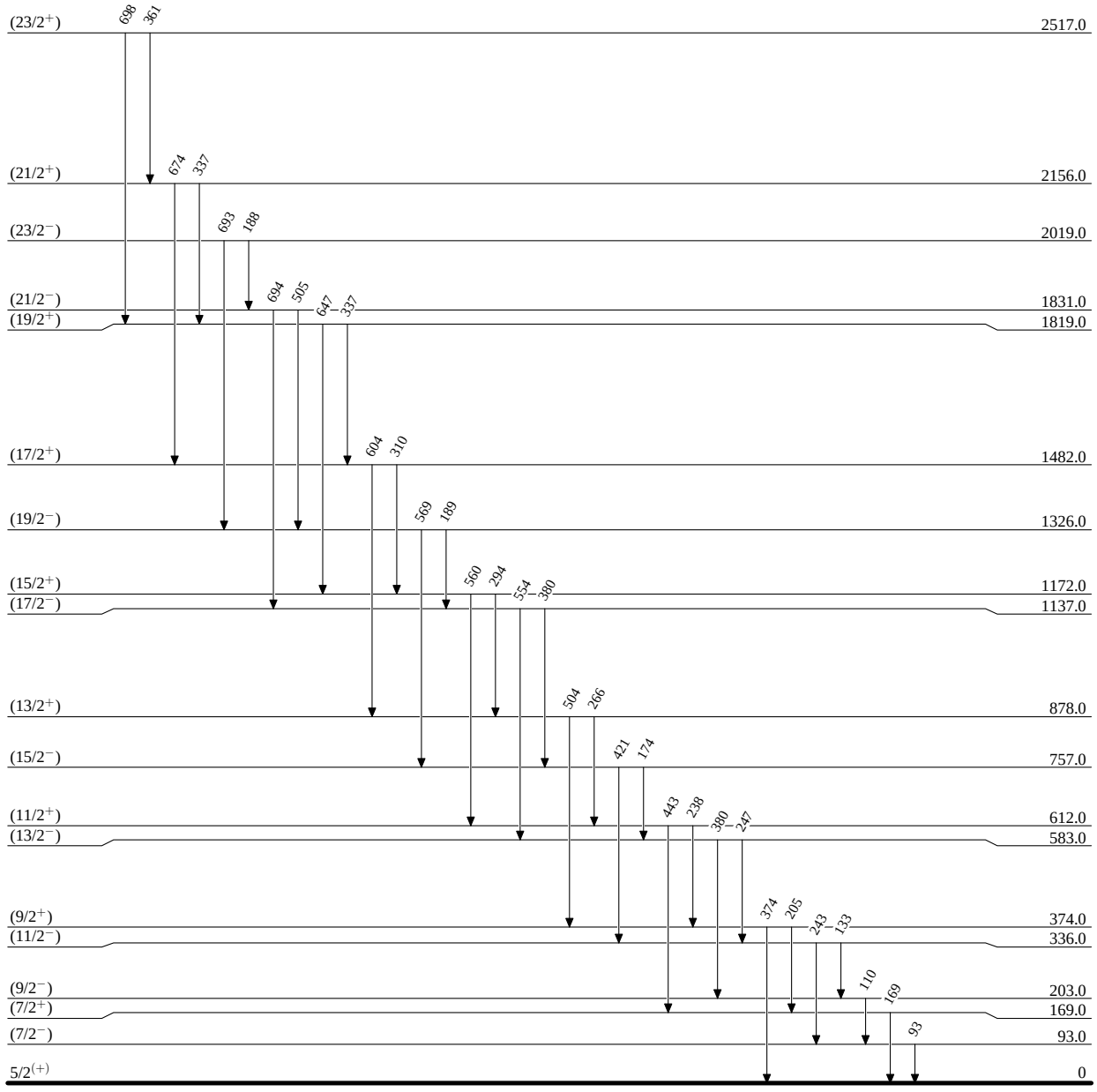
γ Decay (Uncertain)



$^{123}_{56}Ba_{67}$

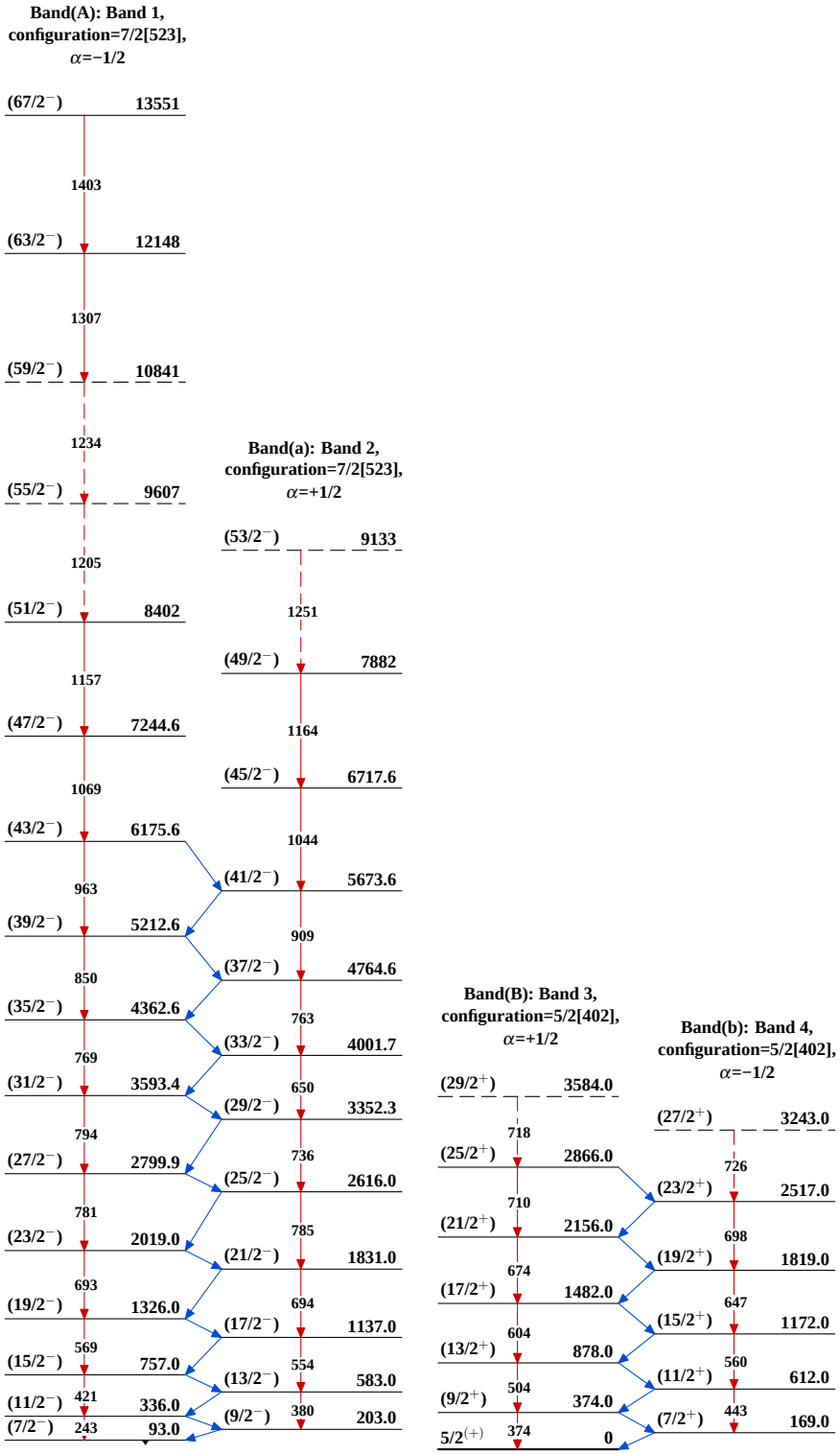
^{94}Mo(^{32}S,2pnγ),^{74}Se(^{52}Cr,2pnγ) 1988Wy02

Level Scheme (continued)



$^{123}_{56}Ba_{67}$

^{94}Mo(^{32}S,2pnγ),^{74}Se(^{52}Cr,2pnγ) 1988Wy02



$^{123}_{56}Ba_{67}$

^{108}Cd(^{19}F,3npγ) 2016Ch30

2016Ch30: E=90 MeV ^{19}F beam was produced from the HI-13 Tandem Accelerator at the China Institute of Atomic Energy (CIAE). Target was 1.1 mg/cm^2 ^{108}Cd on a 14 mg/cm^2 lead. The γ rays were detected with 11 Compton-suppressed HPGe detectors and two planar HPGe detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, DCO ratios. Deduced high-spin levels, J^π, bands, configurations, B(E1)/B(E2) ratios, and octupole correlations. Potential-energy surface calculations. Comparisons with relativistic mean-field model, and cluster model calculations.

^{123}Ba Levels

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
0.0[a]	5/2$^+$	582.3[c] 3	13/2$^-$	1480.8[a] 3	17/2$^+$	2863.7[a] 3	25/2$^+$
92.5[b] 2	7/2$^-$	611.9[&] 2	11/2$^+$	1818.2[&] 3	19/2$^+$	3189.4[&] 5	27/2$^+$
120.9[#] 9	1/2$^+$	695.1[#] 9	9/2$^+$	1829.9[c] 4	21/2$^-$	3340.1[@] 10	(27/2$^+$)
153.6[@] 5	3/2$^+$	756.5[b] 3	15/2$^-$	1925.3[@] 7	19/2$^+$	3350.2[c] 5	29/2$^-$
169.0[&] 2	7/2$^+$	790.3[@] 6	11/2$^+$	2017.9[b] 3	23/2$^-$	3591.3[b] 6	31/2$^-$
202.3[c] 2	9/2$^-$	877.6[a] 3	13/2$^+$	2154.3[a] 3	21/2$^+$	4000.6[c] 7	33/2$^-$
327.9[#] 8	5/2$^+$	1136.5[c] 3	17/2$^-$	2516.0[&] 4	23/2$^+$	4360.2[b] 8	35/2$^-$
335.6[b] 3	11/2$^-$	1171.7[&] 3	15/2$^+$	2612.0[@] 9	23/2$^+$		
374.2[a] 2	9/2$^+$	1307.9[@] 6	15/2$^+$	2614.2[c] 4	25/2$^-$		
397.0[@] 6	7/2$^+$	1325.4[b] 3	19/2$^-$	2797.9[b] 4	27/2$^-$		

† From a least-squares fit to γ-ray energies.
‡ From 2016Ch30, based on measured γ(DCO) and band structures. See Adopted Levels for adopted assignments.
# Band(A): Band 1, configuration=$\nu s_{1/2}$, α=+1/2.
@ Band(a): Band 2, configuration=$\nu s_{1/2}$, α=−1/2.
& Band(B): Band 3, configuration=$\nu(d_{5/2}+g_{7/2})$, α=−1/2.
a Band(b): Band 4, configuration=$\nu(d_{5/2}+g_{7/2})$, α=+1/2.
b Band(C): Band 5, configuration=$\nu h_{11/2}$, α=−1/2.
c Band(c): Band 6, configuration=$\nu h_{11/2}$, α=+1/2.

γ(^{123}Ba)

DCO values are from e-mail reply of Oct 25, 2016 from one of authors of 2016Ch30, C. Xu.
The DCO ratios are for gates on ΔJ=2, quadrupole transitions. Expected DCO ratios are >1.0 for ΔJ=2, quadrupole transitions and <0.80 for ΔJ=1, dipole transitions. Mult=D+Q is assumed by the evaluator for DCO values between 0.8 and 1.0.

Eγ†	Iγ†	Ei(level)	Jiπ	Ef	Jfπ	Mult.#	Comments
69.1 5		397.0	7/2$^+$	327.9	5/2$^+$		
92.5 2	66.2 14	92.5	7/2$^-$	0.0	5/2$^+$	D	DCO=0.60 12
109.8 2	54 4	202.3	9/2$^-$	92.5	7/2$^-$	(D+Q)	DCO=0.85 4
133.3 2	60 4	335.6	11/2$^-$	202.3	9/2$^-$	(D+Q)[@]	DCO=0.94 5
153.6 5	9.4 6	153.6	3/2$^+$	0.0	5/2$^+$	D	DCO=0.77 11
169.0 2	48.9 8	169.0	7/2$^+$	0.0	5/2$^+$	D	DCO=0.61 6
174.2 2	21.3 15	756.5	15/2$^-$	582.3	13/2$^-$	(D+Q)[@]	DCO=0.99 7
183.7 5		2797.9	27/2$^-$	2614.2	25/2$^-$		
188.0 5		2017.9	23/2$^-$	1829.9	21/2$^-$		
188.9 5		1325.4	19/2$^-$	1136.5	17/2$^-$		
205.2 2	34.2 18	374.2	9/2$^+$	169.0	7/2$^+$	(D+Q)	DCO=0.88 6
207.0 5	8.2 6	327.9	5/2$^+$	120.9	1/2$^+$	Q	DCO=1.72 16

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^{108}Cd(^{19}F,3npγ) 2016Ch30 (continued)

$\gamma(^{123}Ba)$ (continued)

E_γ [†]	I_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Comments
237.7 *2*	25.6 *14*	611.9	11/2$^+$	374.2	9/2$^+$	(D+Q)[@]	DCO=0.96 *10*
243.1 *5*	19.2 *16*	335.6	11/2$^-$	92.5	7/2$^-$	Q	DCO=1.04 *8*
243.4 *2*	23.3 *12*	397.0	7/2$^+$	153.6	3/2$^+$		DCO=0.94 *6* Mult.: (D+Q) assumed from DCO value but ΔJ=2.
246.7 *2*	39.2 *24*	582.3	13/2$^-$	335.6	11/2$^-$	(D+Q)[@]	DCO=1.03 *10*
265.7 *5*	12.1 *9*	877.6	13/2$^+$	611.9	11/2$^+$		
294.1 *5*	14.6 *9*	1171.7	15/2$^+$	877.6	13/2$^+$		
309.1 *5*	8.8 *7*	1480.8	17/2$^+$	1171.7	15/2$^+$		
336.1 *5*		2154.3	21/2$^+$	1818.2	19/2$^+$		
337.4 *5*		1818.2	19/2$^+$	1480.8	17/2$^+$		
361.7 *5*		2516.0	23/2$^+$	2154.3	21/2$^+$		
367.2 *5*		695.1	9/2$^+$	327.9	5/2$^+$		
374.2 *5*	18.2 *4*	374.2	9/2$^+$	0.0	5/2$^+$		
380.0 *2*	24.1 *12*	582.3	13/2$^-$	202.3	9/2$^-$		
380.0 *2*	22 *4*	1136.5	17/2$^-$	756.5	15/2$^-$		DCO=1.29 *10* Mult.: DCO consistent with Q but ΔJ=1.
393.3 *2*	42 *4*	790.3	11/2$^+$	397.0	7/2$^+$	Q	DCO=1.57 *10*
409.6 *5*	13 *3*	611.9	11/2$^+$	202.3	9/2$^-$		
420.9 *2*	96 *5*	756.5	15/2$^-$	335.6	11/2$^-$	Q	DCO=1.43 *6*
442.9 *2*	27.3 *16*	611.9	11/2$^+$	169.0	7/2$^+$	Q	DCO=1.34 *11*
503.4 *2*	30.7 *18*	877.6	13/2$^+$	374.2	9/2$^+$	Q	DCO=1.00 *6*
504.5 *5*	11.8 *12*	1829.9	21/2$^-$	1325.4	19/2$^-$		
517.6 *2*	33.5 *17*	1307.9	15/2$^+$	790.3	11/2$^+$	Q	DCO=1.20 *8*
552.3 *5*		3350.2	29/2$^-$	2797.9	27/2$^-$		
554.2 *2*	35.9 *25*	1136.5	17/2$^-$	582.3	13/2$^-$	(Q)	DCO=0.96 *8*
559.8 *2*	47 *3*	1171.7	15/2$^+$	611.9	11/2$^+$	Q	DCO=1.03 *4*
568.9 *2*	100	1325.4	19/2$^-$	756.5	15/2$^-$	Q	DCO=1.14 *5*
575.2 *5*	8.0 *17*	3189.4	27/2$^+$	2614.2	25/2$^-$		
589.4 *5*	6.0 *14*	1171.7	15/2$^+$	582.3	13/2$^-$		
596.3 *5*		2614.2	25/2$^-$	2017.9	23/2$^-$		
603.2 *2*	33.2 *20*	1480.8	17/2$^+$	877.6	13/2$^+$	Q	DCO=1.24 *7*
617.4 *2*	25.7 *14*	1925.3	19/2$^+$	1307.9	15/2$^+$	Q	DCO=1.46 *11*
646.5 *2*	49 *3*	1818.2	19/2$^+$	1171.7	15/2$^+$	Q	DCO=1.90 *13*
650.4 *5*		4000.6	33/2$^-$	3350.2	29/2$^-$		
673.4 *5*	14.1 *24*	3189.4	27/2$^+$	2516.0	23/2$^+$	Q	DCO=1.76 *16*
673.5 *2*	35 *5*	2154.3	21/2$^+$	1480.8	17/2$^+$	Q	DCO=1.87 *10*
686.1 *5*	6.0 *19*	2516.0	23/2$^+$	1829.9	21/2$^-$		
686.7 *5*	19.9 *12*	2612.0	23/2$^+$	1925.3	19/2$^+$	Q	DCO=1.42 *13*
692.5 *2*	80 *6*	2017.9	23/2$^-$	1325.4	19/2$^-$	Q	DCO=1.93 *9*
693.4 *5*	16.4[‡] *18*	1829.9	21/2$^-$	1136.5	17/2$^-$	(Q)	DCO=0.96 *6*
697.8 *5*	18.7 *13*	2516.0	23/2$^+$	1818.2	19/2$^+$	Q	DCO=1.08 *5*
709.4 *2*	25.2 *16*	2863.7	25/2$^+$	2154.3	21/2$^+$	Q	DCO=1.58 *10*
728.1 *5*	8.2 *7*	3340.1	(27/2$^+$)	2612.0	23/2$^+$		
736.0 *5*	8.9 *11*	3350.2	29/2$^-$	2614.2	25/2$^-$		
768.9 *5*		4360.2	35/2$^-$	3591.3	31/2$^-$		
780.0 *2*	48 *4*	2797.9	27/2$^-$	2017.9	23/2$^-$	Q	DCO=1.32 *8*
784.3 *5*	11.9 *18*	2614.2	25/2$^-$	1829.9	21/2$^-$		
793.4 *5*		3591.3	31/2$^-$	2797.9	27/2$^-$		
828.9 *5*	8.5 *24*	2154.3	21/2$^+$	1325.4	19/2$^-$		
845.8 *2*	26 *4*	2863.7	25/2$^+$	2017.9	23/2$^-$		

[†] From e-mail reply of Oct 25, 2016 from C. Xu. Energy uncertainty is stated by the authors as 0.2-0.5 keV and is assigned here

Continued on next page (footnotes at end of table)

^{108}Cd(^{19}F,3npγ) 2016Ch30 (continued)

$\gamma(^{123}Ba)$ (continued)

to be 0.2 keV for γ rays with I$\gamma\geq$20, and 0.5 keV for Iγ<20.

‡ Uncertainty of 1.18 in the data sent by e-mail reply seems a misprint and is assumed to be 1.8 here.

From 2016Ch30 based on measured DCO ratios and the authors′ statement on expected DCO values for ΔJ=2 quadrupole and ΔJ=1 dipole transitions.

@ The DCO ratio is too large to be consistent with ΔJ=1, dipole transition. Perhaps the transition is heavily mixed with quadrupole radiation.

^{108}Cd(^{19}F,3npγ) 2016Ch30

Level Scheme

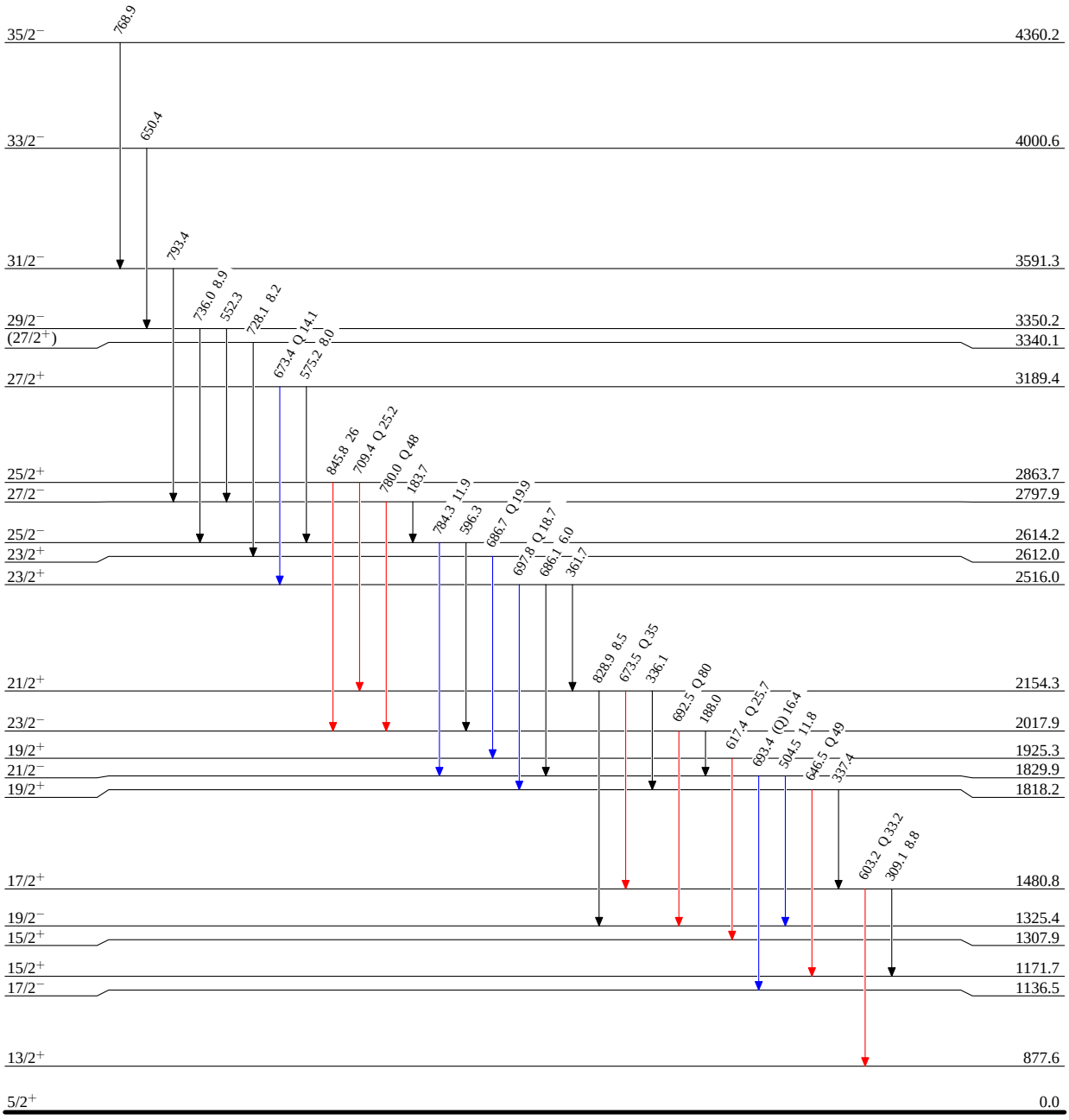
Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

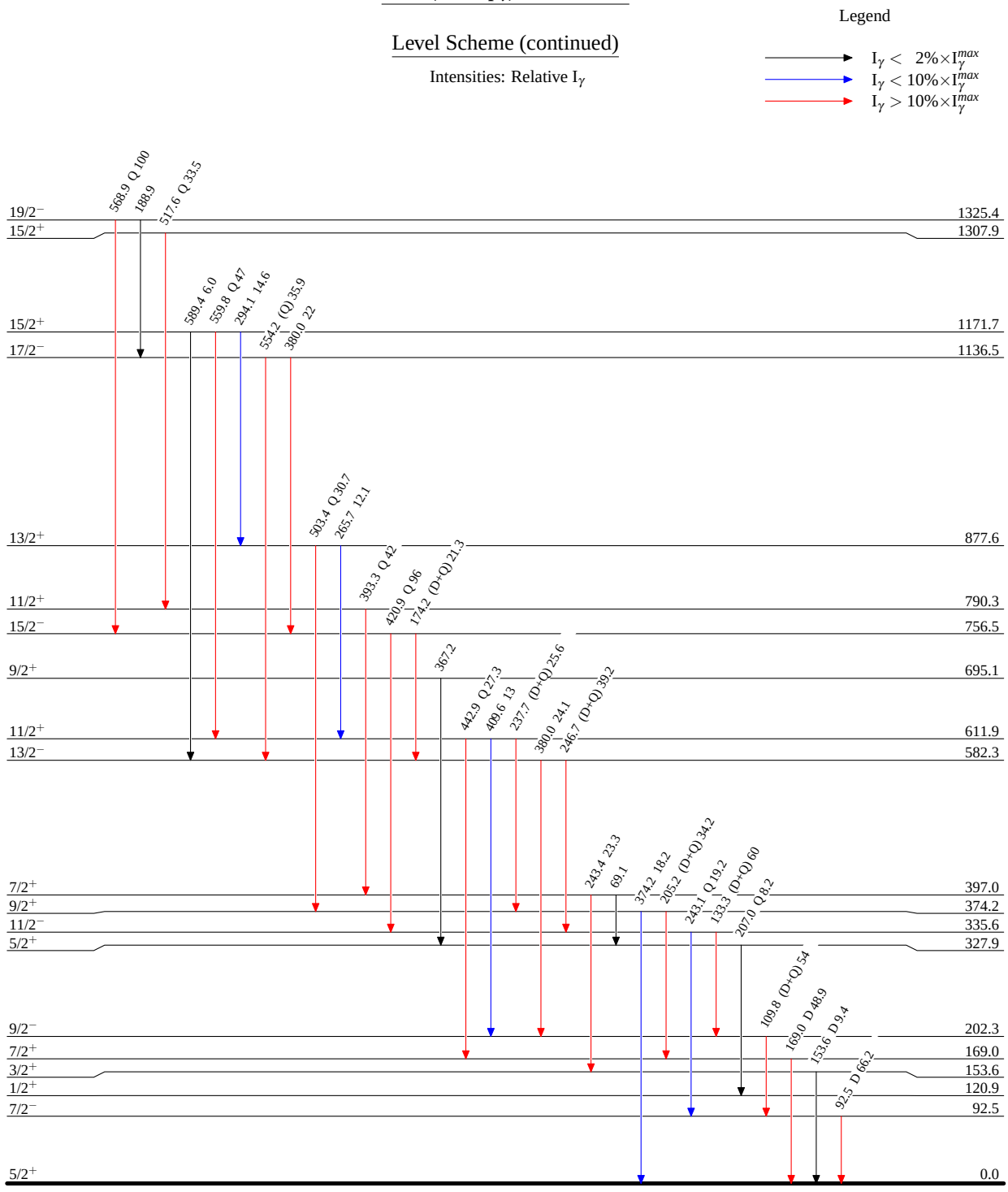


$^{123}_{56}Ba_{67}$

^{108}Cd(^{19}F,3npγ) 2016Ch30

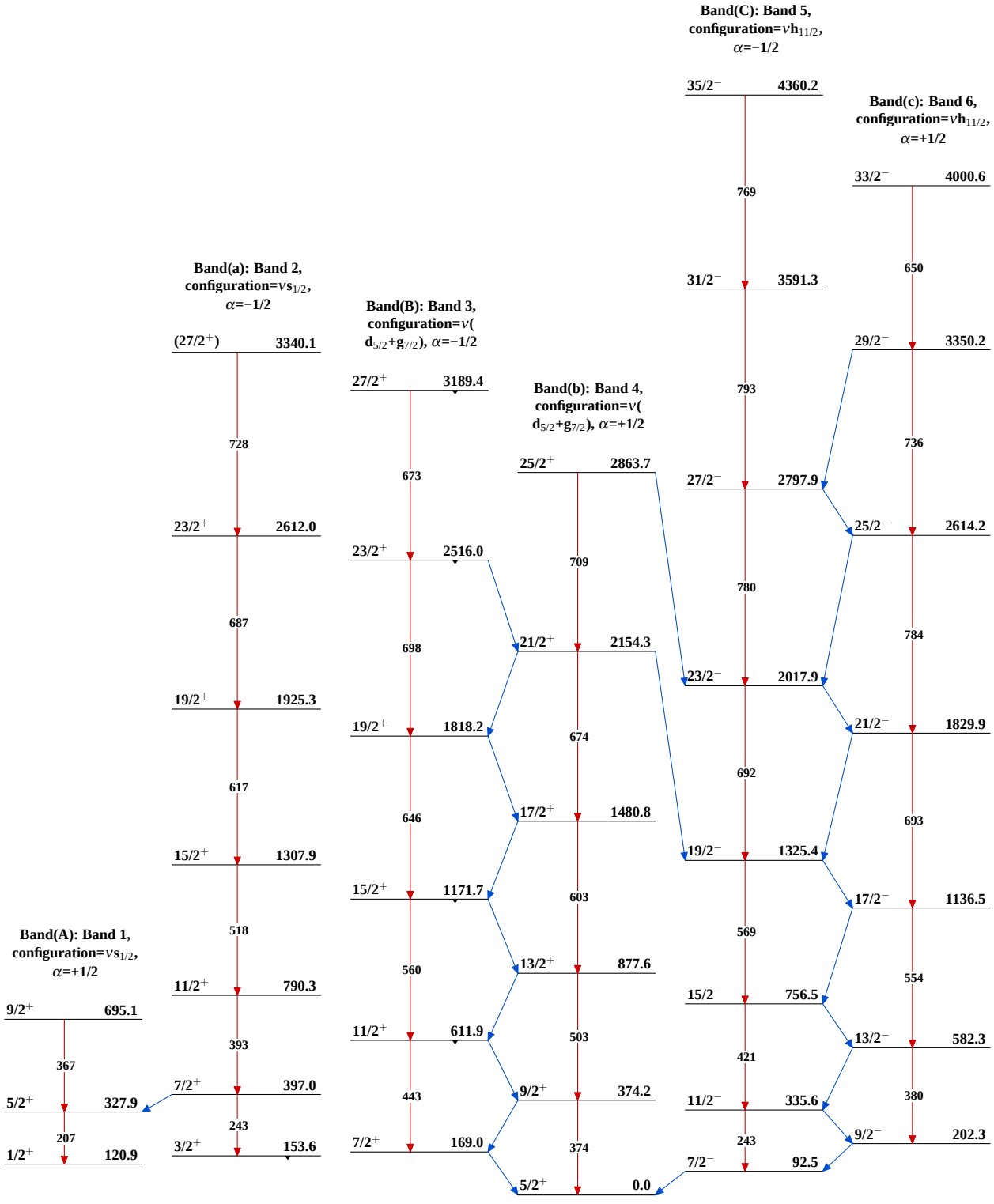
Level Scheme (continued)

Intensities: Relative I_γ



$^{123}_{56}Ba_{67}$

^{108}Cd(^{19}F,3npγ) 2016Ch30



$^{123}_{56}Ba_{67}$

^{114}Sn(^{12}C,3nγ) 1979Yo06

1979Yo06: E=52-63 MeV ^{12}C beams were produced from the Grenoble variable-energy cyclotron. Target was metallic tin 66.5% enriched in ^{114}Sn. γ rays were detected with Ge(Li) detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, γ(t), $\gamma(\theta)$. Deduced levels, J, π, $T_{1/2}$, γ-ray multipolarities. Systematics of neighboring nuclei.

^{123}Ba Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	Comments
0.0	$5/2^{(+)}$		
92.70 *10*	$(7/2^-)$	≈40 ns	$T_{1/2}$: from γ(t) in 1979Yo06.
169.6 *10*	$(7/2^+)$		
202.70 *15*	$(9/2^-)$		
335.9 *8*	$(11/2^-)$		
374.9 *11*	$(9/2^+)$		
582.9 *8*	$(13/2^-)$		
613.0 *11*	$(11/2^+)$		
757.0 *10*	$(15/2^-)$		
1136.8 *9*	$(17/2^-)$		
1326.0 *11*	$(19/2^-)$		
1831.5 *14*	$(21/2^-)$		
2020.7 *15*	$(23/2^-)$		
2801.3 *18*	$(27/2^-)$		

[†] From a least-squares fit to γ-ray energies.
[‡] From Adopted Levels. Assignments are supported by $\gamma(\theta)$ in 1979Yo06 where available.

γ(^{123}Ba)

E$_\gamma$[†]	I$_\gamma$[†]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[‡]	Comments
92.7 *1*	102 *8*	92.70	$(7/2^-)$	0.0	$5/2^{(+)}$	(D+Q)	Mult.: A_2=−0.20 *5*.
110.0 *1*	100 *8*	202.70	$(9/2^-)$	92.70	$(7/2^-)$	(D+Q)	Mult.: A_2=−0.41 *7*.
133.3 *10*	≈81	335.9	$(11/2^-)$	202.70	$(9/2^-)$		Mult.: A_2=−0.45 *10* for composite line.
169.6 *10*	≈30	169.6	$(7/2^+)$	0.0	$5/2^{(+)}$		
174.4 *10*	≈23	757.0	$(15/2^-)$	582.9	$(13/2^-)$		
189.1 *10*	≈33	1326.0	$(19/2^-)$	1136.8	$(17/2^-)$		
205.3 *2*	28 *4*	374.9	$(9/2^+)$	169.6	$(7/2^+)$	(D+Q)	Mult.: A_2=−0.54 *16*.
238.1 *3*	14 *3*	613.0	$(11/2^+)$	374.9	$(9/2^+)$	(D+Q)	Mult.: A_2=−0.31 *9*.
247.0 *3*	30 *4*	582.9	$(13/2^-)$	335.9	$(11/2^-)$	(D+Q)	Mult.: A_2=−0.738.
380.1[#] *10*	37[#] *7*	582.9	$(13/2^-)$	202.70	$(9/2^-)$		Mult.: A_2=+0.04 *10* for composite line.
380.1[#] *10*	37[#] *7*	1136.8	$(17/2^-)$	757.0	$(15/2^-)$		
421.3 *10*	≈118	757.0	$(15/2^-)$	335.9	$(11/2^-)$		Mult.: A_2=+0.29 *6* for composite line.
553.7 *6*	30 *5*	1136.8	$(17/2^-)$	582.9	$(13/2^-)$		Mult.: A_2=+0.21 *7*.
569.0 *6*	72 *11*	1326.0	$(19/2^-)$	757.0	$(15/2^-)$		Mult.: A_2=+0.20 *6*.
694.7[#] *10*	≈55[#]	1831.5	$(21/2^-)$	1136.8	$(17/2^-)$		Mult.: A_2=+0.28 *2* for composite line.
694.7[#] *10*	≈55[#]	2020.7	$(23/2^-)$	1326.0	$(19/2^-)$		
780.6 *10*	≈34	2801.3	$(27/2^-)$	2020.7	$(23/2^-)$		

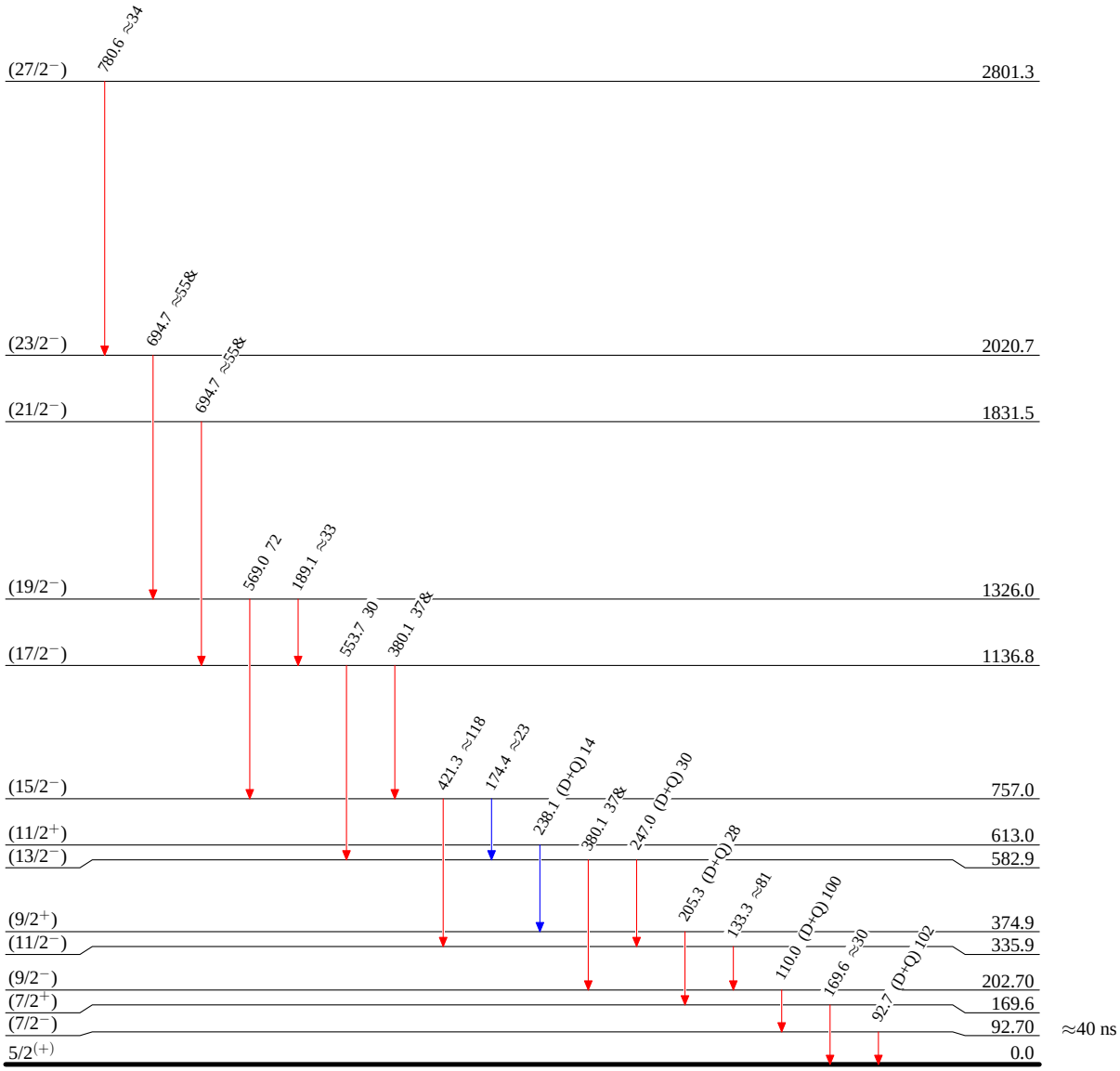
[†] From 1979Yo06, relative to I(110γ)=100. Uncertainties for Eγ are not explicitly given in 1979Yo06 and are assigned to be 0.1% for resolved lines according to authors' statement and 1 keV for unresolved composite line estimated by the evaluator.
[‡] From $\gamma(\theta)$ in 1979Yo06. The evaluator assumed (D+Q) for transitions with negative A_2 values given under comment; large positive A_2 values are consistent with ΔJ=2 while ΔJ=0 also possible.
[#] Multiply placed with undivided intensity.

^{114}Sn(^{12}C,3nγ) 1979Yo06

Level Scheme

Intensities: Relative I_γ
& Multiply placed: undivided intensity given

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



$^{123}_{56}Ba_{67}$

Adopted Levels, Gammas

Q(β^-)=−8370 *syst*; S(n)=12180 *syst*; S(p)=1330 *syst*; Q(α)=1230 *syst* 2021Wa16
ΔQ(β^-)=360, ΔS(n)=360, ΔS(p)=200, ΔQ(α)=200 (syst,2021Wa16).
S(2n)=22600 *360*, S(2p)=6130 *200*, Q(εp)=2210 *200* (syst,2021Wa16).
Structure calculations: 2018Se02, 2014Ag01, 2014Sh10.

^{123}La Levels

Cross Reference (XREF) Flags

A ^{123}Ce ε decay (3.8 s)
B ^{124}Pr εp decay (1.2 s)
C ^{92}Mo(^{34}S,p2nγ),^{52}Cr(^{74}Se,p2nγ)
D ^{92}Mo(^{40}Ca,2αpγ)

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	XREF	Comments
0.0		16.3 s *3*	CD	%ε+%β^+=100 XREF: C(?)D(?). $T_{1/2}$: weighted average of 16.3 s *3* (1992Ic02, γ(t)), 16 s *1* (1988GeZR, γ(t)), and 17 s *3* (1978Bo32, x-ray(t)).
0+x	(5/2$^+$)		CD	E(level): this level may correspond to the g.s., but it is not established from ^{123}La ε decay study.
0+y[d]	(9/2$^+$)		CD	
35.6+x[#] *4*	(3/2$^+$)		CD	
39.8+x[&] *4*	(11/2$^-$)		CD	
209.57+y[c] *19*	(11/2$^+$)		CD	
224.7+x[#] *3*	(7/2$^+$)		CD	
270.6+x[&] *5*	(15/2$^-$)		CD	
449.00+y[d] *22*	(13/2$^+$)		CD	
549.6+x[#] *4*	(11/2$^+$)		CD	
674.0+x[&] *5*	(19/2$^-$)		CD	
716.12+y[c] *23*	(15/2$^+$)		CD	
957.4+x[a] *5*	(15/2$^-$)		D	
987.7+x[#] *4*	(15/2$^+$)		CD	
1008.33+y[d] *25*	(17/2$^+$)		CD	
1223.9+x[&] *5*	(23/2$^-$)		CD	
1322.6+y[c] *3*	(19/2$^+$)		CD	
1352.0+x[a] *5*	(19/2$^-$)		D	
1487.7+x[#] *5*	(19/2$^+$)		CD	
1656.1+y[d] *3*	(21/2$^+$)		CD	
1735.4+x[b] *8*	(21/2$^-$)		D	
1797.9+x[@] *6*	(21/2$^+$)		D	
1856.3+x[a] *5*	(23/2$^-$)		D	
1894.6+x[&] *5*	(27/2$^-$)		CD	
1979.7+x[#] *5*	(23/2$^+$)		CD	
2005.5+y[c] *3*	(23/2$^+$)		CD	
2304.2+x[b] *6*	(25/2$^-$)		D	
2325.7+x[@] *5*	(25/2$^+$)		D	
2365.5+y[d] *4*	(25/2$^+$)		CD	
2466.6+x[a] *5*	(27/2$^-$)		D	
2519.3+x[#] *6*	(27/2$^+$)		CD	

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Adopted Levels, Gammas (continued)

^{123}La Levels (continued)

E(level)†	Jπ‡	XREF	E(level)†	Jπ‡	XREF	E(level)†	Jπ‡	XREF
2662.6+x& 6	(31/2⁻)	CD	5438.2+x& 7	(43/2⁻)	CD	9132.7+y[c] 8	(55/2⁺)	D
2725.3+y[c] 4	(27/2⁺)	CD	5498.3+x[b] 7	(41/2⁻)	D	9288.9+x?[a] 14	(55/2⁻)	D
2906.2+x@ 6	(29/2⁺)	D	5607.6+x# 7	(43/2⁺)	CD	9550.6+x@ 9	(57/2⁺)	D
2968.4+x[b] 6	(29/2⁻)	D	5830.3+x[a] 7	(43/2⁻)	D	9765.9+y[d] 6	(57/2⁺)	D
3074.9+y[d] 4	(29/2⁺)	D	5841.2+y[c] 5	(43/2⁺)	D	10019.4+x# 12	(59/2⁺)	D
3152.9+x# 6	(31/2⁺)	CD	6131.6+x@ 7	(45/2⁺)	D	10142.0+x& 11	(59/2⁻)	D
3173.4+x[a] 6	(31/2⁻)	D	6327.0+y[d] 5	(45/2⁺)	D	10425.6+y[c] 9	(59/2⁺)	D
3417.5+y[c] 4	(31/2⁺)	D	6503.6+x[b] 9	(45/2⁻)	D	10892.8+x@ 10	(61/2⁺)	D
3512.3+x& 6	(35/2⁻)	CD	6511.2+x& 7	(47/2⁻)	CD	11107.3+y[d] 8	(61/2⁺)	D
3574.3+x@ 6	(33/2⁺)	D	6589.2+x# 11	(47/2⁺)	CD	11337.5+x# 13	(63/2⁺)	D
3727.4+x[b] 6	(33/2⁻)	D	6842.5+y[c] 5	(47/2⁺)	D	11490.0+x& 12	(63/2⁻)	D
3763.3+y[d] 4	(33/2⁺)	D	6905.6+x[a] 8	(47/2⁻)	D	11811.3+y[c] 10	(63/2⁺)	D
3883.0+x# 6	(35/2⁺)	CD	7168.5+x@ 7	(49/2⁺)	D	12327.4+x@ 12	(65/2⁺)	D
3968.4+x[a] 6	(35/2⁻)	D	7376.0+y[d] 5	(49/2⁺)	D	12542.2+y[d] 9	(65/2⁺)	D
4132.6+y[c] 4	(35/2⁺)	D	7579.7+x[b] 10	(49/2⁻)	D	12752.3+x# 14	(67/2⁺)	D
4336.9+x@ 6	(37/2⁺)	D	7649.5+x# 11	(51/2⁺)	CD	12909.4+x& 13	(67/2⁻)	D
4437.7+x& 7	(39/2⁻)	CD	7652.4+x& 10	(51/2⁻)	CD	13852.2+x?@ 15	(69/2⁺)	D
4519.7+y[d] 4	(37/2⁺)	D	7938.4+y[c] 6	(51/2⁺)	D	14271.5+x# 15	(71/2⁺)	D
4571.3+x[b] 7	(37/2⁻)	D	8068.3+x[a] 10	(51/2⁻)	D	14408.1+x& 14	(71/2⁻)	D
4703.7+x# 7	(39/2⁺)	CD	8306.8+x@ 7	(53/2⁺)	D	15895.7+x# 16	(75/2⁺)	D
4852.1+x[a] 6	(39/2⁻)	D	8522.2+y[d] 6	(53/2⁺)	D	15992.8+x& 15	(75/2⁻)	D
4937.8+y[c] 4	(39/2⁺)	D	8700.7+x[b] 14	(53/2⁻)	D	17651.5+x?# 17	(79/2⁺)	D
5189.8+x@ 6	(41/2⁺)	D	8791.1+x# 11	(55/2⁺)	D	17663.2+x?& 16	(79/2⁻)	D
5374.0+y[d] 5	(41/2⁺)	D	8863.1+x& 10	(55/2⁻)	D			

† From a least-squares fit to γ-ray energies. The bandhead energies are not determined.

‡ From (^{40}Ca,2αpγ), based on measured γγ(DCO) and proposed band structures. Assignments are consistent with structure calculations based on Nilsson orbitals.

Band(A): Band 1: π3/2[422] ($g_{7/2}$ orbital), α=−1/2.

@ Band(B): Band 2: π($d_{5/2}$/$g_{7/2}$)E_pF_p, α=+1/2. E_p=most favored proton π$h_{11/2}$, α=−1/2; F_p=most favored proton π$h_{11/2}$, α=+1/2.

& Band(C): Band 3: π1/2[550], α=−1/2.

[a] Band(D): Band 4: Quasi γ-vibration band based on $h_{11/2}$, α=−1/2.

[b] Band(E): Band 5: Quasi γ-vibration band based on $h_{11/2}$, α=+1/2 (?).

[c] Band(F): Band 6: π9/2[404], α=−1/2.

[d] Band(f): Band 7: π9/2[404], α=+1/2.

γ(^{123}La)

γ rays of 66, 113 and 178 keV were observed and tentatively assigned to ^{123}La in ^{123}Ce ε decay; γ rays of 70, 113 and 166 keV were observed and assigned to ^{123}La in ^{124}Pr εp decay. Those γ rays are not placed since the level scheme is not known.

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Adopted Levels, Gammas (continued)

$\gamma(^{123}La)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	Comments
209.57+y	(11/2$^+$)	209.6 *2*	100	0+y	(9/2$^+$)	D	E_γ: weighted average of 209.6 *2* from (^{34}S,p2nγ) and 209.5 *2* from (^{40}Ca,2αpγ).
224.7+x	(7/2$^+$)	189.1 *2*	100 *16*	35.6+x	(3/2$^+$)	Q	E_γ: weighted average of 189.2 *2* from (^{34}S,p2nγ) and 189.0 *2* from (^{40}Ca,2αpγ). I_γ: other: 100 *30* from (^{34}S,p2nγ).
		224.7 *3*	≈37	0+x	(5/2$^+$)	D	E_γ: weighted average of 224.9 *2* from (^{34}S,p2nγ) and 224.4 *2* from (^{40}Ca,2αpγ). I_γ: other: 70 *30* from (^{34}S,p2nγ).
270.6+x	(15/2$^-$)	230.8 *2*	100	39.8+x	(11/2$^-$)	Q	E_γ: weighted average of 230.8 *2* from (^{34}S,p2nγ) and 230.7 *2* from (^{40}Ca,2αpγ).
449.00+y	(13/2$^+$)	239.5 *2*	100 *3*	209.57+y	(11/2$^+$)	D	E_γ: weighted average of 239.4 *2* from (^{34}S,p2nγ) and 239.5 *2* from (^{40}Ca,2αpγ). I_γ: other: 100 *30* from (^{34}S,p2nγ).
		448.9 *4*	19 *1*	0+y	(9/2$^+$)		E_γ: unweighted average of 448.5 *3* from (^{34}S,p2nγ) and 449.2 *2* from (^{40}Ca,2αpγ). I_γ: other: 18 *9* from (^{34}S,p2nγ).
549.6+x	(11/2$^+$)	324.9 *2*	100 *7*	224.7+x	(7/2$^+$)	Q	E_γ: weighted average of 324.8 *2* from (^{34}S,p2nγ) and 324.9 *2* from (^{40}Ca,2αpγ). I_γ: other: 100 from (^{34}S,p2nγ).
		509.9 *2*	18 *2*	39.8+x	(11/2$^-$)		
674.0+x	(19/2$^-$)	403.3 *2*	100	270.6+x	(15/2$^-$)	Q	E_γ: weighted average of 403.3 *3* from (^{34}S,p2nγ) and 403.3 *2* from (^{40}Ca,2αpγ).
716.12+y	(15/2$^+$)	267.1 *2*	100 *4*	449.00+y	(13/2$^+$)	D	E_γ: weighted average of 267.0 *2* from (^{34}S,p2nγ) and 267.1 *2* from (^{40}Ca,2αpγ). I_γ: other: 100 *30* from (^{34}S,p2nγ).
		506.5 *2*	44 *2*	209.57+y	(11/2$^+$)		E_γ: weighted average of 506.1 *3* from (^{34}S,p2nγ) and 506.6 *2* from (^{40}Ca,2αpγ). I_γ: other: 55 *18* from (^{34}S,p2nγ).
957.4+x	(15/2$^-$)	687.0 *5*	100 *20*	270.6+x	(15/2$^-$)		
		917.5 *5*	<100	39.8+x	(11/2$^-$)		
987.7+x	(15/2$^+$)	438.2 *2*	100 *3*	549.6+x	(11/2$^+$)	Q	E_γ: weighted average of 438.3 *3* from (^{34}S,p2nγ) and 438.2 *2* from (^{40}Ca,2αpγ).
		717.0 *2*	11 *1*	270.6+x	(15/2$^-$)		
1008.33+y	(17/2$^+$)	292.3 *2*	100 *4*	716.12+y	(15/2$^+$)	D	E_γ: weighted average of 292.4 *2* from (^{34}S,p2nγ) and 292.1 *2* from (^{40}Ca,2αpγ). I_γ: other: 100 *30* from (^{34}S,p2nγ).
		559.4 *2*	74 *3*	449.00+y	(13/2$^+$)		E_γ: weighted average of 559.6 *4* from (^{34}S,p2nγ) and 559.3 *2* from (^{40}Ca,2αpγ). I_γ: other: 80 *30* from (^{34}S,p2nγ).
1223.9+x	(23/2$^-$)	550.0 *2*	100	674.0+x	(19/2$^-$)	Q	E_γ: weighted average of 550.1 *3* from (^{34}S,p2nγ) and 550.0 *2* from (^{40}Ca,2αpγ).
1322.6+y	(19/2$^+$)	314.4 *2*	100 *4*	1008.33+y	(17/2$^+$)	D	E_γ: weighted average of 314.3 *2* from (^{34}S,p2nγ) and 314.4 *2* from (^{40}Ca,2αpγ). I_γ: other: 100 *50* from (^{34}S,p2nγ).
		606.3 *2*	84 *4*	716.12+y	(15/2$^+$)		E_γ: weighted average of 606.2 *4* from (^{34}S,p2nγ) and 606.3 *2* from (^{40}Ca,2αpγ). I_γ: other: 100 *50* from (^{34}S,p2nγ).
1352.0+x	(19/2$^-$)	394.7 *5*	56 *6*	957.4+x	(15/2$^-$)		
		678.0 *2*	68 *6*	674.0+x	(19/2$^-$)		
		1081.4 *2*	100 *16*	270.6+x	(15/2$^-$)		
1487.7+x	(19/2$^+$)	500.0 *2*	100 *5*	987.7+x	(15/2$^+$)	Q	E_γ: weighted average of 500.0 *3* from (^{34}S,p2nγ) and 500.0 *2* from (^{40}Ca,2αpγ).
		814 *1*	<5	674.0+x	(19/2$^-$)		

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Adopted Levels, Gammas (continued)

γ(^{123}La) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	Comments
1656.1+y	(21/2$^+$)	333.6 *2*	86 *4*	1322.6+y	(19/2$^+$)	D	E_γ: weighted average of 333.5 *2* from (^{34}S,p2nγ) and 333.6 *2* from (^{40}Ca,2αpγ). I_γ: other: 50 *30* from (^{34}S,p2nγ).
		647.8 *2*	100 *4*	1008.33+y	(17/2$^+$)		E_γ: weighted average of 647.6 *4* from (^{34}S,p2nγ) and 647.8 *2* from (^{40}Ca,2αpγ). I_γ: other: 100 *30* from (^{34}S,p2nγ).
1735.4+x	(21/2$^-$)	1062[#] *1*	<100	674.0+x	(19/2$^-$)		
1797.9+x	(21/2$^+$)	1123.5 *5*	<100	674.0+x	(19/2$^-$)		
1856.3+x	(23/2$^-$)	504.3 *2*	100 *3*	1352.0+x	(19/2$^-$)		
		1182.3 *2*	37 *4*	674.0+x	(19/2$^-$)		E_γ: a 1210.5γ-1184.3γ cascade placed to feed the 7652.8+x level in (^{34}S,p2nγ).
1894.6+x	(27/2$^-$)	670.5 *2*	100	1223.9+x	(23/2$^-$)	Q	E_γ: weighted average of 670.3 *4* from (^{34}S,p2nγ) and 670.6 *2* from (^{40}Ca,2αpγ).
1979.7+x	(23/2$^+$)	492.0 *2*	100	1487.7+x	(19/2$^+$)	Q	E_γ: weighted average of 491.9 *3* from (^{34}S,p2nγ) and 492.0 *2* from (^{40}Ca,2αpγ).
2005.5+y	(23/2$^+$)	349.6 *2*	57 *2*	1656.1+y	(21/2$^+$)	D	E_γ: weighted average of 349.5 *3* from (^{34}S,p2nγ) and 349.7 *2* from (^{40}Ca,2αpγ). I_γ: other: 80 *30* from (^{34}S,p2nγ).
		682.8 *3*	100 *5*	1322.6+y	(19/2$^+$)		E_γ: weighted average of 683.4 *4* from (^{34}S,p2nγ) and 682.6 *2* from (^{40}Ca,2αpγ). I_γ: other: 100 *30* from (^{34}S,p2nγ).
2304.2+x	(25/2$^-$)	568.8 *5*	<54	1735.4+x	(21/2$^-$)		
		1080.3 *2*	100 *16*	1223.9+x	(23/2$^-$)		
2325.7+x	(25/2$^+$)	527.4 *5*	<50	1797.9+x	(21/2$^+$)		
		1101.9 *2*	100 *13*	1223.9+x	(23/2$^-$)	D	
2365.5+y	(25/2$^+$)	360.0 *2*	54 *3*	2005.5+y	(23/2$^+$)	D	E_γ: weighted average of 359.8 *3* from (^{34}S,p2nγ) and 360.1 *2* from (^{40}Ca,2αpγ). I_γ: other: 100 *40* from (^{34}S,p2nγ).
		709.2 *2*	100 *5*	1656.1+y	(21/2$^+$)		E_γ: weighted average of 709.4 *4* from (^{34}S,p2nγ) and 709.2 *2* from (^{40}Ca,2αpγ). I_γ: other: 100 *40* from (^{34}S,p2nγ).
2466.6+x	(27/2$^-$)	610.3 *2*	100 *4*	1856.3+x	(23/2$^-$)		
		1242 *1*	<21	1223.9+x	(23/2$^-$)		
2519.3+x	(27/2$^+$)	539.6 *2*	100	1979.7+x	(23/2$^+$)	Q	E_γ: weighted average of 539.6 *3* from (^{34}S,p2nγ) and 539.6 *2* from (^{40}Ca,2αpγ).
2662.6+x	(31/2$^-$)	767.9 *3*	100	1894.6+x	(27/2$^-$)	Q	E_γ: weighted average of 767.4 *4* from (^{34}S,p2nγ) and 768.0 *2* from (^{40}Ca,2αpγ).
2725.3+y	(27/2$^+$)	359.6 *2*	59 *3*	2365.5+y	(25/2$^+$)	D	E_γ: weighted average of 359.8 *3* from (^{34}S,p2nγ) and 359.5 *2* from (^{40}Ca,2αpγ). I_γ: other: 100 *40* from (^{34}S,p2nγ).
		719.8 *2*	100 *5*	2005.5+y	(23/2$^+$)		E_γ: weighted average of 720.0 *4* from (^{34}S,p2nγ) and 719.7 *2* from (^{40}Ca,2αpγ). I_γ: other: 100 *40* from (^{34}S,p2nγ).
2906.2+x	(29/2$^+$)	580.6 *2*	87 *5*	2325.7+x	(25/2$^+$)		
		1011.5	100 *8*	1894.6+x	(27/2$^-$)	D	
2968.4+x	(29/2$^-$)	664.3 *2*	100 *12*	2304.2+x	(25/2$^-$)		
		1072 *1*	<61	1894.6+x	(27/2$^-$)		
3074.9+y	(29/2$^+$)	349.4 *2*	44 *3*	2725.3+y	(27/2$^+$)	D	
		709.6 *2*	100 *5*	2365.5+y	(25/2$^+$)		
3152.9+x	(31/2$^+$)	633.6 *2*	100	2519.3+x	(27/2$^+$)	Q	E_γ: weighted average of 633.6 *4* from (^{34}S,p2nγ) and 633.6 *2* from (^{40}Ca,2αpγ).
3173.4+x	(31/2$^-$)	706.8 *2*	100	2466.6+x	(27/2$^-$)		
3417.5+y	(31/2$^+$)	342.9 *2*	40 *2*	3074.9+y	(29/2$^+$)	D	

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Adopted Levels, Gammas (continued)

γ(^{123}La) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	Comments
3417.5+y	(31/2$^+$)	692.3 *2*	100 *5*	2725.3+y	(27/2$^+$)		
3512.3+x	(35/2$^-$)	849.7 *2*	100	2662.6+x	(31/2$^-$)	Q	E_γ: weighted average of 849.9 *5* from (^{34}S,p2nγ) and 849.7 *2* from (^{40}Ca,2αpγ).
3574.3+x	(33/2$^+$)	668.1 *2*	100 *4*	2906.2+x	(29/2$^+$)		
		911.6 *2*	30 *2*	2662.6+x	(31/2$^-$)	D	
3727.4+x	(33/2$^-$)	759.0 *2*	100	2968.4+x	(29/2$^-$)		
3763.3+y	(33/2$^+$)	346.1 *2*	38 *2*	3417.5+y	(31/2$^+$)		
		688.1 *2*	100 *5*	3074.9+y	(29/2$^+$)		
3883.0+x	(35/2$^+$)	730.1 *2*	100	3152.9+x	(31/2$^+$)	Q	E_γ: weighted average of 729.9 *4* from (^{34}S,p2nγ) and 730.1 *2* from (^{40}Ca,2αpγ).
3968.4+x	(35/2$^-$)	795.0 *2*	100	3173.4+x	(31/2$^-$)		
4132.6+y	(35/2$^+$)	369.2 *2*	42 *3*	3763.3+y	(33/2$^+$)	D	
		715.1 *2*	100 *5*	3417.5+y	(31/2$^+$)		
4336.9+x	(37/2$^+$)	762.6 *2*	100	3574.3+x	(33/2$^+$)		
4437.7+x	(39/2$^-$)	925.4 *2*	100	3512.3+x	(35/2$^-$)	Q	E_γ: weighted average of 925.7 *5* from (^{34}S,p2nγ) and 925.4 *2* from (^{40}Ca,2αpγ).
4519.7+y	(37/2$^+$)	387.1 *5*	31 *2*	4132.6+y	(35/2$^+$)	D+Q	
		756.3 *2*	100 *4*	3763.3+y	(33/2$^+$)		
4571.3+x	(37/2$^-$)	843.9 *2*	100	3727.4+x	(33/2$^-$)		
4703.7+x	(39/2$^+$)	820.7 *2*	100	3883.0+x	(35/2$^+$)	Q	E_γ: weighted average of 820.4 *5* from (^{34}S,p2nγ) and 820.8 *2* from (^{40}Ca,2αpγ).
4852.1+x	(39/2$^-$)	883.7 *2*	100	3968.4+x	(35/2$^-$)		
4937.8+y	(39/2$^+$)	417.9 *5*	28 *3*	4519.7+y	(37/2$^+$)	D	
		805.3 *2*	100 *5*	4132.6+y	(35/2$^+$)		
5189.8+x	(41/2$^+$)	852.9 *2*	100	4336.9+x	(37/2$^+$)		
5374.0+y	(41/2$^+$)	436.4 *5*	25 *3*	4937.8+y	(39/2$^+$)	D	
		854.3 *2*	100 *6*	4519.7+y	(37/2$^+$)		
5438.2+x	(43/2$^-$)	1000.5 *2*	100	4437.7+x	(39/2$^-$)	Q	E_γ: weighted average of 1000.9 *5* from (^{34}S,p2nγ) and 1000.4 *2* from (^{40}Ca,2αpγ).
5498.3+x	(41/2$^-$)	927.0 *2*	100	4571.3+x	(37/2$^-$)		
5607.6+x	(43/2$^+$)	903.9 *2*	100	4703.7+x	(39/2$^+$)	Q	E_γ: weighted average of 903.5 *5* from (^{34}S,p2nγ) and 904.0 *2* from (^{40}Ca,2αpγ).
5830.3+x	(43/2$^-$)	978.2 *2*	100	4852.1+x	(39/2$^-$)		
5841.2+y	(43/2$^+$)	467.0 *5*	34 *2*	5374.0+y	(41/2$^+$)		
		903.4 *2*	100 *6*	4937.8+y	(39/2$^+$)		
6131.6+x	(45/2$^+$)	941.8 *2*	100	5189.8+x	(41/2$^+$)		
6327.0+y	(45/2$^+$)	485.8 *5*	33 *2*	5841.2+y	(43/2$^+$)		
		953.0 *2*	100 *6*	5374.0+y	(41/2$^+$)		
6503.6+x	(45/2$^-$)	1005.3 *5*	100	5498.3+x	(41/2$^-$)		
6511.2+x	(47/2$^-$)	1073.0 *2*	100	5438.2+x	(43/2$^-$)	Q	E_γ: weighted average of 1073.4 *6* from (^{34}S,p2nγ) and 1073.0 *2* from (^{40}Ca,2αpγ).
6589.2+x	(47/2$^+$)	981.5 *8*	100	5607.6+x	(43/2$^+$)	Q	E_γ: unweighted average of 980.7 *5* from (^{34}S,p2nγ) and 982.2 *2* from (^{40}Ca,2αpγ).
6842.5+y	(47/2$^+$)	1001.3 *2*	100	5841.2+y	(43/2$^+$)		
6905.6+x	(47/2$^-$)	1075.3 *5*	100	5830.3+x	(43/2$^-$)		
7168.5+x	(49/2$^+$)	1036.9 *2*	100	6131.6+x	(45/2$^+$)		
7376.0+y	(49/2$^+$)	1049.0 *2*	100	6327.0+y	(45/2$^+$)		
7579.7+x	(49/2$^-$)	1076.1 *5*	100	6503.6+x	(45/2$^-$)		
7649.5+x	(51/2$^+$)	1060.3 *3*	100	6589.2+x	(47/2$^+$)	Q	E_γ: weighted average of 1059.5 *6* from (^{34}S,p2nγ) and 1060.4 *2* from (^{40}Ca,2αpγ).
7652.4+x	(51/2$^-$)	1141.2 *7*	100	6511.2+x	(47/2$^-$)	Q	E_γ: unweighted average of 1140.5 *7* from (^{34}S,p2nγ) and 1141.9 *2* from (^{40}Ca,2αpγ).
7938.4+y	(51/2$^+$)	1095.9 *2*	100	6842.5+y	(47/2$^+$)		
8068.3+x	(51/2$^-$)	1162.7 *5*	100	6905.6+x	(47/2$^-$)		

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

γ(^{123}La) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	Comments
8306.8+x	(53/2$^+$)	1138.3 *2*	100	7168.5+x	(49/2$^+$)		
8522.2+y	(53/2$^+$)	1146.1 *2*	100	7376.0+y	(49/2$^+$)		
8700.7+x	(53/2$^-$)	1121 *1*	100	7579.7+x	(49/2$^-$)		
8791.1+x	(55/2$^+$)	1141.6 *2*	100	7649.5+x	(51/2$^+$)	Q	E_γ: weighted average of 1140.7 *8* from (^{34}S,p2nγ) and 1141.7 *2* from (^{40}Ca,2αpγ).
8863.1+x	(55/2$^-$)	1210.7 *2*	100	7652.4+x	(51/2$^-$)		E_γ: a 1210.5γ-1184.3γ cascade placed to feed the 7652.8+x level in (^{34}S,p2nγ).
9132.7+y	(55/2$^+$)	1194.3 *5*	100	7938.4+y	(51/2$^+$)		
9288.9+x?	(55/2$^-$)	1221[#] *1*	100	8068.3+x	(51/2$^-$)		
9550.6+x	(57/2$^+$)	1243.8 *5*	100	8306.8+x	(53/2$^+$)		
9765.9+y	(57/2$^+$)	1243.7 *2*	100	8522.2+y	(53/2$^+$)		
10019.4+x	(59/2$^+$)	1228.3 *5*	100	8791.1+x	(55/2$^+$)		
10142.0+x	(59/2$^-$)	1278.8 *2*	100	8863.1+x	(55/2$^-$)		
10425.6+y	(59/2$^+$)	1292.9 *5*	100	9132.7+y	(55/2$^+$)		
10892.8+x	(61/2$^+$)	1342.2 *5*	100	9550.6+x	(57/2$^+$)		
11107.3+y	(61/2$^+$)	1341.4 *5*	100	9765.9+y	(57/2$^+$)		
11337.5+x	(63/2$^+$)	1318.1 *5*	100	10019.4+x	(59/2$^+$)		
11490.0+x	(63/2$^-$)	1348.0 *5*	100	10142.0+x	(59/2$^-$)		
11811.3+y	(63/2$^+$)	1385.7 *5*	100	10425.6+y	(59/2$^+$)		
12327.4+x	(65/2$^+$)	1434.6 *5*	100	10892.8+x	(61/2$^+$)		
12542.2+y	(65/2$^+$)	1434.9 *5*	100	11107.3+y	(61/2$^+$)		
12752.3+x	(67/2$^+$)	1414.8 *5*	100	11337.5+x	(63/2$^+$)		
12909.4+x	(67/2$^-$)	1419.4 *5*	100	11490.0+x	(63/2$^-$)		
13852.2+x?	(69/2$^+$)	1525[#] *1*	100	12327.4+x	(65/2$^+$)		
14271.5+x	(71/2$^+$)	1519.2 *5*	100	12752.3+x	(67/2$^+$)		
14408.1+x	(71/2$^-$)	1498.7 *5*	100	12909.4+x	(67/2$^-$)		
15895.7+x	(75/2$^+$)	1624.2 *5*	100	14271.5+x	(71/2$^+$)		
15992.8+x	(75/2$^-$)	1584.7 *5*	100	14408.1+x	(71/2$^-$)		
17651.5+x?	(79/2$^+$)	1755[#] *1*	100	15895.7+x	(75/2$^+$)		
17663.2+x?	(79/2$^-$)	1670[#] *1*	100	15992.8+x	(75/2$^-$)		

[†] From (^{40}Ca,2αpγ), unless otherwise noted.

[‡] From γγ(DCO) in (^{40}Ca,2αpγ). Assignments from γγ(DCO) in (^{34}S,p2nγ) are also available for some γ rays and are consistent.

[#] Placement of transition in the level scheme is uncertain.

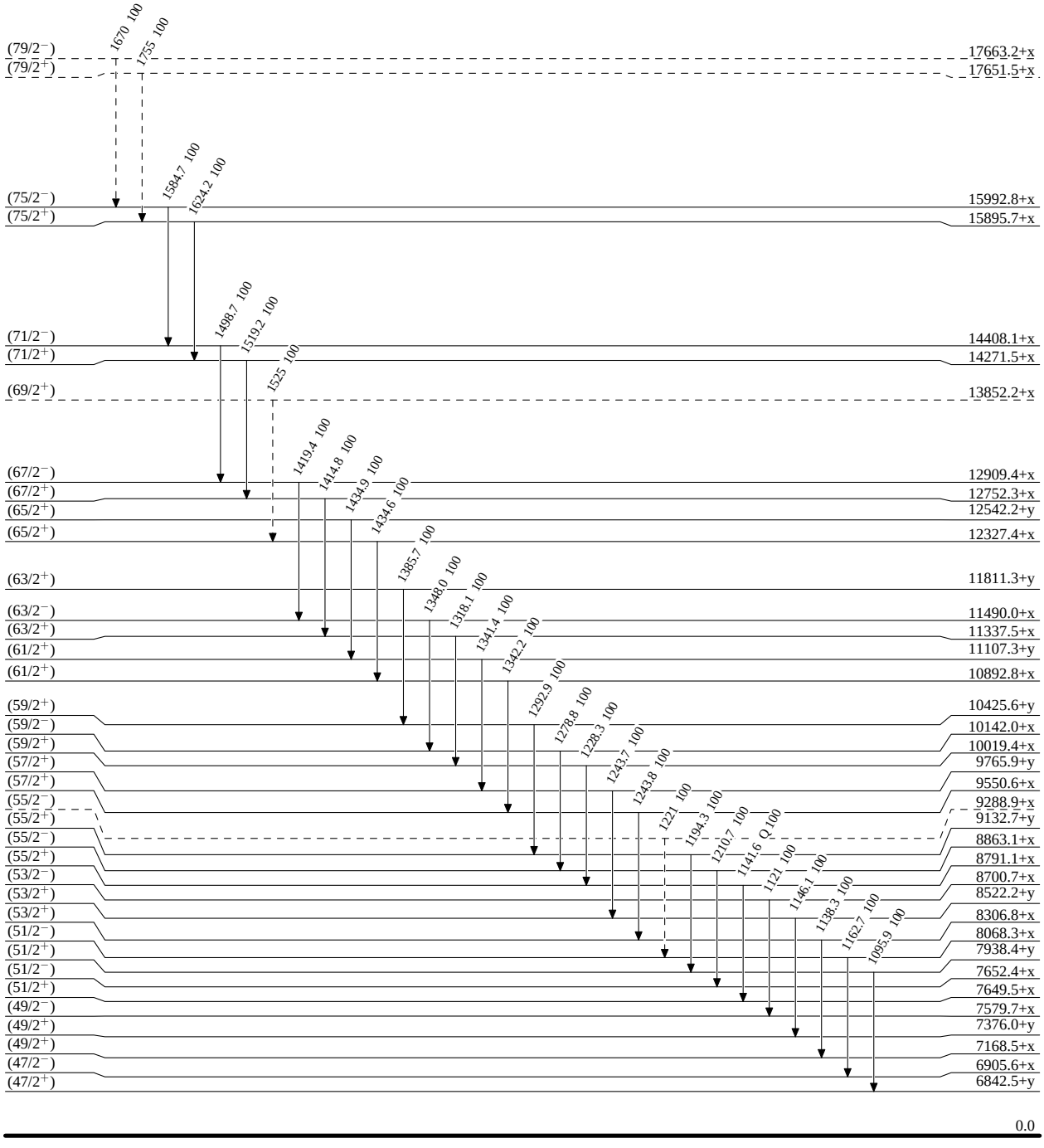
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

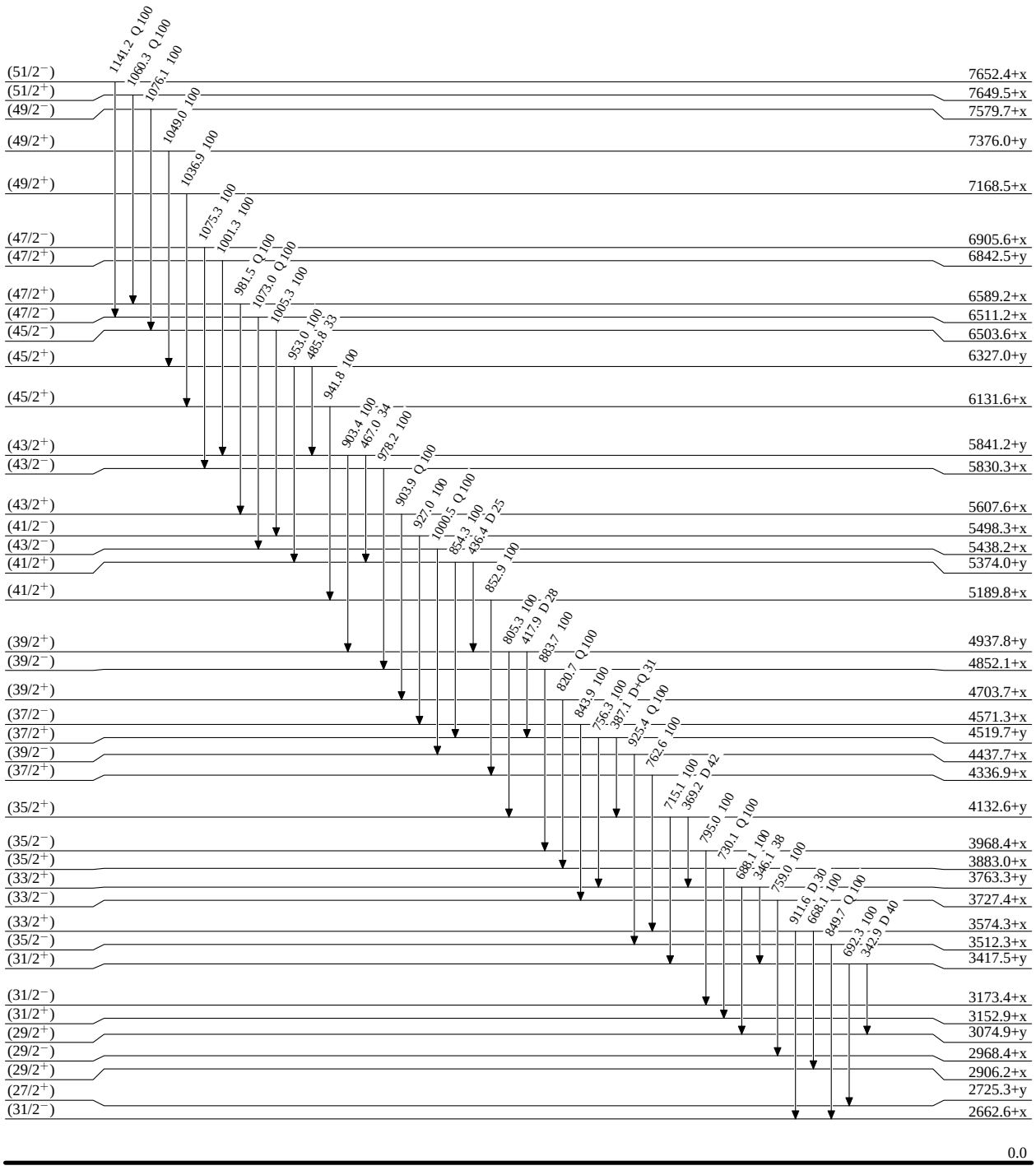


$^{123}_{57}La_{66}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{123}_{57}La_{66}$

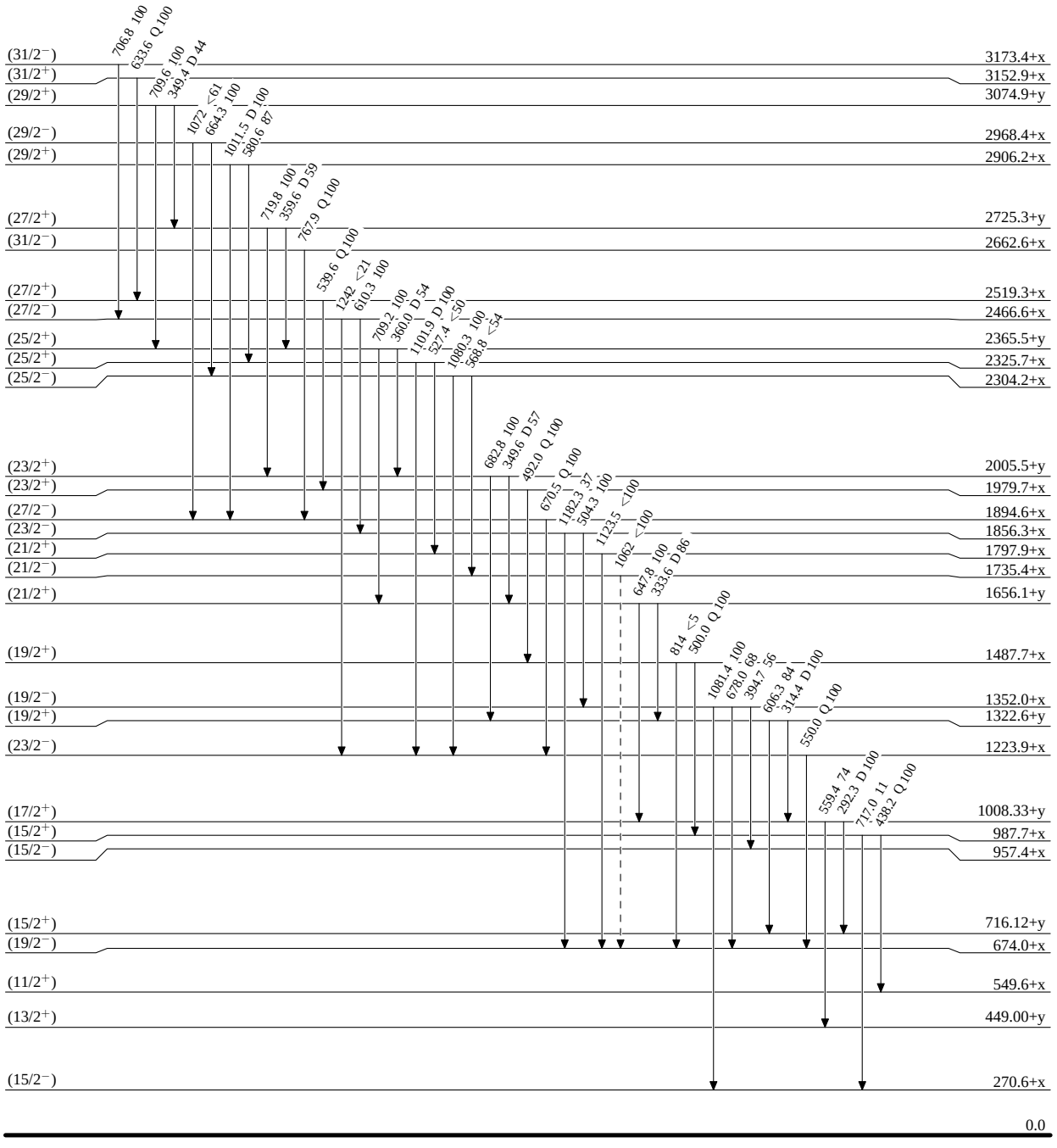
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

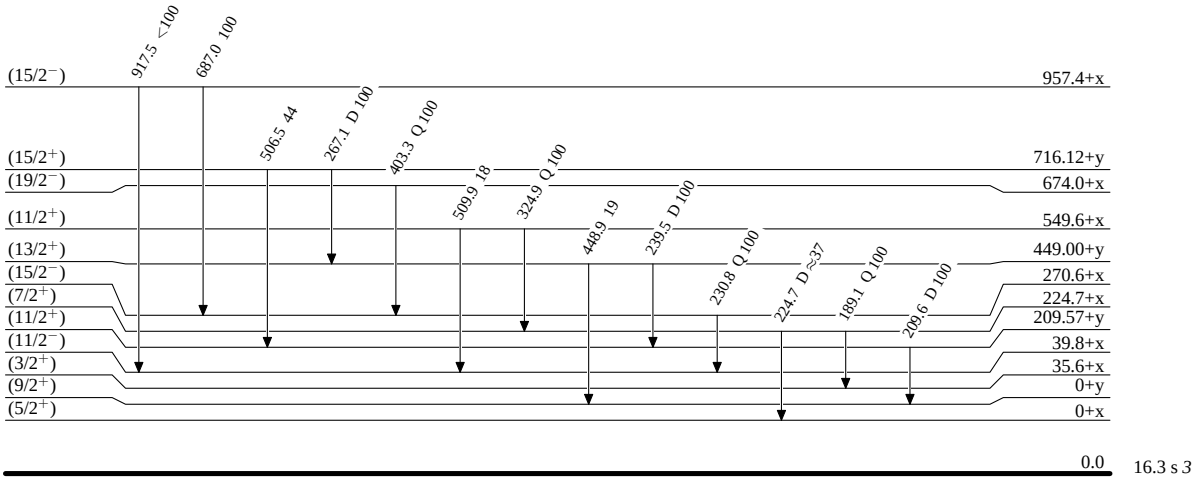


$^{123}_{57}La_{66}$

Adopted Levels, Gammas

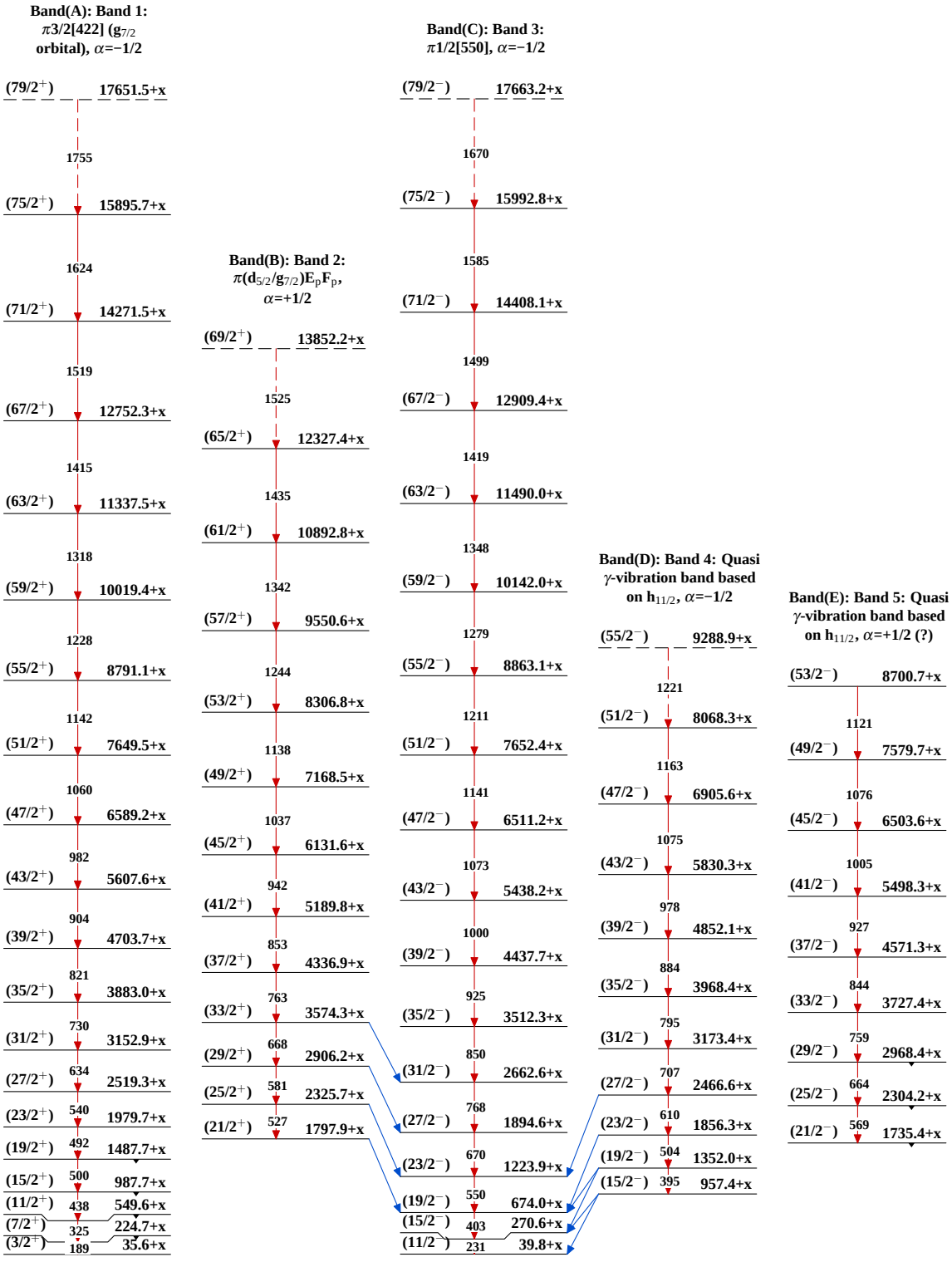
Level Scheme (continued)

Intensities: Relative photon branching from each level



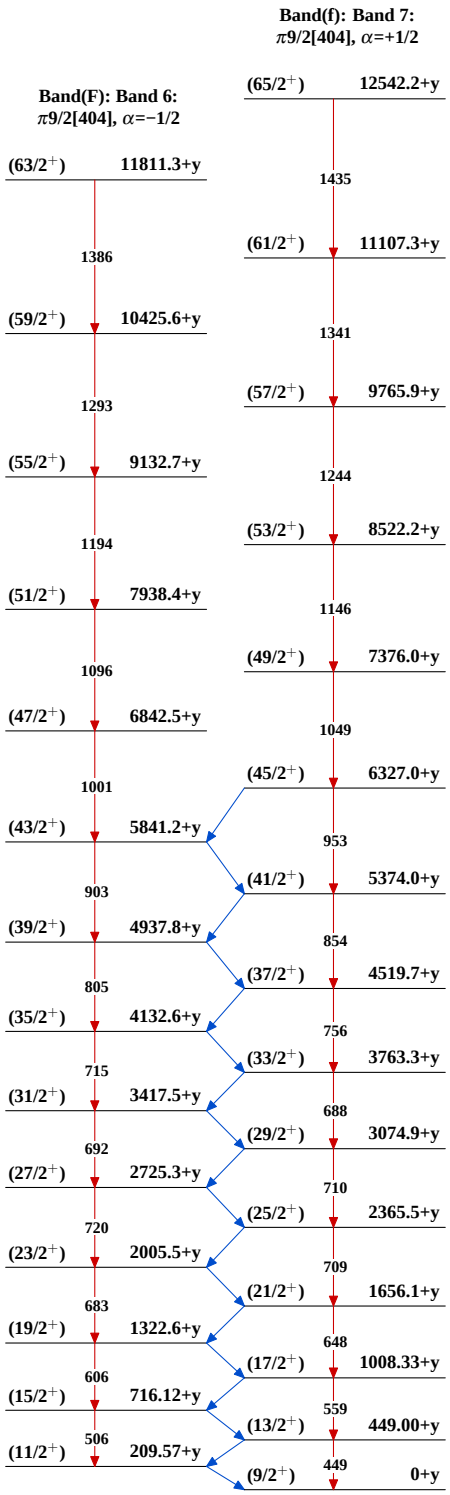
$^{123}_{57}La_{66}$

Adopted Levels, Gammas



$^{123}_{57}La_{66}$

Adopted Levels, Gammas (continued)



$^{123}_{57}La_{66}$

^{123}Ce ε decay (3.8 s) 1988GeZR,1984Ni03

Parent: ^{123}Ce: E=0.0; J^{π}=(5/2); $T_{1/2}$=3.8 s *2*; Q(ε)=8370 *syst*; %ε+%β^+ decay=100

^{123}Ce-J^{π}: From Adopted Levels of ^{123}Ce; proposed by 1984Ni03 from a comparison of proton decay to 2^+, 4^+ and possibly 6^+ rotational levels in ^{122}Ba with calculated branchings.

^{123}Ce-$T_{1/2}$: from weighted average of 3.9 s *2* from delayed decay of protons and 3.3 s *6* from decay of La x-ray (1984Ni03); adopted in Adopted Levels in ^{123}Ce.

^{123}Ce-Q(ε): From 2021Wa16, ΔQ(ε)=360 (syst).

1988GeZR: ^{123}Ce source was produced via ^{92}Mo(^{36}Ar,αnγ) reaction with ^{36}Ar beam provided by the variable-energy cyclotron at SARA. Measured Eγ, E(x ray), He-jet $\gamma\gamma$-coin, (x ray)γ-coin.

1984Ni03: ^{123}Ce source was produced via ^{92}Mo(^{36}Ar,αnγ) reaction with E=196 MeV ^{36}Ar beam provided by the LBL SuperHILAC. Fragments were separated with the isotope separator OASIS. Measured Eγ, E(x ray), γ(t), (x ray)-proton-coin, γ-proton-coin.

γ(^{123}La)

E_γ [†]
x66 [‡]
x113 [‡]
x178 [‡]

† Weak γ rays observed and tentatively assigned to ^{123}La by 1988GeZR. Those γ rays are also seen in ^{124}Pr εp decay (1986Wi15).

‡ Placement of transition in the level scheme is uncertain.

x γ ray not placed in level scheme.

^{124}Pr εp decay (1.2 s) 1986Wi15

Parent: ^{124}Pr: E=0.0; $T_{1/2}$=1.2 s *2*; Q(εp)=8210 *syst*; %εp decay>0.0

^{124}Pr-$T_{1/2}$: From 1986Wi15, adopted in Adopted Levels of ^{124}Pr.

^{124}Pr-Q(εp): From 2021Wa16, ΔQ(εp)=450 (syst).

1986Wi15: ^{124}Pr source was produced via ^{92}Mo(^{36}Ar,p3nγ) reaction with E=174 MeV ^{36}Ar beam provided by the LBL SuperHILAC. Fragments were separated with the isotope separator OASIS. Measured Eγ, E(x ray), γ(t), (x ray)-proton-coin, γ-proton-coin.

Ce and La K x rays, γ rays of 70, 113 and 166 keV were observed in coincidence with the protons but the γ transitions cannot be uniquely placed since the level scheme of ^{123}La is not known (1986Wi15). γ rays of 66, 113 and 178 keV are seen and assigned to ^{123}La in ^{123}Ce ε decay (1988GeZR).

γ(^{123}La)

E_γ
[x]70
[x]113
[x]166

[x] γ ray not placed in level scheme.

^{92}Mo(^{34}S,p2nγ),^{52}Cr(^{74}Se,p2nγ) 1989Wy02

1989Wy02: two measurements were performed at the Daresbury Nuclear Structure Facility. In the measurement of ^{92}Mo(^{34}S,p2nγ), E=150 and 155 MeV ^{34}S beam was incident on a stacked target of two 0.4 mg/cm^2 self-supporting foil of ^{92}Mo. γ rays were detected with the TESSA3 spectrometer. Measured $\gamma\gamma$-coin, $\gamma\gamma$(DCO). In the measurement of ^{52}Cr(^{74}Se,p2nγ), E=290 MeV ^{74}Se beam was incident on a ^{52}Cr target. Reaction products were separated using the Daresbury Recoil Separator and γ rays were detected with an array of 14 BGO-suppressed Ge detectors. Measured Eγ, Iγ. Deduced levels, J, π, band structures. Comparisons with shell-model calculations.

All data are from 1989Wy02.

^{123}La Levels

E(level)†	Jπ#	E(level)†	Jπ#	E(level)†	Jπ#	E(level)†	Jπ#
0+x‡	(5/2$^+$)	715.73+y[a] *24*	(15/2$^+$)	2365.3+y[b] *5*	(25/2$^+$)	5606.9+x[&] *12*	(43/2$^+$)
0+y[b]	(9/2$^+$)	988.0+x[&] *5*	(15/2$^+$)	2519.5+x[&] *7*	(27/2$^+$)	6471.8+z[@] *13*	(47/2$^-$)
0+z[@]	(11/2$^-$)	1008.1+y[b] *3*	(17/2$^+$)	2621.9+z[@] *8*	(31/2$^-$)	6587.6+x[&] *13*	(47/2$^+$)
35.7+x[&] *3*	(3/2$^+$)	1184.2+z[@] *5*	(23/2$^-$)	2725.2+y[a] *5*	(27/2$^+$)	7612.3+z[@] *15*	(51/2$^-$)
209.50+y[a] *18*	(11/2$^+$)	1322.2+y[a] *4*	(19/2$^+$)	3153.1+x[&] *8*	(31/2$^+$)	7647.1+x[&] *14*	(51/2$^+$)
224.90+x[&] *20*	(7/2$^+$)	1488.0+x[&] *5*	(19/2$^+$)	3471.8+z[@] *9*	(35/2$^-$)	8787.8+x[&] *16*	(55/2$^+$)
230.80+z[@] *20*	(15/2$^-$)	1655.8+y[b] *4*	(21/2$^+$)	3883.0+x[&] *9*	(35/2$^+$)	8796.6+z?[@] *17*	(55/2$^-$)
448.73+y[b] *20*	(13/2$^+$)	1854.5+z[@] *7*	(27/2$^-$)	4397.5+z[@] *11*	(39/2$^-$)	10007.1+z?[@] *19*	(59/2$^-$)
549.7+x[&] *3*	(11/2$^+$)	1979.9+x[&] *6*	(23/2$^+$)	4703.4+x[&] *10*	(39/2$^+$)		
634.1+z[@] *4*	(19/2$^-$)	2005.4+y[a] *4*	(23/2$^+$)	5398.4+z[@] *12*	(43/2$^-$)		

† From a least-squares fit to γ-ray energies. The bandhead energies are not determined (1989Wy02).
‡ This level may correspond to the g.s., but it is not established from ^{123}La ε decay study.
# As given in 2003Pa41 based on measured γ(DCO) and proposed band structures, with parentheses added by the evaluator.
@ Band(A): Band 1: π1/2[550], α=−1/2.
& Band(B): Band 2: π3/2[422], α=−1/2. Configuration=π1/2[420] with α=+1/2 cannot be excluded (1989Wy02).
a Band(C): Band 3: π9/2[404], α=−1/2.
b Band(c): Band 4: π9/2[404], α=+1/2.

γ(^{123}La)

Measured DCO ratios from 1989Wy02 are given under comments. Expected DCO ratios are ≈1.0 for pure dipole transitions (ΔJ=1) and ≈2.0 for pure quadrupole transitions (ΔJ=2).

E$_\gamma$	I$_\gamma$#	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.@	Comments
189.2 *2*	6 *2*	224.90+x	(7/2$^+$)	35.7+x	(3/2$^+$)	Q	DCO=2.05 *31*
209.6 *2*	15 *3*	209.50+y	(11/2$^+$)	0+y	(9/2$^+$)	D	DCO=1.27 *17*
224.9 *2*	4 *2*	224.90+x	(7/2$^+$)	0+x	(5/2$^+$)		
230.8 *2*	71 *2*	230.80+z	(15/2$^-$)	0+z	(11/2$^-$)	Q	DCO=1.98 *14*
239.4 *2*	11 *3*	448.73+y	(13/2$^+$)	209.50+y	(11/2$^+$)	D	DCO=1.07 *11*
267.0 *2*	11 *3*	715.73+y	(15/2$^+$)	448.73+y	(13/2$^+$)	D	DCO=0.87 *14*
292.4 *2*	6 *2*	1008.1+y	(17/2$^+$)	715.73+y	(15/2$^+$)		
314.2 *2*	4 *2*	1322.2+y	(19/2$^+$)	1008.1+y	(17/2$^+$)		
324.8 *2*	14 *3*	549.7+x	(11/2$^+$)	224.90+x	(7/2$^+$)	Q	DCO=2.03 *26*
333.5 *2*	3 *2*	1655.8+y	(21/2$^+$)	1322.2+y	(19/2$^+$)		
349.5 *3*	5 *2*	2005.4+y	(23/2$^+$)	1655.8+y	(21/2$^+$)		
359.8[&] *3*	5[&] *2*	2365.3+y	(25/2$^+$)	2005.4+y	(23/2$^+$)		

Continued on next page (footnotes at end of table)

^{92}Mo(^{34}S,p2nγ),^{52}Cr(^{74}Se,p2nγ) 1989Wy02 (continued)

γ(^{123}La) (continued)

E_γ	I_γ[#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	Comments
359.8[&] *3*	5[&] *2*	2725.2+y	(27/2$^+$)	2365.3+y	(25/2$^+$)		
403.3 *3*	60 *2*	634.1+z	(19/2$^-$)	230.80+z	(15/2$^-$)	Q	DCO=2.11 *18*
438.3 *3*	15 *3*	988.0+x	(15/2$^+$)	549.7+x	(11/2$^+$)	Q	DCO=2.11 *39*
448.5 *3*	2 *1*	448.73+y	(13/2$^+$)	0+y	(9/2$^+$)		
491.9 *3*	16 *3*	1979.9+x	(23/2$^+$)	1488.0+x	(19/2$^+$)	Q	DCO=1.66 *31*
500.0 *3*	18 *3*	1488.0+x	(19/2$^+$)	988.0+x	(15/2$^+$)	Q	DCO=1.71 *23*
506.1 *3*	6 *2*	715.73+y	(15/2$^+$)	209.50+y	(11/2$^+$)		
539.6 *3*	17 *4*	2519.5+x	(27/2$^+$)	1979.9+x	(23/2$^+$)	Q	DCO=2.06 *37*
550.1 *3*	57 *3*	1184.2+z	(23/2$^-$)	634.1+z	(19/2$^-$)	Q	DCO=2.20 *26*
559.6 *4*	5 *2*	1008.1+y	(17/2$^+$)	448.73+y	(13/2$^+$)		
606.2 *4*	4 *2*	1322.2+y	(19/2$^+$)	715.73+y	(15/2$^+$)		
633.6 *4*	16 *4*	3153.1+x	(31/2$^+$)	2519.5+x	(27/2$^+$)	Q	DCO=2.08 *37*
647.6 *4*	6 *2*	1655.8+y	(21/2$^+$)	1008.1+y	(17/2$^+$)		
670.3 *4*	44 *3*	1854.5+z	(27/2$^-$)	1184.2+z	(23/2$^-$)	Q	DCO=2.07 *25*
683.4 *4*	6 *2*	2005.4+y	(23/2$^+$)	1322.2+y	(19/2$^+$)		
709.4 *4*	5 *2*	2365.3+y	(25/2$^+$)	1655.8+y	(21/2$^+$)		
720.0 *4*	5 *2*	2725.2+y	(27/2$^+$)	2005.4+y	(23/2$^+$)		
729.9 *4*	18 *4*	3883.0+x	(35/2$^+$)	3153.1+x	(31/2$^+$)	Q	DCO=2.11 *35*
767.4 *4*	39 *3*	2621.9+z	(31/2$^-$)	1854.5+z	(27/2$^-$)		
820.4 *5*	12 *4*	4703.4+x	(39/2$^+$)	3883.0+x	(35/2$^+$)		
849.9 *5*	30 *4*	3471.8+z	(35/2$^-$)	2621.9+z	(31/2$^-$)	Q	DCO=2.16 *27*
903.5 *5*	8 *3*	5606.9+x	(43/2$^+$)	4703.4+x	(39/2$^+$)		
925.7 *5*	14 *3*	4397.5+z	(39/2$^-$)	3471.8+z	(35/2$^-$)	Q	DCO=1.51 *33*
980.7 *5*	8 *3*	6587.6+x	(47/2$^+$)	5606.9+x	(43/2$^+$)		
1000.9 *5*	9 *2*	5398.4+z	(43/2$^-$)	4397.5+z	(39/2$^-$)		
1059.5 *6*	5 *2*	7647.1+x	(51/2$^+$)	6587.6+x	(47/2$^+$)		
1073.4 *6*	11 *3*	6471.8+z	(47/2$^-$)	5398.4+z	(43/2$^-$)		
1140.5 *7*	11 *3*	7612.3+z	(51/2$^-$)	6471.8+z	(47/2$^-$)		
1140.7 *8*	5 *2*	8787.8+x	(55/2$^+$)	7647.1+x	(51/2$^+$)		
1184.3[‡a] *8*	5 *2*	8796.6+z?	(55/2$^-$)	7612.3+z	(51/2$^-$)		
1210.5[†a] *9*	4 *2*	10007.1+z?	(59/2$^-$)	8796.6+z?	(55/2$^-$)		

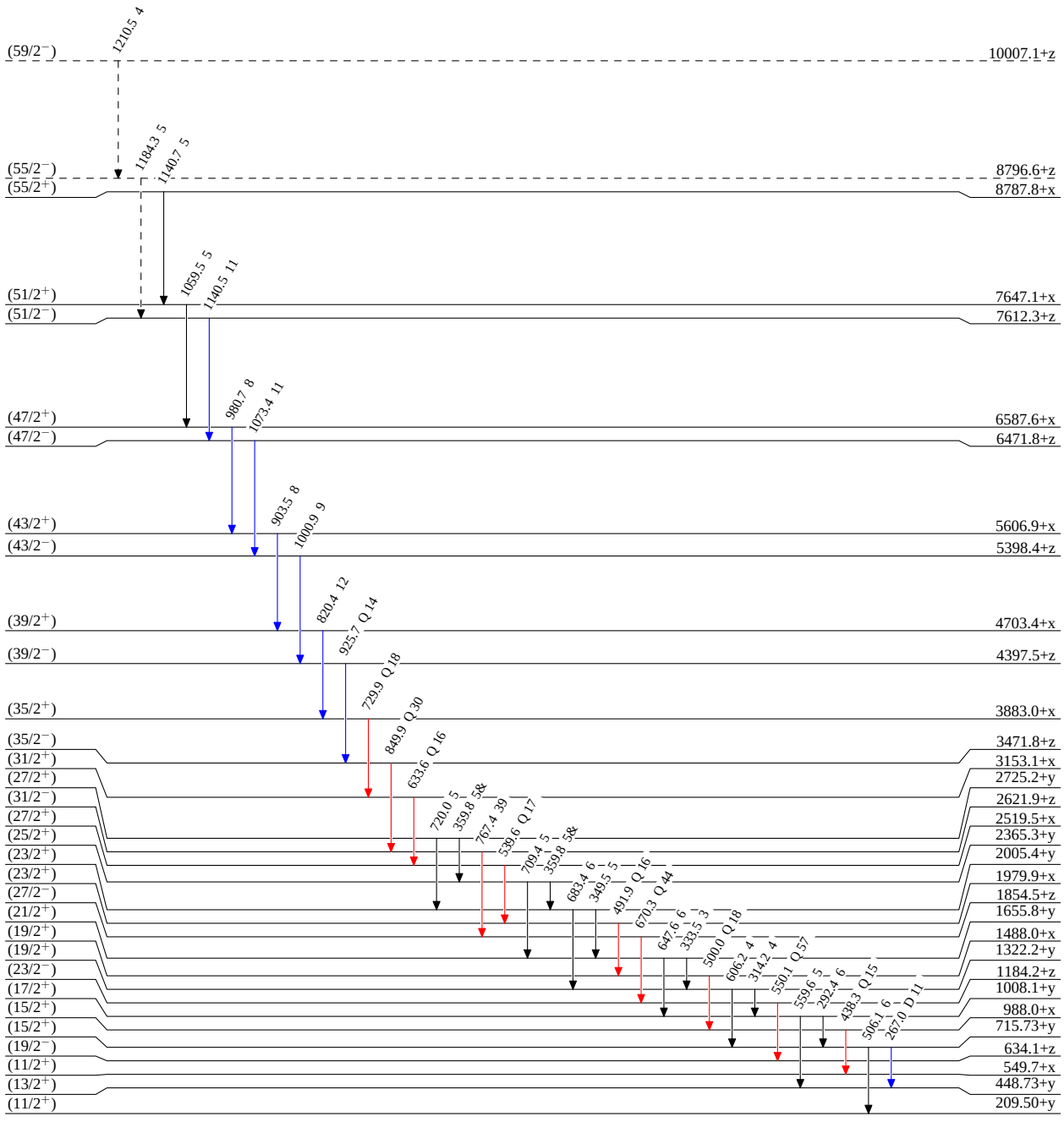
[†] Placed from a 8863.5+x, (55/2$^-$) level by 2003Pa41 in ^{92}Mo(^{40}Ca,2αpγ).
[‡] A 1182.3γ placed from a 1855.9+x, (23/2$^-$) level by 2003Pa41 in ^{92}Mo(^{40}Ca,2αpγ).
[#] Relative to I(209.6γ)+I(230.8γ)+I(324.8γ)=100 (1989Wy02).
[@] From measured DCO ratios in 1989Wy02.
[&] Multiply placed with undivided intensity.
[a] Placement of transition in the level scheme is uncertain.

^{92}Mo(^{34}S,p2nγ),^{52}Cr(^{74}Se,p2nγ) 1989Wy02

Level Scheme

Intensities: Relative I_γ
& Multiply placed: undivided intensity given

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)



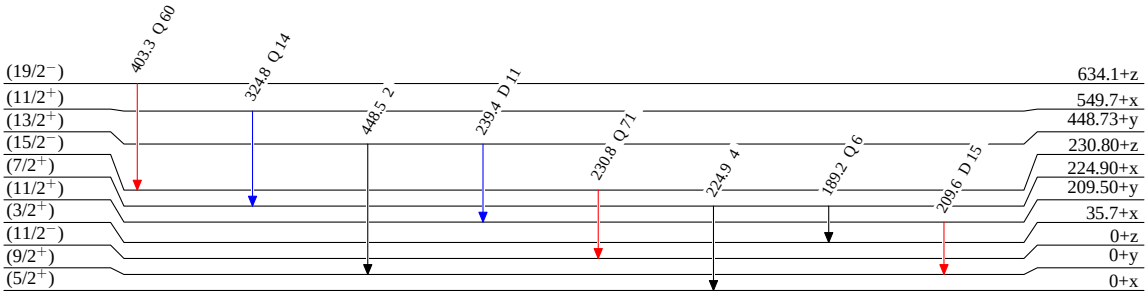
$^{123}_{57}La_{66}$

^{92}Mo(^{34}S,p2nγ),^{52}Cr(^{74}Se,p2nγ) 1989Wy02

Level Scheme (continued)

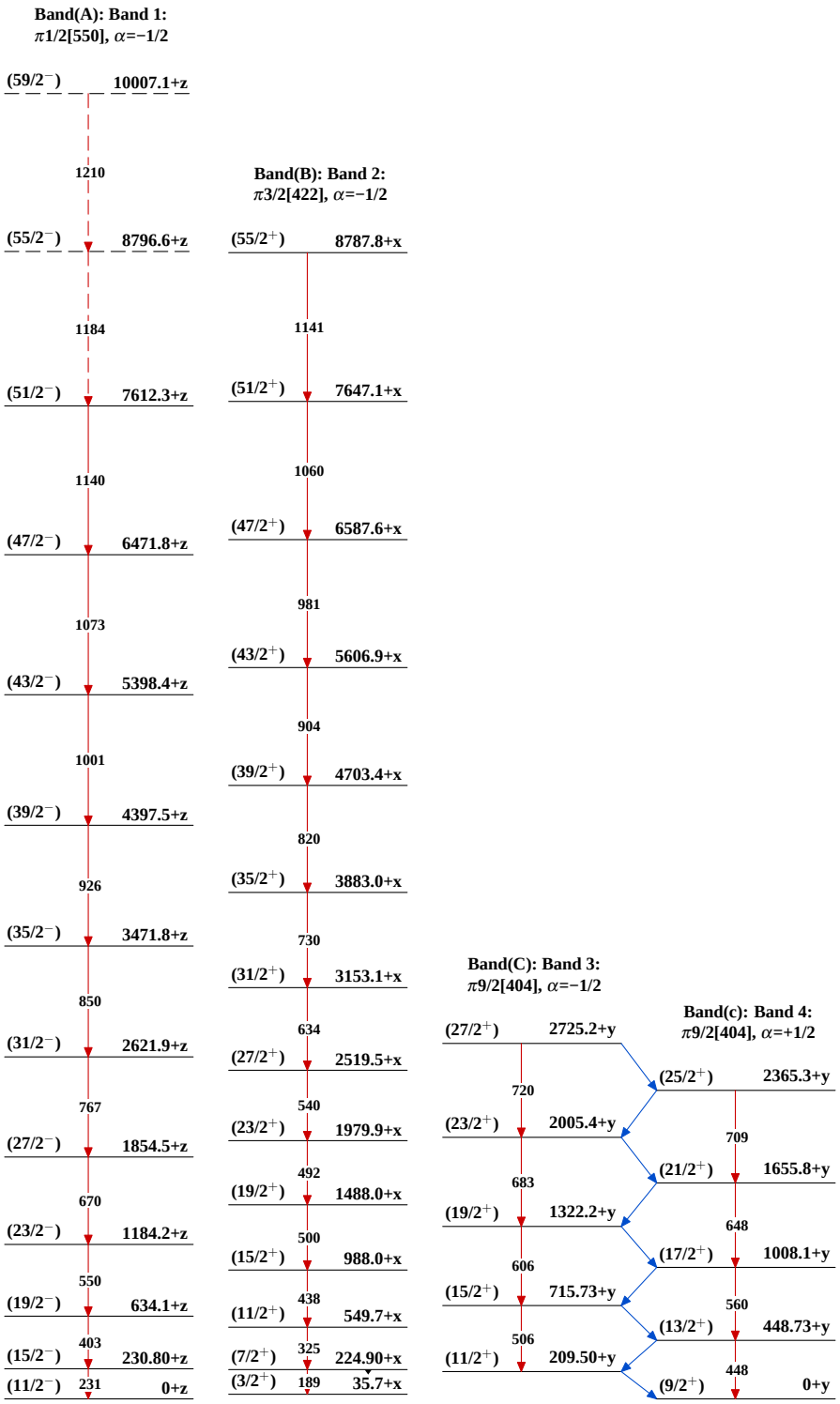
Intensities: Relative I_γ
& Multiply placed: undivided intensity given

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



$^{123}_{57}La_{66}$

^{92}Mo(^{34}S,p2nγ),^{52}Cr(^{74}Se,p2nγ) 1989Wy02



$^{123}_{57}La_{66}$

^{92}Mo(^{40}Ca,2αpγ) 2003Pa41

2003Pa41: E=184 MeV ^{40}Ca beam was produced from the ATLAS accelerator at ANL. Target was 0.625 mg/cm^2 self-supporting foil of ^{92}Mo. γ rays were detected with the Gammasphere array of 99 Ge detectors and charged particles were detected with the Washington University Microball array. Measured Eγ, Iγ, γγ-coin, γγγ-coin, γγ(DCO). Deduced levels, J, π, band structures. Comparisons with cranked shell-model calculations.

All data are from 2003Pa41.

^{123}La Levels

Quasiparticle labels used in band comments:
E_n=most favored neutron $\nu h_{11/2}$, α=−1/2.
F_n=most favored neutron $\nu h_{11/2}$, α=+1/2.
E_p=most favored proton $\pi h_{11/2}$, α=−1/2.
F_p=most favored proton $\pi h_{11/2}$, α=+1/2.
G_n=second favored neutron $\nu h_{11/2}$, α=−1/2.
H_n=second favored neutron $\nu h_{11/2}$, α=+1/2.
G_p=second favored proton $\pi h_{11/2}$, α=−1/2.
H_p=second favored proton $\pi h_{11/2}$, α=+1/2.

E(level)†	Jπ#	E(level)†	Jπ#	E(level)†	Jπ#	E(level)†	Jπ#
0+x‡	(5/2+)	2325.4+x& 5	(25/2+)	5189.5+x& 6	(41/2+)	9132.6+y[d] 7	(55/2+)
0+y[e]	(9/2+)	2365.4+y[e] 3	(25/2+)	5374.0+y[e] 4	(41/2+)	9288.9+x?[b] 14	(55/2−)
35.4+x@ 3	(3/2+)	2466.2+x[b] 5	(27/2−)	5437.9+x[a] 6	(43/2−)	9550.4+x& 9	(57/2+)
39.5+x[a] 4	(11/2−)	2519.0+x@ 5	(27/2+)	5498.0+x[c] 6	(41/2−)	9765.8+y[e] 6	(57/2+)
209.59+y[d] 16	(11/2+)	2662.4+x[a] 5	(31/2−)	5607.5+x@ 7	(43/2+)	10020.1+x@ 9	(59/2+)
224.40+x@ 20	(7/2+)	2725.2+y[d] 3	(27/2+)	5829.9+x[b] 6	(43/2−)	10142.3+x[a] 8	(59/2−)
270.3+x[a] 4	(15/2−)	2906.0+x& 5	(29/2+)	5841.1+y[d] 4	(43/2+)	10425.5+y[d] 9	(59/2+)
449.12+y[e] 16	(13/2+)	2968.1+x[c] 5	(29/2−)	6131.3+x& 6	(45/2+)	10892.6+x& 10	(61/2+)
549.3+x@ 3	(11/2+)	3074.8+y[e] 3	(29/2+)	6327.0+y[e] 5	(45/2+)	11107.2+y[e] 8	(61/2+)
673.6+x[a] 4	(19/2−)	3152.6+x@ 6	(31/2+)	6503.3+x[c] 8	(45/2−)	11338.2+x@ 10	(63/2+)
716.25+y[d] 19	(15/2+)	3173.0+x[b] 5	(31/2−)	6510.9+x[a] 7	(47/2−)	11490.3+x[a] 9	(63/2−)
957.1+x[b] 5	(15/2−)	3417.4+y[d] 4	(31/2+)	6589.7+x@ 7	(47/2+)	11811.2+y[d] 10	(63/2+)
987.4+x@ 4	(15/2+)	3512.1+x[a] 6	(35/2−)	6842.4+y[d] 5	(47/2+)	12327.2+x& 11	(65/2+)
1008.33+y[e] 21	(17/2+)	3574.0+x& 5	(33/2+)	6905.2+x[b] 8	(47/2−)	12542.1+y[e] 9	(65/2+)
1223.6+x[a] 5	(23/2−)	3727.1+x[c] 6	(33/2−)	7168.2+x& 7	(49/2+)	12753.1+x@ 12	(67/2+)
1322.66+y[d] 23	(19/2+)	3763.3+y[e] 4	(33/2+)	7376.0+y[e] 5	(49/2+)	12909.7+x[a] 10	(67/2−)
1351.7+x[b] 4	(19/2−)	3882.7+x@ 6	(35/2+)	7579.4+x[c] 10	(49/2−)	13852.2+x?& 15	(69/2+)
1487.4+x@ 4	(19/2+)	3968.0+x[b] 6	(35/2−)	7650.1+x@ 7	(51/2+)	14272.3+x@ 13	(71/2+)
1656.10+y[e] 25	(21/2+)	4132.5+y[d] 4	(35/2+)	7652.8+x[a] 7	(51/2−)	14408.4+x[a] 12	(71/2−)
1735.2+x[c] 7	(21/2−)	4336.6+x& 6	(37/2+)	7938.3+y[d] 5	(51/2+)	15896.5+x@ 14	(75/2+)
1797.6+x& 6	(21/2+)	4437.5+x[a] 6	(39/2−)	8067.9+x[b] 10	(51/2−)	15993.2+x[a] 13	(75/2−)
1855.9+x[b] 4	(23/2−)	4519.6+y[e] 4	(37/2+)	8306.5+x& 7	(53/2+)	17651.5+x?@ 17	(79/2+)
1894.3+x[a] 5	(27/2−)	4571.0+x[c] 6	(37/2−)	8522.1+y[e] 6	(53/2+)	17663.2+x?[a] 16	(79/2−)
1979.4+x@ 5	(23/2+)	4703.5+x@ 6	(39/2+)	8700.4+x[c] 14	(53/2−)		
2005.5+y[d] 3	(23/2+)	4851.7+x[b] 6	(39/2−)	8791.8+x@ 8	(55/2+)		
2303.9+x[c] 5	(25/2−)	4937.7+y[d] 4	(39/2+)	8863.5+x[a] 7	(55/2−)		

† From a least-squares fit to γ-ray energies. The bandhead energies are not determined (2003Pa41).
‡ This level may correspond to the g.s., but it is not established from ^{123}La ε decay study.
# As given in 2003Pa41 based on measured γ(DCO) and proposed band structures, with parentheses added by the evaluator.

Continued on next page (footnotes at end of table)

^{92}Mo(^{40}Ca,2αpγ) 2003Pa41 (continued)

^{123}La Levels (continued)

@ Band(A): Band 1: π3/2[422] ($g_{7/2}$ orbital), α=−1/2. Crossing by E_pF_p at higher spins.
& Band(B): Band 2: $\pi(d_{5/2}/g_{7/2})E_pF_p$, α=+1/2.
a Band(C): Band 3: π1/2[550], α=−1/2. Crossing by E_nF_n at higher spins, and a second crossing by F_pG_p.
b Band(D): Band 4: Quasi γ-vibration band based on $h_{11/2}$, α=−1/2. First crossing by E_nF_n, second crossing by F_pG_p at higher spins.
c Band(E): Band 5: Quasi γ-vibration band based on $h_{11/2}$, α=+1/2 (?).
d Band(F): Band 6: π9/2[404], α=−1/2. Crossing by E_pF_p above $29/2^+$.
e Band(f): Band 7: π9/2[404], α=+1/2 Crossing by E_pF_p above $29/2^+$.

γ(^{123}La)

DCO ratios given under comments are measured with gates on a stretched quadrupole transition. Expected DCO ratios are ≈0.5 for pure dipole transitions (ΔJ=1) and ≈1.0 for pure quadrupole transitions (ΔJ=2) with ΔJ=0 also possible (2003Pa41).

E_γ †	I_γ ‡	E_i(level)	J_i^π	E_f	J_f^π	Mult.#	Comments
189.0 *2*	19 *3*	224.40+x	$(7/2^+)$	35.4+x	$(3/2^+)$	Q	DCO=0.91 *2*
209.5 *2*	≈45	209.59+y	$(11/2^+)$	0+y	$(9/2^+)$	D	DCO=0.55 *6*
224.4 *2*	≈7	224.40+x	$(7/2^+)$	0+x	$(5/2^+)$	D	DCO=0.69 *4*
230.7 *2*	≈120	270.3+x	$(15/2^-)$	39.5+x	$(11/2^-)$	Q	DCO=0.91 *1*
239.5 *2*	31 *1*	449.12+y	$(13/2^+)$	209.59+y	$(11/2^+)$	D	DCO=0.58 *6*
267.1 *2*	23 *1*	716.25+y	$(15/2^+)$	449.12+y	$(13/2^+)$	D	DCO=0.55 *6*
292.1 *2*	18.5 *8*	1008.33+y	$(17/2^+)$	716.25+y	$(15/2^+)$	D	DCO=0.54 *6*
314.4 *2*	15.4 *6*	1322.66+y	$(19/2^+)$	1008.33+y	$(17/2^+)$	D	DCO=0.52 *5*
324.9 *2*	28 *2*	549.3+x	$(11/2^+)$	224.40+x	$(7/2^+)$	Q	DCO=0.93 *2*
333.6 *2*	11.5 *5*	1656.10+y	$(21/2^+)$	1322.66+y	$(19/2^+)$	D	DCO=0.59 *6*
342.9 *2*	4.5 *2*	3417.4+y	$(31/2^+)$	3074.8+y	$(29/2^+)$	D	DCO=0.55 *6*
346.1 *2*	3.7 *2*	3763.3+y	$(33/2^+)$	3417.4+y	$(31/2^+)$		
349.4 *2*	5.7 *4*	3074.8+y	$(29/2^+)$	2725.2+y	$(27/2^+)$	D	DCO=0.58 *6*
349.7 *2*	7.4 *3*	2005.5+y	$(23/2^+)$	1656.10+y	$(21/2^+)$	D	DCO=0.58 *6*
359.5 *2*	7.0 *3*	2725.2+y	$(27/2^+)$	2365.4+y	$(25/2^+)$	D	DCO=0.58 *6*
360.1 *2*	7.2 *4*	2365.4+y	$(25/2^+)$	2005.5+y	$(23/2^+)$	D	DCO=0.57 *6*
369.2 *2*	3.3 *2*	4132.5+y	$(35/2^+)$	3763.3+y	$(33/2^+)$	D	DCO=0.54 *7*
387.1 *5*	2.9 *2*	4519.6+y	$(37/2^+)$	4132.5+y	$(35/2^+)$	D+Q	DCO=0.72 *17*
394.7 *5*	2.8 *3*	1351.7+x	$(19/2^-)$	957.1+x	$(15/2^-)$		
403.3 *2*	100	673.6+x	$(19/2^-)$	270.3+x	$(15/2^-)$	Q	DCO=0.94 *2*
417.9 *5*	2.2 *2*	4937.7+y	$(39/2^+)$	4519.6+y	$(37/2^+)$	D	DCO=0.53 *8*
436.4 *5*	1.8 *2*	5374.0+y	$(41/2^+)$	4937.7+y	$(39/2^+)$	D	DCO=0.55 *7*
438.2 *2*	35 *1*	987.4+x	$(15/2^+)$	549.3+x	$(11/2^+)$	Q	DCO=0.98 *2*
449.2 *2*	6.0 *3*	449.12+y	$(13/2^+)$	0+y	$(9/2^+)$		
467.0 *5*	1.8 *1*	5841.1+y	$(43/2^+)$	5374.0+y	$(41/2^+)$		
485.8 *5*	1.7 *1*	6327.0+y	$(45/2^+)$	5841.1+y	$(43/2^+)$		
492.0 *2*	36 *1*	1979.4+x	$(23/2^+)$	1487.4+x	$(19/2^+)$	Q	DCO=0.96 *2*
500.0 *2*	37 *2*	1487.4+x	$(19/2^+)$	987.4+x	$(15/2^+)$	Q	DCO=1.02 *2*
504.3 *2*	9.2 *3*	1855.9+x	$(23/2^-)$	1351.7+x	$(19/2^-)$		
506.6 *2*	10.2 *5*	716.25+y	$(15/2^+)$	209.59+y	$(11/2^+)$		
509.9 *2*	5.0 *5*	549.3+x	$(11/2^+)$	39.5+x	$(11/2^-)$		
527.4 *5*	<2	2325.4+x	$(25/2^+)$	1797.6+x	$(21/2^+)$		
539.6 *2*	32 *1*	2519.0+x	$(27/2^+)$	1979.4+x	$(23/2^+)$	Q	DCO=1.08 *2*
550.0 *2*	83 *4*	1223.6+x	$(23/2^-)$	673.6+x	$(19/2^-)$	Q	DCO=1.00 *1*
559.3 *2*	13.4 *6*	1008.33+y	$(17/2^+)$	449.12+y	$(13/2^+)$		
568.8 *5*	<2	2303.9+x	$(25/2^-)$	1735.2+x	$(21/2^-)$		
580.6 *2*	6.7 *4*	2906.0+x	$(29/2^+)$	2325.4+x	$(25/2^+)$		

Continued on next page (footnotes at end of table)

^{92}Mo(^{40}Ca,2αpγ) 2003Pa41 (continued)

γ(^{123}La) (continued)

E_γ †	I_γ ‡	E_i(level)	J_i^π	E_f	J_f^π	Mult.#	Comments
606.3 *2*	13.1 *6*	1322.66+y	(19/2$^+$)	716.25+y	(15/2$^+$)		
610.3 *2*	9.5 *4*	2466.2+x	(27/2$^-$)	1855.9+x	(23/2$^-$)		
633.6 *2*	30.7 *9*	3152.6+x	(31/2$^+$)	2519.0+x	(27/2$^+$)	Q	DCO=1.11 *3*
647.8 *2*	13.4 *6*	1656.10+y	(21/2$^+$)	1008.33+y	(17/2$^+$)		
664.3 *2*	3.3 *4*	2968.1+x	(29/2$^-$)	2303.9+x	(25/2$^-$)		
668.1 *2*	13.2 *5*	3574.0+x	(33/2$^+$)	2906.0+x	(29/2$^+$)		
670.6 *2*	71 *3*	1894.3+x	(27/2$^-$)	1223.6+x	(23/2$^-$)	Q	DCO=1.00 *2*
678.0 *2*	3.4 *3*	1351.7+x	(19/2$^-$)	673.6+x	(19/2$^-$)		
682.6 *2*	13.0 *6*	2005.5+y	(23/2$^+$)	1322.66+y	(19/2$^+$)		
687.0 *5*	2.0 *4*	957.1+x	(15/2$^-$)	270.3+x	(15/2$^-$)		
688.1 *2*	9.8 *5*	3763.3+y	(33/2$^+$)	3074.8+y	(29/2$^+$)		
692.3 *2*	11.3 *6*	3417.4+y	(31/2$^+$)	2725.2+y	(27/2$^+$)		
706.8 *2*	6.8 *3*	3173.0+x	(31/2$^-$)	2466.2+x	(27/2$^-$)		
709.2 *2*	13.4 *7*	2365.4+y	(25/2$^+$)	1656.10+y	(21/2$^+$)		
709.6 *2*	12.9 *7*	3074.8+y	(29/2$^+$)	2365.4+y	(25/2$^+$)		
715.1 *2*	7.8 *4*	4132.5+y	(35/2$^+$)	3417.4+y	(31/2$^+$)		
717.0 *2*	3.9 *2*	987.4+x	(15/2$^+$)	270.3+x	(15/2$^-$)		DCO=0.9 *1*
719.7 *2*	11.9 *6*	2725.2+y	(27/2$^+$)	2005.5+y	(23/2$^+$)		
730.1 *2*	27.0 *7*	3882.7+x	(35/2$^+$)	3152.6+x	(31/2$^+$)	Q	DCO=0.95 *2*
756.3 *2*	9.4 *4*	4519.6+y	(37/2$^+$)	3763.3+y	(33/2$^+$)		
759.0 *2*	5.0 *4*	3727.1+x	(33/2$^-$)	2968.1+x	(29/2$^-$)		
762.6 *2*	15.2 *6*	4336.6+x	(37/2$^+$)	3574.0+x	(33/2$^+$)		
768.0 *2*	50 *2*	2662.4+x	(31/2$^-$)	1894.3+x	(27/2$^-$)	Q	DCO=1.02 *3*
795.0 *2*	4.8 *5*	3968.0+x	(35/2$^-$)	3173.0+x	(31/2$^-$)		
805.3 *2*	7.8 *4*	4937.7+y	(39/2$^+$)	4132.5+y	(35/2$^+$)		
814 *1*	<2	1487.4+x	(19/2$^+$)	673.6+x	(19/2$^-$)		
820.8 *2*	21.6 *5*	4703.5+x	(39/2$^+$)	3882.7+x	(35/2$^+$)	Q	DCO=1.05 *5*
843.9 *2*	4.7 *3*	4571.0+x	(37/2$^-$)	3727.1+x	(33/2$^-$)		
849.7 *2*	31 *2*	3512.1+x	(35/2$^-$)	2662.4+x	(31/2$^-$)	Q	DCO=1.00 *4*
852.9 *2*	14.0 *5*	5189.5+x	(41/2$^+$)	4336.6+x	(37/2$^+$)		
854.3 *2*	7.2 *4*	5374.0+y	(41/2$^+$)	4519.6+y	(37/2$^+$)		
883.7 *2*	4.3 *3*	4851.7+x	(39/2$^-$)	3968.0+x	(35/2$^-$)		
903.4 *2*	5.3 *3*	5841.1+y	(43/2$^+$)	4937.7+y	(39/2$^+$)		
904.0 *2*	15.9 *4*	5607.5+x	(43/2$^+$)	4703.5+x	(39/2$^+$)	Q	DCO=1.09 *4*
911.6 *2*	3.9 *3*	3574.0+x	(33/2$^+$)	2662.4+x	(31/2$^-$)	D	DCO=0.64 *4*
917.5 *5*	<2	957.1+x	(15/2$^-$)	39.5+x	(11/2$^-$)		
925.4 *2*	24 *1*	4437.5+x	(39/2$^-$)	3512.1+x	(35/2$^-$)	Q	DCO=0.97 *4*
927.0 *2*	4.3 *3*	5498.0+x	(41/2$^-$)	4571.0+x	(37/2$^-$)		
941.8 *2*	9.7 *5*	6131.3+x	(45/2$^+$)	5189.5+x	(41/2$^+$)		
953.0 *2*	5.1 *3*	6327.0+y	(45/2$^+$)	5374.0+y	(41/2$^+$)		
978.2 *2*	3.4 *3*	5829.9+x	(43/2$^-$)	4851.7+x	(39/2$^-$)		
982.2 *2*	11.3 *3*	6589.7+x	(47/2$^+$)	5607.5+x	(43/2$^+$)	Q	DCO=1.17 *5*
1000.4 *2*	16.3 *6*	5437.9+x	(43/2$^-$)	4437.5+x	(39/2$^-$)	Q	DCO=1.00 *5*
1001.3 *2*	5.0 *3*	6842.4+y	(47/2$^+$)	5841.1+y	(43/2$^+$)		
1005.3 *5*	2.8 *3*	6503.3+x	(45/2$^-$)	5498.0+x	(41/2$^-$)		
1011.5	7.7 *6*	2906.0+x	(29/2$^+$)	1894.3+x	(27/2$^-$)	D	DCO=0.56 *4*
1036.9 *2*	8.8 *4*	7168.2+x	(49/2$^+$)	6131.3+x	(45/2$^+$)		
1049.0 *2*	5.1 *3*	7376.0+y	(49/2$^+$)	6327.0+y	(45/2$^+$)		
1060.4 *2*	7.7 *2*	7650.1+x	(51/2$^+$)	6589.7+x	(47/2$^+$)	Q	DCO=1.10 *7*
1062@ *1*	<2	1735.2+x	(21/2$^-$)	673.6+x	(19/2$^-$)		
1072 *1*	<2	2968.1+x	(29/2$^-$)	1894.3+x	(27/2$^-$)		
1073.0 *2*	13.3 *6*	6510.9+x	(47/2$^-$)	5437.9+x	(43/2$^-$)	Q	DCO=0.94 *7*
1075.3 *5*	2.5 *3*	6905.2+x	(47/2$^-$)	5829.9+x	(43/2$^-$)		
1076.1 *5*	<2	7579.4+x	(49/2$^-$)	6503.3+x	(45/2$^-$)		
1080.3 *2*	3.7 *6*	2303.9+x	(25/2$^-$)	1223.6+x	(23/2$^-$)		

Continued on next page (footnotes at end of table)

^{92}Mo(^{40}Ca,2αpγ) 2003Pa41 (continued)

γ(^{123}La) (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [#]	Comments
1081.4 *2*	5.0 *8*	1351.7+x	(19/2$^-$)	270.3+x	(15/2$^-$)		
1095.9 *2*	4.8 *3*	7938.3+y	(51/2$^+$)	6842.4+y	(47/2$^+$)		
1101.9 *2*	4.0 *5*	2325.4+x	(25/2$^+$)	1223.6+x	(23/2$^-$)	D	DCO=0.46 *7*
1121 *1*	<2	8700.4+x	(53/2$^-$)	7579.4+x	(49/2$^-$)		
1123.5 *5*	<2	1797.6+x	(21/2$^+$)	673.6+x	(19/2$^-$)		
1138.3 *2*	4.1 *2*	8306.5+x	(53/2$^+$)	7168.2+x	(49/2$^+$)		
1141.7 *2*	5.4 *8*	8791.8+x	(55/2$^+$)	7650.1+x	(51/2$^+$)	Q	DCO=1.02 *8*
1141.9 *2*	9.6 *4*	7652.8+x	(51/2$^-$)	6510.9+x	(47/2$^-$)	Q	DCO=1.37 *9*
1146.1 *2*	5.1 *3*	8522.1+y	(53/2$^+$)	7376.0+y	(49/2$^+$)		
1162.7 *5*	2.0 *3*	8067.9+x	(51/2$^-$)	6905.2+x	(47/2$^-$)		
1182.3 *2*	3.4 *4*	1855.9+x	(23/2$^-$)	673.6+x	(19/2$^-$)		
1194.3 *5*	2.9 *2*	9132.6+y	(55/2$^+$)	7938.3+y	(51/2$^+$)		
1210.7 *2*	4.8 *2*	8863.5+x	(55/2$^-$)	7652.8+x	(51/2$^-$)		
1221[@] *1*	<2	9288.9+x?	(55/2$^-$)	8067.9+x	(51/2$^-$)		
1228.3 *5*	2.9 *2*	10020.1+x	(59/2$^+$)	8791.8+x	(55/2$^+$)	Q	DCO=1.02 *12*
1242 *1*	<2	2466.2+x	(27/2$^-$)	1223.6+x	(23/2$^-$)		
1243.7 *2*	4.0 *2*	9765.8+y	(57/2$^+$)	8522.1+y	(53/2$^+$)		
1243.8 *5*	2.5 *2*	9550.4+x	(57/2$^+$)	8306.5+x	(53/2$^+$)		
1278.8 *2*	4.5 *2*	10142.3+x	(59/2$^-$)	8863.5+x	(55/2$^-$)		
1292.9 *5*	<2	10425.5+y	(59/2$^+$)	9132.6+y	(55/2$^+$)		
1318.1 *5*	<2	11338.2+x	(63/2$^+$)	10020.1+x	(59/2$^+$)		
1341.4 *5*	<2	11107.2+y	(61/2$^+$)	9765.8+y	(57/2$^+$)		
1342.2 *5*	<2	10892.6+x	(61/2$^+$)	9550.4+x	(57/2$^+$)		
1348.0 *5*	<2	11490.3+x	(63/2$^-$)	10142.3+x	(59/2$^-$)		
1385.7 *5*	<2	11811.2+y	(63/2$^+$)	10425.5+y	(59/2$^+$)		
1414.8 *5*	<2	12753.1+x	(67/2$^+$)	11338.2+x	(63/2$^+$)		
1419.4 *5*	<2	12909.7+x	(67/2$^-$)	11490.3+x	(63/2$^-$)		
1434.6 *5*	<2	12327.2+x	(65/2$^+$)	10892.6+x	(61/2$^+$)		
1434.9 *5*	<2	12542.1+y	(65/2$^+$)	11107.2+y	(61/2$^+$)		
1498.7 *5*	<2	14408.4+x	(71/2$^-$)	12909.7+x	(67/2$^-$)		
1519.2 *5*	<2	14272.3+x	(71/2$^+$)	12753.1+x	(67/2$^+$)		
1525[@] *1*	<2	13852.2+x?	(69/2$^+$)	12327.2+x	(65/2$^+$)		
1584.7 *5*	<2	15993.2+x	(75/2$^-$)	14408.4+x	(71/2$^-$)		
1624.2 *5*	<2	15896.5+x	(75/2$^+$)	14272.3+x	(71/2$^+$)		
1670[@] *1*	<2	17663.2+x?	(79/2$^-$)	15993.2+x	(75/2$^-$)		
1755[@] *1*	<2	17651.5+x?	(79/2$^+$)	15896.5+x	(75/2$^+$)		

[†] Uncertainty of 0.2 keV is assigned to γ rays with Iγ>3, 0.5 keV for γ rays with Iγ<3, and 1 keV when Eγ values are quoted to nearest keV, based on a general comment in 2003Pa41.

[‡] Relative intensity normalized to I(403.3γ)=100 (2003Pa41).

[#] Deduced (by evaluator) from measured DCO ratios based on the statement for expected DCO ratios for pure dipole and quadrupole transitions in 2003Pa41. Multipolarities are not explicitly given in 2003Pa41.

[@] Placement of transition in the level scheme is uncertain.

^{92}Mo(^{40}Ca,2αpγ) 2003Pa41

Level Scheme

Intensities: Relative I_γ

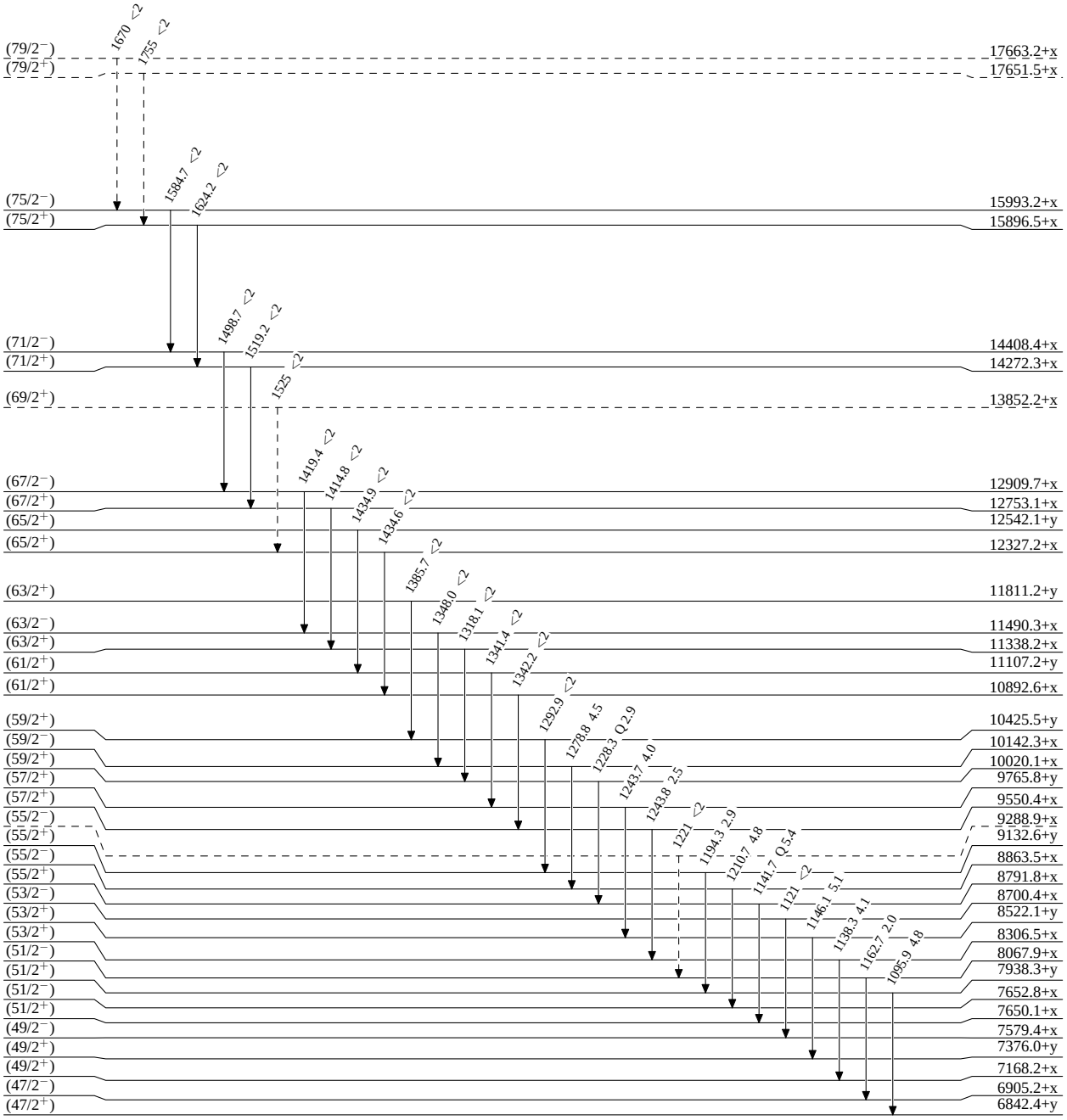
Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

γ Decay (Uncertain)



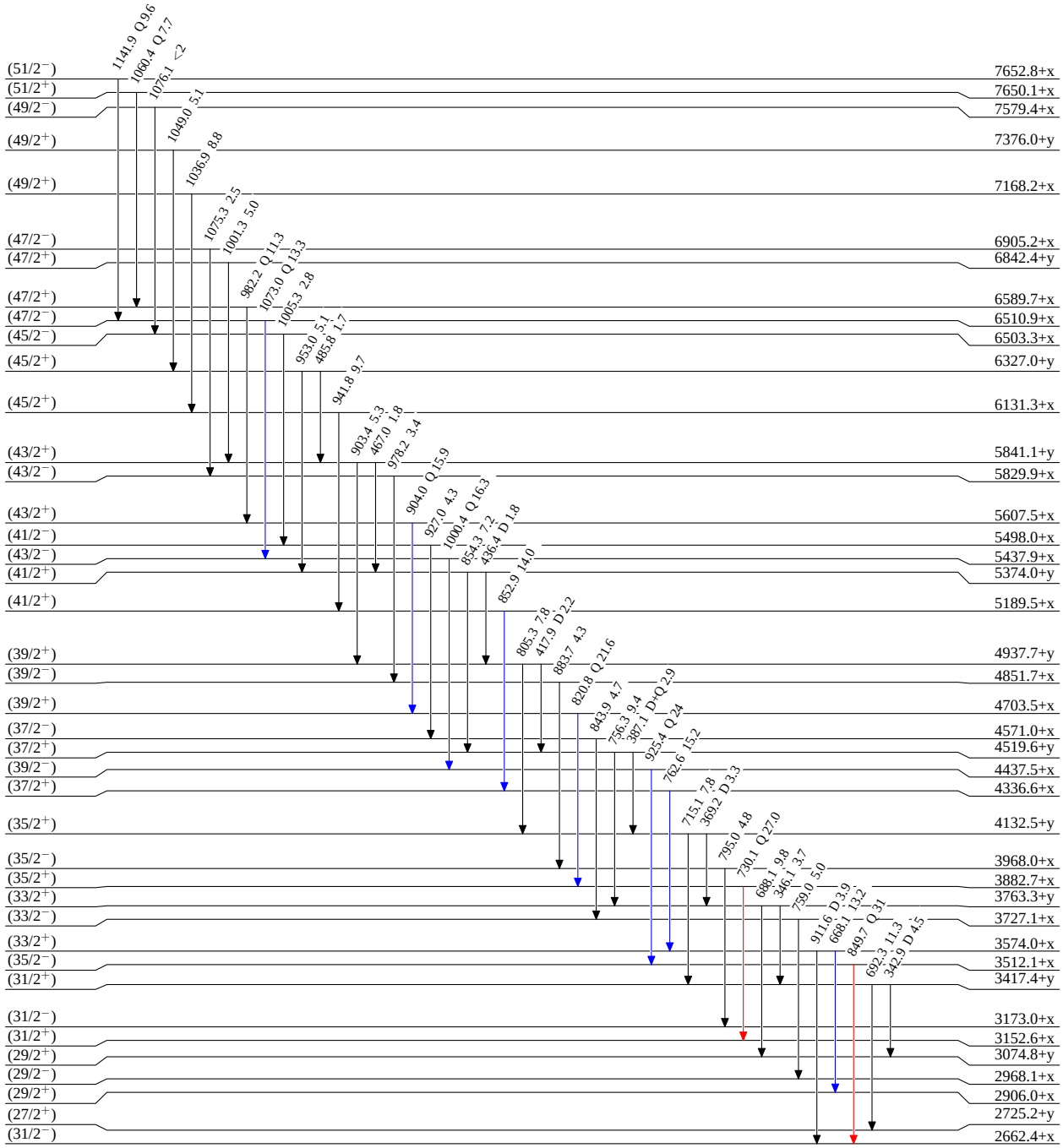
$^{123}_{57}La_{66}$

^{92}Mo(^{40}Ca,2αpγ) 2003Pa41

Level Scheme (continued)

Intensities: Relative I_γ

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



$^{123}_{57}La_{66}$

^{92}Mo(^{40}Ca,2αpγ) 2003Pa41

Level Scheme (continued)

Intensities: Relative I_γ

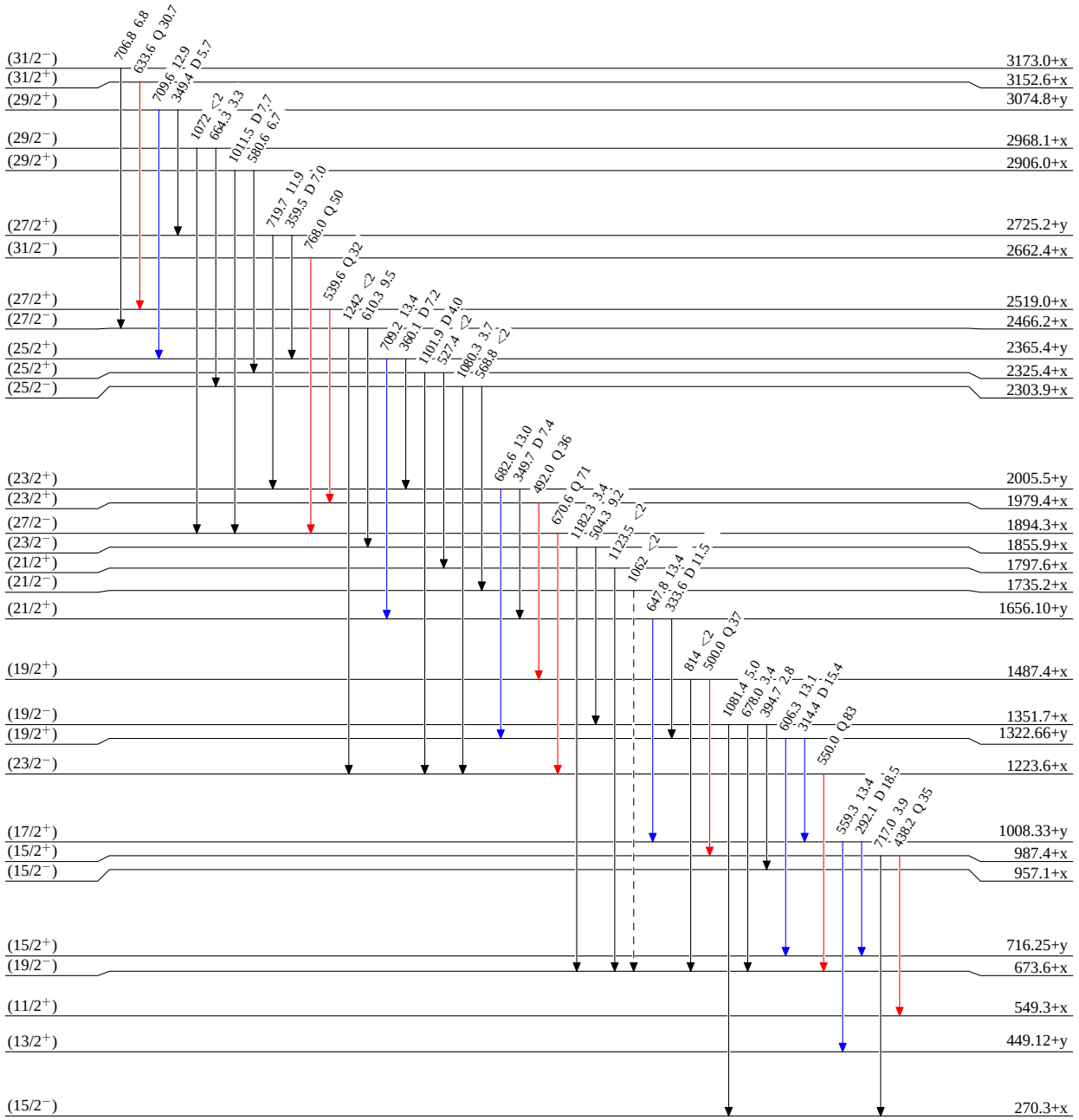
Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

γ Decay (Uncertain)

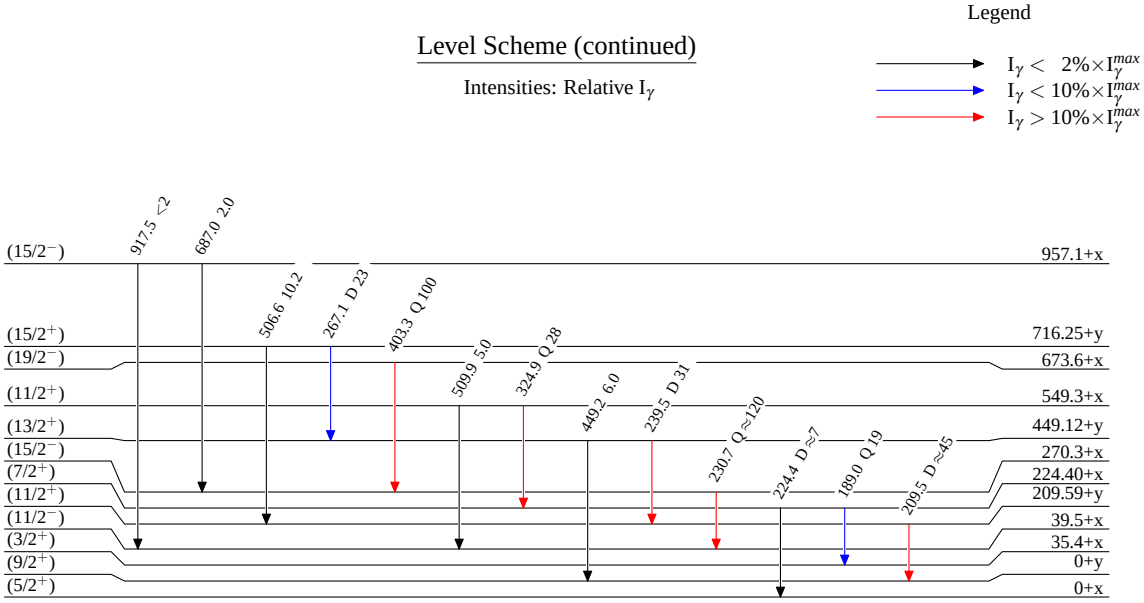


$^{123}_{57}La_{66}$

^{92}Mo(^{40}Ca,2αpγ) 2003Pa41

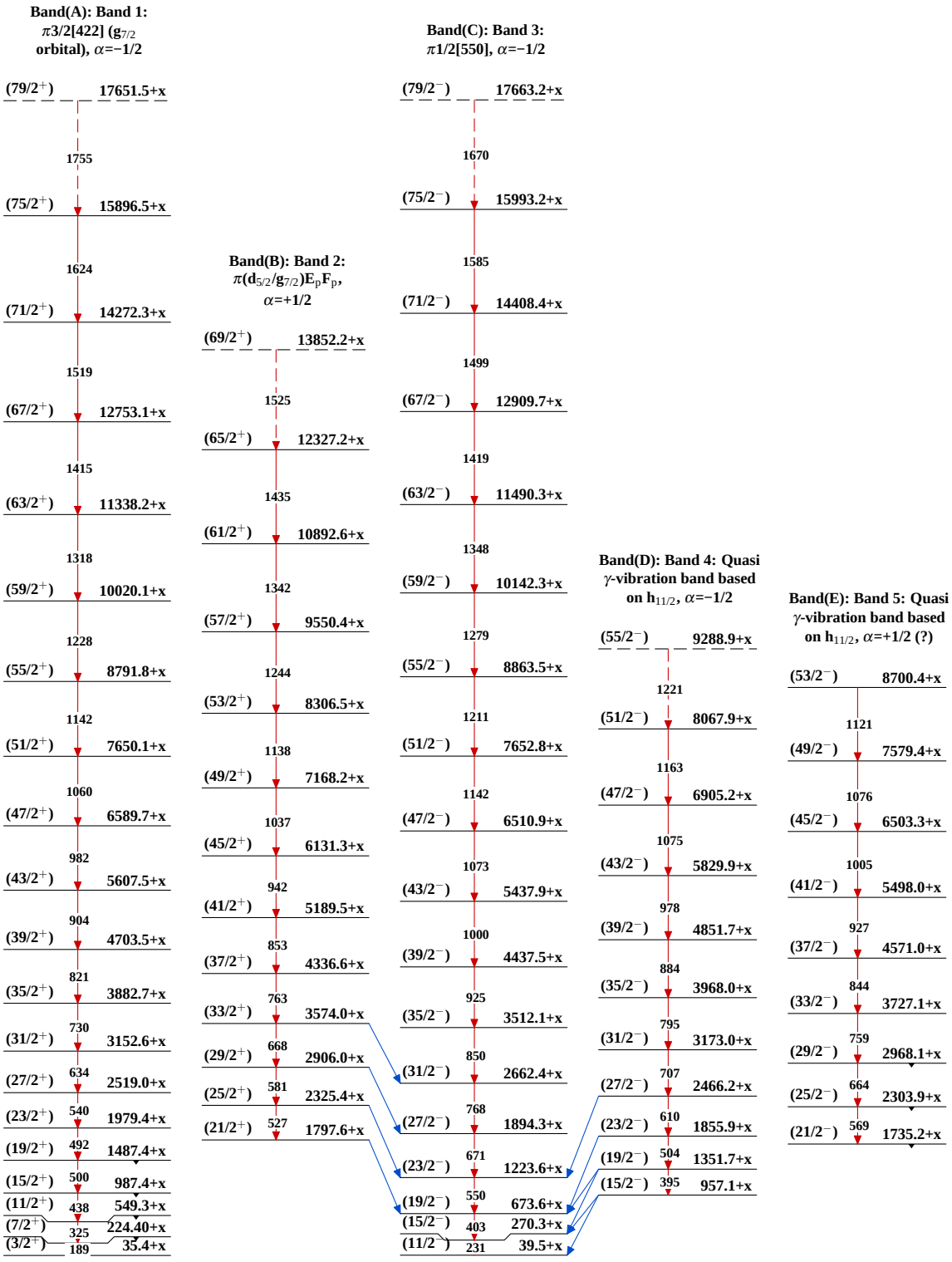
Level Scheme (continued)

Intensities: Relative I_γ



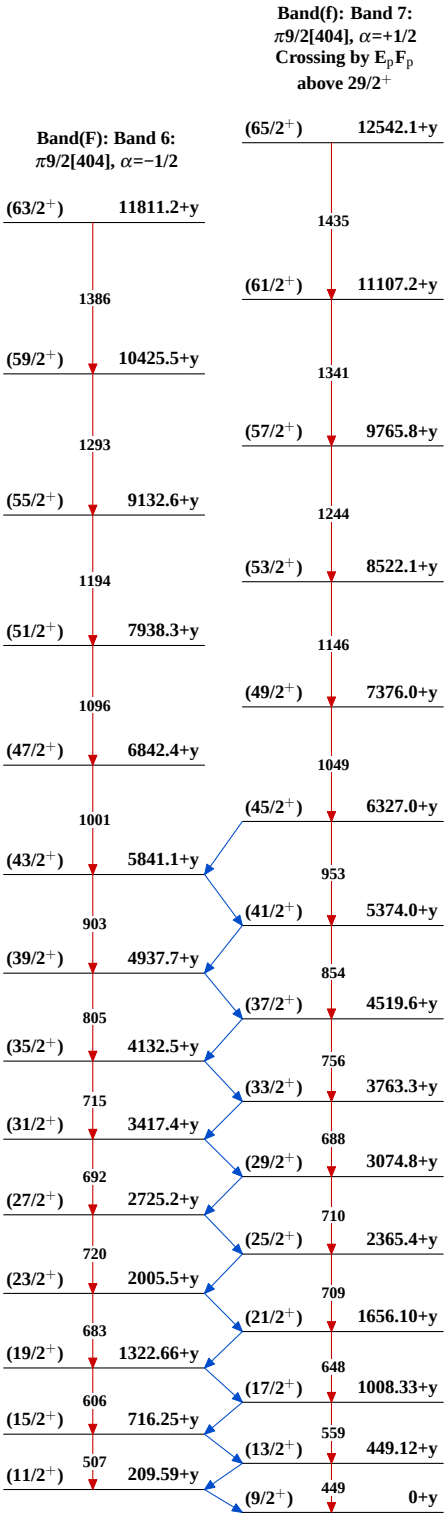
$^{123}_{57}La_{66}$

^{92}Mo(^{40}Ca,2αpγ) 2003Pa41



$^{123}_{57}La_{66}$

^{92}Mo(^{40}Ca,2αpγ) 2003Pa41 (continued)



$^{123}_{57}La_{66}$

Adopted Levels, Gammas

Q(β^-)=−10060 *syst*; S(n)=10480 *syst*; S(p)=3030 *syst*; Q(α)=1880 *syst* 2021Wa16
ΔQ(β^-)=500, ΔS(n)=500, ΔS(p)=420, ΔQ(α)=360 (syst,2021Wa16).
S(2n)=23740 *500*, S(2p)=4120 *330*, Q(εp)=7030 *300* (syst,2021Wa16).
Mass measurement: 2017At01.
Other measurements:
1984Ni03 (also 1988WiZN): ^{123}Ce produced and identified in ^{92}Mo(^{36}Ar,αn) reaction at E=196 MeV, β-delayed proton; the delayed protons feed the ground-state band 0^+, 2^+, 4^+, 6^+ members of ^{122}Ba.
1988GeZR: ^{123}Ce produced in ^{92}Mo(^{36}Ar,X), E=170-210 MeV; measured Eγ, Iγ. Possible 66-, 113-, 178-keV γ rays from the decay of ^{123}Ce to ^{123}La. Half-life of 3.8 s from 1984Ni03 was checked for only the 113γ.
Structure calculations: 2018Se02, 2017Se19, 2016Na19, 2015El05, 2013Ku12, 2012Qi01, 2011Sh13, 2010Af01, 2002Du01, 2002Sa20, 1995Sh16.

^{123}Ce Levels

Cross Reference (XREF) Flags

A ^{64}Zn(^{64}Zn,αnγ)

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	XREF	Comments
0.0	(5/2)	3.8 s *2*		%ε+%β^+=100; %ecpgt 0. J$^\pi$: from a comparison of proton decay to 2^+, 4^+ and possibly 6^+ rotational levels in ^{122}Ba with calculated branchings (1984Ni03). $T_{1/2}$: from weighted average of 3.9 s *2* from delayed decay of protons and 3.3 s *6* from decay of La x-ray (1984Ni03).
0+x[@]	(5/2$^+$)		A	E(level),J$^\pi$: this level may be the ground state of ^{123}Ce based on proton decay of g.s. of ^{123}Ce to ^{122}Ba.
0+y[#]	(7/2$^+$)		A	
0+z[&]	(7/2$^-$)		A	
270.70+z[&] *10*	(11/2$^-$)		A	
273.00+x[@] *10*	(9/2$^+$)		A	
335.80+y[#] *10*	(11/2$^+$)		A	
638.50+z[&] *15*	(15/2$^-$)		A	
669.40+x[@] *15*	(13/2$^+$)		A	
788.90+y[#] *15*	(15/2$^+$)		A	
1131.10+z[&] *18*	(19/2$^-$)		A	
1176.60+x[@] *18*	(17/2$^+$)		A	
1347.10+y[#] *18*	(19/2$^+$)		A	
1728.60+z[&] *20*	(23/2$^-$)		A	
1781.20+x[@] *20*	(21/2$^+$)		A	
1995.20+y[#] *20*	(23/2$^+$)		A	
2407.31+z[&] *23*	(27/2$^-$)		A	
2466.6+x[@] *3*	(25/2$^+$)		A	
2715.11+y[#] *23*	(27/2$^+$)		A	
3131.7+z[&] *3*	(31/2$^-$)		A	
3211.6+x[@] *11*	(29/2$^+$)		A	
3456.1+y[#] *3*	(31/2$^+$)		A	
3874.9+z[&] *4*	(35/2$^-$)		A	
3958.6+x[@] *15*	(33/2$^+$)		A	
4210.7+y[#] *4*	(35/2$^+$)		A	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{123}Ce Levels (continued)

E(level)[†]	J$^\pi$[‡]	XREF
4658.5+z?[&] *5*	(39/2$^-$)	A
4778.6+x?[@] *18*	(37/2$^+$)	A
4994.1+y[#] *5*	(39/2$^+$)	A
5513.5+z?[&] *11*	(43/2$^-$)	A
5833.1+y?[#] *11*	(43/2$^+$)	A

[†] From a least-squares fit to γ-ray energies.
[‡] Tentative assignments as suggested by 2012Sm04 based on J^π assignments of low-lying levels from systematics of neighboring nuclei and cascades of ΔJ=2, quadrupole (most likely E2) transitions built on these states. It should be noted, however, that cascading interband M1/E2 transitions are not reported.
[#] Band(A): Possible ν5/2[413],α=−1/2. Spherical orbital=g$_{7/2}$.
[@] Band(a): Possible ν5/2[413],α=+1/2 Spherical orbital=g$_{7/2}$.
[&] Band(B): Possible ν5/2[532],α=−1/2 Spherical orbital=h$_{11/2}$.

γ(^{123}Ce)

E$_i$(level)	J$_i^\pi$	E$_\gamma$[†]	I$_\gamma$[†]	E$_f$	J$_f^\pi$	Mult.[‡]
270.70+z	(11/2$^-$)	270.7 *1*	100	0+z	(7/2$^-$)	Q
273.00+x	(9/2$^+$)	273.0 *1*	100	0+x	(5/2$^+$)	(Q)
335.80+y	(11/2$^+$)	335.8 *1*	100	0+y	(7/2$^+$)	Q
638.50+z	(15/2$^-$)	367.8 *1*	100	270.70+z	(11/2$^-$)	Q
669.40+x	(13/2$^+$)	396.4 *1*	100	273.00+x	(9/2$^+$)	Q
788.90+y	(15/2$^+$)	453.1 *1*	100	335.80+y	(11/2$^+$)	Q
1131.10+z	(19/2$^-$)	492.6 *1*	100	638.50+z	(15/2$^-$)	(Q)
1176.60+x	(17/2$^+$)	507.2 *1*	100	669.40+x	(13/2$^+$)	Q
1347.10+y	(19/2$^+$)	558.2 *1*	100	788.90+y	(15/2$^+$)	Q
1728.60+z	(23/2$^-$)	597.5 *1*	100	1131.10+z	(19/2$^-$)	Q
1781.20+x	(21/2$^+$)	604.6 *1*	100	1176.60+x	(17/2$^+$)	Q
1995.20+y	(23/2$^+$)	648.1 *1*	100	1347.10+y	(19/2$^+$)	Q
2407.31+z	(27/2$^-$)	678.7 *1*	100	1728.60+z	(23/2$^-$)	Q
2466.6+x	(25/2$^+$)	685.4 *2*	100	1781.20+x	(21/2$^+$)	(Q)
2715.11+y	(27/2$^+$)	719.9 *1*	100	1995.20+y	(23/2$^+$)	Q
3131.7+z	(31/2$^-$)	724.4 *2*	100	2407.31+z	(27/2$^-$)	Q
3211.6+x	(29/2$^+$)	745 *1*	100	2466.6+x	(25/2$^+$)	
3456.1+y	(31/2$^+$)	741.0 *2*	100	2715.11+y	(27/2$^+$)	Q
3874.9+z	(35/2$^-$)	743.2 *2*	100	3131.7+z	(31/2$^-$)	Q
3958.6+x	(33/2$^+$)	747 *1*	100	3211.6+x	(29/2$^+$)	
4210.7+y	(35/2$^+$)	754.6 *2*	100	3456.1+y	(31/2$^+$)	Q
4658.5+z?	(39/2$^-$)	783.6[#] *2*	100	3874.9+z	(35/2$^-$)	
4778.6+x?	(37/2$^+$)	820[#] *1*	100	3958.6+x	(33/2$^+$)	
4994.1+y	(39/2$^+$)	783.4 *2*	100	4210.7+y	(35/2$^+$)	Q
5513.5+z?	(43/2$^-$)	855[#] *1*	100	4658.5+z?	(39/2$^-$)	
5833.1+y?	(43/2$^+$)	839[#] *1*	100	4994.1+y	(39/2$^+$)	

[†] From (^{64}Zn,αnγ) (2012Sm04).
[‡] From angular anisotropy ratio in (^{64}Zn,αnγ) (2012Sm04). Multiplarity=Q indicates ΔJ=2, quadrupole (most likely E2) transition.
[#] Placement of transition in the level scheme is uncertain.

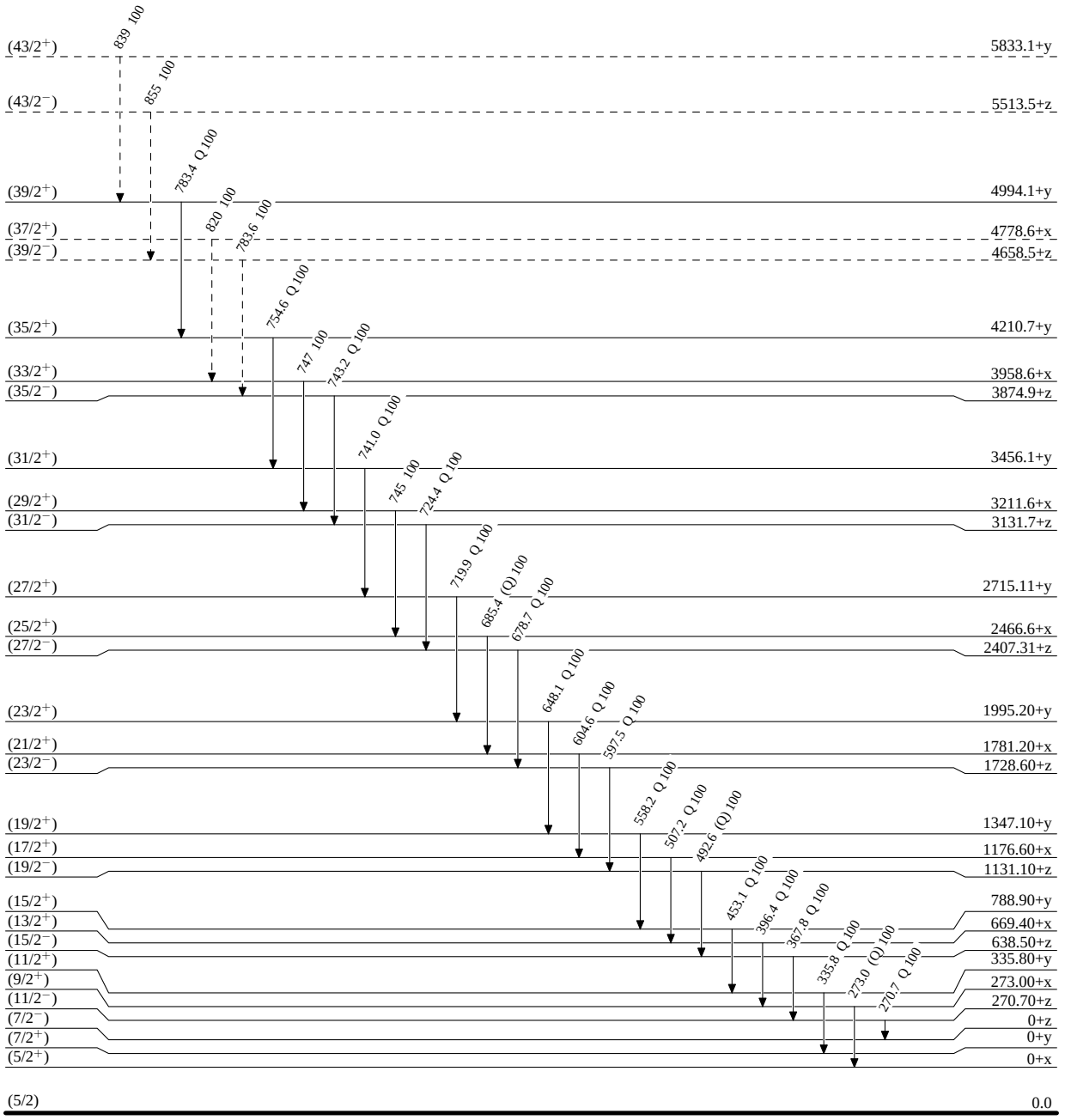
Adopted Levels, Gammas

Legend

Level Scheme

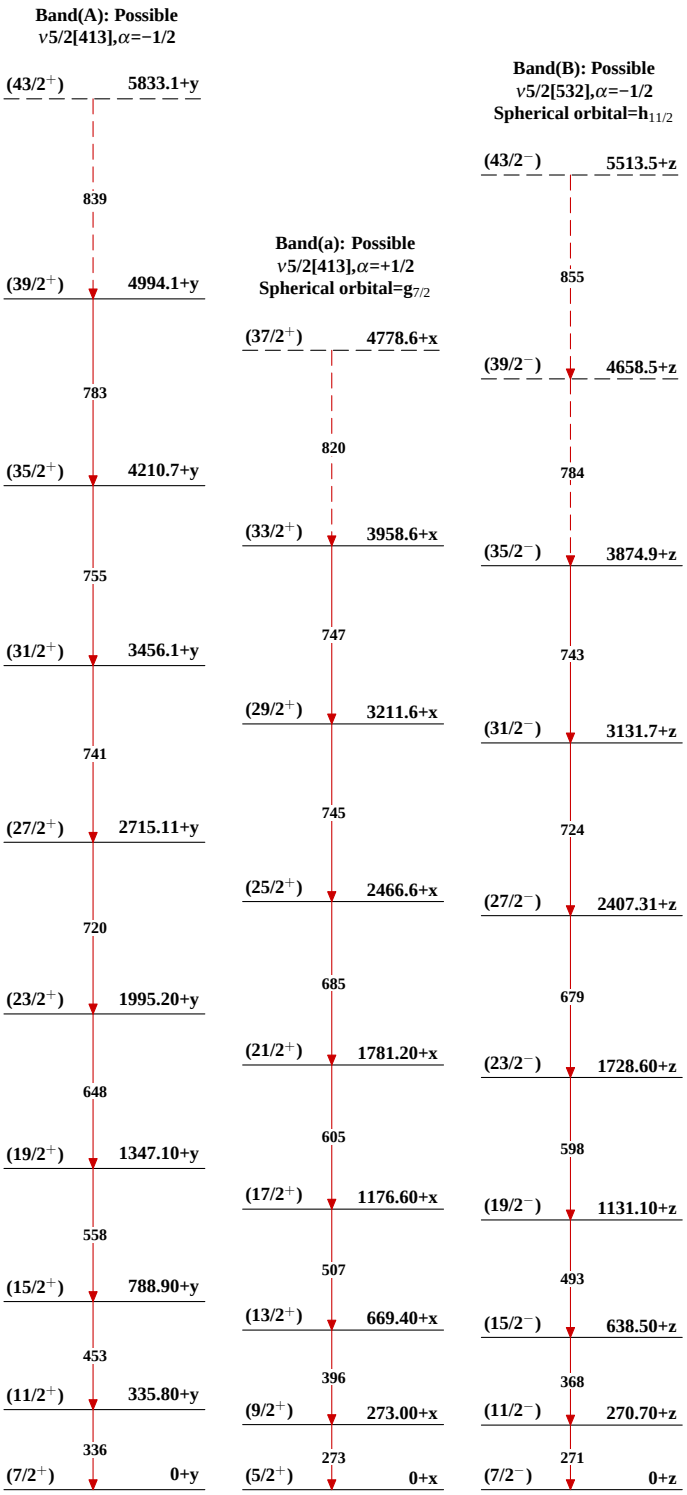
Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{123}_{58}Ce_{65}$

Adopted Levels, Gammas



$^{123}_{58}Ce_{65}$

^{64}Zn(^{64}Zn,αnγ) 2012Sm04

2012Sm04: E=260 MeV ^{64}Zn beam was provided by the Argonne Tandem Linac Accelerator System (ATLAS) at Argonne National Laboratory. Target was a 500μg/cm^2 ^{64}Zn foil. γ rays were detected by the Gammasphere array consisting of 78 HPGe detectors; neutrons were detected by the Neutron Shell consisting of 30 BC501A scintillators; α particles were detected by the Microball charged-particle spectrometer consisting of 95 CsI(Tl) scintillators; recoils were dispersed and analyzed using Argonne Fragment Mass Analyzer. Measured Eγ, Iγ, $\gamma\gamma$-coin, nγ-coin, $\alpha\gamma$-coin, (recoil)γ-coin, $\gamma(\theta)$. Deduced levels, J, π, band structures, configurations, γ-ray multipolarities. Comparisons with Total Routhian Surface (TRS) and cranked shell-model (CSM) calculations.

^{123}Ce Levels

E(level)[†]	J$^\pi$[‡]	Comments
0+x[@]	(5/2$^+$)	E(level),J$^\pi$: this level may be the ground state of ^{123}Ce based on proton decay of g.s. of ^{123}Ce to ^{122}Ba.
0+y[#]	(7/2$^+$)	
0+z[&]	(7/2$^-$)	
270.70+z[&] *10*	(11/2$^-$)	
273.00+x[@] *10*	(9/2$^+$)	
335.80+y[#] *10*	(11/2$^+$)	
638.50+z[&] *15*	(15/2$^-$)	
669.40+x[@] *15*	(13/2$^+$)	
788.90+y[#] *15*	(15/2$^+$)	
1131.10+z[&] *18*	(19/2$^-$)	
1176.60+x[@] *18*	(17/2$^+$)	
1347.10+y[#] *18*	(19/2$^+$)	
1728.60+z[&] *20*	(23/2$^-$)	
1781.20+x[@] *20*	(21/2$^+$)	
1995.20+y[#] *20*	(23/2$^+$)	
2407.31+z[&] *23*	(27/2$^-$)	
2466.6+x[@] *3*	(25/2$^+$)	
2715.11+y[#] *23*	(27/2$^+$)	
3131.7+z[&] *3*	(31/2$^-$)	
3211.6+x[@] *11*	(29/2$^+$)	
3456.1+y[#] *3*	(31/2$^+$)	
3874.9+z[&] *4*	(35/2$^-$)	
3958.6+x[@] *15*	(33/2$^+$)	
4210.7+y[#] *4*	(35/2$^+$)	
4658.5+z?[&] *5*	(39/2$^-$)	
4778.6+x?[@] *18*	(37/2$^+$)	
4994.1+y[#] *5*	(39/2$^+$)	
5513.5+z?[&] *11*	(43/2$^-$)	
5833.1+y?[#] *11*	(43/2$^+$)	

[†] From a least-squares fit to γ-ray energies.
[‡] Tentative assignments as shown in level-scheme figure 4 of 2012Sm04, based on measured $\gamma(\theta)$ and band structures.
[#] Band(A): ν5/2[413],α=−1/2. Spherical orbital=g$_{7/2}$.
[@] Band(a): ν5/2[413],α=+1/2 Spherical orbital=g$_{7/2}$.
[&] Band(B): ν5/2[532],α=−1/2 Spherical orbital=h$_{11/2}$.

^{64}Zn(^{64}Zn,αnγ) 2012Sm04 (continued)

γ(^{123}Ce)

Assignment of γ cascades to ^{123}Ce is from subtraction of αpn, α2n and 2αn matrices from total projection of $\gamma\gamma$ matrix.
Angular-intensity ratio R=Iγ(≈140°)/Iγ(≈90°). Expected ratios are 0.7 for ΔJ=1, dipole and 1.2 for ΔJ=2, quadrupole transitions.

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	Comments
270.7 *1*	88 *6*	270.70+z	(11/2$^-$)	0+z	(7/2$^-$)	Q	R=1.1 *2*.
273.0 *1*	94 *8*	273.00+x	(9/2$^+$)	0+x	(5/2$^+$)	(Q)	R=0.77 *16*.
335.8 *1*	89 *4*	335.80+y	(11/2$^+$)	0+y	(7/2$^+$)	Q	R=1.1 *2*.
367.8 *1*	88 *6*	638.50+z	(15/2$^-$)	270.70+z	(11/2$^-$)	Q	R=1.07 *12*.
396.4 *1*	98 *8*	669.40+x	(13/2$^+$)	273.00+x	(9/2$^+$)	Q	R=1.3 *2*.
453.1 *1*	100 *4*	788.90+y	(15/2$^+$)	335.80+y	(11/2$^+$)	Q	R=1.2 *3*.
492.6 *1*	71 *11*	1131.10+z	(19/2$^-$)	638.50+z	(15/2$^-$)	(Q)	R=0.91 *19*.
507.2 *1*	95 *9*	1176.60+x	(17/2$^+$)	669.40+x	(13/2$^+$)	Q	R=1.4 *3*.
558.2 *1*	94 *4*	1347.10+y	(19/2$^+$)	788.90+y	(15/2$^+$)	Q	R=1.3 *2*.
597.5 *1*	62 *7*	1728.60+z	(23/2$^-$)	1131.10+z	(19/2$^-$)	Q	R=1.00 *17*.
604.6 *1*	94 *8*	1781.20+x	(21/2$^+$)	1176.60+x	(17/2$^+$)	Q	R=1.4 *3*.
648.1 *1*	94 *5*	1995.20+y	(23/2$^+$)	1347.10+y	(19/2$^+$)	Q	R=1.2 *2*.
678.7 *1*	41 *7*	2407.31+z	(27/2$^-$)	1728.60+z	(23/2$^-$)	Q	R=1.1 *3*.
685.4 *2*	85 *15*	2466.6+x	(25/2$^+$)	1781.20+x	(21/2$^+$)	(Q)	R=1.1 *4*.
719.9 *1*	86 *4*	2715.11+y	(27/2$^+$)	1995.20+y	(23/2$^+$)	Q	R=1.5 *3*.
724.4 *2*	34 *8*	3131.7+z	(31/2$^-$)	2407.31+z	(27/2$^-$)	Q	R=1.6 *5*.
741.0 *2*	85 *4*	3456.1+y	(31/2$^+$)	2715.11+y	(27/2$^+$)	Q	R=1.5 *4*.
743.2 *2*	21 *9*	3874.9+z	(35/2$^-$)	3131.7+z	(31/2$^-$)	Q	R=1.7 *5*.
745 *1*	86 *11*	3211.6+x	(29/2$^+$)	2466.6+x	(25/2$^+$)		
747 *1*	81 *11*	3958.6+x	(33/2$^+$)	3211.6+x	(29/2$^+$)		
754.6 *2*	80 *4*	4210.7+y	(35/2$^+$)	3456.1+y	(31/2$^+$)	Q	R=1.6 *4*.
783.4 *2*	68 *3*	4994.1+y	(39/2$^+$)	4210.7+y	(35/2$^+$)	Q	R=1.6 *6*.
783.6[‡] *2*	13 *8*	4658.5+z?	(39/2$^-$)	3874.9+z	(35/2$^-$)		
820[‡] *1*	51 *13*	4778.6+x?	(37/2$^+$)	3958.6+x	(33/2$^+$)		
839[‡] *1*	21 *4*	5833.1+y?	(43/2$^+$)	4994.1+y	(39/2$^+$)		
855[‡] *1*	5 *2*	5513.5+z?	(43/2$^-$)	4658.5+z?	(39/2$^-$)		

[†] From angular-intensity (anisotropy) ratio. Multipolarity=Q indicates ΔJ=2, quadrupole (most likely E2) transition. 2012Sm04 assign E2 for all the transitions.
[‡] Placement of transition in the level scheme is uncertain.

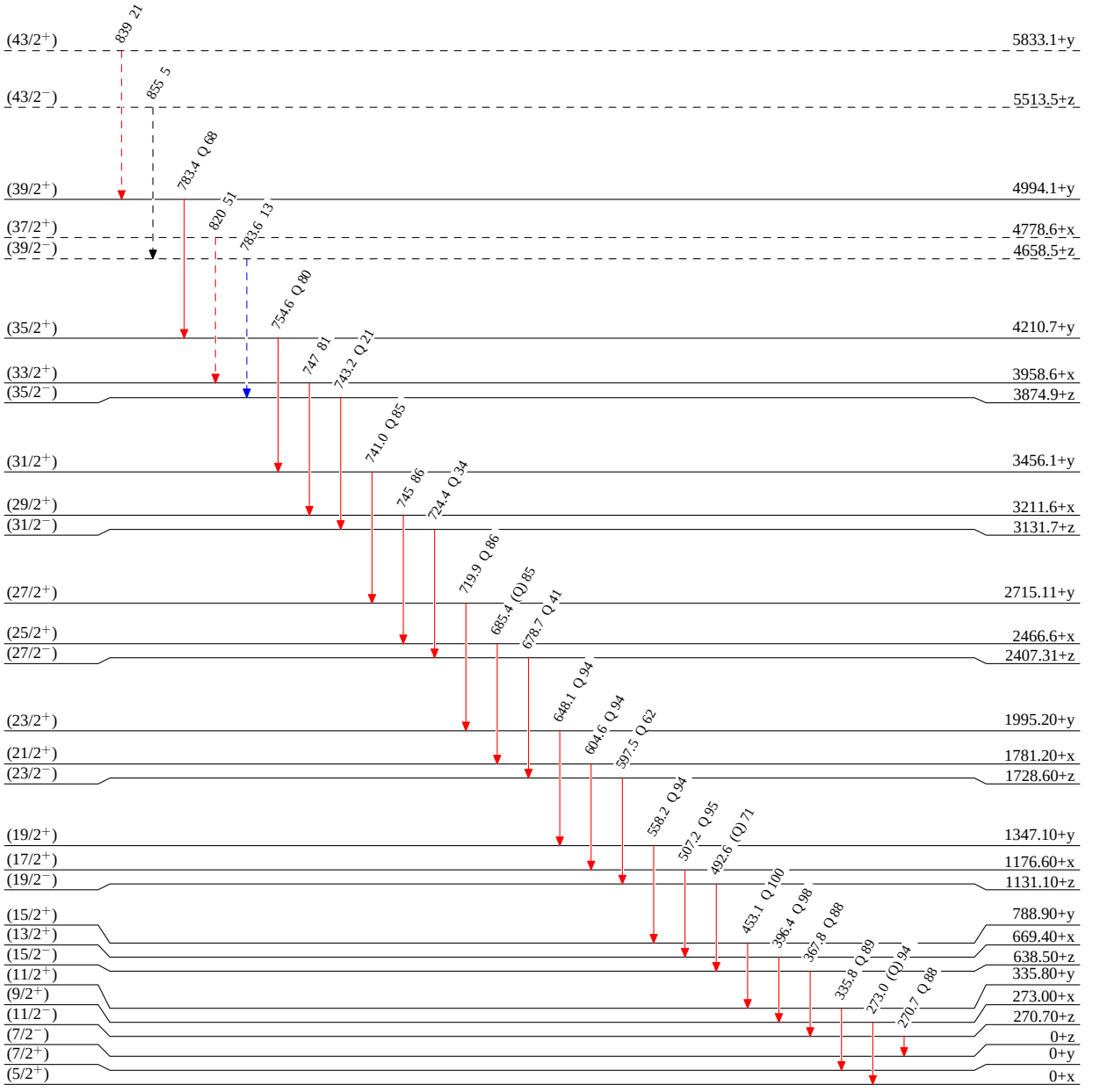
^{64}Zn(^{64}Zn,αnγ) 2012Sm04

Level Scheme

Intensities: Relative I_γ

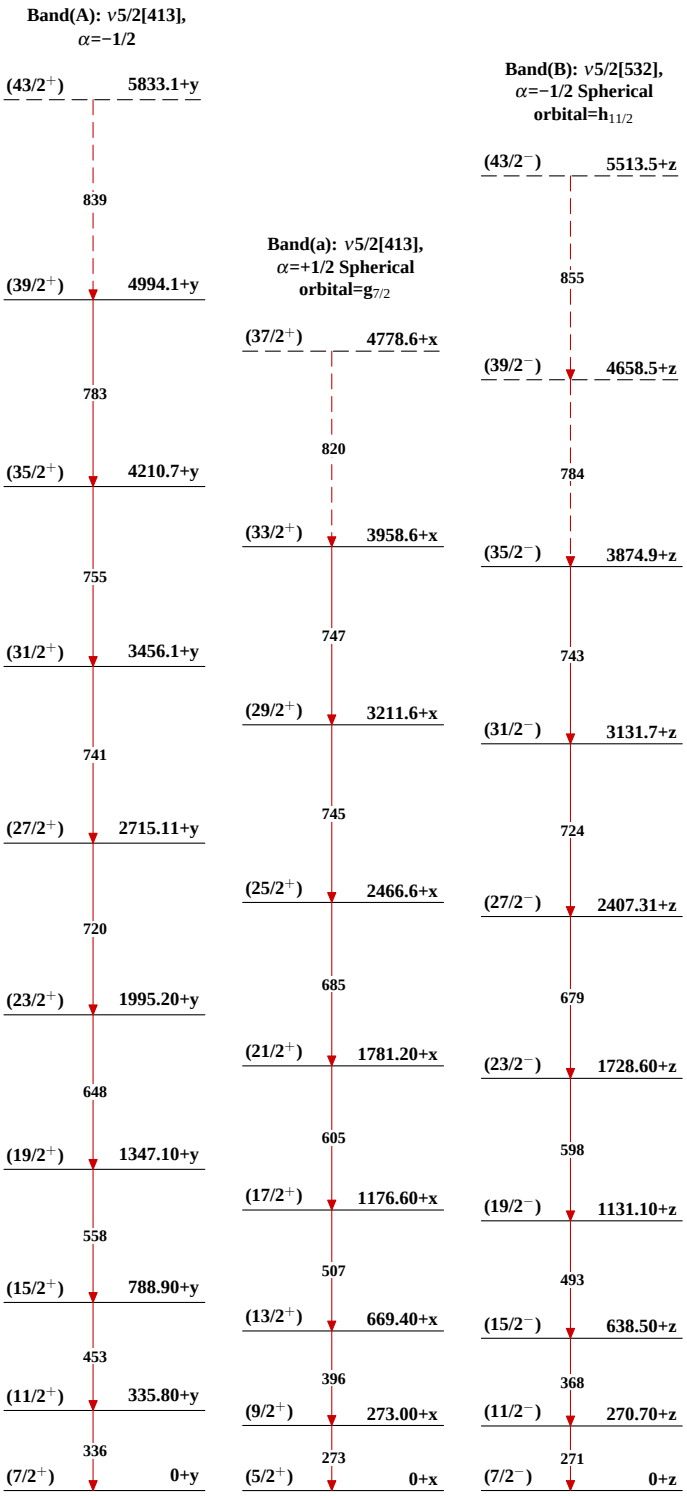
Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)



$^{123}_{58}Ce_{65}$

^{64}Zn(^{64}Zn,αnγ) 2012Sm04



$^{123}_{58}Ce_{65}$

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