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Nuclear Data Sheets for A=214*

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Nuclear Data Sheets for A=214*

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Abstract: Experimental nuclear structure and decay data are evaluated for all of 12 known nuclides of mass 214 (Hg, Tl, Pb, Bi, Po, At, Rn, Fr, Ra, Ac, Th, Pa). 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 in the Adopted Levels and Gammas. The present evaluation supersedes the earlier one on A=214 by S. -C. Wu (2009Wu02), published in **Nuclear Data Sheets** 110, 681 (2009).

Cutoff Date: All data received prior to May 1, 2021 have been considered in adopting the properties given in this evaluation. Main bibliographic source was the NSR database (2014Pr09) 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: 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-2020).

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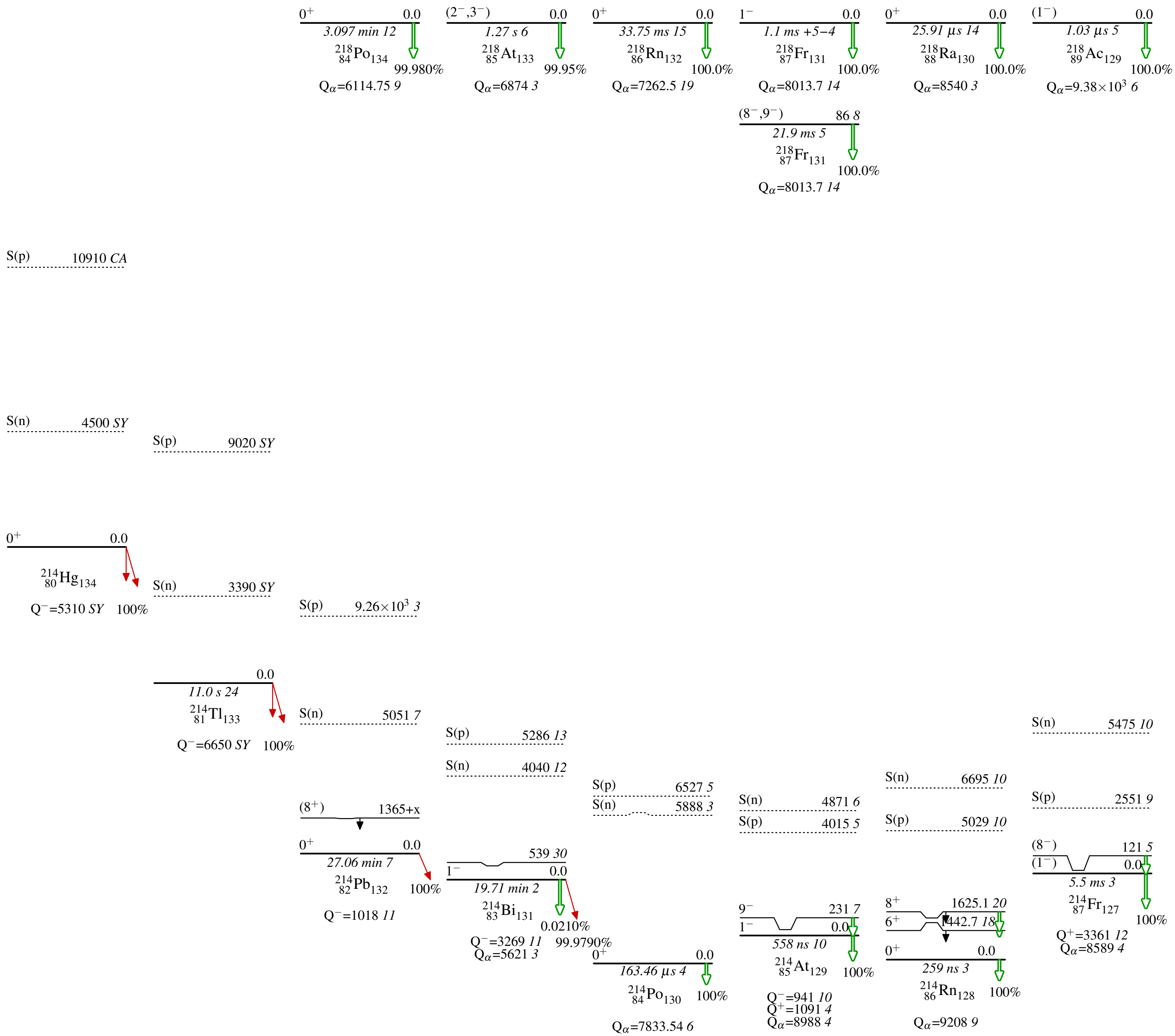
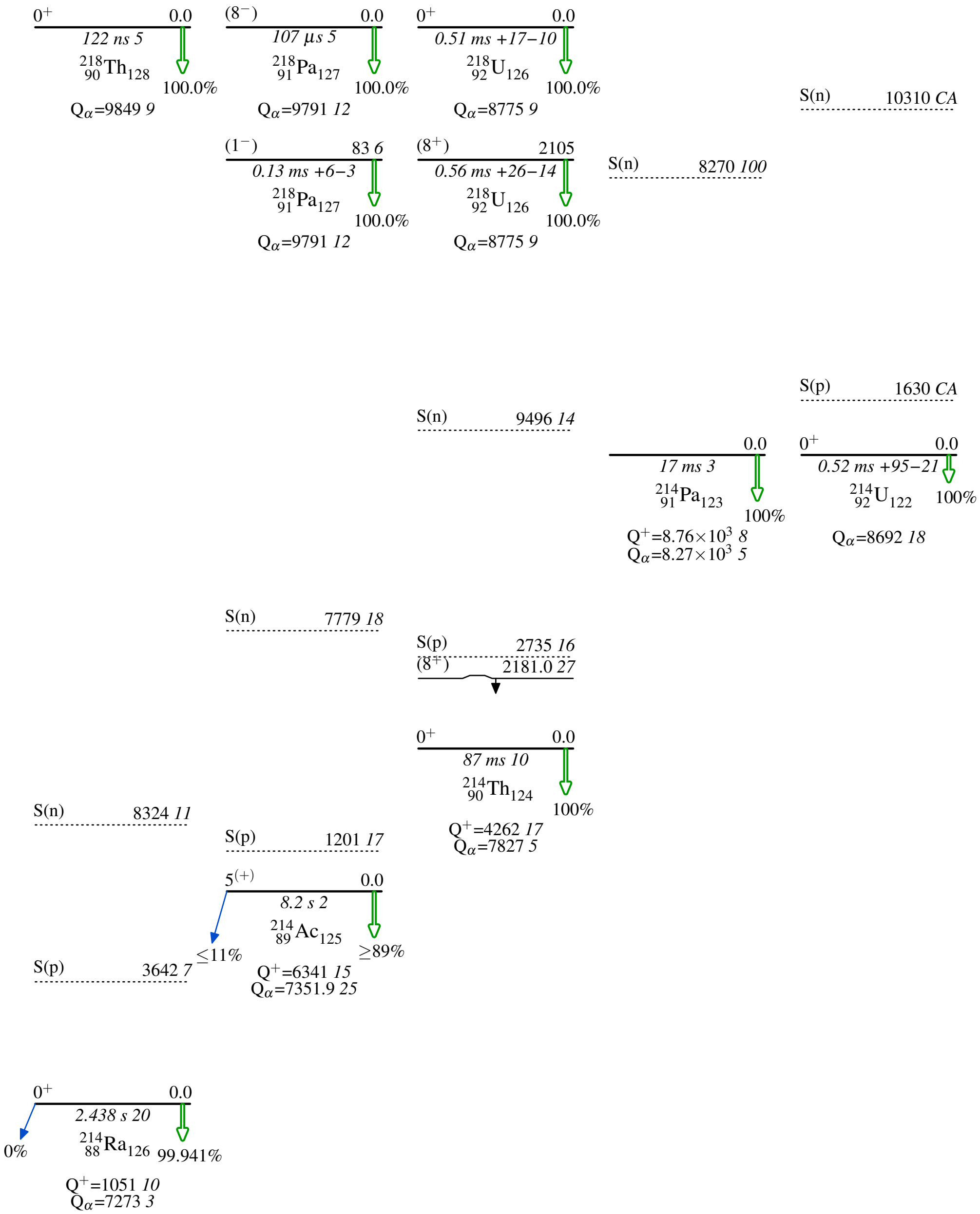
Index for A=214

Skeleton Scheme for A=214



Skeleton Scheme for A=214 (continued)



Ground-State and Isomeric-Level Properties

Nuclide	Level	Jπ	$T_{1/2}$	Decay Mode
^{214}Hg	0.0	0^+		$\%\beta^-$=100; $\%\beta^-$n=?
^{214}Tl	0.0		11.0 s *24*	$\%\beta^-$=100; $\%\beta^-$n=34 *12*
^{214}Pb	0.0	0^+	27.06 min *7*	$\%\beta^-$=100
^{214}Pb	1365+x	(8^+)	6.2 μs *3*	%IT=100
^{214}Bi	0.0	1^-	19.71 min *2*	$\%\beta^-$=99.9790 *13*; $\%\alpha$=0.0210 *13*
^{214}Bi	539		>93 s	
^{214}Po	0.0	0^+	163.46 μs *4*	$\%\alpha$=100
^{214}At	0.0	1^-	558 ns *10*	$\%\alpha$=100
^{214}At	231	9^-	760 ns *15*	$\%\alpha\leq$100
^{214}Rn	0.0	0^+	259 ns *3*	$\%\alpha$=100
^{214}Rn	1442.7	6^+	0.69 ns *21*	$\%\alpha$>0; %IT<100
^{214}Rn	1625.1	8^+	6.5 ns *17*	%IT=95.9 *10*; $\%\alpha$=4.1 *10*
^{214}Fr	0.0	(1^-)	5.5 ms *3*	$\%\alpha$=100
^{214}Fr	121	(8^-)	3.38 ms *5*	$\%\alpha$=100
^{214}Ra	0.0	0^+	2.438 s *20*	$\%\varepsilon$=0.059 *4*; $\%\alpha$=99.941 *4*
^{214}Ac	0.0	$5^{(+)}$	8.2 s *2*	$\%\alpha\geq$89 *3*; $\%\varepsilon\leq$11 *3*
^{214}Th	0.0	0^+	87 ms *10*	$\%\alpha$=100
^{214}Th	2181.0	(8^+)	1.21 μs *12*	%IT=100
^{214}Pa	0.0		17 ms *3*	$\%\alpha$=100
^{214}U	0.0	0^+	0.52 ms *+95−21*	$\%\alpha$=100
^{218}Po	0.0	0^+	3.097 min *12*	$\%\alpha$=99.980 *2*
^{218}At	0.0	$(2^-,3^-)$	1.27 s *6*	$\%\alpha$=99.95 *5*
^{218}Rn	0.0	0^+	33.75 ms *15*	$\%\alpha$=100.0
^{218}Fr	0.0	1^-	1.1 ms *+5−4*	$\%\alpha$=100.0
^{218}Fr	86	$(8^-,9^-)$	21.9 ms *5*	$\%\alpha\leq$100.0
^{218}Ra	0.0	0^+	25.91 μs *14*	$\%\alpha$=100.0
^{218}Ac	0.0	(1^-)	1.03 μs *5*	$\%\alpha$=100.0
^{218}Th	0.0	0^+	122 ns *5*	$\%\alpha$=100.0
^{218}Pa	0.0	(8^-)	107 μs *5*	$\%\alpha$=100.0
^{218}Pa	83	(1^-)	0.13 ms *+6−3*	$\%\alpha$=100.0
^{218}U	0.0	0^+	0.51 ms *+17−10*	$\%\alpha$=100.0
^{218}U	2105	(8^+)	0.56 ms *+26−14*	$\%\alpha$=100.0

Adopted Levels

Q(β^-)=5310 *SY*; S(n)=4500 *SY*; S(p)=10910 *CA*; Q(α)=1210 *CA* 2021Wa16,2019Mo01

ΔQ(β^-)=450; ΔS(n)=500 (2021Wa16).

S(2n)=7390 (syst) *500*; Q(β^-n)=1920 (syst) *400* (2021Wa16).

S(p), Q(α) and S(2p)=20440 (theory, 2019Mo01).

2010Al24: ^{214}Hg nuclide was produced by the fragmentation of ^{238}U at an energy of 1 GeV/nucleon on a ^{9}Be target at GSI. Its identification was made on the basis of magnetic rigidity, velocity and time-of-flight, energy loss and its atomic number determined by FRagment Separatort (FRS) and associated detectors at different focal planes. The FRS magnet was tuned for ^{210}Au, ^{216}Pb, ^{219}Pb, ^{227}At and ^{229}At to be along its central trajectory. The probability of at least one of the events corresponding to ^{214}Hg was larger than 95%.

^{214}Hg Levels

E(level)	J$^\pi$	Comments
0	0$^+$	%β^-=100; %β^-n=? Only the β^- and β^--delayed neutron decays are expected. Calculated %β^-n=10 (2019Mo01). $T_{1/2}$: Experimental lower limit: 300 ns based on the minimum time-of-flight through FRS (2006Ca30); Actual halflife is expected to be much longer based on calcuated half-life for β decay: 5.5 s (2019Mo01). Production σ=0.247 nb with 10% statistical and 20% systematic uncertainties (2010Al24).

Adopted Levels

Q(β^-)=6650 *SY*; S(n)=3390 *SY*; S(p)=9020 *SY*; Q(α)=1360 *SY* 2021Wa16
ΔQ(β^-)=200; ΔS(n)=200; ΔS(p)=360; ΔQ(α)=450 (2021Wa16).
S(2n)=8130 (syst) *280*; Q(β^-n)=1600 (syst) *200* (2021Wa16).
S(2p)=18950 (theory, 2019Mo01).
2010Al24, 2016Ca25, 2017Ca12: ^{214}Tl nuclide was produced by the fragmentation of ^{238}U at an energy of 1 GeV/nucleon on a ^{9}Be target at GSI. Its identification was made on the basis of magnetic rigidity, velocity, time-of-flight, energy loss and its atomic number determined by Fragment Separator (FRS) and associated detectors at different focal planes.

^{214}Tl Levels

E(level)	$T_{1/2}$	Comments
0	11.0 s *24*	%β^-=100; %β^-n=34 *12* $T_{1/2}$: from the analysis of implant-β timing correlation with the maximum likelihood algorithm (2016Ca25, 2017Ca12). %β^-n: from the analysis of implant-β and neutron correlation. The efficiency of neutron detector (BELEN) was considered to be constant over the entire energy range at a value of 38% with 5% uncertainty (2016Ca25, 2017Ca12). Production σ=2.50 nb with 10% statistical uncertainty and 20% systematic uncertainty (2010Al24).

Adopted Levels, Gammas

Q(β^-)=1018 *11*; S(n)=5051 *7*; S(p)=9.26×10^3 *3*; Q(α)=2692 *SY* 2021Wa16
ΔQ(α)=200 (2021Wa16).
S(2n)=8776.7 *20*; S(2p)=17780 (syst) *300* (2021Wa16).
^{214}Pb (RaB) was first identified as a descendent of ^{226}Ra decay chain, by Rutherford and Barnes (1904Ru04) in a study of radiations from radium (^{226}Ra), as reviewed in article 2013Fr04.

^{214}Pb Levels

Cross Reference (XREF) Flags

A ^{218}Po α decay (3.097 min)
B ^{9}Be(^{238}U,Xγ)

E(level)†	J$^\pi$#	T$_{1/2}$	XREF	Comments
0.0‡	0$^+$	27.06 min *7*	AB	%β^-=100 T$_{1/2}$: from 2011Vo01; Others: 26.8 min (1931Cu01) and 26.89 min *3* (1991Ma68). The discrepancy between result of 2011Vo01 and 1991Ma68 was attributed to the loss of ^{214}Bi from pumping in the measurement of 1991Ma68, as demonstrated in 2011Vo01. δ<r^2>=+0.610 fm^2 *5* was deduced from the measured isotopic shift 11503 MHz *20* relative to ^{208}Pb (1986An06). The rms charge radius <r^2>$^{1/2}$=5.5577 fm *23* was deduced from δ<r^2>=+0.610 fm^2 *5* (2013An02).
835‡ *1*	(2$^+$)		AB	J$^\pi$: HF for α transition from ^{218}Po is consistent with (2$^+$) assignment.
1179‡ *2*	(4$^+$)		B	
1365‡ *2*	(6$^+$)		B	
1365+x?‡	(8$^+$)	6.2 μs *3*	B	%IT=100 E(level): x < 88 keV (2012Go19). T$_{1/2}$: from γ(t) decay curve (2012Go19).

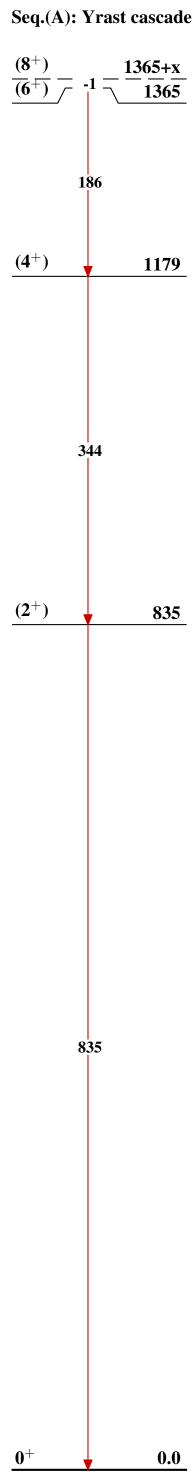
† From Eγ values, assuming 1 keV uncertainty for each γ ray.
‡ Seq.(A): Yrast cascade.
\# The transitions in the yrast cascade are attributed to E2 transitions with the assumption that the isomer is predominantly a fully aligned pair of neutrons with a $(g_{9/2})^2$ configuration (2012Go19).

γ(^{214}Pb)

E$_i$(level)	J$^\pi_i$	E$_\gamma$†	I$_\gamma$	E$_f$	J$^\pi_f$	Mult.	α‡	Comments
835	(2$^+$)	835	100	0.0	0$^+$	[E2]	0.00953	
1179	(4$^+$)	344	100	835	(2$^+$)	[E2]	0.0777 *13*	
1365	(6$^+$)	186	100	1179	(4$^+$)	[E2]	0.552 *14*	
1365+x?	(8$^+$)	x	100	1365	(6$^+$)	[E2]		E$_\gamma$: transition to (6$^+$) level was not seen in γ-ray spectra, x is assumed to be smaller than 88 keV based on the observation that the intensity of K$_\alpha$ x rays was only compatible with that from the internal conversion of the 6$^+$ to 4$^+$ transition (2012Go19).

† 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.

Adopted Levels, Gammas



$^{214}_{82}Pb_{132}$

^{218}**Po α decay (3.097 min) 1958Wa16,1971Gr17**

Parent: ^{218}Po: E=0.0; J$^{\pi}$=0^{+}; $T_{1/2}$=3.097 min *12*; Q(α)=6114.75 *9*; %α decay=99.980 *2*
^{218}Po-$T_{1/2}$: From ^{218}Po Adopted Levels (2019Si39).
^{218}Po-Q(α): From 2021Wa16.
^{218}Po-%α decay: %α=99.980 *2* based on %β^{-}=0.020 *2* from measurements by 1952Hi60 and 1958Wa16.

^{214}Pb Levels

E(level)	J$^{\pi}$	Comments
0.0	0^{+}	
837 *2*	(2^{+})	E(level): deduced from Eα (1958Wa16).

α radiations

Eα	E(level)	Iα †#	HF‡	Comments
5181 *2*	837	0.0011	7.5	Eα: measured by 1958Wa16.
6002.55 *10*	0.0	99.9989	1	Eα: measured by 1971Gr17. Other measurements: 6002 (1958Wa16); 6000 *1* (1963Ba62).

† The relative α intensities were measured as Iα(5181α)/Iα(6002α)=1.1×10^{-5} (1958Wa16).
‡ r_0(^{214}Pb)=1.5379 *2* is deduced from HF(6002.55α)=1.0.
# For absolute intensity per 100 decays, multiply by 0.99980 *2*.

^{9}Be(^{238}U,Xγ) 2012Go19

2012Go19: ^{214}Pb ions were produced in fragmentation reaction with 1 GeV/nucleon ^{238}U beam on ^{9}Be target, and were separated and identified by fragment separator (FRS) at GSI. The γ rays were detected by RISING γ-spectrometer of 105 Ge crystals in correlation with the ^{214}Pb ions. Measured Eγ, level half-life by γ(t). Deduced levels, J, π.

^{214}Pb Levels

E(level)†	J^{π}‡	$T_{1/2}$	Comments
0#	0^+		
835# *1*	(2^+)		
1179# *2*	(4^+)		
1365# *2*	(6^+)		
1365+x?#	(8^+)	6.2 μs *3*	%IT=100 E(level): x<88 keV (2012Go19). $T_{1/2}$: from γ(t) decay curve (2012Go19).

† From Eγ values, assuming 1 keV uncertainty for each γ ray.

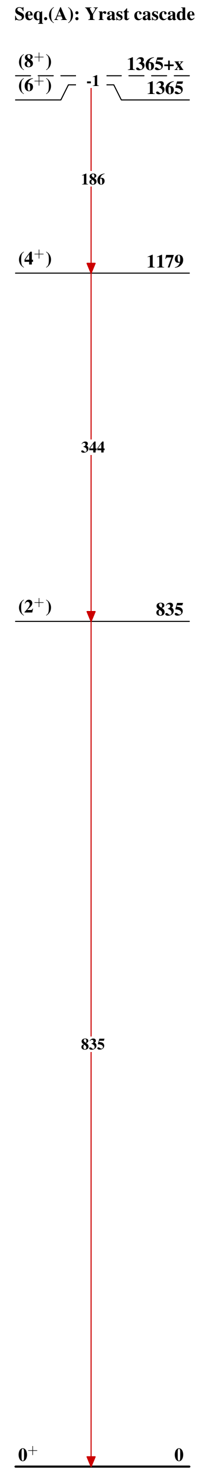
‡ The transitions in the yrast cascade are attributed to E2 transitions with the assumption that the isomer is predominantly a fully aligned pair of neutrons with a $(g_{9/2})^2$ configuration (2012Go19).

Seq.(A): Yrast cascade.

γ(^{214}Pb)

E_γ	E_i(level)	J_i^{π}	E_f	J_f^{π}	Comments
x	1365+x?	(8^+)	1365	(6^+)	E_γ: transition to (6^+) level was not seen in γ-ray spectra, x is assumed to be smaller than 88 keV based on the observation that the intensity of K_α x rays was only compatible with that from the internal conversion of the 6^+ to 4^+ transition (2012Go19).
186	1365	(6^+)	1179	(4^+)	
344	1179	(4^+)	835	(2^+)	
835	835	(2^+)	0	0^+	

^{9}Be(^{238}U,Xγ) 2012Go19



$^{214}_{82}Pb_{132}$

Adopted Levels, Gammas

$Q(\beta^-)$=3269 *11*; S(n)=4040 *12*; S(p)=5286 *13*; $Q(\alpha)$=5621 *3* 2021Wa16
S(2n)=9225 *11*; S(2p)=14230 (syst) *200* (2021WA16).
^{214}Bi (RaC) was first identified as a descendent of ^{226}Ra decay chain, by Rutherford and Barnes (1904Ru04) in a study of radiations from radium (^{226}Ra), as reviewed in article 2013Fr04.

^{214}Bi Levels

Cross Reference (XREF) Flags

A ^{218}At α decay
B ^{214}Pb β^- decay

E(level)†	J^π	$T_{1/2}$‡	XREF	Comments
0.0	1^-	19.71 min *2*	AB	$\%\beta^-$=99.9790 *13*; $\%\alpha$=0.0210 *13* $T_{1/2}$: from 1991Ma68; others: 19.9 min *4* (1956Da06), 19.7 min adopted in 1931Cu01. $\%\alpha$: from 1960Wa14; other: 0.04% adopted in 1931Cu01. J^π: log *ft*=7.872 *11* of β^- to 0^+ and log *ft*=9.05 *6* to 2^+ of ^{214}Po and β^- from 0^+ of ^{214}Pb with log *ft*=6.26 *4* consistent with J=1; M1+E2 γ from 2^-. Most possible configuration=((π $h_{9/2}$)(ν $g_{9/2}$)).
53.2260 *15*	2^-	≤15 ps	AB	J^π: E1 γ from 1^+; no observed β feeding from 0^+ excluding 0^- assignments. $T_{1/2}$: from $\gamma\gamma$(t) fast timing (2011ReZZ). Others: ≤ 0.1 ns (1991Be06), 0.52 ns *5* (1984Pe13).
62.68 *5*	$(2^-,3^-)$		AB	J^π: 196.20γ from (2^-) state; favored 6693α from ^{218}At g.s. which is suggested to be (2,3) from hfs (2019Ba22) and α decay (2019Cu02) measurements.
101 *5*	$(3^-,4^-)$		A	E(level): deduced from Eα=6654 *4* to this level and Eα=6693 *3* to 62.68-keV level. J^π: unfavored 6654α from ^{218}At g.s., which is suggested to be (2,3) from hfs (2019Ba22) and α decay (2019Cu02) measurements.
258.869 *24*	$(2)^-$		B	J^π: M1 γ to 1^- g.s.; γ to $(2)^-$.
295.2236 *19*	1^-	≤0.05 ns	B	J^π: M1+E2 γ to 1^-; M1(+E2) γ to 2^-; log *ft*=5.250 *24* from 0^+. $T_{1/2}$: from $\gamma\gamma$(t) gated on 242γ (1991Be06). Other: ≤0.10 ns from $\beta\gamma$(t) (1984Pe13).
351.9323 *21*	$0^-,1^-$	≤0.10 ns	B	J^π: M1+E2 γ to 1^-; log *ft*=5.07 *3* from 0^+. $T_{1/2}$: from $\beta\gamma$(t) (1984Pe13).
377.03 *4*	(2^-)		B	J^π: γ from 1^+; γ to $(2)^-$; γ to (3^-); no β feeding from 0^+;
533.672 *14*	(1^-)		B	J^π: log *ft*=6.22 *4* from 0^+; M1(+E2) γs to $(2)^-$; γ to 1^-.
539 *30*		>93 s		E(level),$T_{1/2}$: measured in Storage Ring at GSI using FRS and Schottky Mass Spectrometry with single-ion tracing method (2008ChZI).
797.30? *8*			B	
838.994 *22*	1^+		B	J^π: log *ft*=4.43 *9* from 0^+;
888.03? *10*			B	

† From a least square fit to Eγ's, except where noted.
‡ Half-lives of excited states were measured in ^{214}Pb β^- decay.

Adopted Levels, Gammas (continued)

$\gamma(^{214}Bi)$

E_i(level)	J^{π}_i	E_{γ}†	I_{γ}†	E_f	J^{π}_f	Mult.†	δ†	α‡	Comments
53.2260	2^-	53.2256 *16*	100	0.0	1^-	M1+E2	0.038 *+26−18*	12.20 *35*	B(M1)(W.u.) > 0.73 Mult.,δ: from L1:L2:L3=650:124:10.1 (1954Ml77) and L1/L2=10 *3*, L1/L3=85 *15* (1957Ni11) (^{214}Pb β^- decay) and α(tot)=8.6 *4* (2019Cu02) (^{218}At α decay).
62.68	$(2^-,3^-)$	(9.5)	100	53.2260	2^-				Transition not observed, but expected to be the dominant decay path (1991Be06,2019Cu02).
258.869	$(2)^-$	196.20 *5*	12.8 *17*	62.68	$(2^-,3^-)$				
		205.68 *9*	2.1 *3*	53.2260	2^-				
		258.86 *4*	100.0 *8*	0.0	1^-	M1		0.696 *10*	
295.2236	1^-	241.995 *4*	39.32 *12*	53.2260	2^-	M1+E2	0.50 *+8−7*	0.718 *33*	B(E2)(W.u.) > 5.0; B(M1)(W.u.) > 0.0043
		295.224 *2*	100.0 *4*	0.0	1^-	M1+E2	0.39 *7*	0.438 *16*	B(E2)(W.u.) > 2.9; B(M1)(W.u.) > 0.0067
351.9323	$0^-,1^-$	351.9320 *21*	100	0.0	1^-	M1+E2	0.49 *10*	0.257 *15*	B(E2)(W.u.) > 1.4; B(M1)(W.u.) > 0.0030
377.03	(2^-)	314.32 *7*	100 *12*	62.68	$(2^-,3^-)$				
		323.83 *4*	38 *5*	53.2260	2^-				
533.672	(1^-)	274.80 *5*	99.7 *24*	258.869	$(2)^-$	M1		0.590 *8*	
		480.43 *2*	100.0 *13*	53.2260	2^-	M1		0.1303 *18*	
		533.66 *2*	54 *3*	0.0	1^-				
797.30?		538.43# *8*	100	258.869	$(2)^-$				
838.994	1^+	305.26 *3*	3.00 *21*	533.672	(1^-)				
		462.01 *7*	20.0 *6*	377.03	(2^-)				
		487.11 *7*	40.9 *5*	351.9323	$0^-,1^-$	(E1)		0.01046 *15*	
		543.82 *7*	4.7 *9*	295.2236	1^-				
		580.13 *3*	34.8 *5*	258.869	$(2)^-$	(E1)		0.00732 *10*	
		785.96 *9*	100 *7*	53.2260	2^-	E1		0.00406 *6*	
		839.06 *9*	54.8 *10*	0.0	1^-	(E1)		0.00359 *5*	
888.03?		511.00# *9*	100	377.03	(2^-)				

† From ^{214}Pb β^- decay, 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.

$^{214}_{83}Bi_{131}$-2

^{218}At α decay 2019Cu02

Parent: ^{218}At: E=0.0; J^π=(2^-,3^-); $T_{1/2}$=1.27 s *6*; Q(α)=6874 *3*; %α decay=99.95 *5*
^{218}At-J^π,$T_{1/2}$: From ^{218}At Adopted Levels (2019Si39).
^{218}At-Q(α): From 2021Wa16.
2019Cu02: ^{218}At produced at CERN-ISOLDE facility and separated with laser ionization and magnetic separator. Measured α, α-γ and half-life after ion implantation at the center of decay station with ^{218}At ions at 30-keV energy.

^{214}Bi Levels

E(level)	J^π†	Comments
0.0	1^-	
53.3 *3*	2^-	E(level): from Eγ.
62.68 *5*	(2^-,3^-)	E(level): from the Adopted Levels.
101 *5*	(3^-,4^-)	E(level): deduced from Eα=6654 *4* to this level and Eα=6693 *3* to 62.68-keV level. J^π: unfavored 6654α from ^{218}At g.s., which is suggested to be (3^-) from hfs (2019Ba22) and α decay (2019Cu02) measurements.

† From the Adopted Levels.

α radiations

Eα‡	E(level)	Iα#@	HF†	Comments
6654 *5*	101	6.9 *1*	20.2 *12*	Eα: weighted average of 6653 *5* (1963Wa29) and 6655 *7* (2019Cu02). Iα: other: 6.4 (1963Wa29).
6693 *3*	62.68	92.7 *5*	2.09 *11*	Eα: weighted average of 6693 *3* (1963Wa29) and 6694 *5* (2019Cu02). Iα: deduced from Iα(6760α)+Iα(6693α)=93.1 *1* with Iα(6760α) ≤ 0.9 (2019Cu02). Other: 90 (1963Wa29).
≈6760	0.0	≤0.9	≥348	other: Eα=6756 *5*; Iα=3.6 (1963Wa29). the observation of 6756α was a private communication. It was not observed in 1960Wa14 and 2019Cu02.

† r_0(^{214}Bi)=1.549 *6*, unweighted average of r_0(^{212}Pb)=1.54117 *28*, r_0(^{214}Pb)=1.5379 *2*, r_0(^{214}Po)=1.5606 *7*, r_0(^{216}Po)=1.5555 *1* (2020Si16).
‡ Due to a change in calibration energy, the Eα values measured in 1963Wa29 were recommended to be reduced by 1 keV by 1991Ry01.
# From 2019Cu02.
@ For absolute intensity per 100 decays, multiply by 0.9995 *5*.

γ(^{214}Bi)

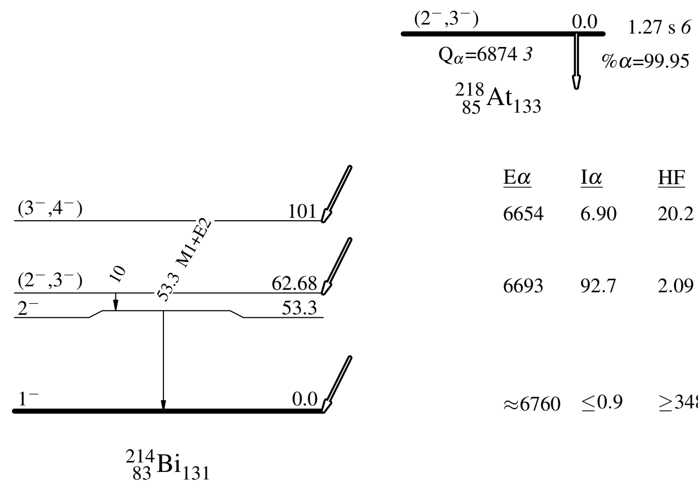
E$_\gamma$	E$_i$(level)	J^π_i	E$_f$	J^π_f	Mult.	δ	Comments
(10)	62.68	(2^-,3^-)	53.3	2^-			γ not observed, but expected to be the dominant decay path because the coincident relation between 6693α and the 53.3γ (2019Cu02).
53.3 *3*	53.3	2^-	0.0	1^-	M1+E2	0.038 +*26*−*18*	E$_\gamma$: from 2019Cu02. Mult.,δ: from the Adopted Gammas. α(tot)=8.6 *4* (2019Cu02).

^{218}At α decay 2019Cu02

Legend

Decay Scheme

- - - - - - ► γ Decay (Uncertain)



$E\alpha$	$I\alpha$	HF
6654	6.90	20.2
6693	92.7	2.09
≈6760	≤0.9	≥348

^{214}Pb β^- decay 1991Be06

Parent: ^{214}Pb: E=0.0; $J^\pi=0^+$; $T_{1/2}$=27.06 min *7*; Q(β^-)=1018 *11*; %β^- decay=100.0
^{214}Pb-$T_{1/2}$: From Adopted Levels of ^{214}Pb.
^{214}Pb-Q(β^-): From 2021Wa16.
2004Mo07: ^{226}Ra(α) radioactivity in equilibrium; measured absolute ^{226}Ra α strength; measured absolute Iγ; Ge(Li) and HPGe detectors for γ measurements; ZnS scintillator and α-spectrometer for α measurements.
2002De03: ^{226}Ra(α) radioactivity in equilibrium; measured relative Iγ; one planar p-type HPGe and one coaxial n-type HPGe.
1991Be06: ^{226}Ra radioactivity in equilibrium; Ice measurement using an 1000 μm thick surface-barrier Si detector; $\gamma\gamma(\theta)$ measurement using four 28% efficiency HPGe detectors; $\beta\gamma\gamma$(t) measurement using a BaF_2, a plastic and a HPGe detector; Eγ measurement using a LEPS detector; $\gamma\gamma$ measurement using two HPGe and one LEPS detectors. Determined levels; J^π; $T_{1/2}$; γ-mult. and δ.
Other Eγ and absolute Iγ: 1998Mo14, 1991Li11, 1983Sc13, 1983Ol01.
Other Eγ and relative Iγ: 2002MoZP, 2000Sa32, 1983Bu14, 1983Ol01, 1983Sc13, 1982Fa10, 1981We18, 1979Hn02, 1977Zo01, 1975Ha31, 1972ClZS, 1970Mo28, 1969Li10, 1969Gr33, 1969Wa27, 1967Ma51, 1964Ew04, 1964Hy02, 1954Ml80, 1952Mu45.
$\gamma\gamma$ measurements: 1990Mo08, 1982Ak03.
Ice measurements: 1957Ni11, 1954Ml77, 1954Ml80, 1953Ka40, 1952Be78, 1951Ka32.
Level $T_{1/2}$ measurements: 2011ReZZ, 1984Pe13.
For near-zero energy electrons (e_0) measurements: 2006Va02.
X rays(Bi):
I(Kα1 x ray)=10.13% *8*; I(Kα2 x ray)=6.02% *5* (2004Mo07). Others: I(Kα x ray)=16.3% *4* (1983Sc13); 17.3% *20* (1969Li10).
I(Kβ x ray)=4.23% *10* (2004Mo07). Others: I(Kβ x ray)=4.94% *12* (1983Sc13); 4.3% *8* (1969Li10).

^{214}Bi Levels

E(level)†	J^π‡	$T_{1/2}$	Comments
0.0	1^-	19.71 min *2*	$T_{1/2}$: from the Adopted Levels.
53.2260 *15*	2^-	≤15 ps	$T_{1/2}$: $\gamma\gamma$(t) fast timing with $LaBr_3$(Ce) (2011ReZZ); Other: <0.1 ns from $\beta\gamma\gamma$(t) (1991Be06); 0.52 ns *15* from $\beta\gamma\gamma$(t) (1984Pe13).
62.68 *5*	(2^-,3^-)		
258.869 *24*	$(2)^-$		
295.2236 *19*	1^-	≤0.05 ns	$T_{1/2}$: from $\beta\gamma\gamma$(t) (1991Be06). Other:≤0.10 ns from $\beta\gamma$(t) (1984Pe13).
351.9323 *21*	0^-,1^-	≤0.10 ns	$T_{1/2}$: from $\beta\gamma$(t) (1984Pe13).
377.03 *4*	(2^-)		
533.672 *14*	(1^-)		
797.30? *8*			
838.994 *22*	1^+		
888.03? *10*			

† From a least square fit to Eγ's.
‡ From Adopted Levels.

β^- radiations

E(decay)	E(level)	Iβ^-†‡	Log *ft*	Comments
(130 *11*)	888.03?	0.015 *4*	6.26 *17*	
(179 *11*)	838.994	2.75 *8*	4.43 *9*	
(484 *11*)	533.672	1.063 *18*	6.23 *4*	
(666 *11*)	351.9323	44.5 *7*	5.07 *3*	E=670 *20*, %Iβ=25 was measured by 1952Be78 and E=590 *10*, %Iβ=56 by 1953Ka40.
(723 *11*)	295.2236	39.0 *5*	5.250 *24*	E=730, %Iβ=75 was measured by 1952Be78 and E=650 *10*, %Iβ=44 by 1953Ka40.
(759 *11*)	258.869	0.075 *20*	8.04 *12*	
(1018 *11*)	0.0	12.7 *9*	6.26 *4*	E(decay): 1030 *60* measured by 1956Da28.

Continued on next page (footnotes at end of table)

^{214}Pb β^- decay 1991Be06 (continued)

β^- radiations (continued)

E(decay)	E(level)	Comments
		Iβ^-: from intensity balance. %Iβ^-=6.3 *20* from 1956Da28. %Iβ^-<10 was measured by 1957Ni11.

† From intensity balance, experimental values are given in comments.
‡ Absolute intensity per 100 decays.

γ(^{214}Bi)

Iγ normalization: Deduced from Iγ(609)=45.45 19 (weighted average of 45.0 7 (1983Ol01), 44.6 5 (1983Sc13), 46.1 5 (1991Li11), 44.8 6 (1998Mo14), 45.57 18 (2004Mo07)) per 100 ^{214}Bi β^- decays with ^{226}Ra or ^{222}Rn in equilibrium.

E_γ	I_γ †‡	E_i(level)	J^π_i	E_f	J^π_f	Mult.	δ	α#	Comments
(9.5)		62.68	(2^-,3^-)	53.2260	2^-				E_γ: deduced from level energy difference; transition not observed, but expected to be the dominant decay path (1991Be06). Intensity balance at the 62.68-keV level yields I(γ+ce)(62.7γ)+I(γ+ce)(9.5γ)=0.314 25. The transition Eγ=62.7 was not observed; 1991Be06 set a limit for its intensity: Iγ(62.7γ)/Iγ(53.23γ)<0.003.
53.2256 16	2.362 22	53.2260	2^-	0.0	1^-	M1+E2	0.038 +26−18	12.20 35	E_γ: weighted average of 53.2260 14 (1952Mu45), 53.2230 21 (1991Be06) and 53.232 4 (2002MoZP). I_γ: weighted average of 2.49 12 (1983Sc13), 2.329 23 (2002De03) and 2.383 20 (2002MoZP). Mult.,δ: from the Adopted Gammas with L1:L2:L3=650:124:10.1 (1954Ml77); L1/L2=10 3, L1/L3=85 15 (1957Ni11).
^{x}107.22 9	0.015 3								E_γ,I_γ: from 1990Mo08.
^{x}137.5 3	0.12 3								E_γ: from 1969Li10. I_γ: weighted average of 0.10 4 (2000Sa32) and 0.14 5 (1969Li10).
^{x}141.3 6	0.06 3								E_γ: from 1969Li10. I_γ: from 2000Sa32.
^{x}170.07 6	0.032 6								E_γ,I_γ: from 1990Mo08.
196.20 5	0.15 2	258.869	(2)$^-$	62.68	(2^-,3^-)				
205.68 9	0.025 3	258.869	(2)$^-$	53.2260	2^-				E_γ,I_γ: from 1990Mo08. E_γ,I_γ: from 1990Mo08.
^{x}216.47 7	0.022 5								E_γ,I_γ: from 1990Mo08.
241.995 4	15.98 5	295.2236	1^-	53.2260	2^-	M1+E2	0.50 +8−7	0.718 33	E_γ: weighted average of 241.924 30 (1952Mu45), 241.981 8 (1977Zo01), 241.9983 30 (1991Be06) and 241.995 4 (2002MoZP). I_γ: weighted average of 16.0 3 (1983Sc13), 16.23 10 (1990Mo08), 16.1 3 (1991Li11), 15.7 3 (1998Mo14), 16.1 1 (2000Sa32), 15.90 5 (2002De03) and 15.98 6 (2002MoZP). Mult.,δ: K:L1:L2=425:78:17.1 (1954Ml77); K/L=5.30 15 (1957Ni11); α(K)exp=0.73 16, α(L)exp=0.104 26 (1991Be06); (242γ)(53γ)(θ): A_2=+0.194 24, A_4=−0.03 3 (1991Be06).
258.86 4	1.169 9	258.869	(2)$^-$	0.0	1^-	M1		0.696 10	E_γ: weighted average of 258.82 10 (1969Li10) and 258.87 4 (1990Mo08). I_γ: weighted average of 1.23 6 (1990Mo08), 1.14 3

$^{214}_{83}$Bi$_{131}$-7

γ(^{214}Bi) (continued)

E_γ	I_γ †‡	E_i(level)	J^π_i	E_f	J^π_f	Mult.	δ	α #	Comments
									(1991Li11), 1.17 *3* (1998Mo14), 1.15 *4* (2000Sa32) and 1.171 *9* (2002De03). Mult.: K/L1=5.7 (1954Ml77), assuming 10% uncertainty by evaluator; α(K)exp≈0.58; deduced δ=0.0 *25* (1954Ml77,1991Be06).
274.80 *5*	0.739 *18*	533.672	(1$^-$)	258.869	(2)$^-$	M1		0.590 *8*	E_γ: weighted average of 274.8 *1* (1969Li10), 274.78 *24* (1982Ak03) and 274.80 *5* (1990Mo08). I_γ: weighted average of 0.84 *5* (1990Mo08), 0.732 *11* (1998Mo14) and 0.83 *8* (2000Sa32). Mult.,δ: K/L1=6.4 (1954Ml77) assuming 10% uncertainty by evaluator; α(K)exp≈0.52 deduced δ=0.00 *2* (1954Ml77,1991Be06), (275γ)(259γ)(θ): A_2=+0.13 *6*, A_4=−0.04 *9* (1991Be06).
295.224 *2*	40.64 *18*	295.2236	1$^-$	0.0	1$^-$	M1+E2	0.39 *7*	0.438 *16*	E_γ: weighted average of 295.217 *39* (1952Mu45), 295.213 *8* (1977Zo01), 295.226 *2* (1991Be06) and 295.219 *5* (2002MoZP). I_γ: weighted average of 41.3 *9* (1983Ol01), 40.8 *8* (1983Sc13), 41.85 *26* (1990Mo08), 41.9 *6* (1991Li11), 40.0 *7* (1998Mo14), 40.8 *12* (2000Sa32), 40.36 *12* (2002De03) and 40.61 *13* (2002MoZP). Mult.,δ: K/L1=6.5, K/L2=39, K/M1=28 (1954Ml77), 5.55 *15* (1957Ni11); α(K)exp=0.418 *38*, α(L)exp=0.082 *10* (1991Be06).
305.26 *3*	0.070 *5*	838.994	1$^+$	533.672	(1$^-$)				E_γ: from 1990Mo08. I_γ: weighted average of 0.075 *16* (1982Ak03), 0.068 *5* (1990Mo08) and 0.080 *15* (2000Sa32).
314.32 *7*	0.164 *20*	377.03	(2$^-$)	62.68	(2$^-$,3$^-$)				E_γ: From 1990Mo08. I_γ: weighted average of 0.17 *2* (1990Mo08) and 0.158 *20* (2000Sa32).
323.83 *4*	0.063 *8*	377.03	(2$^-$)	53.2260	2$^-$				E_γ: From 1990Mo08. I_γ: weighted average of 0.060 *7* (1990Mo08) and 0.084 *20* (2000Sa32).
351.9320 *21*	78.6 *4*	351.9323	0$^-$,1$^-$	0.0	1$^-$	M1+E2	0.49 *10*	0.257 *15*	E_γ: weighted average of 351.992 *62* (1952Mu45), 351.921 *8* (1977Zo01), 351.9319 *19* (1991Be06) and 351.939 *6* (2002MoZP). I_γ: weighted average of 79.6 *17* (1983Ol01), 78.7 *13* (1983Sc13), 81.48 *48* (1990Mo08), 81.6 *12* (1991Li11), 77.5 *14* (1998Mo14), 78.5 *24* (2000Sa32), 78.16 *23* (2002De03) and 78.34 *23* (2002MoZP). Mult.,δ: K/L1=5.9, K/L2=33, K/M1=26 (1954Ml77), K/L=5.65 *15* (1957Ni11); α(K)exp=0.280 *23*, α(L)exp=0.049 *5* (1991Be06). 56.84- and 298.76-keV γ decays not observed, tentatively placed by 1969Li10. A ce line observed by 1954Ml77 at 40.30 keV was interpreted by 1969Li10 as the L1 of 56.84γ.

$^{214}_{83}$Bi$_{131}$-8

$\gamma(^{214}$Bi) (continued)

E_γ	I_γ [†‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α [#]	Comments
462.01 *7*	0.467 *14*	838.994	1$^+$	377.03	(2$^-$)			E_γ: weighted average of 462.1 *2* (1969Li10) and 462.00 *7* (1990Mo08). I_γ: weighted average of 0.40 *4* (1990Mo08), 0.479 *20* (1991Li11) and 0.470 *14* (2000Sa32).
^{x}470.6 *8*	0.024 *6*							E_γ: from 1969Li10. I_γ: weighted average of 0.024 *7* (2000Sa32) and 0.023 *9* (1969Li10).
480.43 *2*	0.741 *10*	533.672	(1$^-$)	53.2260	2$^-$	M1	0.1303 *18*	E_γ: weighted average of 480.5 *2* (1969Li10), 480.54 *16* (1982Ak03) and 480.43 *2* (1990Mo08). I_γ: weighted average of 0.71 *5* (1990Mo08), 0.694 *25* (1991Li11), 0.75 *4* (1998Mo14), 0.74 *3* (2000Sa32) and 0.749 *10* (2002De03). Mult.,δ: from (480γ)(53γ)(θ): A_2=+0.16 *6*, A_4=+0.03 *9* deduced δ=0.00 *+19−17* (1991Be06).
487.11 *7*	0.952 *12*	838.994	1$^+$	351.9323	0$^-$,1$^-$	(E1)	0.01046 *15*	E_γ: weighted average of 487.25 *20* (1969Li10) and 487.90 *7* (1990Mo08). I_γ: weighted average of 0.83 *7* (1990Mo08), 0.92 *4* (1991Li11), 0.96 *4* (1998Mo14), 0.90 *5* (2000Sa32) and 0.961 *12* (2002De03). Mult.: α(K)exp<0.024 (1954Ml77,1991Be06); (487γ)(352γ)(θ): A_2=−0.01 *3*, A_4=−0.01 *4* (1991Be06).
511.00 [@] *9*	0.033 *9*	888.03?		377.03	(2$^-$)			The 511.0γ was observed to be in direct coincidence with the 324- and 314-keV γ transitions, and placed by 1990Mo08 between a level at 888 keV and the 377-keV level. The authors of 1990Mo08 consider this placement, and therefore existence of the proposed level at 888 keV, to be questionable.
533.66 *2*	0.397 *20*	533.672	(1$^-$)	0.0	1$^-$			E_γ: weighted average of 533.8 *2* (1969Li10), 533.71 *16* (1982Ak03) and 533.66 *2* (1990Mo08). I_γ: weighted average of 0.39 *3* (1990Mo08), 0.403 *20* (1991Li11) and 0.39 *3* (2000Sa32). 181.5- and 238.4-keV γ decays tentatively assigned by 1969Li10. Not observed by others. A ce line observed by 1954Ml77 at 90.96 was interpreted by 1969Li10 as being the K of a 181.5γ.
538.43 [@] *8*	0.042 *6*	797.30?		258.869	(2)$^-$			E_γ: weighted average of 538.7 *4* (1969Li10), 538.47 *24* (1982Ak03) and 538.41 *8* (1990Mo08). I_γ: weighted average of 0.038 *9* (1982Ak03), 0.044 *6* (1990Mo08) and 0.037 *20* (2000Sa32).
543.82 *7*	0.11 *2*	838.994	1$^+$	295.2236	1$^-$			E_γ: weighted average of 544.0 *3* (1969Li10) and 543.81 *7* (1990Mo08). I_γ: weighted average of 0.15 *2* (1990Mo08) and 0.10 *1* (2000Sa32).
580.13 *3*	0.811 *12*	838.994	1$^+$	258.869	(2)$^-$	(E1)	0.00732 *10*	E_γ: weighted average of 580.3 *2* (1969Li10), 580.11 *16* (1982Ak03) and 580.13 *3* (1990Mo08). I_γ: weighted average of 0.79 *11* (1982Ak03), 0.76 *6* (1990Mo08), 0.76 *3* (1991Li11), 0.84 *4* (1998Mo14), 0.74 *4* (2000Sa32) and 0.823 *11* (2002De03). Mult.: α(K)exp<0.024 (1954Ml77,1991Be06); (580γ)(259γ)(θ): A_2=+0.16 *4*, A_4=−0.06 *6* (1991Be06).
^{x}766.0 *2*	0.12 *2*							E_γ: weighted average of 766.0 *4* (1969Li10), 766.1 *4* (1982Ak03) and 765.96 *21* (1990Mo08). I_γ: weighted average of 0.27 *9* (1982Ak03), 0.17 *3* (1990Mo08) and 0.11 *1* (2000Sa32).
785.96 *9*	2.33 *17*	838.994	1$^+$	53.2260	2$^-$	E1	0.00406 *6*	E_γ,I_γ: from 1990Mo08.

γ(^{214}Bi) (continued)

E_γ	I_γ[†‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[#]	Comments
839.06 *9*	1.278 *23*	838.994	1^+	0.0	1^-	(E1)	0.00359 *5*	Mult.: α(K)exp<0.009 (1954Ml77,1991Be06), (786γ)(53γ)(θ): A_2=+0.21 *8* (1991Be06). E_γ: weighted average of 839.2 *2* (1969Li10), 839.03 *16* (1982Ak03) and 839.04 *9* (1990Mo08). I_γ: weighted average of 1.29 *10* (1990Mo08), 1.27 *3* (1991Li11) and 1.29 *4* (2000Sa32). Mult.: from its ce lines not observed.

† Relative intensities are normalized to Iγ(609)=100 with ^{226}Ra or ^{222}Rn in equilibrium.

‡ For absolute intensity per 100 decays, multiply by 0.4545 *19*.

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.

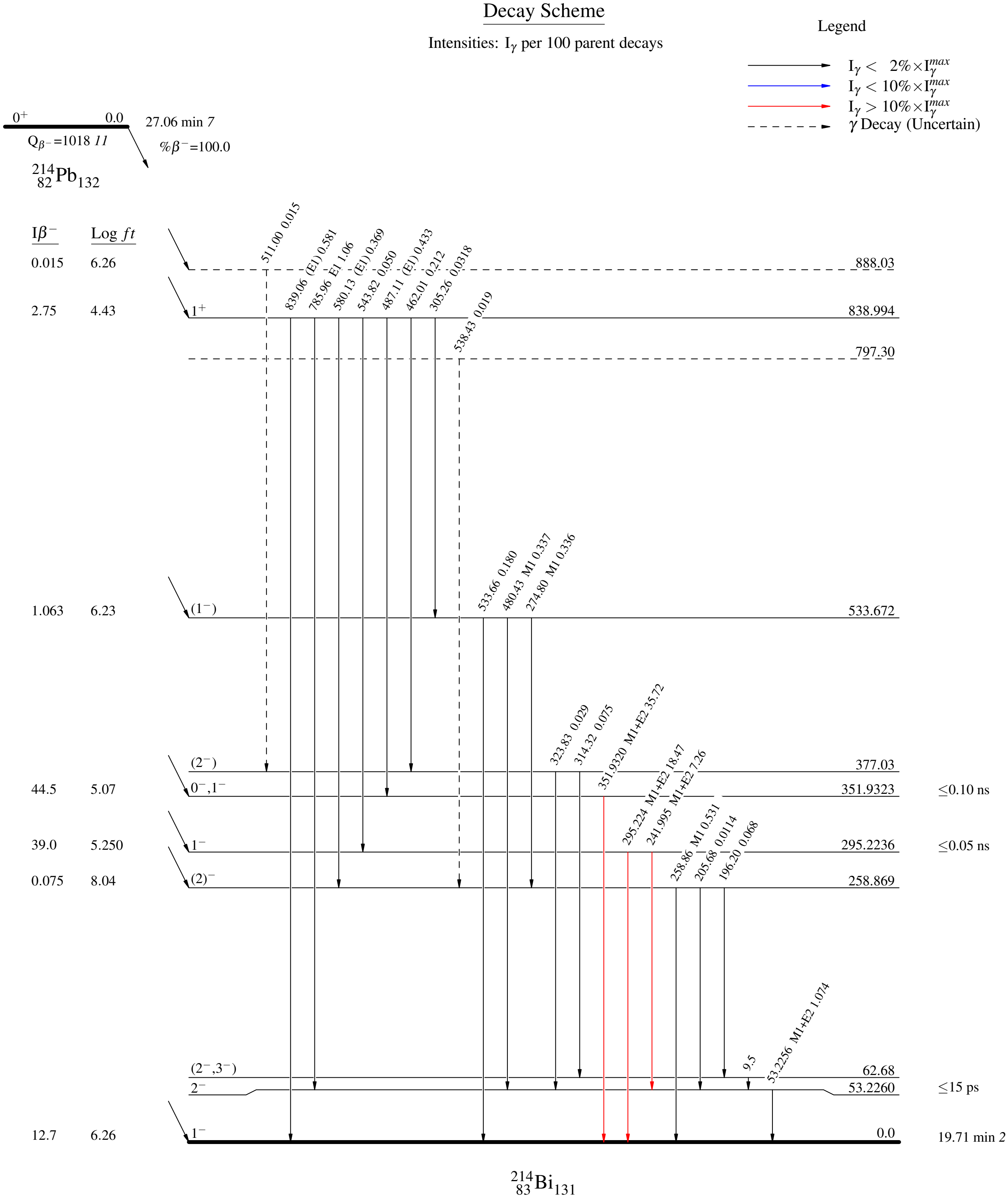
^{x} γ ray not placed in level scheme.

$^{214}_{83}$Bi$_{131}$-10

^{214}Pb β^- decay 1991Be06

Decay Scheme

Intensities: I_γ per 100 parent decays



Adopted Levels, Gammas

Q(β^-)=−1091 *4*; S(n)=5888 *3*; S(p)=6527 *5*; Q(α)=7833.54 *6* 2021Wa16
S(2n)=10243.2 *9*; S(2p)=11499.0 *21* (2021Wa16).
^{214}Po (RaC′) was first identified as a descendent of ^{226}Ra decay chain, by K. Fanjans (Phys. Z. 13 (1912) 699) in a study of α radiations from ^{214}Bi, as reviewed in article 2013Fr04.

^{214}Po Levels

Cross Reference (XREF) Flags

A ^{218}Rn α decay
B ^{214}Bi β^- decay
C ^{208}Pb(^{16}O,Xγ)

E(level)†	J$^\pi$	T$_{1/2}$	XREF	Comments
0.0‡	0$^+$	163.46 μs *4*	ABC	%α=100 T$_{1/2}$: from 2015Al10 and 2016Al28 with 580-day continuous measurements; others: 150 μs *20* (1939Du01), 140 μs *15* (1939Ro03), 145 μs *5* (1941Ro01), 155 μs *5* (1943Ja01), 163.7 μs *2* (1950Vo02), 158 μs *2* (1953Ba60), 164.3 μs *18* (1961Do02), 165 μs *3* (1971Er02), 160 μs *12* (1993Zh30), 164.2 μs *6* (2012Su11), 163.6 μs *3* (2013Be13), 163.5 μs *8* (2013Al11) and 163.8 μs *30* (2013Be20).
609.317‡ *5*	2$^+$		ABC	%IT=100; %α=0.00026 J$^\pi$: E2 to 0$^+$. %α: from 1965Le08 with I(8287α)/I(7688α)=1.2x10^{-6} and I(γ+ce).
1015.040‡ *20*	(4$^+$)		BC	J$^\pi$: E2 to 2$^+$; yrast state from ^{208}Pb(^{16}O,Xγ).
1274.764 *9*	3$^-$		AB	%IT=100; %α=0.0012 J$^\pi$: E1 to 2$^+$; no γ to 0$^+$; α to 0$^+$ in ^{210}Pb; α from 0$^+$ in ^{218}Rn. %α: from 1965Le08 with I(8950α)/I(7688α)=2x10^{-7} and I(γ+ce).
1339.4‡ *5*	(6$^+$)		C	J$^\pi$: (E2) to (4$^+$); yrast state from ^{208}Pb(^{16}O,Xγ).
1377.680 *7*	2$^+$		B	J$^\pi$: E2 to 0$^+$; M1+E2 to 2$^+$.
1415.498 *8*	0$^+$	99 ps *3*	B	%IT=99.88; %α=0.12 T$_{1/2}$: from ^{214}Bi β- decay. J$^\pi$: E0 to 0$^+$; E2 to 2$^+$. %α: from 1965Le08 with I(9080α)/I(7688α)=2.2x10^{-5} and I(γ+ce).
1543.369 *9*	2$^+$		B	%IT=100; %α=0.0017 J$^\pi$: M1+E2 to 2$^+$; γ to 0$^+$ and 3$^-$. %α: from 1965Le08 with I(8430α)/I(7688α)=6x10^{-7} and I(γ+ce).
1583.5‡ *7*	(8$^+$)	13 ns *1*	C	J$^\pi$: E2 to (6$^+$); yrast state from ^{208}Pb(^{16}O,Xγ). T$_{1/2}$: from ^{208}Pb(^{16}O,Xγ).
1589.6 *7*			C	
1661.283 *14*	2$^+$		B	%IT=100; %α=0.0037 J$^\pi$: E2 to 0$^+$; γ to 2$^+$. %α: from 1965Le08 with I(9320α)/I(7688α)=5x10^{-7} and I(γ+ce).
1685.5? *5*			C	
1712.92 *8*	(3$^+$)		B	J$^\pi$: γ to 2$^+$; γ to 4$^+$, no γ to 0$^+$ and β$^-$ from 1$^-$ ^{214}Bi with log *ft*=9.57 *5*.
1729.612 *7*	2$^+$		B	%IT=100; %α=0.00011 J$^\pi$: E2 to 0$^+$; M1+E2 to 2$^+$. %α: from 1965Le08 with I(9378α)/I(7688α)=2x10^{-7} and I(γ+ce).
1737.4 *7*			C	
1742.99 *3*	0$^{(+)}$		B	J$^\pi$: (E2) to 2$^+$; γ from 1$^+$; no γ to 0$^+$; γ from 1$^-$.
1764.520 *8*	1$^+$		B	J$^\pi$: M1 to 0$^+$.
1823.1 *9*	(8$^+$)		C	J$^\pi$: M1+E2 to 8$^+$; non-yrast state from ^{208}Pb(^{16}O,Xγ).
1842.9 *7*			C	
1847.446 *9*	2$^+$		B	%IT=100; %α=0.0012

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{214}Po Levels (continued)

E(level)†	J$^\pi$	XREF	Comments
			J$^\pi$: M1 to 2$^+$; α to ^{210}Pb 0$^+$ and β^- from 1$^-$ ^{214}Bi with log *ft*=6.859 *13*. %α: from 1965Le08 with I(9500α)/I(7688α)=1x10^{-6} and I(γ+ce).
1890.306 *13*	(2)$^+$	B	J$^\pi$: M1 to 2$^+$; γ to 0$^+$ and γ to 3$^-$.
1982.3 *7*	(7)	C	J$^\pi$: D to 6$^+$; no γ to 4$^+$.
1994.639 *13*	1$^-$	B	J$^\pi$: E2 to 3$^-$; D to 2$^+$, γ to 0$^+$.
2010.830 *13*	(2$^+$)	B	J$^\pi$: (M1+E2) to 2$^+$; γ to 0$^+$, γ to (3)$^+$ and β^- from 1$^-$ ^{214}Bi with log *ft*=7.422 *15*.
2017.314 *9*	0$^+$	B	%IT=100; %α=0.0016 J$^\pi$: E0 to 0$^+$. %α: from 1965Le08 with I(9670α)/I(7688α)=4x10^{-7} and I(γ+ce).
2088.44 *5*	(1,2$^+$)	B	J$^\pi$: γ to 2$^+$ and β^- from 1$^-$ ^{214}Bi with log *ft*=8.57 *5*.
2118.535 *10*	1$^+$	B	J$^\pi$: M1 to 0$^+$.
2147.86 *5*	(1$^-$,2$^+$)	B	%IT=99.98; %α=0.023 J$^\pi$: D(+Q) to 2$^+$; γ to 0$^+$; γ to 3$^-$. %α: from 1965Le08 with I(9802α)/I(7688α)=1.2x10^{-6} and I(γ+ce).
2157.9 *9*	(9)	C	J$^\pi$: D to (8$^+$).
2179.3‡ *9*	(10$^+$)	C	J$^\pi$: (E2) to (8$^+$); yrast state from ^{218}Pb(^{16}O,Xγ).
2192.536 *16*	(2)$^+$	B	J$^\pi$: M1 to 2$^+$; γ to 0$^+$ and and β^- from 1$^-$ ^{214}Bi with log *ft*=7.397 *17*.
2204.102 *23*	1$^+$	B	J$^\pi$: M1 to 0$^+$.
2208.69 *4*	(2$^-$,3)	B	J$^\pi$: D+Q to 2$^+$; γ to 3$^-$; no γ to 0$^+$ and β^- from 1$^-$ ^{214}Bi with log *ft*=7.97 *7*.
2266.40 *4*	2$^+$	B	%IT=99.97; %α=0.034 J$^\pi$: γ to 0$^+$; E2 to 2$^+$; γ to 3$^-$; α to 0$^+$ in ^{210}Pb and β^- from 1$^-$ ^{214}Bi with log *ft*=7.94 *4*. %α: from 1965Le08 with I(9907α)/I(7688α)=7x10^{-7} and I(γ+ce).
2272.1 *10*	(9)	C	J$^\pi$: D to (8$^+$) from ^{208}Pb(^{16}O,Xγ).
2293.362 *19*	(1$^+$,2$^+$)	B	J$^\pi$: (M1+E2) to 2$^+$; γ to 0$^+$ and β^- from 1$^-$ ^{214}Bi with log *ft*=7.433 *22*.
2348.3 *7*	(1,2$^+$)	B	J$^\pi$: γ to 0$^+$ and γ to 2$^+$.
2360.97 *17*	(1,2$^+$)	B	J$^\pi$: γ to 0$^+$ and γ to 2$^+$.
2377.6 *10*	(10$^+$)	C	J$^\pi$: Q to (8$^+$) from ^{208}Pb(^{16}O,Xγ).
2423.24 *6*	(1,2$^+$)	B	J$^\pi$: γ to 0$^+$; γ to 2$^+$; γ to 1$^+$.
2447.701 *19*	1$^-$	B	%IT=100; %α=0.0049 J$^\pi$: E1 to 0$^+$. %α: from 1965Le08 with I(10082α)/I(7688α)=1.4x10^{-6} and I(γ+ce).
2482.459 *17*	(1$^-$,2$^+$)	B	J$^\pi$: γ to 2$^+$; γ to 0$^+$; γ to 1$^-$ and γ to 3$^-$.
2505.34 *9*	(1$^-$,2$^+$)	B	J$^\pi$: γ to 0$^+$; γ to 2$^+$ and γ to 3$^-$.
2508.12 *4*	(0$^+$)	B	%IT=99.98; %α=0.017 J$^\pi$: γ to 1$^+$; γ to 2$^+$; no γ to 0$^+$, 1$^-$ and 3; α to 0$^+$ in ^{210}Pb and β^- from 1$^-$ ^{214}Bi with log *ft*= 7.69 *5*. %α from 1965Le08 with I(10150α)/I(7688α)=2x10^{-7} and I(γ+ce).
2544.92 *11*		B	
2553.0 *5*		B	
2562.4 *5*		B	
2604.68 *6*	(2$^+$)	B	J$^\pi$: γ to 0$^+$; γ to 2$^+$; γ to 3$^-$ and γ to (3)$^+$.
2605.1 *12*		C	
2612.5‡ *10*	(12$^+$)	C	J$^\pi$: Q to (10$^+$); yrast state from ^{208}Pb(^{16}O,Xγ).
2630.84 *9*	(1,2$^+$)	B	J$^\pi$: γ to 0$^+$ and γ to 2$^+$.
2662.33 *9*	(2$^+$)	B	J$^\pi$: γ to 0$^+$; γ to 2$^+$; γ to (3)$^+$ and γ to 3$^-$.
2670.0 *12*		C	
2694.62 *5*	(1$^-$,2$^+$)	B	%IT=99.97; %α=0.032 J$^\pi$: γ to 0$^+$; γ to 2$^+$ and γ to 3$^-$. %α: from 1965Le08 with I(10332α)/I(7688α)=8x10^{-7} and I(γ+ce).
2698.60 *7*	(1,2)$^+$	B	J$^\pi$: γ to 0$^+$ and M1 to 2$^+$.
2719.26 *5*	1$^+$	B	J$^\pi$: M1 to 0$^+$.
2728.616 *23*	(0$^+$,1,2)	B	J$^\pi$: γ to 1$^+$, γ to 1$^-$ and γ to 2$^+$.
2734.4 *12*	(12$^+$)	C	J$^\pi$: Q to (10)$^+$ from ^{208}Pb(^{16}O,Xγ).
2769.91 *13*	(1,2$^+$)	B	J$^\pi$: γ to 0$^+$; γ to 2$^+$ and β^- from 1$^-$ ^{214}Bi with log *ft*= 7.39 *7*.
2785.97 *9*	(1,2$^+$)	B	J$^\pi$: γ to 0$^+$; γ to 2$^+$ and β^- from 1$^-$ ^{214}Bi with log *ft*= 7.46 *7*.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{214}Po Levels (continued)

E(level)†	J^π	XREF	Comments
2794.1 *6*		B	
2802.54 *19*		B	
2826.82 *14*	$(1,2^+)$	B	J^π: γ to 0^+; γ to 2^+ and β^- from 1^- ^{214}Bi with log *ft*= 7.38 *14*.
2860.93 *13*	$(1,2^+)$	B	J^π: γ to 0^+; γ to 2^+ and β^- from 1^- ^{214}Bi with log *ft*= 7.40 *9*.
2869.63 *17*	$(2^-,3^-)$	B	J^π: γ to 2^+; γ to 1^-; γ to 3^-; no γ to 0^+; no γ to 1^+ and β^- from 1^- ^{214}Bi with log *ft*= 7.73 *11*.
2880.36 *14*	$(1^-,2^+)$	B	%IT=99.83; %α=0.17 J^π: γ to 0^+; γ to 2^+; α to 0^+ in ^{210}Pb and β^- from 1^- ^{214}Bi with log *ft*= 7.78 *7*. %α from 1965Le08 with I(10505α)/I(7688α)=2x10^{-7} and I(γ+ce).
2893.63 *11*	$(1,2^+)$	B	J^π: γ to 0^+; γ to 2^+ and β^- from 1^- ^{214}Bi with log *ft*= 7.27 *8*.
2896.98 *23*		B	
2919.5 *3*		B	
2921.89 *11*	$(1,2^+)$	B	J^π: γ to 0^+; γ to 2^+ and β^- from 1^- ^{214}Bi with log *ft*= 7.32 *6*.
2928.55 *22*	$(1,2^+)$	B	J^π: γ to 0^+; γ to 2^+ and β^- from 1^- ^{214}Bi with log *ft*= 8.61 *6*.
2934.54 *18*	$(1,2^+)$	B	J^π: γ to 0^+; γ to 2^+ and β^- from 1^- ^{214}Bi with log *ft*= 8.29 *7*.
2940.67 *10*	$(1^-,2^+)$	B	J^π: γ to 0^+; γ to 2^+; γ to 3^- and β^- from 1^- ^{214}Bi with log *ft*= 6.91 *7*.
2962.8 *7*		B	
2967.6 *5*		B	
2978.93 *12*	$(1,2^+)$	B	J^π: γ to 0^+; γ to 2^+ and β^- from 1^- ^{214}Bi with log *ft*= 7.21 *6*.
2986.22 *13*	$(2^-,3)$	B	J^π: γ to 2^+; γ to 3^-; no γ to 0^+ and β^- from 1^- ^{214}Bi with log *ft*= 7.43 *7*.
3000.00 *14*	$(1^-,2^+)$	B	J^π: γ to 0^+; γ to 2^+; γ to 3^- and β^- from 1^- ^{214}Bi with log *ft*= 7.31 *8*.
3003.4 *10*		B	
3005.8 *6*		B	
3014.10 *15*	$(1,2^+)$	B	J^π: γ to 0^+; γ to 2^+ and β^- from 1^- ^{214}Bi with log *ft*= 6.64 *9*.
3022.3 *3*	$(2^-,3,4^+)$	B	J^π: γ to 2^+; γ to 3^-; no γ to 0^+ and no γ to $1\pm$.
3030.3 *6*		B	
3039.3 *6*		B	
3053.88 *18*	$(1,2^+)$	B	J^π: γ to 0^+; γ to 2^+ and β^- from 1^- ^{214}Bi with log *ft*= 6.44 *10*.
3068.3 *8*		B	
3078.7 *6*		B	
3081.84 *25*	$(1,2^+)$	B	J^π: γ to 0^+; γ to 2^+ and β^- from 1^- ^{214}Bi with log *ft*= 6.91 *14*.
3094.0 *3*	$(1^-,2^+)$	B	J^π: γ to 0^+; γ to 2^+; γ to 3^- and β^- from 1^- ^{214}Bi with log *ft*= 6.79 *13*.
3139.0 *8*		B	
3142.6 *3*	$(1,2^+)$	B	J^π: γ to 0^+; γ to 2^+ and β^- from 1^- ^{214}Bi with log *ft*= 6.97 *15*.
3149.2 *5*	$(1,2^+)$	B	J^π: γ to 0^+; γ to 2^+ and β^- from 1^- ^{214}Bi with log *ft* = 8.29 *13*.
3160.4 *5*	$(1,2^+)$	B	J^π: γ to 0^+; γ to 2^+ and β^- from 1^- ^{214}Bi with log *ft*= 7.16 *17*.
3164.4 *8*		B	
3173.3 *6*		B	
3183.7 *4*	$(1,2^+)$	B	J^π: γ to 0^+; γ to 2^+ and β^- from 1^- ^{214}Bi with log *ft*= 6.57 *20*.
3262.4 *8*		B	

† From least square fit to Eγ′s by evaluator. 1.0-keV uncertainty assumed when not reported.
‡ Band(A): Yrast cascade.

$\gamma(^{214}Po)$

E_i(level)	J_i^π	E_γ†	I_γ†	E_f	J_f^π	Mult.†	δ†	α‡	$I_{(\gamma+ce)}$	Comments
609.317	2^+	609.321 *7*	100	0.0	0^+	E2		0.02038 *29*		
1015.040	(4^+)	405.72 *2*	100	609.317	2^+	(E2)		0.0541 *8*		
1274.764	3^-	665.446 *9*	100	609.317	2^+	E1		0.00579 *8*		
1339.4	(6^+)	324.4 *5*	100	1015.040	(4^+)	(E2)		0.1001 *15*		Mult.: from R_{ADO} and yrast sequence in $^{208}Pb(^{16}O,X\gamma)$.
1377.680	2^+	768.360 *7*	100.0 *3*	609.317	2^+	M1+E2	3.81 *13*	0.01429 *24*		
		1377.669 *12*	81.5 *3*	0.0	0^+	E2		0.00404 *6*		
1415.498	0^+	806.179 *10*	100.0 *5*	609.317	2^+	E2		0.01127 *16*		B(E2)(W.u.)=0.156 *5*
		1415.495 *10*		0.0	0^+	E0			40.0 *11*	
1543.369	2^+	268.60 *6*	0.51 *6*	1274.764	3^-	[E1]		0.0405 *6*		
		528.30 *8*	0.23 *9*	1015.040	(4^+)					
		934.056 *8*	100.0 *4*	609.317	2^+	M1+E2	0.37 *24*	0.0228 *25*		
		1543.33 *6*	10.0 *4*	0.0	0^+	[E2]		0.00333 *5*		
1583.5	(8^+)	244.1 *5*	100	1339.4	(6^+)	E2		0.240 *4*		B(E2)(W.u.)=0.53 *5* Mult.: from $^{208}Pb(^{16}O,X\gamma)$.
1589.6		250.2 *5*	100	1339.4	(6^+)					
1661.283	2^+	1051.96 *3*	29.9 *10*	609.317	2^+	[M1,E2]		0.012 *6*		
		1661.274 *17*	100.0 *6*	0.0	0^+	E2		0.00296 *4*		
1685.5?		670.5@ *5*	100	1015.040	(4^+)					
1712.92	(3^+)	697.89 *10*	63 *8*	1015.040	(4^+)					
		1103.70 *19*	100 *14*	609.317	2^+					
1729.612	2^+	351.9 *5*	0.21 *3*	1377.680	2^+	[M1+E2]		0.20 *12*		
		454.80 *3*	1.95 *9*	1274.764	3^-	[E1]		0.01251 *18*		
		1120.294 *6*	100.00 *21*	609.317	2^+	M1+E2	0.37 *20*	0.0144 *12*		
		1729.595 *11*	19.30 *21*	0.0	0^+	E2		0.00278 *4*		
1737.4		398.0 *5*	100	1339.4	(6^+)					
1742.99	$0^{(+)}$	1133.66 *3*	100	609.317	2^+	(E2)		0.00578 *8*		
1764.520	1^+	221.5 *2*	0.018 *6*	1543.369	2^+	[M1,E2]		0.7 *4*		
		348.92 *6*	0.68 *15*	1415.498	0^+	[M1]		0.335 *5*		
		386.77 *5*	1.93 *12*	1377.680	2^+	[M1,E2]		0.16 *10*		
		1155.210 *8*	10.69 *5*	609.317	2^+	M1+E2	+0.48 *18*	0.0127 *10*		
		1764.491 *14*	100.0 *3*	0.0	0^+	M1		0.00512 *7*		
1823.1	(8^+)	239.6 *5*	100	1583.5	(8^+)	M1+E2	0.73 *+26−23*	0.70 *10*		Mult.,δ: from $^{208}Pb(^{16}O,X\gamma)$.
1842.9		503.5 *5*	100	1339.4	(6^+)					
1847.446	2^+	304.43 *12*	0.58 *19*	1543.369	2^+	[M1,E2]		0.30 *18*		
		469.76 *4*	2.26 *13*	1377.680	2^+	[M1,E2]		0.09 *6*		
		572.77 *7*	1.33 *10*	1274.764	3^-	[E1]		0.00779 *11*		
		832.37 *11*	0.48 *5*	1015.040	(4^+)					
		1238.122 *10*	100.0 *3*	609.317	2^+	M1		0.01201 *17*		
		1847.433 *17*	34.76 *23*	0.0	0^+	[E2]		2.53×10^{-3} *4*		
1890.306	$(2)^+$	615.76 *6*	3.8 *6*	1274.764	3^-					
		1280.976 *12*	100.0 *5*	609.317	2^+	M1		0.01102 *15*		

Adopted Levels, Gammas (continued)

$\gamma(^{214}Po)$ (continued)

E_i(level)	J_i^π	E_γ†	I_γ†	E_f	J_f^π	Mult.†	δ†	α‡	$I_{(\gamma+ce)}$	Comments
1890.306	(2)+	1890.30 14	5.8 7	0.0	0+					
1982.3	(7)	642.9 5	100	1339.4	(6+)	D				
1994.639	1−	(104.4 2)		1890.306	(2)+					
		230 1	0.36 12	1764.520	1+	[E1]		0.0581 8		
		333.37 8	7.9 6	1661.283	2+	[E1]		0.02466 35		
		579.14 16		1415.498	0+	[E1]		0.00762 11		
		617.02 13	3.3 3	1377.680	2+	[E1]		0.00672 9		
		719.86 3	51.1 17	1274.764	3−	E2		0.01424 20		
		1385.310 14	100.0 9	609.317	2+	D				
2010.830	(2+)	297.81 24		1712.92	(3+)					
		595.24 7	1.30 10	1415.498	0+					
		633.09 5	4.2 3	1377.680	2+					
		1401.515 13	100.0 4	609.317	2+	(M1+E2)	+1.6 5	0.0053 8		
		2010.80 12	3.31 17	0.0	0+					
2017.314	0+	252.79 6	0.51 8	1764.520	1+	[M1]		0.810 11		
		356.05 16	0.29 8	1661.283	2+	[E2]		0.0769 11		
		639.61 5	1.33 19	1377.680	2+	[E2]		0.01832 26		
		1407.988 12	100.0 4	609.317	2+	(E2)		0.00389 5		
		2017.309 12		0.0	0+	E0			0.0023 4	
2088.44	(1,2+)	(71.1 2)		2017.314	0+					
		710.69 10	100.0 25	1377.680	2+					
		1479.19 12	75 10	609.317	2+					
2118.535	1+	388.89 5	18.16 21	1729.612	2+	[M1]		0.2497 35		
		703.10 4	22.6 9	1415.498	0+	[M1]		0.0519 7		
		740.77 13	2.03 11	1377.680	2+	[M1,E2]		0.029 16		
		1509.211 10	100.0 6	609.317	2+	(M1+E2)	−0.056 22	0.00733 10		
		2118.514 25	54.4 4	0.0	0+	M1		0.00356 5		
2147.86	(1−,2+)	486.3 3	5.1 21	1661.283	2+					
		769.7 5	6.7 22	1377.680	2+					
		872.95 19	4.0 9	1274.764	3−					
		1538.53 6	100 5	609.317	2+	D(+Q)				
		2148.00 12	3.1 3	0.0	0+					
2157.9	(9)	574.4 5	100	1583.5	(8+)	D				Mult.: from R_{ADO} in $^{208}Pb(^{16}O,X\gamma)$.
2179.3	(10+)	595.8 5	100	1583.5	(8+)	Q				Mult.: from R_{ADO} in $^{208}Pb(^{16}O,X\gamma)$.
2192.536	(2)+	428.07 8	1.61 19	1764.520	1+					
		649.20 5	7.8 10	1543.369	2+					
		814.92 11	5.5 5	1377.680	2+					
		917.7 3	0.6 4	1274.764	3−					
		1583.203 17	100.0 8	609.317	2+	M1		0.00655 9		
		2192.58 16	5.5 6	0.0	0+					
2204.102	1+	461.06 11	0.88 13	1742.99	0(+)	[M1]		0.1581 22		
		474.43 5	1.97 18	1729.612	2+	[M1+E2]		0.09 6		
		542.81 7	1.49 20	1661.283	2+	[M1+E2]		0.06 4		

$^{214}_{84}Po_{130}$-5

Adopted Levels, Gammas (continued)

$\gamma(^{214}Po)$ (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.†	α‡	Comments
2204.102	1^+	660.87 *14*	0.96 *10*	1543.369	2^+	[M1+E2]	0.039 *22*	
		788.2 *3*	0.30 *6*	1415.498	0^+	[M1]	0.0385 *5*	
		826.41 *11*	2.1 *3*	1377.680	2^+	[M1+E2]	0.022 *12*	
		1594.75 *8*	5.5 *4*	609.317	2^+	[M1+E2]	0.0048 *16*	
		2204.10 *4*	100.0 *5*	0.0	0^+	M1	0.00333 *5*	
2208.69	$(2^-,3)$	547.21 *17*	10.4 *10*	1661.283	2^+			
		934.1 *2*	15 *3*	1274.764	3^-			
		1599.56 *12*	100 *6*	609.317	2^+	D+Q		
2266.40	2^+	(61.0 *8*)		2204.102	1^+	[M1+E2]	40 *32*	
		501.97 *12*	28 *4*	1764.520	1^+	[M1+E2]	0.08 *5*	
		536.78 *4*	100 *13*	1729.612	2^+	[M1+E2]	0.07 *4*	
		723.01 *12*	56 *6*	1543.369	2^+	E2	0.01411 *20*	
		991.56 *19*	15 *4*	1274.764	3^-	[E1]	0.00276 *4*	
		1657.04 *18*	77 *7*	609.317	2^+	[M1+E2]	0.0044 *15*	
		2266.52 *13*	26.1 *14*	0.0	0^+	[E2]	2.00×10^{-3} *3*	
2272.1	(9)	449.0 *5*	100	1823.1	(8^+)	D		Mult.: from R_{ADO} in $^{208}Pb(^{16}O,X\gamma)$.
2293.362	$(1^+,2^+)$	878.02 *12*	3.5 *9*	1415.498	0^+			
		915.73 *15*	7.8 *9*	1377.680	2^+			
		1684.012 *23*	71 *4*	609.317	2^+	(M1+E2)	0.0043 *14*	
		2293.38 *3*	100.0 *15*	0.0	0^+			
2348.3	$(1,2^+)$	1739.1 *8*		609.317	2^+			
		2348.0 *13*	100 *70*	0.0	0^+			
2360.97	$(1,2^+)$	631.2 *4*	100 *13*	1729.612	2^+			
		1751.6 *7*	26 *21*	609.317	2^+			
		2360.99 *19*	9.2 *13*	0.0	0^+			
2377.6	(10^+)	554.5 *5*	100	1823.1	(8^+)	Q		Mult.: from R_{ADO} in $^{208}Pb(^{16}O,X\gamma)$.
2423.24	$(1,2^+)$	230.66 *14*		2192.536	$(2)^+$			
		334.80 *8*	100 *11*	2088.44	$(1,2^+)$			
		658.76 *21*	44 *8*	1764.520	1^+			
		693.1@ *2*	17 *6*	1729.612	2^+			
		710.27@ *8*		1712.92	(3^+)			
		1045.73 *16*	66 *8*	1377.680	2^+			
		1813.73 *14*	34 *3*	609.317	2^+			
		2423.32 *13*	15.5 *14*	0.0	0^+			
2447.701	1^-	255.16 *10*		2192.536	$(2)^+$			
		452.91 *9*	1.97 *24*	1994.639	1^-	[M1+E2]	0.10 *6*	
		683.21 *6*	5.3 *6*	1764.520	1^+	[E1]	0.00551 *8*	
		704.96 *25*	3.0 *6*	1742.99	$0^{(+)}$	[E1]	0.00519 *7*	
		786.35 *16*	21 *3*	1661.283	2^+	[E1]	0.00422 *6*	
		904.35 *9*	4.7 *6*	1543.369	2^+	[E1]	0.00326 *5*	
		1032.39 *8*	4.1 *6*	1415.498	0^+	[E1]	0.00257 *4*	
		1069.97 *8*	17.6 *12*	1377.680	2^+	[E1]	2.41×10^{-3} *3*	
		1173.01 *10*	3.5 *3*	1274.764	3^-	[E2]	0.00542 *8*	

$^{214}_{84}Po_{130}$-6

Adopted Levels, Gammas (continued)

$\gamma(^{214}Po)$ (continued)

E_i(level)	J_i^π	E_γ†	I_γ†	E_f	J_f^π	Mult.†	α‡	Comments
2447.701	1^-	1838.36 *5*	22.6 *9*	609.317	2^+	[E1]	1.36×10^{-3} *2*	
		2447.69 *3*	100.0 *6*	0.0	0^+	E1	1.42×10^{-3} *2*	
2482.459	$(1^-,2^+)$	273.79 *5*	28 *3*	2208.69	$(2^-,3)$			
		334.9 *5*	12.0 *20*	2147.86	$(1^-,2^+)$			
		394.04@ *8*	2.9 *3*	2088.44	$(1,2^+)$			
		487.6 *3*	6.1 *20*	1994.639	1^-			
		634.77 *16*	1.4 *5*	1847.446	2^+			
		752.84 *3*	29.0 *20*	1729.612	2^+			
		821.18 *3*	36 *3*	1661.283	2^+			
		939.6 *5*	4.3 *9*	1543.369	2^+			
		1104.68 *19*	16.8 *9*	1377.680	2^+			
		1207.68 *3*	100 *4*	1274.764	3^-			
		1873.16 *5*	47.0 *20*	609.317	2^+			
		2482.8# *4*	0.22 *4*	0.0	0^+			
2505.34	$(1^-,2^+)$	961.66 *17*	7.0 *9*	1543.369	2^+			
		1230.6 *4*	5.5 *24*	1274.764	3^-			
		1896.05 *14*	100 *6*	609.317	2^+			
		2505.46 *13*	3.8 *6*	0.0	0^+			
2508.12	(0^+)	304.00 *4*	52 *5*	2204.102	1^+			
		496.89 *18*	14 *4*	2010.830	(2^+)			
		965.00# *10*	21 *6*	1543.369	2^+			
		1130.38 *20*	74 *8*	1377.680	2^+			
		1898.68 *16*	100 *18*	609.317	2^+			
2544.92		(36.8 *2*)		2508.12	(0^+)			
		1167.26 *18*	40 *6*	1377.680	2^+			
		1935.58 *20*	100 *10*	609.317	2^+			
2553.0		1943.7 *8*		609.317	2^+			
		2553.0 *6*	≈100	0.0	0^+			
2562.4		1953.4 *6*		609.317	2^+			
		2562.0 *6*	100 *50*	0.0	0^+			
2604.68	(2^+)	396.02 *6*	21.1 *25*	2208.69	$(2^-,3)$			
		840.4 *5*	7.5 *21*	1764.520	1^+			
		891.8 *3*		1712.92	(3^+)			
		943.33 *12*	12.9 *21*	1661.283	2^+			
		1226.7 *3*	100 *40*	1377.680	2^+			
		1329.94 *17*	9.3 *11*	1274.764	3^-			
		1994.6 *6*	5.4 *21*	609.317	2^+			
		2604.5 *5*	0.32 *7*	0.0	0^+			
2605.1		333.0 *5*	100	2272.1	(9)			
2612.5	(12^+)	433.2 *5*	100	2179.3	(10^+)	Q		Mult.: from R_{ADO} in $^{208}Pb(^{16}O,X\gamma)$.
2630.84	$(1,2^+)$	866.0 *8*		1764.520	1^+			
		1087.4	70 *30*	1543.369	2^+			
		1253.14 *12*		1377.680	2^+			

$^{214}_{84}Po_{130}$-7

Adopted Levels, Gammas (continued)

$\gamma(^{214}Po)$ (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.†	α‡
2630.84	(1,2$^+$)	2021.52 12	100 11	609.317	2$^+$		
		2630.9 3	4.0 9	0.0	0$^+$		
2662.33	(2$^+$)	651.50 16	<2.6	2010.830	(2$^+$)		
		949.8 3	7 3	1712.92	(3$^+$)		
		1118.9 5	56 14	1543.369	2$^+$		
		1284 1	17.2 13	1377.680	2$^+$		
		1387.5 2		1274.764	3$^-$		
		2052.96 12	100 7	609.317	2$^+$		
		2662.4 7	0.33 7	0.0	0$^+$		
2670.0		292.4 5	100	2377.6	(10$^+$)		
2694.62	(1$^-$,2$^+$)	247.2 8		2447.701	1$^-$		
		485.93 11	28 5	2208.69	(2$^-$,3)		
		677.41 15	7 3	2017.314	0$^+$		
		699.86 18	22 5	1994.639	1$^-$		
		847.14 11	31 4	1847.446	2$^+$		
		930.2 2	32 9	1764.520	1$^+$		
		952.2 8	7 3	1742.99	0$^{(+)}$		
		965.00# 10		1729.612	2$^+$		
		1033.31 18	25 4	1661.283	2$^+$		
		1316.99 15	100 11	1377.680	2$^+$		
		1419.70 29	6.1 11	1274.764	3$^-$		
		2085.19 15	10.0 6	609.317	2$^+$		
		2694.66 13	36.7 17	0.0	0$^+$		
2698.60	(1,2)$^+$	494.21 9	24 3	2204.102	1$^+$		
		687.56 21	15 4	2010.830	(2$^+$)		
		934.5 5	21 6	1764.520	1$^+$		
		1038.0# 6	17 4	1661.283	2$^+$		
		1155.6 5	34 9	1543.369	2$^+$		
		1321.5	10 5	1377.680	2$^+$		
		2089.65 15	100 6	609.317	2$^+$	M1	0.00365 5
		2699.21 20	6.1 5	0.0	0$^+$		
2719.26	1$^+$	600.0 5	7 3	2118.535	1$^+$	[M1+E2]	0.050 29
		630.81 7	15.7 17	2088.44	(1,2$^+$)		
		708.95 23	11.7 13	2010.830	(2$^+$)		
		976.18 12	14.3 22	1742.99	0$^{(+)}$		
		1058.1	8 3	1661.283	2$^+$	[M1+E2]	0.012 6
		1303.75 8	100 9	1415.498	0$^+$	M1	0.01054 15
		1341.49 16	20 3	1377.680	2$^+$	[M1+E2]	0.0070 28
		2109.98 12	82 4	609.317	2$^+$	[M1+E2]	0.0029 7
		2719.32 19	1.70 17	0.0	0$^+$	[M1]	0.00256 4
2728.616	(0$^+$,1,2)	280.97 5	17.1 24	2447.701	1$^-$		
		519.90 5	4.4 5	2208.69	(2$^-$,3)		
		524.60 7	4.5 5	2204.102	1$^+$		

Adopted Levels, Gammas (continued)

$\gamma(^{214}Po)$ (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.†	Comments
2728.616	(0+,1,2)	733.81 *10*	10.9 *10*	1994.639	1−		
		964.08 *3*	100 *5*	1764.520	1+		
		1067.4 *3*	6.8 *16*	1661.283	2+		
		1351@ *1*	1.8 *5*	1377.680	2+		
		2120.0 *10*	1.8 *5*	609.317	2+		
2734.4	(12+)	356.8 *5*	100	2377.6	(10+)	Q	Mult.: from R_{ADO} in $^{208}Pb(^{16}O,X\gamma)$.
2769.91	(1,2+)	1108.8	23 *8*	1661.283	2+		
		1226.8 *6*	100 *30*	1543.369	2+		
		1392.5@ *4*	56 *23*	1377.680	2+		
		2160.4 *3*	6.1 *15*	609.317	2+		
		2769.92 *15*	82 *5*	0.0	0+		
2785.97	(1,2+)	581.9 *8*		2204.102	1+		
		938.65 *16*	85 *24*	1847.446	2+		
		1021.4 *3*	100 *18*	1764.520	1+		
		1370.5	67 *15*	1415.498	0+		
		2176.52 *19*	33 *12*	609.317	2+		
		2785.93 *15*	36 *3*	0.0	0+		
2794.1		2184.8 *6*	100	609.317	2+		
2802.54		598.5 *8*		2204.102	1+		
		1038.0# *2*	100 *17*	1764.520	1+		
		2193.3 *6*		609.317	2+		
2826.82	(1,2+)	282.0 *4*	53 *20*	2544.92			
		1062.4	70 *40*	1764.520	1+		
		1448.85 *24*	100 *50*	1377.680	2+		
		2826.96 *19*	13.3 *15*	0.0	0+		
2860.93	(1,2+)	1013.4 *10*	100 *30*	1847.446	2+		
		1317.7 *4*		1543.369	2+		
		1483.5	100 *30*	1377.680	2+		
		2251.55 *15*	41 *3*	609.317	2+		
		2861.1 *4*	3.1 *7*	0.0	0+		
2869.63	(2−,3−)	422.0 *8*		2447.701	1−		
		1594.8 *3*	60 *30*	1274.764	3−		
		2260.32 *20*	100 *5*	609.317	2+		
2880.36	(1−,2+)	2270.9 *4*	13.2 *23*	609.317	2+		
		2880.35 *14*	100 *14*	0.0	0+		
2893.63	(1,2+)	626.4@ *6*	23 *8*	2266.40	2+		
		1515.7@	100 *30*	1377.680	2+		
		2284.33 *18*	28 *3*	609.317	2+		
		2893.59 *14*	33 *3*	0.0	0+		
2896.98		2287.65 *23*	100	609.317	2+		
2919.5		2310.2 *3*	100	609.317	2+		
2921.89	(1,2+)	2312.45 *15*	67 *7*	609.317	2+		

$^{214}_{84}Po_{130}$-9

Adopted Levels, Gammas (continued)

$\gamma(^{214}Po)$ (continued)

E_i(level)	J_i^π	E_γ†	I_γ†	E_f	J_f^π
2921.89	$(1,2^+)$	2921.97 15	100 7	0.0	0^+
2928.55	$(1,2^+)$	2319.3@ 3	38 13	609.317	2^+
		2928.53 22	100 8	0.0	0^+
2934.54	$(1,2^+)$	2325.18 25	100 11	609.317	2^+
		2934.54 25	27 5	0.0	0^+
2940.67	$(1^-,2^+)$	1279.0 7	57 10	1661.283	2^+
		1665.86 19	37 12	1274.764	3^-
		2331.38 12	100 14	609.317	2^+
		2940.0	16 6	0.0	0^+
2962.8		2353.5 7	100	609.317	2^+
2967.6		1693.4 8		1274.764	3^-
		2358.0 6		609.317	2^+
2978.93	$(1,2^+)$	2369.56 17	20 3	609.317	2^+
		2978.94 15	100 3	0.0	0^+
2986.22	$(2^-,3)$	1711.0@ 8	20 10	1274.764	3^-
		2376.89 13	100 10	609.317	2^+
3000.00	$(1^-,2^+)$	280.6 4		2719.26	1^+
		551.9 8		2447.701	1^-
		1723.7 8		1274.764	3^-
		2390.82 21	18.4 16	609.317	2^+
		3000.0 2	100 11	0.0	0^+
3003.4		1156 1	100	1847.446	2^+
3005.8		2396.5 6	100	609.317	2^+
3014.10	$(1,2^+)$	314.9 8		2698.60	$(1,2)^+$
		1285.1 5	100 30	1729.612	2^+
		1353.0@ 8	28 7	1661.283	2^+
		1471.1 6	10 4	1543.369	2^+
		1598.0 5	37 17	1415.498	0^+
		1636.36 19	71 11	1377.680	2^+
		2405.1 5	2.6 9	609.317	2^+
3022.3	$(2^-,3,4^+)$	1011.8 8		2010.830	(2^+)
3022.3	$(2^-,3,4^+)$	1361.2 8		1661.283	2^+
		1644.0 8		1377.680	2^+
		1747.2 8		1274.764	3^-
		2413.1 4		609.317	2^+
3030.3		2421.0 6	100	609.317	2^+
3039.3		2430.0 6	100	609.317	2^+
3053.88	$(1,2^+)$	1206.4 8		1847.446	2^+
		1637 1	33 13	1415.498	0^+
		1676.1	<10.9	1377.680	2^+
		2444.7 7	37 11	609.317	2^+
		3053.9 2	100 11	0.0	0^+
3068.3		2459.0 8	100	609.317	2^+
3078.7		2469.4 6	100	609.317	2^+
3081.84	$(1,2^+)$	2472.9	38 13	609.317	2^+
		3081.79 25	100 30	0.0	0^+
3094.0	$(1^-,2^+)$	1717.0@ 8	100 25	1377.680	2^+
		1819.2 4	<25.0	1274.764	3^-
		2482.8#@ 4	37 16	609.317	2^+
		3094.0 4	11 3	0.0	0^+
3139.0		2529.7 8	100	609.317	2^+
3142.6	$(1,2^+)$	1481.3	70 30	1661.283	2^+
		3142.6 3	100 11	0.0	0^+
3149.2	$(1,2^+)$	2540.3 8		609.317	2^+
		3149.0 5	≈100	0.0	0^+
3160.4	$(1,2^+)$	2550.6 7	58 17	609.317	2^+
		3160.7 6	100 30	0.0	0^+
3164.4		2555.1 8	100	609.317	2^+
3173.3		2564.0 6	100	609.317	2^+
3183.7	$(1,2^+)$	2574.7	<37	609.317	2^+
		3183.6 4	100 17	0.0	0^+
3262.4		1532.8 8	100	1729.612	2^+

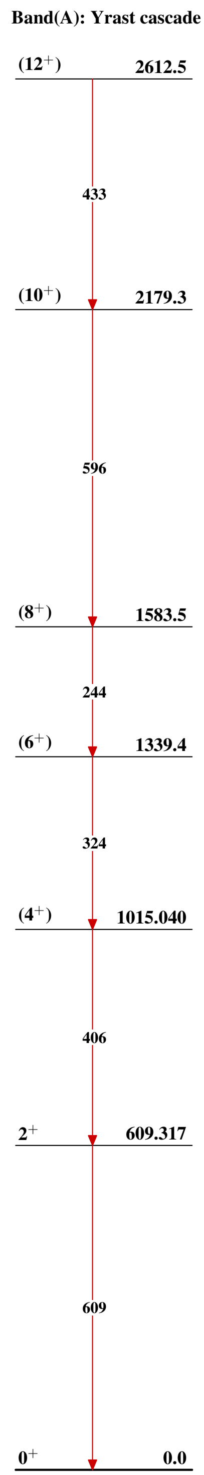
† From ^{214}Bi β^- decay except those only observed from $^{208}Pb(^{16}O,X\gamma)$.

‡ 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.

Adopted Levels, Gammas



$^{214}_{84}Po_{130}$

^{218}Rn α decay

Parent: ^{218}Rn: E=0.0; J$^{\pi}$=0^{+}; T$_{1/2}$=33.75 ms *15*; Q(α)=7262.5 *19*; %α decay=100.0
^{218}Rn-Q(α): from 2021Wa16.
^{218}Rn-T$_{1/2}$: from Adopted Levels of ^{218}Rn (2019Si39).

^{214}Po Levels

E(level)†	J$^{\pi}$‡
0.0	0^{+}
609.31 *1*	2^{+}
1274.61 *20*	3^{-}

† From Eγ.
‡ From the Adopted Levels.

α radiations

Eα	E(level)	Iα‡	HF†	Comments
(5878.02 *19*)	1274.61	0.00009 *3*	10 *4*	Eα: from α-γ coincidence and Q(α)=7262.5 keV *19* and E(level)=1274.61 keV *20*. Iα: derived from Iγ=0.00009 *3* by 1995Ko54.
(6531.1 *19*)	609.31	0.130 *4*	4.69 *15*	Eα: from α-γ coincidence and Q(α)=7262.5 keV *19* and E(level)=609.311 keV *10*. Iα: derived from Iγ=0.127 *4* by evaluators.
7129.1 *19*	0.0	99.870 *4*	1.000	Eα: weighted average of 7128.9 *20* (1982Bo04,1973BoXL), 7131.4 *100* (1956As38) and 7131 *10* (1964Wa19); others: 7.12 MeV *4* (1958To25), 7.2 MeV *2* (1948St42). Suggested adjustments to the original measured values (1991Ry01): −0.3 keV (1982Bo04) and +4.4 keV (1956As38). Iα: derived from level scheme by evaluators; others: 99.87% (1995Ko54) and 99.8% *1* (1956As38).

† r$_0$(^{214}Po)=1.5606 *7* is deduced from HF(7129.1α)=1.
‡ Absolute intensity per 100 decays.

γ(^{214}Po)

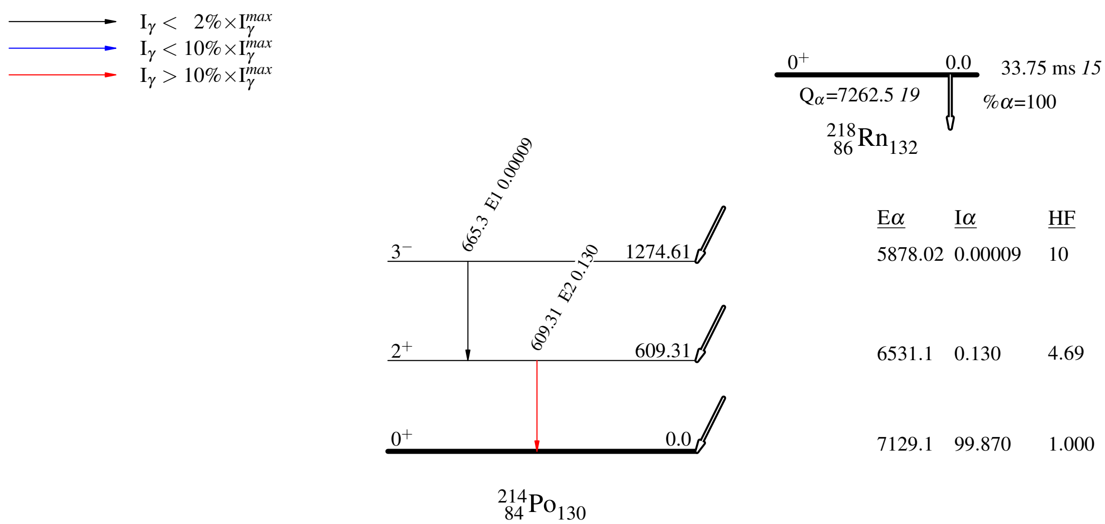
E$_{\gamma}$	I$_{\gamma}$†	E$_i$(level)	J$^{\pi}_i$	E$_f$	J$^{\pi}_f$	Mult.	α‡	Comments
609.31 *1*	0.127 *4*	609.31	2^{+}	0.0	0^{+}	E2	0.02038 *29*	E$_{\gamma}$: weighted average of 609.31 keV *1* (1995Ko54) and 609.31 keV *6* (1976Ku08); others: 609 keV *6* (1956As38) and 606 *15* (1963Le17). I$_{\gamma}$: weighted average of 0.127 *4* (1995Ko54) and 0.126 *8* (1976Ku08) relative to 100 α decay. Other: 0.16 *5* (1963Le17) and 0.20 *5* (1956As38). Mult.: α(exp)$_{tot}$=0.022 *6* deduced from (α)(ce)/(α)(γ) (1963Le17).
665.3 *2*	0.00009 *3*	1274.61	3^{-}	609.31	2^{+}	E1	0.00580 *8*	E$_{\gamma}$: from 1995Ko54. I$_{\gamma}$: per 100 α decay (1995Ko54).

† 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.

^{218}Rn α decay

Decay Scheme

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



Eα	Iα	HF
5878.02	0.00009	10
6531.1	0.130	4.69
7129.1	99.870	1.000

^{214}Bi β^- decay 1994Mo06,1989Si17

Parent: ^{214}Bi: E=0.0; J$^{\pi}$=1$^-$; T$_{1/2}$=19.71 min *2*; Q(β^-)=3269 *11*; %β^- decay=99.9790 *13*
^{214}Bi-Q(β^-): from 2021Wa16.
2004Mo07, 2002De03, 1998Mo14: Radioactivity ^{226}Ra(α); measured Eγ, relative and absolute Iγ, X-ray spectra; Ge(Li), HPGe detectors. α-spectra with 20 keV resolution using ZnS scintillator.
2002MoZP: Radioactivity ^{226}Ra(α); measured Eγ, Iγ; Compton suppressed spectrometer, planar HPGe detector.
2000Sa32: Radioactivity ^{226}Ra(α); measured Eγ, Iγ; HPGe detector.
1994Mo06, 1993Di09, 1990Mo08, 1982Ak03: Radioactivity ^{226}Ra(α); measured Eγ, Iγ, $\gamma\gamma$; planar HPGe detector and Ge(Li) detectors.
1989Si17, 1989Ta15, 1986Ta16: Radioactivity ^{226}Ra(α); measured Eγ, Iγ, $\gamma\gamma$, $\gamma\gamma(\theta)$; Ge detectors with anti-Compton arrangement.
Others:
For ce measurements, see 1975HaZA, 1967Ma51, 1960Lu07, 1960Ma05, 1957Ni11 and 1954Ml77.
For additional Eγ, Iγ measurements, see 2003Kl15,1991Li11,1983Ol01, 1983Sc13, 1982Fa10, 1977Zo01, 1975Ha31, 1972ClZS, 1971DiZI, 1969Li10, 1969Gr33, 1969Gu15, 1969La03, 1969Li10, 1969Wa27, 1969La03, 1968Yt01, 1967Ma51, 1967Ar20, 1967Bu17, 1966Hu03, 1964Ew04, 1960Lu07, 1958Bi87, 1958Dz94, 1958Dz94, 1954Ml77, 1952Mu45, 1949Ma75.
X rays(Bi):
I(Kα1 x ray)=0.97% *7*; I(Kα2 x ray)=0.53% *3* (2004Mo07). Other: I(Kα x ray)=)=1.77% *5* (1983Sc13).
I(Kβ x ray)=0.44% *5* (2004Mo07).

^{214}Po Levels

The decay level scheme is mainly from $\gamma\gamma$ coincidences of 1989Si17 and 1994Mo06.

E(level)†	J$^{\pi}$‡	T$_{1/2}$	Comments
0.0	0$^+$	163.46 μs *4*	T$_{1/2}$: from the Adopted Levels.
609.318 *5*	2$^+$		
1015.041 *20*	(4$^+$)		
1274.765 *9*	3$^-$		
1377.681 *7*	2$^+$		
1415.498 *8*	0$^+$	99 ps *3*	T$_{1/2}$: from 1979Be12; other: 0.23 ns *19* (1959Tu44).
1543.370 *9*	2$^+$		
1661.282 *14*	2$^+$		
1712.93 *8*	(3$^+$)		
1729.613 *7*	2$^+$		
1742.99 *3*	0$^{(+)}$		
1764.520 *8*	1$^+$		
1847.446 *9*	2$^+$		
1890.306 *13*	(2)$^+$		
1994.639 *13*	1$^-$		
2010.831 *13*	(2$^+$)		
2017.315 *9*	0$^+$		
2088.44 *5*	(1,2$^+$)		
2118.535 *10*	1$^+$		
2147.86 *5*	(1$^-$,2$^+$)		
2192.536 *16*	(2)$^+$		
2204.103 *23*	1$^+$		
2208.69 *4*	(2$^-$,3)		
2266.41 *4*	2$^+$		
2293.362 *19*	(1$^+$,2$^+$)		
2348.3 *7*	(1,2$^+$)		
2360.97 *17*	(1,2$^+$)		
2423.25 *6*	(1,2$^+$)		
2447.701 *19*	1$^-$		
2482.460 *17*	(1$^-$,2$^+$)		

Continued on next page (footnotes at end of table)

^{214}Bi β^- decay 1994Mo06,1989Si17 (continued)

^{214}Po Levels (continued)

E(level)†	J$^\pi$‡	Comments
2505.34 *9*	(1$^-$,2$^+$)	
2508.12 *4*	(0$^+$)	
2544.92 *11*		
2553.0 *5*		
2562.4 *5*		
2604.68 *6*	(2$^+$)	
2630.84 *9*	(1,2$^+$)	
2662.33 *9*	(2$^+$)	
2694.62 *5*	(1$^-$,2$^+$)	
2698.60 *7*	(1,2)$^+$	E(level): from 1989Si17. Proposed as two levels at 2698.31 and 2699.12 keV in 1993Di09 and 1994Mo06.
2719.26 *5*	1$^+$	
2728.617 *23*	(0$^+$,1,2)	
2769.91 *13*	(1,2$^+$)	
2785.97 *9*	(1,2$^+$)	
2794.1 *6*		
2802.54 *19*		
2826.82 *14*	(1,2$^+$)	
2860.93 *13*	(1,2$^+$)	
2869.63 *17*	(2$^-$,3$^-$)	
2880.36 *14*	(1$^-$,2$^+$)	
2893.60 *11*	(1,2$^+$)	
2896.98 *23*		
2919.5 *3*		
2921.89 *11*	(1,2$^+$)	
2928.55 *22*	(1,2$^+$)	
2934.54 *18*	(1,2$^+$)	
2940.67 *10*	(1$^-$,2$^+$)	
2962.8 *7*		
2967.6 *5*		
2978.93 *12*	(1,2$^+$)	
2986.22 *13*	(2$^-$,3)	
3000.00 *14*	(1$^-$,2$^+$)	
3003.4 *10*		
3005.8 *6*		
3014.11 *15*	(1,2$^+$)	
3022.3 *3*	(2$^-$,3,4$^+$)	
3030.3 *6*		
3039.3 *6*		
3053.88 *18*	(1,2$^+$)	
3068.3 *8*		
3078.7 *6*		
3081.84 *25*	(1,2$^+$)	
3093.48 *23*	(1$^-$,2$^+$)	
3139.0 *8*		
3142.6 *4*	(1,2$^+$)	
3149.2 *5*	(1,2$^+$)	
3160.4 *5*	(1,2$^+$)	
3164.4 *8*		
3173.3 *6*		
3183.6 *4*	(1,2$^+$)	
3262.4 *8*		

† From a least squares fit to Eγ's by evaluators. 1.0-keV uncertainty assumed when not reported.
‡ From the Adopted Levels.

^{214}Bi β^- decay 1994Mo06,1989Si17 (continued)

β^- radiations

E(decay)	E(level)	I$\beta^{-\dagger}$	Log *ft*	Comments
(85 *11*)	3183.6	0.0016 *3*	6.57 *20*	
(96 *11*)	3173.3	0.00014 *9*	7.8 *4*	
(109 *11*)	3160.4	0.00086 *17*	7.16 *17*	
(120 *11*)	3149.2	8.63×10^{-5} *4*	8.29 *13*	
(126 *11*)	3142.6	0.0021 *4*	6.97 *15*	
(176 *11*)	3093.48	0.0088 *17*	6.79 *13*	
(187 *11*)	3081.84	0.0082 *20*	6.91 *14*	
(215 *11*)	3053.88	0.037 *5*	6.44 *10*	
(255 *11*)	3014.11	0.040 *6*	6.64 *9*	
(266 *11*)	3003.4	0.007 *3*	7.46 *20*	
(269 *11*)	3000.00	0.0102 *10*	7.31 *8*	
(283 *11*)	2986.22	0.0091 *9*	7.43 *7*	
(290 *11*)	2978.93	0.0164 *7*	7.21 *6*	
(306 *11*)	2962.8	0.00036 *14*	8.94 *18*	
(328 *11*)	2940.67	0.049 *5*	6.91 *7*	
(334 *11*)	2934.54	0.00214 *21*	8.29 *7*	
(340 *11*)	2928.55	0.00109 *9*	8.61 *6*	
(347 *11*)	2921.89	0.0227 *13*	7.32 *6*	
(350 *11*)	2919.5	0.0014 *9*	8.5 *3*	
(372 *11*)	2896.98	0.0045 *5*	8.12 *7*	
(375 *11*)	2893.60	0.033 *5*	7.27 *8*	
(389 *11*)	2880.36	0.0113 *14*	7.78 *7*	
(399 *11*)	2869.63	0.014 *3*	7.73 *11*	
(408 *11*)	2860.93	0.032 *6*	7.40 *9*	
(442 *11*)	2826.82	0.043 *13*	7.38 *14*	
(466 *11*)	2802.54	0.0082 *14*	8.18 *9*	
(483 *11*)	2785.97	0.048 *6*	7.46 *7*	
(499 *11*)	2769.91	0.063 *9*	7.39 *7*	
(540 *11*)	2728.617	0.542 *22*	6.57 *4*	
(550 *11*)	2719.26	0.273 *12*	6.89 *4*	
(570 *11*)	2698.60	0.103 *7*	7.37 *4*	
(574 *11*)	2694.62	0.249 *15*	7.00 *4*	
(607 *11*)	2662.33	0.125 *11*	7.38 *5*	
(638 *11*)	2630.84	0.037 *8*	7.98 *10*	
(664 *11*)	2604.68	0.20 *5*	7.30 *12*	
(707 *11*)	2562.4	0.00018 *9*	10.44 *22*	
(716 *11*)	2553.0	9.09×10^{-5} *4*	10.758 *23*	
(724 *11*)	2544.92	0.033 *6*	8.21 *9*	Iβ^-: since I(γ+ce)(36.8γ) is not known, the given Iβ may be considered a lower limit.
(761 *11*)	2508.12	0.130 *11*	7.69 *5*	Iβ^-: may be considered as an upper limit because of unknown intensity of the 36.8γ feeding from the 2545-keV level.
(764 *11*)	2505.34	0.174 *10*	7.57 *4*	
(787 *11*)	2482.460	1.28 *4*	6.75 *3*	
(821 *11*)	2447.701	2.78 *6*	6.478 *23*	
(846 *11*)	2423.25	0.084 *6*	8.04 *4*	
(908 *11*)	2360.97	0.024 *5*	8.69 *10*	
(921 *11*)	2348.3	0.00014 *9*	10.9 *3*	
(976 *11*)	2293.362	0.563 *16*	7.433 *22*	
(1003 *11*)	2266.41	0.192 *12*	7.94 *4*	Iβ^-: since the transition intensity of the 61.0γ is not known, its possible contribution is not included in Iβ calculation.
(1060 *11*)	2208.69	0.22 *3*	7.97 *7*	
(1065 *11*)	2204.103	5.56 *5*	6.573 *17*	
(1076 *11*)	2192.536	0.866 *12*	7.397 *17*	
(1121 *11*)	2147.86	0.46 *3*	7.73 *4*	
(1150 *11*)	2118.535	4.33 *4*	6.801 *16*	
(1181 *11*)	2088.44	0.081 *9*	8.57 *5*	Iβ^-: since I(γ+ce)(71.1γ) is not known, any contribution from the 71.1γ could

Continued on next page (footnotes at end of table)

^{214}Bi β^- decay 1994Mo06,1989Si17 (continued)

β^- radiations (continued)

E(decay)	E(level)	Iβ^- †	Log *ft*	Comments
				not be included in calculation of Iβ to 2088.41 level.
(1252 *11*)	2017.315	2.460 *15*	7.179 *15*	Iβ^-: since I(γ+ce)(71.1γ) from the 2088.41 level is not known, its intensity could not be subtracted in calculation of Iβ to the 2017.30 level.
(1258 *11*)	2010.831	1.433 *11*	7.422 *15*	
(1274 *11*)	1994.639	1.192 *21*	7.522 *16*	
(1379 *11*)	1890.306	1.589 *17*	7.521 *14*	
(1422 *11*)	1847.446	8.16 *5*	6.859 *13*	
(1504 *11*)	1764.520	16.90 *11*	6.634 *13*	
(1526 *11*)	1742.99	0.138 *16*	8.74 *6*	
(1539 *11*)	1729.613	17.55 *10*	6.654 *12*	
(1556‡ *11*)	1712.93	0.153 *16*	9.57^{1u} *5*	
(1608 *11*)	1661.282	0.57 *5*	8.21 *4*	
(1726 *11*)	1543.370	3.09 *4*	7.593 *12*	
(1854 *11*)	1415.498	0.90 *5*	8.25 *3*	
(1891 *11*)	1377.681	7.22 *8*	7.374 *11*	
(1994 *11*)	1274.765	0.06 *4*	9.5 *3*	
(2254 *11*)	1015.041	0.079 *13*	9.63 *8*	
(2660‡ *11*)	609.318	0.55 *8*	9.06 *7*	
(3269 *11*)	0.0	19.2 *4*	7.872 *11*	E(decay): measured values: 3275 keV *15* (1960Lu07), 3260 keV *30* (1956Da06), 3180 keV *90* (1955Ri54), 3170 keV (1952Wa33, 1941Co04).

† For absolute intensity per 100 decays, multiply by 0.999790 *13*.

‡ Existence of this branch is questionable.

γ(^{214}Po)

Iγ normalization: Deduced from Iγ(609)=45.45 *19* (weighted average of 45.0 *7* (1983Ol01), 44.6 *5* (1983Sc13), 46.1 *5* (1991Li11), 44.8 *6* (1998Mo14), 45.57 *18* (2004Mo07)) per 100 ^{214}Bi β^- decays with ^{226}Ra or ^{222}Rn in equilibrium.

E_γ	I_γ @	E_i(level)	J^π_i	E_f	J^π_f	Mult.	α &	Comments
(36.8† *2*)		2544.92		2508.12	(0$^+$)			E_γ: from 1993Di09 and 1994Mo06, based on coincident analysis, no γ transitions observed.
(61.0† *8*)		2266.41	2$^+$	2204.103	1$^+$	[M1+E2]	40 *32*	E_γ: from 1993Di09 and 1994Mo06, based on coincident analysis, no γ transitions observed.
(71.1† *2*)		2088.44	(1,2$^+$)	2017.315	0$^+$			E_γ: from 1993Di09 and 1994Mo06, based on coincident analysis, no γ transitions observed.
(104.4† *2*)		1994.639	1$^-$	1890.306	(2)$^+$			E_γ: from 1993Di09 and 1994Mo06, based on coincident analysis, no γ transitions observed.
221.5‡ *2*	0.006 *2*	1764.520	1$^+$	1543.370	2$^+$	[M1,E2]	0.7 *4*	E_γ: weighted average of 221.57 *24* (1982Ak03) and 221 *1* (1989Si17). I_γ: from 1989Si17; others: 0.012 (1982Ak03) and 0.130 *13* (2000Sa32).
230#‡ *1*	0.0064 *21*	1994.639	1$^-$	1764.520	1$^+$	[E1]	0.0585 *10*	E_γ: from 1989Si17. I_γ: weighted average of 0.0064 *21* (1989Si17) and 0.0063 *21* (2000Sa32).
230.66#† *14*		2423.25	(1,2$^+$)	2192.536	(2)$^+$			E_γ: from 1993Di09 and 1994Mo06.
247.2† *8*		2694.62	(1$^-$,2$^+$)	2447.701	1$^-$			E_γ: from 1993Di09 and 1994Mo06.
252.79 *6*	0.027 *4*	2017.315	0$^+$	1764.520	1$^+$	[M1]	0.810 *11*	E_γ: weighted average of 252.56 *30* (1982Ak03), 253 *1* (1989Si17) and 252.80 *6* (1993Di09,1994Mo06). I_γ: weighted average of 0.033 *7* (1982Ak03), 0.028 *4* (1994Mo06) and 0.019 *7* (2000Sa32); other: 0.006 *2* (1989Si17).
255.16† *10*		2447.701	1$^-$	2192.536	(2)$^+$			E_γ: from 1993Di09 and 1994Mo06.
268.60 *6*	0.035 *4*	1543.370	2$^+$	1274.765	3$^-$	[E1]	0.0405 *6*	E_γ: weighted average of 268.57 *20* (1982Ak03), 269.0 *7* (1989Si17) and 268.60 *6* (1993Di09,1994Mo06). I_γ: weighted average of 0.031 *8* (1982Ak03), 0.06 *2* (1989Si17), 0.035 *4* (1994Mo06) and 0.059 *28* (2000Sa32).
273.79 *5*	0.28 *3*	2482.460	(1$^-$,2$^+$)	2208.69	(2$^-$,3)			E_γ: weighted average of 273.5 *5* (1969Li10), 273.76 *24* (1982Ak03), 273.7 *4* (1989Si17) and 273.80 *5* (1993Di09,1994Mo06). I_γ: weighted average of 0.25 *5* (1982Ak03), 0.38 *6* (1989Si17), 0.27 *3* (1994Mo06) and 0.29 *10* (2000Sa32).
280.6† *4*		3000.00	(1$^-$,2$^+$)	2719.26	1$^+$			E_γ: from 1993Di09 and 1994Mo06.
280.97 *5*	0.14 *2*	2728.617	(0$^+$,1,2)	2447.701	1$^-$			E_γ: weighted average of 281.1 *6* (1969Li10), 281.00 *20* (1982Ak03), 280.94 *12* (1989Si17) and 280.97 *5* (1993Di09,1994Mo06). I_γ: weighted average of 0.13 *2* (1982Ak03), 0.17 *3* (1989Si17), 0.13 *2* (1994Mo06) and 0.17 *4* (2000Sa32).

$^{214}_{84}$Po$_{130}$-18

$\gamma(^{214}Po)$ (continued)

E_γ	I_γ @	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α &	Comments
282.0† *4*	0.021 *8*	2826.82	(1,2$^+$)	2544.92				E_γ: weighted average of 282.04 *36* (1982Ak03) and 282.0 *4* (1993Di09,1994Mo06). I_γ: from 1982Ak03.
^{x}286.9 *6*	0.0060 *11*							E_γ: from 1969Li10. I_γ: from 2000Sa32.
297.81† *24*		2010.831	(2$^+$)	1712.93	(3$^+$)			E_γ: from 1993Di09 and 1994Mo06. $I\gamma$(297.81γ)+$I\gamma$(297.80γ in ^{210}Pb)=0.058 *10* (2000Sa32) and 0.046 *11* (1993Di09).
304.00#† *4*	0.057 *5*	2508.12	(0$^+$)	2204.103	1$^+$			E_γ: weighted average of 304.05 *4* (1982Ak03) and 303.97 *3* (1993Di09,1994Mo06). I_γ: from 0.069 *15* (1982Ak03), 0.055 *5* (1993Di09,1994Mo06) and 0.065 *20* (2000Sa32).
304.43#‡ *12*	0.075 *25*	1847.446	2$^+$	1543.370	2$^+$	[M1,E2]	0.30 *18*	E_γ: from 1989Si17. I_γ: from 2000Sa32.
314.9† *8*		3014.11	(1,2$^+$)	2698.60	(1,2)$^+$			E_γ: from 1993Di09 and 1994Mo06.
333.37 *8*	0.14 *1*	1994.639	1$^-$	1661.282	2$^+$	[E1]	0.02466 *35*	E_γ: weighted average of 333.35 *24* (1982Ak03), 333.61 *12* (1989Si17) and 333.31 *6* (1993Di09,1994Mo06). I_γ: weighted average of 0.16 *3* (1982Ak03), 0.21 *4* (1989Si17), 0.14 *1* (1994Mo06) and 0.13 *3* (2000Sa32).
334.80#† *8*	0.071 *8*	2423.25	(1,2$^+$)	2088.44	(1,2$^+$)			E_γ: weighted average of 334.87 *19* (1982Ak03) and 334.78 *8* (1993Di09,1994Mo06). I_γ: weighted average of 0.072 *14* (1982Ak03), 0.066 *8* (1993Di09,1994Mo06) and 0.090 *17* (2000Sa32).
334.9#‡ *5*	0.12 *2*	2482.460	(1$^-$,2$^+$)	2147.86	(1$^-$,2$^+$)			E_γ: from 1989Si17. I_γ: from 1989Si17.
^{x}338.5 *6*	0.25 *9*							E_γ: from 1969Li10. I_γ: from 2000Sa32.
348.92 *6*	0.23 *5*	1764.520	1$^+$	1415.498	0$^+$	[M1]	0.335 *5*	E_γ: weighted average of 348.8 *5* (1989Si17) and 348.92 *6* (1993Di09,1994Mo06). I_γ: weighted average of 0.17 *4* (1989Si17), 0.34 *5* (1994Mo06) and 0.20 *5* (2000Sa32).
351.9‡ *5*	0.15 *2*	1729.613	2$^+$	1377.681	2$^+$	[M1+E2]	0.20 *12*	E_γ,I_γ: from 1989Si17.
356.05 *16*	0.015 *4*	2017.315	0$^+$	1661.282	2$^+$	[E2]	0.0769 *11*	E_γ: weighted average of 356.5 *5* (1989Si17) and 356.00 *17* (1993Di09,1994Mo06). I_γ: from 1989Si17.
^{x}363.50 *14*	0.017 *5*							E_γ: weighted average of 363.47 *12* (1993Di09) and 364.2 *6* (1975Ha31). I_γ: from 1993Di09. Assignment to ^{214}Bi β^- decay is not established.
^{x}375.65 *24*	0.009 *3*							E_γ: weighted average of 375.59 *15* (1993Di09) and 376.6 *6* (1975Ha31). I_γ: from 2000Sa32.

$^{214}_{84}Po_{130}$-19

γ(^{214}Po) (continued)

E_γ	I_γ[@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	α[&]	Comments
386.77 *5*	0.65 *4*	1764.520	1$^+$	1377.681	2$^+$	[M1,E2]	0.16 *10*	E_γ: weighted average of 386.8 *8* (1969Li10), 386.72 *19* (1982Ak03), 387.0 *3* (1989Si17) and 386.77 *5* (1993Di09,1994Mo06). Other: 386.9 *10* (1967Ma51). I_γ: weighted average of 0.64 *10* (1982Ak03), 0.79 *13* (1989Si17), 0.63 *5* (1994Mo06) and 0.70 *15* (2000Sa32).
388.89 *5*	0.85 *1*	2118.535	1$^+$	1729.613	2$^+$	[M1]	0.2497 *35*	E_γ: weighted average of 388.8 *8* (1969Li10), 388.98 *19* (1982Ak03), 389.1 *3* (1989Si17) and 388.88 *5* (1993Di09,1994Mo06). Other: 389.0 *10* (1967Ma51). I_γ: weighted average of 0.87 *12* (1982Ak03), 0.90 *11* (1989Si17), 0.85 *1* (1994Mo06) and 0.86 *4* (2000Sa32).
394.04[‡a] *8*	0.029 *3*	2482.460	(1$^-$,2$^+$)	2088.44	(1,2$^+$)			E_γ: weighted average of 394.00 *19* (1982Ak03), 394.0 *10* (1989Si17) and 394.05 *8* (1993Di09). I_γ: weighted average of 0.033 *4* (1982Ak03), 0.019 *8* (1989Si17), 0.024 *3* (2000Sa32) and 0.032 *3* (1993Di09).
396.02 *6*	0.059 *7*	2604.68	(2$^+$)	2208.69	(2$^-$,3)			E_γ: weighted average of 396.3 *6* (1969Li10), 396.05 *17* (1982Ak03), 396.01 *12* (1989Si17) and 396.01 *8* (1993Di09,1994Mo06). I_γ: weighted average of 0.060 *9* (1982Ak03), 0.066 *13* (1989Si17), 0.059 *7* (1993Di09) and 0.053 *10* (2000Sa32).
405.72 *2*	0.37 *2*	1015.041	(4$^+$)	609.318	2$^+$	(E2)	0.0541 *8*	E_γ: weighted average of 405.9 *4* (1969Li10), 405.82 *17* (1982Ak03), 405.74 *3* (1989Si17) and 405.71 *2* (1993Di09,1994Mo06). Mult.: from $\gamma\gamma$(E2)(θ): A_2=+0.10 *5*, A_4=−0.056 (1989Ta15). I_γ: weighted average of 0.38 *5* (1982Ak03), 0.36 *2* (1989Si17), 0.37 *2* (1994Mo06) and 0.39 *3* (2000Sa32).
422.0[†] *8*		2869.63	(2$^-$,3$^-$)	2447.701	1$^-$			E_γ: from 1993Di09 and 1994Mo06.
[x]426.5 *5*	0.027 *8*							E_γ: from 1969Li10. I_γ: from 2000Sa32.
428.07 *8*	0.025 *3*	2192.536	(2)$^+$	1764.520	1$^+$			E_γ: weighted average of 428.0 *5* (1989Si17) and 428.07 *8* (1993Di09,1994Mo06). I_γ: weighted average of 0.023 *6* (1989Si17) and 0.025 *3* (2000Sa32); other: <0.0023 (1994Mo06).
[x]439.36 *9*	0.025 *5*							E_γ: weighted average of 439.47 *24* (1982Ak03), 439.34 *8* (1993Di09) and 440.4 *6* (1969Li10). I_γ: weighted average of 0.033 *5* (1982Ak03), 0.026 *5* (1993Di09) and 0.015 *5* (2000Sa32).
452.91[†] *9*	0.067 *8*	2447.701	1$^-$	1994.639	1$^-$	[M1+E2]	0.10 *6*	E_γ: weighted average of 452.88 *20* (1982Ak03) and 452.92 *10* (1993Di09,1994Mo06). I_γ: weighted average of 0.068 *11* (1982Ak03) and 0.067 *8* (1993Di09,1994Mo06).
454.80 *3*	0.64 *3*	1729.613	2$^+$	1274.765	3$^-$	[E1]	0.01251 *18*	E_γ: weighted average of 455.0 *3* (1969Li10), 455.26 *17* (1982Ak03), 454.77 *12* (1989Si17) and 454.79 *2* (1993Di09,1994Mo06). I_γ: weighted average of 0.69 *3* (1989Si17), 0.64 *3* (1994Mo06) and 0.59 *3* (2000Sa32).
461.06 *11*	0.095 *14*	2204.103	1$^+$	1742.99	0$^{(+)}$	[M1]	0.1581 *22*	E_γ: weighted average of 460.97 *24* (1982Ak03), 460.9 *5* (1989Si17)

$\gamma(^{214}$Po) (continued)

E_γ	I_γ@	E_i(level)	J^π_i	E_f	J^π_f	Mult.	α&	Comments
								and 461.09 *11* (1993Di09,1994Mo06). I_γ: weighted average of 0.078 *13* (1982Ak03), 0.085 *21* (1989Si17), 0.14 *2* (1994Mo06) and 0.10 *3* (2000Sa32).
469.76 *4*	0.290 *17*	1847.446	2^+	1377.681	2^+	[M1,E2]	0.09 *6*	E_γ: weighted average of 470.0 *3* (1969Li10), 469.78 *16* (1982Ak03), 469.69 *12* (1989Si17) and 469.76 *4* (1993Di09,1994Mo06). I_γ: weighted average of 0.30 *5* (1982Ak03), 0.288 *17* (1989Si17), 0.27 *2* (1994Mo06) and 0.34 *3* (2000Sa32).
474.43 *5*	0.213 *20*	2204.103	1^+	1729.613	2^+	[M1+E2]	0.09 *6*	E_γ: weighted average of 474.6 *3* (1969Li10), 474.46 *17* (1982Ak03), 474.38 *10* (1989Si17) and 474.44 *5* (1993Di09,1994Mo06). I_γ: weighted average of 0.23 *4* (1982Ak03), 0.26 *3* (1989Si17), 0.22 *2* (1994Mo06) and 0.190 *20* (2000Sa32).
485.93† *11*	0.050 *9*	2694.62	$(1^-,2^+)$	2208.69	$(2^-,3)$			E_γ: weighted average of 485.95 *24* (1982Ak03) and 485.92 *11* (1993Di09,1994Mo06). I_γ: weighted average of 0.052 *11* (1982Ak03) and 0.048 *9* (1993Di09,1994Mo06).
486.6 *3*	0.049 *20*	2147.86	$(1^-,2^+)$	1661.282	2^+			E_γ: weighted average of 486.3 *5* (1989Si17) and 486.7 *3* (1993Di09,1994Mo06). Other: 487.1 *15* (1967Ma51). I_γ: weighted average of 0.064 *21* (1989Si17) and 0.035 *20* (2000Sa32); other: <0.012 (1994Mo06).
487.7† *3*	0.061 *20*	2482.460	$(1^-,2^+)$	1994.639	1^-			E_γ: weighted average of 487.25 *20* (1969Li10) and 487.95 *13* (1993Di09,1994Mo06). I_γ: from 1993Di09 and 1994Mo06.
494.21 *9*	0.024 *3*	2698.60	$(1,2)^+$	2204.103	1^+			E_γ: weighted average of 494.31 *20* (1982Ak03), 494.6 *10* (1989Si17) and 494.19 *9* (1993Di09,1994Mo06). I_γ: weighted average of 0.031 *5* (1982Ak03), 0.019 *6* (1989Si17), 0.031 *4* (1994Mo06) and 0.019 *3* (2000Sa32).
496.89† *18*	0.015 *4*	2508.12	(0^+)	2010.831	(2^+)			E_γ: weighted average of 496.88 *24* (1982Ak03) and 496.90 *18* (1993Di09,1994Mo06). I_γ: from 1982Ak03, 1993Di09 and 1994Mo06.
501.97 *12*	0.040 *5*	2266.41	2^+	1764.520	1^+	[M1+E2]	0.08 *5*	E_γ: weighted average of 501.96 *20* (1982Ak03), 502.2 *6* (1989Si17) and 501.96 *15* (1993Di09,1994Mo06). I_γ: weighted average of 0.041 *7* (1982Ak03), 0.039 *9* (1989Si17), 0.040 *5* (1994Mo06) and 0.035 *19* (2000Sa32).
519.90† *5*	0.036 *4*	2728.617	$(0^+,1,2)$	2208.69	$(2^-,3)$			E_γ: weighted average of 519.93 *20* (1982Ak03) and 519.90 *5* (1993Di09,1994Mo06). I_γ: weighted average of 0.035 *6* (1982Ak03), 0.036 *4* (1994Mo06) and 0.039 *11* (2000Sa32).
524.60 *7*	0.037 *4*	2728.617	$(0^+,1,2)$	2204.103	1^+			E_γ: weighted average of 524.61 *20* (1982Ak03), 525.0 *6* (1989Si17) and 524.59 *8* (1993Di09,1994Mo06). I_γ: weighted average of 0.038 *6* (1982Ak03), 0.034 *13* (1989Si17), 0.037 *4* (1994Mo06) and 0.039 *13* (2000Sa32).
528.30‡ *8*	0.016 *6*	1543.370	2^+	1015.041	(4^+)			E_γ: weighted average of 528.42 *24* (1982Ak03), 528 *1* (1989Si17) and 528.29 *8* (1993Di09).

γ(^{214}Po) (continued)

E_γ	I_γ[@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	α[&]	Comments
								I_γ: weighted average of 0.025 *5* (1982Ak03), 0.009 *4* (1989Si17) and 0.022 *11* (2000Sa32).
536.78 *4*	0.142 *19*	2266.41	2^+	1729.613	2^+	[M1+E2]	0.07 *4*	E_γ: weighted average of 536.6 *8* (1969Li10), 536.83 *19* (1982Ak03), 536.94 *20* (1989Si17) and 536.77 *4* (1993Di09,1994Mo06). I_γ: weighted average of 0.14 *2* (1982Ak03), 0.154 *19* (1989Si17), 0.14 *2* (1994Mo06) and 0.12 *3* (2000Sa32).
542.81 *7*	0.161 *22*	2204.103	1^+	1661.282	2^+	[M1+E2]	0.06 *4*	E_γ: weighted average of 542.97 *24* (1982Ak03), 543.4 *5* (1989Si17) and 542.78 *7* (1993Di09,1994Mo06). I_γ: weighted average of 0.14 *2* (1982Ak03), 0.183 *19* (1989Si17), 0.13 *2* (1994Mo06) and 0.27 *4* (2000Sa32).
547.21 *17*	0.075 *7*	2208.69	$(2^-,3)$	1661.282	2^+			E_γ: weighted average of 547.05 *17* (1982Ak03), 547.1 *3* (1989Si17), 547.61 *24* (1993Di09,1994Mo06). I_γ: weighted average of 0.08 *1* (1982Ak03), 0.070 *15* (1989Si17), 0.074 *7* (2000Sa32); other: <0.008 (1993Di09,1994Mo06).
551.9[†] *8*		3000.00	$(1^-,2^+)$	2447.701	1^-			E_γ: from 1993Di09 and 1994Mo06.
572.77 *7*	0.171 *13*	1847.446	2^+	1274.765	3^-	[E1]	0.00779 *11*	E_γ: weighted average of 572.6 *4* (1969Li10), 572.74 *19* (1982Ak03), 572.83 *15* (1989Si17) and 572.76 *7* (1993Di09,1994Mo06). I_γ: weighted average of 0.17 *2* (1982Ak03), 0.177 *13* (1989Si17), 0.16 *2* (1994Mo06) and 0.16 *4* (2000Sa32).
579.14[†] *16*		1994.639	1^-	1415.498	0^+	[E1]	0.00762 *11*	E_γ: from 1993Di09 and 1994Mo06.
581.9[†] *8*		2785.97	$(1,2^+)$	2204.103	1^+			E_γ: from 1993Di09 and 1994Mo06.
595.24 *7*	0.038 *3*	2010.831	(2^+)	1415.498	0^+			E_γ: weighted average of 595.24 *24* (1982Ak03), 596.0 *8* (1989Si17) and 595.23 *7* (1993Di09,1994Mo06). I_γ: weighted average of 0.035 *7* (1982Ak03), 0.038 *4* (1994Mo06) and 0.039 *6* (2000Sa32); other: 0.26 *6* (1989Si17).
598.5[†] *8*		2802.54		2204.103	1^+			E_γ: from 1993Di09 and 1994Mo06.
600.0[‡] *5*	0.017 *6*	2719.26	1^+	2118.535	1^+	[M1+E2]	0.050 *29*	E_γ,I_γ: from 1989Si17.
609.321 *7*	100	609.318	2^+	0.0	0^+	E2	0.02038 *29*	E_γ: weighted average of 609.31 *16* (1982Ak03), 609.32 *2* (1989Si17), 609.313 *7* (1993Di09,1994Mo06) and 609.329 *7* (2002MoZP). Other: 609.37 *16* (1952Mu45), 609 *3* (1967Bu17) and 609.3 *3* (1967Ma51). Mult.: from α(K)exp=0.0152 *5*; K/L=3.63 *20*; K/M≈11.5 (1960Lu07); other: α(K)exp=0.015 (1967Ma51); K/L=3.43 *10* and K/M=9.2 *10* (1960Ma05).
615.76 *6*	0.12 *2*	1890.306	$(2)^+$	1274.765	3^-			E_γ: weighted average of 615.8 *6* (1969Li10), 615.49 *36* (1982Ak03), 615.78 *6* (1989Si17) and 615.68 *13* (1993Di09,1994Mo06). I_γ: weighted average of 0.13 *5* (1982Ak03), 0.15 *6* (1989Si17), 0.12 *2* (1994Mo06) and 0.11 *3* (2000Sa32).
617.02[‡] *13*	0.059 *6*	1994.639	1^-	1377.681	2^+	[E1]	0.00672 *9*	E_γ: weighted average of 617.01 *13* (1993Di09), 616.99 *36* (1982Ak03) and 617.1 *3* (1989Si17). I_γ: weighted average of 0.066 *44* (1982Ak03), 0.053 *6* (1993Di09), 0.075 *26* (1989Si17), and 0.077 *11* (2000Sa32).
626.4[‡] *6*	0.009 *3*	2893.60	$(1,2^+)$	2266.41	2^+			E_γ: from 1989Si17. I_γ: from 2000Sa32; other: ≈0.005 (1989Si17).

$^{214}_{84}$Po$_{130}$-22

γ(^{214}Po) (continued)

E_γ	I_γ[@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[&]	Comments
630.81[†] *7*	0.036 *4*	2719.26	1$^+$	2088.44	(1,2$^+$)			E_γ: weighted average of 630.93 *17* (1982Ak03) and 630.79 *7* (1993Di09,1994Mo06). I_γ: weighted average of 0.039 *6* (1982Ak03) and 0.035 *4* (1993Di09,1994Mo06).
631.2[‡] *4*	0.039 *5*	2360.97	(1,2$^+$)	1729.613	2$^+$			E_γ: from 1989Si17. I_γ: weighted average of 0.036 *13* (1989Si17), 0.039 *5* (2000Sa32).
633.09 *5*	0.122 *10*	2010.831	(2$^+$)	1377.681	2$^+$			E_γ: weighted average of 633.6 *4* (1969Li10), 633.17 *17* (1982Ak03), 633.14 *10* (1989Si17) and 633.06 *5* (1993Di09,1994Mo06). I_γ: weighted average of 0.12 *2* (1982Ak03), 0.130 *13* (1989Si17), 0.11 *1* (1994Mo06) and 0.130 *10* (2000Sa32).
634.77[†] *16*	0.014 *5*	2482.460	(1$^-$,2$^+$)	1847.446	2$^+$			E_γ: weighted average of 634.84 *24* (1982Ak03) and 634.72 *21* (1993Di09,1994Mo06). I_γ: from 1994Mo06.
639.61 *10*	0.070 *10*	2017.315	0$^+$	1377.681	2$^+$	[E2]	0.01832 *26*	E_γ: weighted average of 639 *1* (1969Li10), 639.62 *17* (1982Ak03), 639.37 *20* (1989Si17) and 639.67 *10* (1993Di09,1994Mo06). I_γ: weighted average of 0.061 *11* (1982Ak03), 0.068 *11* (1989Si17), 0.065 *10* (1994Mo06) and 0.085 *10* (2000Sa32).
649.20 *5*	0.121 *15*	2192.536	(2)$^+$	1543.370	2$^+$			E_γ: weighted average of 649.4 *4* (1969Li10), 649.22 *17* (1982Ak03), 649.18 *7* (1989Si17) and 649.23 *10* (1993Di09,1994Mo06). I_γ: weighted average of 0.114 *15* (1982Ak03), 0.128 *15* (1989Si17), 0.13 *2* (1994Mo06) and 0.10 *3* (2000Sa32).
651.50[†] *16*	<0.004	2662.33	(2$^+$)	2010.831	(2$^+$)			E_γ: from 1993Di09 and 1994Mo06. I_γ: from 1994Mo06.
658.76 *21*	0.031 *6*	2423.25	(1,2$^+$)	1764.520	1$^+$			E_γ: weighted average of 658.61 *24* (1982Ak03), 658.8 *5* (1989Si17) and 658.86 *21* (1993Di09,1994Mo06). I_γ: weighted average of 0.037 *8* (1982Ak03), 0.019 *6* (1989Si17), 0.046 *8* (1994Mo06) and 0.030 *8* (2000Sa32).
660.87 *14*	0.104 *11*	2204.103	1$^+$	1543.370	2$^+$	[M1+E2]	0.039 *22*	E_γ: weighted average of 660.74 *24* (1982Ak03), 661.4 *6* (1989Si17) and 660.89 *14* (1993Di09,1994Mo06). I_γ: weighted average of 0.077 *13* (1982Ak03), 0.09 *4* (1989Si17), 0.11 *2* (1994Mo06) and 0.120 *10* (2000Sa32).
665.446 *9*	3.390 *19*	1274.765	3$^-$	609.318	2$^+$	E1	0.00579 *8*	E_γ: weighted average of 665.6 *2* (1969Li10), 665.47 *16* (1982Ak03), 665.453 *22* (1989Si17), 665.49 *9* (1993Di09,1994Mo06) and 665.444 *10* (2002MoZP). Other: 670 *4* (1967Bu17) and 665.8 *5* (1967Ma51). Mult.: from $\gamma\gamma$(E2)(θ): A_2=−0.08 *5*, A_4=+0.10 *6* (1986Ta16) and α(K)exp=0.0046 *17* deduced from I(ce)665γ/I(ce)609γ=0.010 *4* (1960Lu07). I_γ: weighted average of 3.36 *37* (1982Ak03), 3.39 *11* (1989Si17), 3.51 *20* (1994Mo06), 3.42 *8* (1998Mo14), 3.33 *10* (2000Sa32), 3.386 *21* (2002MoZP) and 3.42 *6* (2004Mo07).
677.41[†] *15*	0.012 *5*	2694.62	(1$^-$,2$^+$)	2017.315	0$^+$			E_γ: weighted average of 677.41 *21* (1982Ak03) and 677.41 *15*

$^{214}_{84}$Po$_{130}$-23

$\gamma(^{214}$Po) (continued)

E_γ	I_γ[@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	α[&]	Comments
								(1993Di09,1994Mo06). I_γ: from 1982Ak03, 1993Di09 and 1994Mo06.
683.21 *6*	0.180 *19*	2447.701	1^-	1764.520	1^+	[E1]	0.00551 *8*	E_γ: weighted average of 683.3 *5* (1969Li10), 683.13 *17* (1982Ak03), 683.22 *6* (1989Si17) and 683.2 *9* (1993Di09,1994Mo06). I_γ: weighted average of 0.18 *3* (1982Ak03), 0.171 *19* (1989Si17), 0.18 *2* (1994Mo06) and 0.190 *20* (2000Sa32).
687.56 *21*	0.015 *4*	2698.60	$(1,2)^+$	2010.831	(2^+)			E_γ: weighted average of 687.51 *24* (1982Ak03), 687.7 *6* (1989Si17) and 687.58 *21* (1993Di09,1994Mo06). I_γ: weighted average of 0.016 *5* (1982Ak03), 0.013 *6* (1989Si17), 0.015 *4* (1994Mo06) and 0.014 *5* (2000Sa32).
693.1[‡a] *2*	0.012 *4*	2423.25	$(1,2^+)$	1729.613	2^+			E_γ: weighted average of 693.3 *8* (1969Li10), 693.00 *24* (1982Ak03) and 693.3 *5* (1989Si17). I_γ: weighted average of 0.012 *5* (1982Ak03), 0.013 *6* (1989Si17) and 0.012 *4* (2000Sa32).
697.89 *10*	0.132 *16*	1712.93	(3^+)	1015.041	(4^+)	[M1,E2]	0.034 *19*	E_γ: weighted average of 698.4 *4* (1969Li10), 697.83 *17* (1982Ak03), 697.90 *25* (1989Si17) and 697.87 *10* (1993Di09, 1994Mo06). I_γ: weighted average of 0.14 *2* (1982Ak03), 0.081 *15* (1989Si17), 0.14 *2* (1994Mo06) and 0.150 *10* (2000Sa32).
699.86[†] *18*	0.040 *9*	2694.62	$(1^-,2^+)$	1994.639	1^-			E_γ: weighted average of 699.94 *27* (1982Ak03) and 699.82 *18* (1993Di09,1994Mo06). I_γ: weighted average of 0.044 *9* (1982Ak03) and 0.035 *10* (1993Di09,1994Mo06).
703.10 *4*	1.06 *4*	2118.535	1^+	1415.498	0^+	[M1]	0.0519 *7*	E_γ: weighted average of 703.1 *2* (1969Li10), 703.06 *16* (1982Ak03), 703.11 *4* (1989Si17) and 703.09 *9* (1993Di09,1994Mo06). Other: 703.2 *8* (1967Ma51). I_γ: weighted average of 1.08 *15* (1982Ak03), 1.02 *4* (1989Si17), 1.11 *7* (1994Mo06) and 1.12 *8* (2000Sa32).
704.96 *25*	0.103 *21*	2447.701	1^-	1742.99	$0^{(+)}$	[E1]	0.00519 *7*	E_γ: weighted average of 704.9 *5* (1989Si17) and 704.97 *25* (1993Di09,1994Mo06). I_γ: weighted average of 0.094 *21* (1989Si17), 0.11 *3* (1994Mo06) and 0.113 *29* (2000Sa32).
708.95 *23*	0.027 *3*	2719.26	1^+	2010.831	(2^+)			E_γ: weighted average of 709.12 *30* (1982Ak03) and 708.7 *6* (1989Si17) and 708.89 *23* (1993Di09,1994Mo06). I_γ: weighted average of 0.031 *9* (1982Ak03), 0.030 *9* (1989Si17), 0.042 *11* (1994Mo06) and 0.025 *3* (2000Sa32).
710.27[†a] *8*		2423.25	$(1,2^+)$	1712.93	(3^+)			E_γ: from 1993Di09 and 1994Mo06.
710.69 *10*	0.163 *4*	2088.44	$(1,2^+)$	1377.681	2^+			E_γ: weighted average of 710.8 *6* (1969Li10), 710.66 *17* (1982Ak03), 710.8 *2* (1989Si17) and 710.67 *10* (1993Di09,1994Mo06). Other: 710 *4* (1967Bu17). I_γ: weighted average of 0.16 *2* (1982Ak03), 0.162 *4* (1989Si17), 0.16 *2* (1994Mo06) and 0.170 *9* (2000Sa32).
719.86 *3*	0.90 *3*	1994.639	1^-	1274.765	3^-	E2	0.01424 *20*	E_γ: weighted average of 719.9 *2* (1969Li10), 719.87 *17* (1982Ak03), 719.86 *3* (1989Si17) and 719.91 *12* (1993Di09,1994Mo06). Other: 720.2 *8* (1967Ma51).

$^{214}_{84}$Po$_{130}$-24

$\gamma(^{214}$Po) (continued)

E_γ	I_γ[@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	δ	α[&]	Comments
									I_γ: weighted average of 0.90 *13* (1982Ak03), 0.87 *4* (1989Si17), 0.91 *8* (1994Mo06) and 0.91 *3* (2000Sa32). Mult.: from α(K)exp=0.0099 (1967Ma51).
723.01 *12*	0.080 *9*	2266.41	2^+	1543.370	2^+	E2		0.01411 *20*	E_γ: weighted average of 722.93 *19* (1982Ak03), 723.4 *3* (1989Si17) and 722.98 *12* (1993Di09,1994Mo06). Mult.: α(K)exp=0.010 *4* (1960Lu07). I_γ: weighted average of 0.075 *11* (1982Ak03), 0.10 *5* (1989Si17), 0.073 *9* (1994Mo06) and 0.107 *15* (2000Sa32).
^{x}727 *1*	0.08 *3*								E_γ: from 1969Li10. I_γ: from 2000Sa32.
733.81 *10*	0.089 *8*	2728.617	$(0^+,1,2)$	1994.639	1^-				E_γ: weighted average of 734.3 *6* (1969Li10), 733.90 *17* (1982Ak03), 733.65 *10* (1989Si17) and 733.92 *10* (1993Di09,1994Mo06). I_γ: weighted average of 0.086 *12* (1982Ak03), 0.102 *13* (1989Si17), 0.085 *8* (1994Mo06) and 0.092 *17* (2000Sa32).
740.77 *13*	0.095 *5*	2118.535	1^+	1377.681	2^+	[M1,E2]		0.029 *16*	E_γ: weighted average of 740.83 *20* (1982Ak03), 741.5 *10* (1989Si17) and 740.73 *13* (1993Di09,1994Mo06). I_γ: weighted average of 0.11 *2* (1982Ak03), 0.09 *4* (1989Si17), 0.088 *13* (1994Mo06) and 0.095 *5* (2000Sa32).
752.84 *3*	0.29 *2*	2482.460	$(1^-,2^+)$	1729.613	2^+				E_γ: weighted average of 753.0 *3* (1969Li10), 752.84 *17* (1982Ak03), 752.84 *3* (1989Si17) and 752.86 *9* (1993Di09,1994Mo06). I_γ: weighted average of 0.30 *4* (1982Ak03), 0.29 *3* (1989Si17), 0.28 *2* (1994Mo06) and 0.28 *4* (2000Sa32).
768.360 *7*	10.76 *3*	1377.681	2^+	609.318	2^+	M1+E2	3.81 *13*	0.01429 *24*	E_γ: weighted average of 768.4 *2* (1969Li10), 768.36 *16* (1982Ak03), 768.361 *18* (1989Si17), 768.356 *10* (1993Di09,1994Mo06) and 768.362 *7* (2002MoZP). Other: 768.8 *5* (1967Ma51) and 770 *4* (1967Bu17). Mult.,δ: α(K)exp=0.0112 *8*; K/L=4.1 *5* (1960Lu07); others: K/L=3.95 *20* and K/M=10.5 *15* (1960Ma05); K/L=4.6 *12* (1957Ni11); α(K)exp=0.011 (1967Ma51); $\gamma\gamma$(E2)(θ): $A_2=-0.29$ *6*, $A_4=0.36$ *10* (1986Ta16). I_γ: weighted average of 11.9 *17* (1982Ak03), 10.60 *19* (1989Si17), 10.91 *8* (1994Mo06), 10.83 *22* (1998Mo14), 10.39 *31* (2000Sa32), 10.77 *3* (2002MoZP) and 10.68 *5* (2004Mo07).
769.7[‡] *5*	0.064 *21*	2147.86	$(1^-,2^+)$	1377.681	2^+				E_γ: from 1989Si17. Other: 768.8 *5* (1967Ma51). I_γ: from 1989Si17.
786.35 *16*	0.70 *9*	2447.701	1^-	1661.282	2^+	[E1]		0.00422 *6*	E_γ: weighted average of 786.1 *4* (1969Li10), 786.1 *4* (1989Si17) and 786.43 *16* (1993Di09,1994Mo06). I_γ: weighted average of 0.68 20 (1989Si17) and 0.70 *10* (2000Sa32).
788.2 *3*	0.032 *6*	2204.103	1^+	1415.498	0^+	[M1]		0.0385 *5*	E_γ: weighted average of 787.85 *30* (1982Ak03), 789.0 *5* (1989Si17) and 788.2 *5* (1993Di09,1994Mo06).

$^{214}_{84}Po_{130}$-25

γ(^{214}Po) (continued)

E_γ	I_γ[@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	α[&]	Comments
								I_γ: weighted average of 0.057 *14* (1982Ak03), 0.026 *6* (1989Si17), 0.041 *8* (1994Mo06) and 0.020 *10* (2000Sa32).
^{x}803.1	0.010 *3*							E_γ,I_γ: from 2000Sa32.
806.179 *10*	2.778 *14*	1415.498	0^+	609.318	2^+	E2	0.01127 *16*	E_γ: weighted average of 806.2 *2* (1969Li10), 806.17 *17* (1982Ak03), 806.174 *18* (1989Si17), 806.18 *9* (1993Di09,1994Mo06) and 806.181 *10* (2002MoZP). Other: 806.5 *5* (1967Ma51). Mult.: from α(K)exp=0.0073 *12* (1960Lu07); other: α(K)exp=0.083 (1967Ma51); K/L=3.0 *15* (1957Ni11); $\gamma\gamma$(E2)(θ): A_2=0.22 *3*, A_4=1.27 *4* (1986Ta16). I_γ: weighted average of 2.92 *43* (1982Ak03), 2.67 *6* (1989Si17), 2.90 *22* (1994Mo06), 2.81 *24* (1998Mo14), 2.76 *11* (2000Sa32), 2.777 *14* (2002MoZP) and 2.791 *20* (2004Mo07).
814.92 *11*	0.086 *8*	2192.536	$(2)^+$	1377.681	2^+			E_γ: weighted average of 815 *1* (1969Li10), 814.86 *19* (1982Ak03), 815.08 *15* (1989Si17) and 814.86 *11* (1993Di09,1994Mo06). I_γ: weighted average of 0.087 *13* (1982Ak03), 0.087 *15* (1989Si17), 0.081 *8* (1994Mo06) and 0.110 *20* (2000Sa32).
821.18 *3*	0.36 *3*	2482.460	$(1^-,2^+)$	1661.282	2^+			E_γ: weighted average of 821.2 *3* (1969Li10), 821.17 *17* (1982Ak03), 821.18 *3* (1989Si17) and 821.19 *10* (1993Di09,1994Mo06). Other: 821.7 *10* (1967Ma51) and 825 *5* (1967Bu17). I_γ: weighted average of 0.37 *6* (1982Ak03), 0.33 *3* (1989Si17), 0.36 *3* (1994Mo06) and 0.37 *3* (2000Sa32).
826.41 *11*	0.23 *3*	2204.103	1^+	1377.681	2^+	[M1+E2]	0.022 *12*	E_γ: weighted average of 826 *1* (1969Li10), 826.40 *19* (1982Ak03), 826.2 *3* (1989Si17) and 826.44 *11* (1993Di09,1994Mo06). I_γ: weighted average of 0.29 *4* (1982Ak03), 0.200 *15* (1989Si17), 0.28 *3* (1994Mo06) and 0.29 *4* (2000Sa32).
832.37 *11*	0.062 *6*	1847.446	2^+	1015.041	(4^+)			E_γ: weighted average of 832.0 *6* (1969Li10), 832.35 *19* (1982Ak03), 832.35 *20* (1989Si17) and 832.39 *11* (1993Di09,1994Mo06). I_γ: weighted average of 0.064 *10* (1982Ak03), 0.049 *11* (1989Si17), 0.062 *6* (1994Mo06) and 0.080 *13* (2000Sa32).
840.4[‡] *5*	0.021 *6*	2604.68	(2^+)	1764.520	1^+			E_γ: from 1989Si17. I_γ: weighted average of 0.019 *6* (1989Si17) and 0.025 *8* (2000Sa32).
847.14[†] *11*	0.055 *7*	2694.62	$(1^-,2^+)$	1847.446	2^+			E_γ: weighted average of 847.07 *19* (1982Ak03) and 847.16 *11* (1993Di09,1994Mo06). I_γ: weighted average of 0.052 *12* (1982Ak03), 0.057 *7* (1994Mo06) and 0.053 *15* (2000Sa32).
866.0[†] *8*		2630.84	$(1,2^+)$	1764.520	1^+			E_γ: from 1993Di09 and 1994Mo06.
872.95 *19*	0.038 *9*	2147.86	$(1^-,2^+)$	1274.765	3^-			E_γ: weighted average of 872.51 *36* (1982Ak03), 873.0 *5* (1989Si17) and 873.07 *19* (1993Di09,1994Mo06). I_γ: weighted average of 0.032 *10* (1982Ak03), 0.036 *13* (1989Si17), 0.042 *9* (1994Mo06) and 0.040 *10* (2000Sa32).
878.02[†] *12*	0.024 *6*	2293.362	$(1^+,2^+)$	1415.498	0^+			E_γ: weighted average 877.91 *36* (1982Ak03) and 878.03 *12* (1993Di09,1994Mo06). I_γ: weighted average of 0.022 *7* (1982Ak03) and 0.026 *6* (1993Di09,1994Mo06).

γ(^{214}Po) (continued)

E_γ	I_γ[@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	δ	α[&]	Comments
891.8[†] 3		2604.68	(2$^+$)	1712.93	(3$^+$)				E_γ: from 1993Di09 and 1994Mo06.
904.35 9	0.16 2	2447.701	1$^-$	1543.370	2$^+$	[E1]		0.00326 5	E_γ: weighted average of 904.1 5 (1969Li10), 904.30 17 (1982Ak03), 904.25 25 (1989Si17) and 904.38 9 (1993Di09,1994Mo06). I_γ: weighted average of 0.15 2 (1982Ak03), 0.23 3 (1989Si17), 0.14 2 (1994Mo06) and 0.16 4 (2000Sa32).
915.73 15	0.053 6	2293.362	(1$^+$,2$^+$)	1377.681	2$^+$				E_γ: weighted average of 915.68 24 (1982Ak03), 915.8 4 (1989Si17) and 915.74 15 (1993Di09,1994Mo06). I_γ: weighted average of 0.070 14 (1982Ak03), 0.049 13 (1989Si17), 0.065 8 (1994Mo06) and 0.043 6 (2000Sa32).
917.7[†] 3	0.010 7	2192.536	(2)$^+$	1274.765	3$^-$				E_γ: weighted average of 917.73 36 (1982Ak03) and 917.73 29 (1993Di09,1994Mo06). I_γ: from 1982Ak03 and 1994Mo06.
930.2 2	0.058 17	2694.62	(1$^-$,2$^+$)	1764.520	1$^+$				E_γ: weighted average of 930.5 5 (1989Si17) and 930.15 17 (1993Di09,1994Mo06). I_γ: weighted average of 0.043 11 (1989Si17), 0.10 2 (1993Di09,1994Mo06) and 0.08 3 (2000Sa32).
934.056 8	6.81 3	1543.370	2$^+$	609.318	2$^+$	M1+E2	0.37 24	0.0228 25	E_γ: weighted average of 934.0 2 (1969Li10), 934.052 20 (1989Si17), 934.061 12 (1993Di09,1994Mo06) and 934.054 8 (2002MoZP). Mult.,δ: from α(K)exp=0.0188 9; K/L=5.3 7 (1960Lu07); K/L=5.4 3 (1957Ni11); others: α(K)exp=0.0188 (1967Ma51); $\gamma\gamma$(E2)(θ): A_2=0.41 6, A_4=0.06 8 (1986Ta16). I_γ: weighted average of 7.0 9 (1982Ak03), 6.87 13 (1989Si17), 6.81 14 (1998Mo14), 6.88 5 (1994Mo06), 6.70 20 (2000Sa32), 6.83 4 (2002MoZP) and 6.78 3 (2004Mo07).
934.1 2	0.107 21	2208.69	(2$^-$,3)	1274.765	3$^-$				E_γ: weighted average of 934.0 5 (1989Si17) and 934.10 20 (1993Di09,1994Mo06). I_γ: from 1989Si17.
934.5[‡] 5	0.021 6	2698.60	(1,2)$^+$	1764.520	1$^+$				E_γ,I_γ: from 1989Si17.
938.65[†] 16	0.028 8	2785.97	(1,2$^+$)	1847.446	2$^+$				E_γ: weighted average of 938.64 20 (1982Ak03) and 938.65 16 (1993Di09,1994Mo06). I_γ: weighted average of 0.030 8 (1982Ak03) and 0.028 8 (1993Di09,1994Mo06).
939.6[‡] 5	0.043 9	2482.460	(1$^-$,2$^+$)	1543.370	2$^+$				E_γ: from 1989Si17. I_γ: weighted average of 0.038 13 (1989Si17) and 0.045 9 (2000Sa32).
943.33 12	0.036 6	2604.68	(2$^+$)	1661.282	2$^+$				E_γ: weighted average of 943.31 20 (1982Ak03), 943.3 4 (1989Si17) and 943.34 12 (1993Di09,1994Mo06). I_γ: weighted average of 0.034 8 (1982Ak03), 0.036 13 (1989Si17), 0.037 6 (1994Mo06) and 0.050 26 (2000Sa32).
949.8[†] 3	0.011 5	2662.33	(2$^+$)	1712.93	(3$^+$)				E_γ: weighted average of 949.81 36 (1982Ak03) and 949.83 50 (1993Di09,1994Mo06).

$\gamma(^{214}$Po) (continued)

E_γ	I_γ [@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α [&]	Comments
								I_γ: weighted average of 0.009 *6* (1982Ak03) and 0.012 *5* (1993Di09,1994Mo06).
952.2[†] *8*	0.013 *5*	2694.62	$(1^-,2^+)$	1742.99	$0^{(+)}$			E_γ,I_γ: from 1993Di09 and 1994Mo06.
961.66 *17*	0.023 *3*	2505.34	$(1^-,2^+)$	1543.370	2^+			E_γ: weighted average of 961.84 *36* (1982Ak03), 962 *1* (1989Si17) and 961.61 *17* (1993Di09,1994Mo06). I_γ: weighted average of 0.046 *12* (1982Ak03), 0.021 *10* (1989Si17), 0.03 *2* (1994Mo06) and 0.022 *3* (2000Sa32).
964.08 *3*	0.82 *4*	2728.617	$(0^+,1,2)$	1764.520	1^+			E_γ: weighted average of 964.1 *3* (1969Li10), 964.10 *17* (1982Ak03), 964.08 *3* (1989Si17) and 964.11 *10* (1993Di09,1994Mo06). Other: 964.8 *10* (1967Ma51). I_γ: weighted average of 0.82 *10* (1982Ak03), 0.83 *4* (1989Si17), 0.80 *5* (1994Mo06) and 0.80 *7* (2000Sa32).
965.00[‡] *10*	0.023 *7*	2508.12	(0^+)	1543.370	2^+			E_γ: from 1989Si17. Placement from 965γ and 934γ coincidence (1989Si17). Possible placement between the 2694- and 1729-keV levels from the energy fit (1994Mo06). I_γ: weighted average of 0.021 *10* (1989Si17) and 0.024 *7* (2000Sa32).
965.00[†] *10*		2694.62	$(1^-,2^+)$	1729.613	2^+			E_γ: from 1993Di09 and 1994Mo06.
976.18 *12*	0.033 *5*	2719.26	1^+	1742.99	$0^{(+)}$			E_γ: weighted average of 976.18 *19* (1982Ak03) and 976.2 *10* (1989Si17) and 976.18 *12* (1993Di09,1994Mo06). I_γ: weighted average of 0.029 *8* (1982Ak03), 0.049 *26* (1989Si17), 0.033 *5* (1994Mo06) and 0.035 *13* (2000Sa32).
^{x}989.29 *17*	0.017 *6*							E_γ: weighted average of 989.04 *36* (1982Ak03) and 989.34 *17* (1993Di09). I_γ: weighted average of 0.009 *6* (1982Ak03) and 0.022 *5* (1993Di09).
991.56[†] *19*	0.021 *5*	2266.41	2^+	1274.765	3^-	[E1]	0.00276 *4*	E_γ: weighted average of 991.83 *36* (1982Ak03) and 991.49 *19* (1993Di09,1994Mo06). I_γ: weighted average of 0.015 *7* (1982Ak03), 0.022 *5* (1993Di09,1994Mo06) and 0.050 *22* (2000Sa32).
1011.8[†] *8*		3022.3	$(2^-,3,4^+)$	2010.831	(2^+)			E_γ: from 1993Di09 and 1994Mo06.
1013.4[‡] *10*	0.029 *8*	2860.93	$(1,2^+)$	1847.446	2^+			E_γ: from 1989Si17, not assigned to ^{214}Po in 1993Di09. I_γ: weighted average of 0.021 *13* (1989Si17) and 0.034 *11* (2000Sa32).
1021.4 *3*	0.033 *6*	2785.97	$(1,2^+)$	1764.520	1^+			E_γ: weighted average of 1020.5 *6* (1989Si17) and 1021.53 *19* (1993Di09,1994Mo06). I_γ: weighted average of 0.026 *13* (1989Si17), 0.034 *6* (1994Mo06) and 0.036 *15* (2000Sa32).
1032.39 *8*	0.14 *2*	2447.701	1^-	1415.498	0^+	[E1]	0.00257 *4*	E_γ: weighted average of 1032.5 *6* (1969Li10), 1032.37 *8* (1989Si17) and 1032.46 *17* (1993Di09,1994Mo06). I_γ: weighted average of 0.21 *4* (1989Si17), 0.13 *1* (1994Mo06) and 0.17 *3* (2000Sa32).
1033.31 *18*	0.045 *7*	2694.62	$(1^-,2^+)$	1661.282	2^+			E_γ: weighted average of 1033.2 *10* (1989Si17) and 1033.31 *18* (1993Di09,1994Mo06). I_γ: weighted average of 0.051 *13* (1989Si17) and 0.043 *7* (2000Sa32).
1038.0[‡] *6*	0.017 *4*	2698.60	$(1,2)^+$	1661.282	2^+			E_γ,I_γ: from 1989Si17.

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γ(^{214}Po) (continued)

E_γ	I_γ[@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	δ	α[&]	Comments
1038.0[†] *2*	0.018 *3*	2802.54		1764.520	1$^+$				E_γ,I_γ: from 1993Di09 and 1994Mo06; other: 0.030 *10* (2000Sa32).
1045.73 *16*	0.047 *6*	2423.25	(1,2$^+$)	1377.681	2$^+$				E_γ: weighted average of 1045.4 *6* (1989Si17) and 1045.76 *17* (1993Di09,1994Mo06). I_γ: weighted average of 0.029 *15* (1989Si17), 0.051 *6* (1994Mo06) and 0.037 *20* (2000Sa32).
1051.96 *3*	0.688 *22*	1661.282	2$^+$	609.318	2$^+$	[M1,E2]		0.012 *6*	E_γ: weighted average of 1052.0 *3* (1969Li10), 1051.96 *3* (1989Si17) and1051.97 *15* (1993Di09, 1994Mo06). Other: 1052.4 *1.5* (1967Ma51). I_γ: weighted average of 0.68 *3* (1989Si17), 0.66 *5* (1994Mo06) and 0.72 *4* (2000Sa32).
(1058.1[‡])	0.018 *6*	2719.26	1$^+$	1661.282	2$^+$	[M1+E2]		0.012 *6*	E_γ: from 1989Si17, not assigned to ^{214}Po in 1993Di09. I_γ: from 2000Sa32.
(1062.4[‡])	0.028 *17*	2826.82	(1,2$^+$)	1764.520	1$^+$				E_γ: from 1989Si17, assigned to ^{210}Pb in 1993Di09. I_γ: from 2000Sa32; other: <0.021 (1989Si17).
1067.4 *3*	0.056 *13*	2728.617	(0$^+$,1,2)	1661.282	2$^+$				E_γ: weighted average of 1066.9 *8* (1989Si17) and 1067.50 *27* (1993Di09,1994Mo06). I_γ: weighted average of 0.062 *26* (1989Si17), 0.055 *20* (1994Mo06) and 0.051 *24* (2000Sa32).
1069.97 *8*	0.60 *4*	2447.701	1$^-$	1377.681	2$^+$	[E1]		2.41×10^{-3} *3*	E_γ: weighted average of 1070.0 *3* (1969Li10), 1069.96 *8* (1989Si17) and 1070.01 *16* (1993Di09,1994Mo06). I_γ: weighted average of 0.62 *4* (1989Si17), 0.56 *4* (1994Mo06) and 0.65 *6* (2000Sa32).
(1087.4[‡])	0.033 *15*	2630.84	(1,2$^+$)	1543.370	2$^+$				E_γ: from 1989Si17; assigned to ^{210}Pb in 1993Di09. I_γ: from 2000Sa32.
1103.70 *19*	0.21 *3*	1712.93	(3$^+$)	609.318	2$^+$	[M1,E2]		0.011 *5*	E_γ: weighted average of 1104.0 *4* (1969Li10), 1103.7 *3* (1989Si17), 1103.64 *19* (1993Di09,1994Mo06). I_γ: weighted average of 0.21 *11* (1989Si17), 0.21 *3* (1994Mo06) and 0.24 *7* (2000Sa32).
1104.68 *19*	0.168 *9*	2482.460	(1$^-$,2$^+$)	1377.681	2$^+$				E_γ: weighted average of 1104.0 *4* (1969Li10), 1104.8 *3* (1989Si17) and 1104.79 *19* (1993Di09,1994Mo06). I_γ: weighted average of 0.17 *1* (1989Si17), 0.16 *3* (1994Mo06) and 0.16 *3* (2000Sa32).
1108.8[‡]	0.015 *5*	2769.91	(1,2$^+$)	1661.282	2$^+$				E_γ: from 1989Si17, not assigned to ^{214}Po in 1993Di09. I_γ: from 2000Sa32.
1118.9[‡] *5*	0.085 *21*	2662.33	(2$^+$)	1543.370	2$^+$				E_γ,I_γ: from 1989Si17.
1120.294 *6*	32.79 *10*	1729.613	2$^+$	609.318	2$^+$	M1+E2	0.37 *20*	0.0144 *12*	E_γ: weighted average of 1120.4 *2* (1969Li10), 1120.276 *22* (1989Si17), 1120.287 *10* (1993Di09,1994Mo06) and 1120.301 *8* (2002MoZP). Other: 1120.8 *5* (1967Ma51), 1120 *3* (1967Bu17) and 1120 *2* (1969La03). Mult.,δ: from α(K)exp=0.00118 *5*; K/L=6.0 *4* (1960Lu07); K/L=5.6 *2* (1957Ni11); others: α(K)exp=0.0154 (1967Ma51); $\gamma\gamma$(E2)(θ): A_2=0.109

γ(^{214}Po) (continued)

E_γ	I_γ[@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	δ	α[&]	Comments
									6, A_4=0.011 *11* (1986Ta16). I_γ: weighted average of 32.6 *6* (1989Si17), 33.13 *22* (1994Mo06), 33.1 *6* (1998Mo14), 32.3 *10* (2000Sa32), 32.77 *12* (2002MoZP) and 32.74 *10* (2004Mo07).
1130.38 *20*	0.081 *9*	2508.12	(0$^+$)	1377.681	2$^+$				E_γ: weighted average of 1130.8 *4* (1989Si17) and 1130.29 *19* (1993Di09,1994Mo06). I_γ: weighted average of 0.10 *2* (1989Si17), 0.078 *9* (1994Mo06) and 0.080 *11* (2000Sa32).
1133.66 *3*	0.56 *2*	1742.99	0$^{(+)}$	609.318	2$^+$	(E2)		0.00578 *8*	E_γ: weighted average of 1133.8 *3* (1969Li10), 1133.66 *3* (1989Si17) and 1133.73 *15* (1993Di09,1994Mo06). I_γ: weighted average of 0.55 *2* (1989Si17), 0.56 *3* (1994Mo06) and 0.57 *3* (2000Sa32). Mult.: $\gamma\gamma$(E2)(θ): A_2=0.54 *10*, A_4=1.1 *2* (1989Si17).
1155.210 *8*	3.595 *17*	1764.520	1$^+$	609.318	2$^+$	M1+E2	+0.48 *18*	0.0127 *10*	E_γ: weighted average of 1155.3 *2* (1969Li10), 1155.19 *2* (1989Si17), 1155.22 *13* (1993Di09,1994Mo06) and 1155.214 *9* (2002MoZP). Other: 1155.5 *7* (1967Ma51), 1150 *4* (1967Bu17) and 1155 *2* (1969La03). Mult.,δ: from α(K)exp=0.0104 *12* (1960Lu07); others: α(K)exp=0.0091 (1967Ma51); $\gamma\gamma$(E2)(θ): A_2=−0.54 *3*, A_4=−0.02 *6* (1986Ta16). I_γ: weighted average of 3.67 *11* (1989Si17), 3.5 *4* (1994Mo06), 3.61 *10* (1998Mo14), 3.4 *7* (2000Sa32), 3.595 *17* (2002MoZP) and 3.59 *3* (2004Mo07).
1155.6[‡] *5*	0.034 *9*	2698.60	(1,2)$^+$	1543.370	2$^+$				E_γ,I_γ: from 1989Si17.
1156[‡] *1*	0.015 *6*	3003.4		1847.446	2$^+$				E_γ,I_γ: from 1989Si17.
1167.26 *18*	0.027 *4*	2544.92		1377.681	2$^+$				E_γ: weighted average of 1166.9 *10* (1989Si17) and 1167.27 *18* (1993Di09,1994Mo06). I_γ: weighted average of 0.026 *9* (1989Si17), 0.027 *4* (1994Mo06) and 0.028 *10* (2000Sa32).
1173.01 *10*	0.120 *11*	2447.701	1$^-$	1274.765	3$^-$	[E2]		0.00542 *8*	E_γ: weighted average of 1172.9 *6* (1969Li10), 1173.05 *10* (1989Si17) and 1172.90 *17* (1993Di09,1994Mo06). I_γ: weighted average of 0.13 *3* (1989Si17), 0.098 *12* (1994Mo06) and 0.132 *9* (2000Sa32).
1206.4[†] *8*		3053.88	(1,2$^+$)	1847.446	2$^+$				E_γ: from 1993Di09 and 1994Mo06.
1207.68 *3*	1.00 *4*	2482.460	(1$^-$,2$^+$)	1274.765	3$^-$				E_γ: weighted average of 1207.8 *3* (1969Li10), 1207.68 *3* (1989Si17) and 1207.72 *12* (1993Di09,1994Mo06). Other: 1207.8 *8* (1967Ma51) and 1208 *2* (1967Bu17). I_γ: weighted average of 1.00 *4* (1989Si17), 0.98 *6* (1994Mo06) and 1.04 *7* (2000Sa32).
1226.7[†] *3*	0.28 *11*	2604.68	(2$^+$)	1377.681	2$^+$				E_γ: from 1993Di09 and 1994Mo06. I_γ: from 1994Mo06.
1226.8[‡] *6*	0.066 *19*	2769.91	(1,2$^+$)	1543.370	2$^+$				E_γ: from 1989Si17.

γ(^{214}Po) (continued)

E_γ	I_γ[@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	α[&]	Comments
								I_γ: weighted average of 0.058 *19* (1989Si17) and 0.074 *20* (2000Sa32).
1230.6 *4*	0.018 *8*	2505.34	(1$^-$,2$^+$)	1274.765	3$^-$			E_γ: weighted average of 1230.5 *10* (1989Si17) and 1230.65 *38* (1993Di09,1994Mo06). I_γ: weighted average of 0.047 *24* (1989Si17), 0.015 *6* (1994Mo06) and 0.08 *4* (2000Sa32).
1238.122 *10*	12.83 *4*	1847.446	2$^+$	609.318	2$^+$	M1	0.01201 *17*	E_γ: weighted average of 1238.2 *2* (1969Li10), 1238.11 *3* (1989Si17), 1238.110 *12* (1993Di09,1994Mo06) and 1238.131 *10* (2002MoZP). Other: 1240 *4* (1967Bu17) and 1238 *2* (1969La03). Mult.: α(K)exp=0.0113 *11*, K/L=6.1 *+1.2−0.9* (1960Lu07); K/L=5.7 *3* (1957Ni11); others: α(K)εxp=0.0089 (1967Ma51); $\gamma\gamma$(E2)(θ): A_2=0.272 *9*, A_4=0.00 *2* (1986Ta16). I_γ: weighted average of 12.84 *13* (1989Si17), 12.87 *9* (1994Mo06), 12.97 *25* (1998Mo14), 12.7 *4* (2000Sa32), 12.83 *6* (2002De03), 12.80 *4* (2002MoZP) and 12.85 *5* (2004Mo07).
1253.14[†] *12*		2630.84	(1,2$^+$)	1377.681	2$^+$			E_γ: from 1993Di09 and 1994Mo06.
1279.0[‡] *7*	0.029 *5*	2940.67	(1$^-$,2$^+$)	1661.282	2$^+$			E_γ: from 1989Si17. I_γ: weighted average of 0.026 *6* (1989Si17) and 0.037 *10* (2000Sa32).
1280.976 *12*	3.158 *16*	1890.306	(2)$^+$	609.318	2$^+$	M1	0.01102 *15*	E_γ: weighted average of 1281.1 *2* (1969Li10), 1280.96 *2* (1989Si17), 1281.05 *14* (1993Di09,1994Mo06) and 1280.981 *12* (2002MoZP). Other: 1280 *5* (1967Bu17) and 1281 *2* (1969La03). Mult.: from α(K)exp=0.0094 *9* (1960Lu07); others: α(K)exp=0.0082 (1967Ma51); $\gamma\gamma$(E2)(θ): A_2=0.30 *8*, A_4=0.08 *12* (1986Ta16). I_γ: weighted average of 3.20 *11* (1989Si17), 3.17 *17* (1994Mo06), 3.19 *11* (1998Mo14), 3.15 *11* (2000Sa32), 3.159 *16* (2002MoZP) and 3.15 *3* (2004Mo07).
1284[‡] *1*	0.026 *2*	2662.33	(2$^+$)	1377.681	2$^+$			E_γ: from 1989Si17. I_γ: weighted average of 0.026 *2* (1989Si17) and 0.020 *7* (2000Sa32).
1285.1[‡] *5*	0.035 *9*	3014.11	(1,2$^+$)	1729.613	2$^+$			E_γ: from 1989Si17, not assigned to ^{214}Po in 1993Di09. I_γ: weighted average of 0.036 *9* (1989Si17) and 0.033 *9* (2000Sa32).
1303.75 *8*	0.23 *2*	2719.26	1$^+$	1415.498	0$^+$	M1	0.01054 *15*	E_γ: weighted average of 1303.8 *4* (1969Li10) and 1303.76 *8* (1989Si17) and 1303.73 *14* (1993Di09,1994Mo06). I_γ: weighted average of 0.26 *2* (1989Si17), 0.21 *2* (1994Mo06) and 0.20 *5* (2000Sa32). Mult.: from α(K)exp=0.015 (1967Ma51).
1316.99 *15*	0.18 *2*	2694.62	(1$^-$,2$^+$)	1377.681	2$^+$			E_γ: weighted average of 1317.1 *3* (1969Li10), 1316.96 *15* (1989Si17) and 1316.99 *15* (1993Di09,1994Mo06). I_γ: weighted average of 0.19 *2* (1989Si17), 0.16 *2* (1994Mo06) and 0.20 *3* (2000Sa32).
1317.7[†] *4*		2860.93	(1,2$^+$)	1543.370	2$^+$			E_γ: from 1993Di09 and 1994Mo06.
(1321.5[‡])	0.010 *5*	2698.60	(1,2)$^+$	1377.681	2$^+$			E_γ: from 1989Si17, assigned to ^{210}Pb in 1993Di09. I_γ: from 2000Sa32.
1329.94 *17*	0.026 *3*	2604.68	(2$^+$)	1274.765	3$^-$			E_γ: weighted average of 1330.0 *6* (1989Si17) and 1329.93 *17* (1993Di09,1994Mo06).

γ(^{214}Po) (continued)

E_γ	I_γ[@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	δ	α[&]	Comments
									I_γ: weighted average of 0.024 *13* (1989Si17), 0.026 *3* (1994Mo06) and 0.039 *17* (2000Sa32).
1341.49 *16*	0.047 *6*	2719.26	1^+	1377.681	2^+	[M1+E2]		0.0070 *28*	E_γ: weighted average of 1341.5 *3* (1989Si17) and 1341.49 *16* (1993Di09,1994Mo06). I_γ: weighted average of 0.049 *26* (1989Si17), 0.046 *6* (1994Mo06) and 0.059 *29* (2000Sa32).
1351[‡a] *1*	0.015 *4*	2728.617	$(0^+,1,2)$	1377.681	2^+				E_γ: from 1989Si17. I_γ: weighted average of 0.021 *11* (1989Si17) and 0.014 *4* (2000Sa32).
1353.0[‡] *8*	0.0098 *25*	3014.11	$(1,2^+)$	1661.282	2^+				E_γ: from 1989Si17, assigned to ^{210}Pb in 1993Di09. I_γ: from 1989Si17.
1361.2[†] *8*		3022.3	$(2^-,3,4^+)$	1661.282	2^+				E_γ: from 1993Di09 and 1994Mo06.
1370.5	0.022 *5*	2785.97	$(1,2^+)$	1415.498	0^+				E_γ: from 1989Si17. I_γ: from 2000Sa32; other: <0.021 (1989Si17).
1377.669 *12*	8.77 *3*	1377.681	2^+	0.0	0^+	E2		0.00404 *6*	E_γ: weighted average of 1377.7 *2* (1969Li10), 1377.65 *3* (1989Si17), 1377.669 *12* (1993Di09,1994Mo06) and 1377.671 *12* (2002MoZP). Other: 1380 *4* (1967Bu17) and 1378 *2* (1969La03). Mult.: from α(K)exp=0.0026 *6* (1960Lu07); other: 0.0027 (1967Ma51). I_γ: weighted average of 8.72 *19* (1989Si17), 8.82 *12* (1994Mo06), 8.91 *18* (1998Mo14), 8.52 *25* (2000Sa32), 8.79 *3* (2002MoZP) and 8.72 *4* (2004Mo07).
1385.310 *14*	1.762 *16*	1994.639	1^-	609.318	2^+	D			E_γ: weighted average of 1385.4 *3* (1969Li10), 1385.31 *3* (1989Si17), 1385.30 *11* (1993Di09,1994Mo06) and 1385.310 *14* (2002MoZP). Other: 1380 *4* (1967Bu17) and 1385 *2* (1969La03). I_γ: weighted average of 1.68 *6* (1989Si17), 1.81 *3* (1994Mo06), 1.76 *5* (2000Sa32) and 1.755 *16* (2002MoZP). Mult.: from $\gamma\gamma$(E2)(θ): A_2=0.19 *10*, A_4=−0.21 *19* (1986Ta16).
1387.5[†] *2*		2662.33	(2^+)	1274.765	3^-				E_γ: from 1993Di09 and 1994Mo06.
1392.5[‡a] *4*	0.037 *15*	2769.91	$(1,2^+)$	1377.681	2^+				E_γ: from 1989Si17, assigned to ^{210}Pb in 1993Di09. I_γ: weighted average of 0.041 *19* (1989Si17) and 0.035 *15* (2000Sa32).
1401.515 *13*	2.933 *13*	2010.831	(2^+)	609.318	2^+	(M1+E2)	+1.6 *5*	0.0053 *8*	E_γ: weighted average of 1401.6 *3* (1969Li10), 1401.50 *4* (1989Si17), 1401.52 *11* (1993Di09,1994Mo06) and 1401.516 *13* (2002MoZP). Other: 1402 *2* (1969La03). Mult.,δ: from $\gamma\gamma$(E2)(θ): A_2=−0.37 *2*, A_4=0.25 *4* (1986Ta16). I_γ: weighted average of 3.01 *9* (1989Si17), 2.91 *16* (1994Mo06), 2.96 *9* (1998Mo14), 3.0 *4* (2000Sa32), 2.934 *13* (2002MoZP) and 2.927 *20* (2004Mo07).
1407.988 *12*	5.256 *19*	2017.315	0^+	609.318	2^+	(E2)		0.00389 *5*	E_γ: weighted average of 1408.0 *2* (1969Li10), 1407.98 *4*

γ(^{214}Po) (continued)

E_γ	I_γ @	E_i(level)	J^π_i	E_f	J^π_f	Mult.	δ	α &	$I_{(\gamma+ce)}$ @	Comments
										(1989Si17), 1407.99 *11* (1993Di09,1994Mo06) and 1407.989 *12* (2002MoZP). Other: 1407 *4* (1967Bu17) and 1408 *2* (1969La03). Mult.: from $\gamma\gamma$(E2)(θ) (1986Ta16). I_γ: weighted average of 5.37 *9* (1989Si17), 5.37 *6* (1994Mo06), 5.38 *12* (1998Mo14), 5.5 *5* (2000Sa32), 5.23 *3* (2002De03), 5.250 *19* (2002MoZP) and 5.24 *4* (2004Mo07).
1415.495 *10*		1415.498	0^+	0.0	0^+	E0			1.12 *3*	E_γ: from level-energy difference. ce measurement: 1415.9 (1954Ml77, 1960Lu07). $I_{(\gamma+ce)}$: weighted average of 1.14 *4* from I(ce(K) 1415)/I(ce(K) 609γ)=25.0/45.0 *15*=0.651 *19* (1960Lu07) with α(K)/α(tot)(1415)=0.8536 and α(K)(609γ)=0.01489 *21*; and 1.08 *5* from I(ce(L) 1415)/I(ce(K) 609γ)=4.76 *20*/45.0 *15*=0.106 *4* (1960Lu07) with α(L)/α(tot)(1415)=0.1465 and α(K)(609γ)=0.01489 *21*. Mult.: from ce measurement 1960Lu07.
1419.70 *29*	0.011 *2*	2694.62	$(1^-,2^+)$	1274.765	3^-					E_γ: weighted average of 1419.7 *6* (1989Si17) and 1419.70 *29* (1993Di09,1994Mo06). I_γ: weighted average of 0.011 *2* (1989Si17), 0.011 *3* (1994Mo06) and 0.013 *3* (2000Sa32).
(1448.85‡ *24*)	0.04 *2*	2826.82	$(1,2^+)$	1377.681	2^+					E_γ: from 1989Si17, not assigned to ^{214}Po in 1993Di09. I_γ: from 2000Sa32; other: <0.021 (1989Si17).
1471.1‡ *6*	0.0035 *15*	3014.11	$(1,2^+)$	1543.370	2^+					E_γ: from 1989Si17, not assigned to ^{214}Po in 1993Di09. I_γ: from 2000Sa32.
1479.19 *12*	0.122 *17*	2088.44	$(1,2^+)$	609.318	2^+					E_γ: weighted average of 1479.2 *7* (1969Li10), 1479.22 *12* (1989Si17) and 1479.15 *14* (1993Di09,1994Mo06). Other: 1480 *2* (1969La03). I_γ: weighted average of 0.149 *17* (1989Si17), 0.11 *1* (1994Mo06) and 0.14 *3* (2000Sa32).
(1481.3‡)	0.0020 *7*	3142.6	$(1,2^+)$	1661.282	2^+					E_γ: from 1989Si17, assigned to ^{210}Pb in 1993Di09. I_γ: from 2000Sa32; other: <0.011 (1989Si17).
(1483.5‡)	0.028 *10*	2860.93	$(1,2^+)$	1377.681	2^+					E_γ: from 1989Si17, assigned to ^{210}Pb in 1993Di09. I_γ: from 2000Sa32; other: <0.021 (1989Si17).
1509.211 *10*	4.68 *3*	2118.535	1^+	609.318	2^+	(M1+E2)	−0.056 *22*	0.00733 *10*		E_γ: weighted average of 1509.3 *3* (1969Li10),

γ(^{214}Po) (continued)

E_γ	I_γ[@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[&]	Comments
								1509.19 *4* (1989Si17), 1509.228 *15* (1993Di09,1994Mo06) and 1509.198 *14* (2002MoZP). Other: 1510 *4* (1967Bu17) and 1510 *2* (1969La03). Mult.,δ: from $\gamma\gamma$(E2)(θ): A_2=−0.19 *2*, A_4=0.01 *4* (1986Ta16). I_γ: weighted average of 4.75 *13* (1989Si17), 4.76 *5* (1994Mo06), 4.75 *15* (1998Mo14), 4.63 *15* (2000Sa32), 4.61 *6* (2002De03), 4.67 *3* (2002MoZP) and 4.63 *6* (2004Mo07).
(1515.7[‡])	0.039 *10*	2893.60	(1,2$^+$)	1377.681	2$^+$			E_γ: from 1989Si17, not assigned to ^{214}Po in 1993Di09. I_γ: from 2000Sa32; other: <0.021 (1989Si17).
1532.8 *8*		3262.4		1729.613	2$^+$			E_γ: from 1993Di09.
1538.53 *6*	0.96 *5*	2147.86	(1$^-$,2$^+$)	609.318	2$^+$	D(+Q)		E_γ: weighted average of 1538.7 *3* (1969Li10), 1538.50 *6* (1989Si17) and 1538.66 *14* (1993Di09,1994Mo06). Mult.: from $\gamma\gamma$(E2)(θ): A_2=−0.21 *5*, A_4=0.01 *6* (1989Si17). I_γ: weighted average of 0.90 *13* (1989Si17), 0.95 *6* (1994Mo06) and 0.98 *5* (2000Sa32).
1543.33 *6*	0.68 *3*	1543.370	2$^+$	0.0	0$^+$	[E2]	0.00333 *5*	E_γ: weighted average of 1543.3 *4* (1969Li10), 1543.32 *6* (1989Si17) and 1543.38 *13* (1993Di09,1994Mo06). Other: 1541 *15* (1966Hu03), 1540 *4* (1967Bu17) and 1544 *2* (1969La03). I_γ: weighted average of 0.77 *11* (1989Si17), 0.68 *4* (1994Mo06) and 0.67 *3* (2000Sa32).
1583.203 *17*	1.557 *13*	2192.536	(2)$^+$	609.318	2$^+$	M1	0.00655 *9*	E_γ: weighted average of 1583.3 *3* (1969Li10), 1583.22 *4* (1989Si17), 1583.21 *12* (1993Di09,1994Mo06) and 1583.200 *17* (2002MoZP). Other: 1585 *4* (1967Bu17) and 1584 *2* (1969La03). Mult.: from α(K)exp=0.0062 *9* (1960Lu07); others: α(K)exp=0.0091 (1967Ma51); $\gamma\gamma$(E2)(θ): A_2=0.38 *3*, A_4=0.10 *6* (1986Ta16). I_γ: weighted average of 1.56 *6* (1989Si17), 1.58 *8* (1994Mo06), 1.64 *17* (2000Sa32) and 1.556 *13* (2002MoZP).
1594.75 *8*	0.60 *4*	2204.103	1$^+$	609.318	2$^+$	[M1+E2]	0.0048 *16*	E_γ: weighted average of 1594.8 *4* (1969Li10), 1594.73 *8* (1989Si17) and 1594.80 *12* (1993Di09,1994Mo06). Other: 1595 *2* (1969La03). I_γ: weighted average of 0.58 *4* (1989Si17), 0.61 *4* (1994Mo06) and 0.63 *10* (2000Sa32).
1594.8 *3*	0.011 *6*	2869.63	(2$^-$,3$^-$)	1274.765	3$^-$			E_γ: weighted average of 1595 *1* (1989Si17) and 1594.79 *30* (1993Di09,1994Mo06). I_γ: from 1989Si17.
1598.0[‡] *5*	0.013 *6*	3014.11	(1,2$^+$)	1415.498	0$^+$			E_γ,I_γ: from 1989Si17.
1599.56 *12*	0.72 *4*	2208.69	(2$^-$,3)	609.318	2$^+$	D+Q		E_γ: weighted average of 1599.5 *4* (1969Li10), 1599.3 *6* (1989Si17) and 1599.58 *12* (1993Di09,1994Mo06). Mult.: from $\gamma\gamma$(E2)(θ): A_2=0.27 *6*, A_4=−0.12 *6* (1989Si17). I_γ: weighted average of 0.72 *4* (1989Si17), 0.72 *4* (1994Mo06) and 0.73 *7* (2000Sa32).
1636.36 *19*	0.025 *4*	3014.11	(1,2$^+$)	1377.681	2$^+$			E_γ: weighted average of 1636.6 *4* (1989Si17) and 1636.25 *19* (1993Di09,1994Mo06). I_γ: weighted average of 0.041 *13* (1989Si17), 0.024 *3* (1994Mo06) and 0.06 *3* (2000Sa32).

$^{214}_{84}$Po$_{130}$-34

γ(^{214}Po) (continued)

E_γ	I_γ[@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[&]	Comments
1637[‡] *1*	0.015 *6*	3053.88	(1,2$^+$)	1415.498	0$^+$			E_γ: from 1989Si17. I_γ: weighted average of 0.013 *6* (1989Si17) and 0.020 *10* (2000Sa32).
1644.0[†] *8*		3022.3	(2$^-$,3,4$^+$)	1377.681	2$^+$			E_γ: from 1993Di09 and 1994Mo06.
1657.04 *18*	0.11 *1*	2266.41	2$^+$	609.318	2$^+$	[M1+E2]	0.0044 *15*	E_γ: weighted average of 1657.4 *6* (1989Si17) and 1657.00 *19* (1993Di09,1994Mo06). I_γ: weighted average of 0.16 *7* (1989Si17), 0.10 *1* (1994Mo06) and 0.14 *3* (2000Sa32).
1661.274 *17*	2.301 *14*	1661.282	2$^+$	0.0	0$^+$	E2	0.00296 *4*	E_γ: weighted average of 1661.4 *2* (1969Li10), 1661.28 *6* (1989Si17), 1661.29 *11* (1993Di09,1994Mo06) and 1661.272 *17* (2002MoZP). Other: 1662 *4* (1967Bu17) and 1661 *2* (1969La03). I_γ: weighted average of 2.49 *9* (1989Si17), 2.33 *12* (1994Mo06), 2.38 *10* (1998Mo14), 2.37 *22* (2000Sa32), 2.299 *14* (2002MoZP) and 2.28 *3* (2004Mo07). Mult.: from α(K)exp=0.0026 (1967Ma51).
1665.86 *19*	0.019 *6*	2940.67	(1$^-$,2$^+$)	1274.765	3$^-$			E_γ: weighted average of 1667.0 *15* (1989Si17) and 1665.84 *19* (1993Di09,1994Mo06). I_γ: weighted average of 0.013 *6* (1989Si17), 0.018 *3* (1994Mo06) and 0.046 *9* (2000Sa32).
1676.1[‡]	<0.005	3053.88	(1,2$^+$)	1377.681	2$^+$			E_γ,I_γ: from 1989Si17, assigned to ^{210}Pb in 1993Di09.
1684.012 *23*	0.48 *3*	2293.362	(1$^+$,2$^+$)	609.318	2$^+$	(M1+E2)	0.0043 *14*	E_γ: weighted average of 1684.1 *3* (1969Li10), 1683.99 *4* (1989Si17), 1683.96 *14* (1993Di09,1994Mo06) and 1684.020 *23* (2002MoZP). Other: 1685 *6* (1967Bu17) and 1685 *2* (1969La03). I_γ: weighted average of 0.51 *4* (1989Si17), 0.49 *3* (1994Mo06) and 0.43 *4* (2000Sa32); other: 1.556 *13* (2002MoZP). Mult.: from $\gamma\gamma$(E2)(θ): A_2=−0.05 *6*, A_4=−0.03 *7* (1989Si17).
1693.4[†] *8*		2967.6		1274.765	3$^-$			E_γ: from 1993Di09 and 1994Mo06.
1711.0[a] *8*	0.004 *2*	2986.22	(2$^-$,3)	1274.765	3$^-$			E_γ: from 1993Di09 and 1994Mo06. I_γ: from 1993Di09 and 1994Mo06; others: <0.021 (1989Si17) and 0.05 *1* (2000Sa32).
1717.0 *8*	0.012 *3*	3093.48	(1$^-$,2$^+$)	1377.681	2$^+$			E_γ: from 1993Di09 and 1994Mo06. Other: 1715.9 (1989Si17). I_γ: from 2000Sa32; other: <0.005 (1989Si17).
1723.7[†] *8*		3000.00	(1$^-$,2$^+$)	1274.765	3$^-$			E_γ: from 1993Di09 and 1994Mo06.
1729.595 *15*	6.32 *7*	1729.613	2$^+$	0.0	0$^+$	E2	0.00278 *4*	E_γ: weighted average of 1729.8 *2* (1969Li10), 1729.60 *5* (1989Si17), 1729.595 *15* (1993Di09,1994Mo06) and 1729.592 *19* (2002MoZP). Other: 1730 *4* (1967Bu17) and 1730 *2* (1969La03). Mult.: from α(K)exp=0.0028 *4* (1960Lu07) and 0.002 (1967Ma51). I_γ: weighted average of 6.61 *13* (1989Si17), 6.60 *4* (1994Mo06), 6.27 *15* (1998Mo14), 6.33 *15* (2000Sa32), 6.25 *3* (2002MoZP) and 6.22 *3* (2004Mo07).
1739.1[†] *8*		2348.3	(1,2$^+$)	609.318	2$^+$			E_γ: from 1993Di09 and 1994Mo06.
1747.2[†] *8*		3022.3	(2$^-$,3,4$^+$)	1274.765	3$^-$			E_γ: from 1993Di09 and 1994Mo06.
1751.6 *7*	0.010 *8*	2360.97	(1,2$^+$)	609.318	2$^+$			E_γ: weighted average of 1752 *1* (1989Si17) and 1751.44 *74*

$^{214}_{84}$Po$_{130}$-35

$\gamma(^{214}Po)$ (continued)

E_γ	I_γ[@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[&]	Comments
								(1993Di09,1994Mo06). I_γ: unweighted average of 0.017 *9* (1989Si17) and 0.002 *1* (1993Di09,1994Mo06).
1764.491 *14*	33.64 *11*	1764.520	1^+	0.0	0^+	M1	0.00512 *7*	E_γ: weighted average of 1764.6 *2* (1969Li10), 1764.51 *5* (1989Si17), 1764.494 *14* (1993Di09,1994Mo06) and 1764.485 *14* (2002MoZP). Other: 1764 *2* (1967Bu17) and 1764 *2* (1969La03). Mult.: from α(K)exp=0.0040 *3* (1960Lu07); other: 0.0036 (1967Ma51). I_γ: weighted average of 34.5 *6* (1989Si17), 34.48 *25* (1994Mo06), 33.9 *7* (1998Mo14), 33.3 *10* (2000Sa32), 33.63 *9* (2002MoZP) and 33.5 *1* (2004Mo07).
^{x}1782.1 *10*								I_γ: 0.035 *12* from 1969Li10 and 0.011 *3* from 2000Sa32.
1813.73 *14*	0.024 *2*	2423.25	$(1,2^+)$	609.318	2^+			E_γ: weighted average of 1813.7 *4* (1989Si17) and 1813.73 *14* (1993Di09,1994Mo06). I_γ: weighted average of 0.026 *11* (1989Si17), 0.024 *2* (1994Mo06) and 0.020 *10* (2000Sa32).
1819.2[†] *4*	<0.003	3093.48	$(1^-,2^+)$	1274.765	3^-			E_γ,I_γ: from 1993Di09 and 1994Mo06.
1838.36 *5*	0.77 *3*	2447.701	1^-	609.318	2^+	[E1]	1.36×10^{-3} *2*	E_γ: weighted average of 1838.6 *3* (1969Li10), 1838.36 *5* (1989Si17) and 1838.33 *11* (1993Di09,1994Mo06). I_γ: weighted average of 0.83 *4* (1989Si17), 0.74 *3* (1994Mo06) and 0.77 *4* (2000Sa32).
1847.433 *17*	4.46 *3*	1847.446	2^+	0.0	0^+	[E2]	2.53×10^{-3} *4*	E_γ: weighted average of 1847.6 *3* (1969Li10), 1847.44 *5* (1989Si17), 1847.40 *11* (1993Di09,1994Mo06) and 1847.432 *17* (2002MoZP). Other: 1850 *4* (1967Bu17) and 1848 *2* (1969La03). I_γ: weighted average of 4.61 *15* (1989Si17), 4.57 *6* (1994Mo06), 4.51 *12* (1998Mo14), 4.35 *13* (2000Sa32), 4.42 *3* (2002MoZP) and 4.46 *3* (2004Mo07).
1873.16 *5*	0.47 *2*	2482.460	$(1^-,2^+)$	609.318	2^+			E_γ: weighted average of 1873.4 *3* (1969Li10), 1873.16 *6* (1989Si17) and 1873.10 *12* (1993Di09,1994Mo06). Other: 1873 *2* (1967Bu17). I_γ: weighted average of 0.49 *4* (1989Si17), 0.46 *2* (1994Mo06) and 0.51 *5* (2000Sa32).
1890.30 *14*	0.184 *23*	1890.306	$(2)^+$	0.0	0^+			E_γ: weighted average of 1890.4 *4* (1969Li10), 1890.35 *15* (1989Si17) and 1890.25 *14* (1993Di09,1994Mo06). Other: 1890 *2* (1969La03). I_γ: weighted average of 0.194 *23* (1989Si17), 0.17 *6* (1994Mo06) and 0.17 *3* (2000Sa32).
1896.05 *14*	0.33 *2*	2505.34	$(1^-,2^+)$	609.318	2^+			E_γ: weighted average of 1896.7 *4* (1969Li10), 1896.3 *3* (1989Si17) and 1895.92 *14* (1993Di09,1994Mo06). Other: 1896 *2* (1969La03). I_γ: weighted average of 0.38 *4* (1989Si17), 0.31 *2* (1994Mo06) and 0.35 *4* (2000Sa32).
1898.68 *16*	0.11 *2*	2508.12	(0^+)	609.318	2^+			E_γ: weighted average of 1898.7 *4* (1989Si17) and 1898.68 *16* (1993Di09,1994Mo06). I_γ: weighted average of 0.14 *5* (1989Si17), 0.11 *2* (1994Mo06) and 0.10 *3* (2000Sa32).
1935.58 *20*	0.067 *7*	2544.92		609.318	2^+			E_γ: weighted average of 1935.8 *4* (1989Si17) and 1935.52 *20*

γ(^{214}Po) (continued)

E_γ	I_γ@	E_i(level)	J^π_i	E_f	J^π_f	Mult.	α&	$I_{(\gamma+ce)}$@	Comments
									(1993Di09,1994Mo06). I_γ: from 1993Di09 and 1994Mo06; others: 0.11 *5* (1989Si17) and 0.16 *4* (2000Sa32).
1943.7† *8*		2553.0		609.318	2$^+$				E_γ: from 1994Mo06.
1953.4† *6*		2562.4		609.318	2$^+$				E_γ: from 1994Mo06.
1994.6 *6*	0.015 *6*	2604.68	(2$^+$)	609.318	2$^+$				E_γ: weighted average of 1994.7 *15* (1969Li10), 1994.7 *15* (1989Si17) and 1994.6 *6* (1993Di09,1994Mo06). I_γ: weighted average of 0.013 *7* (1989Si17) and 0.020 *10* (2000Sa32).
^{x}2004.5 *10*	0.005 *2*								E_γ: from 1969Li10. I_γ: from 2000Sa32; other: ≈0.003 from 1969Li10.
2010.80 *12*	0.097 *5*	2010.831	(2$^+$)	0.0	0$^+$				E_γ: weighted average of 2011.0 *6* (1969Li10), 2010.71 *15* (1989Si17) and 2010.85 *12* (1993Di09,1994Mo06). Other: 2011 *2* (1969La03). I_γ: weighted average of 0.106 *11* (1989Si17), 0.100 *5* (1994Mo06) and 0.093 *5* (2000Sa32).
2017.309 *12*		2017.315	0$^+$	0.0	0$^+$	E0		0.012 *2*	E_γ: from level-energy difference. ce measurement: 2016.7 (1954Ml77, 1960Lu07). $I_{(\gamma+ce)}$: from I(ce(K) 2017)/I(ce(K) 609γ)=0.31 *5*/45.0 *15*=0.0069 *11* (1960Lu07) with α(K)/α(tot)(2017)=0.8556 and α(K)(609γ)=0.01489 *21*; other: 1.0 (1954Ml77).
2021.52 *12*	0.047 *5*	2630.84	(1,2$^+$)	609.318	2$^+$				E_γ: weighted average of 2021.8 *3* (1989Si17) and 2021.47 *12* (1993Di09,1994Mo06). I_γ: weighted average of 0.041 *16* (1989Si17), 0.045 *5* (1994Mo06) and 0.057 *11* (2000Sa32).
2052.96 *12*	0.151 *10*	2662.33	(2$^+$)	609.318	2$^+$				E_γ: weighted average of 2053.2 *3* (1969Li10), 2052.94 *15* and 2052.94 *12* (1993Di09,1994Mo06). I_γ: weighted average of 0.151 *15* (1989Si17), 0.15 *1* (1994Mo06) and 0.16 *3* (2000Sa32).
2085.19 *15*	0.018 *1*	2694.62	(1$^-$,2$^+$)	609.318	2$^+$				E_γ: weighted average of 2084.2 *12* (1969Li10), 2085.0 *5* (1989Si17) and 2085.22 *15* (1993Di09,1994Mo06). I_γ: weighted average of 0.021 *6* (1989Si17) and 0.018 *1* (1994Mo06).
2089.65 *15*	0.100 *6*	2698.60	(1,2)$^+$	609.318	2$^+$	M1	0.00365 *5*		E_γ: weighted average of 2089.7 *7* (1969Li10), 2089.51 *15* (1989Si17) and 2089.79 *15* (1993Di09,1994Mo06). I_γ: weighted average of 0.121 *13* (1989Si17), 0.096 *5* (1994Mo06) and 0.12 *3* (2000Sa32). Mult.: >M2 suggested by α(K)exp=0.036 (1967Ma51). It is unlikely based on the decay pattern; however E1 or E2 ruled out .
2109.98 *12*	0.188 *10*	2719.26	1$^+$	609.318	2$^+$	[M1+E2]	0.0029 *7*		E_γ: weighted average of 2110.4 *3* (1969Li10), 2109.90 *12* (1989Si17) and 2109.96 *14* (1993Di09,1994Mo06). I_γ: weighted average of 0.189 *17* (1989Si17), 0.19 *1* (1994Mo06) and 0.17 *3* (2000Sa32).

γ(^{214}Po) (continued)

E_γ	I_γ[@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	α[&]	Comments
2118.513 *25*	2.545 *20*	2118.535	1^+	0.0	0^+	M1	0.00356 *5*	E_γ: weighted average of 2118.7 *3* (1969Li10), 2118.54 *8* (1989Si17), 2118.551 *30* (1993Di09,1994Mo06) and 2118.483 *25* (2002MoZP). Other: 2119 (1960Lu07) and 2119 *2* (1969La03). Mult.: from α(K)exp=0.0033 *7* (1960Lu07); other: 0.0032 (1967Ma51). I_γ: weighted average of 2.62 *6* (1989Si17), 2.56 *3* (1994Mo06), 2.55 *8* (1998Mo14), 2.65 *25* (2000Sa32), 2.536 *20* (2002De03), 2.548 *21* (2002MoZP) and 2.537 *20* (2004Mo07).
2120.0[‡] *10*	0.015 *4*	2728.617	$(0^+,1,2)$	609.318	2^+			E_γ: from 1989Si17. Other: 2119 *2* (1969La03). I_γ: from 1989Si17.
2148.00 *12*	0.030 *3*	2147.86	$(1^-,2^+)$	0.0	0^+			E_γ: weighted average of 2147.7 *10* (1969Li10), 2147.8 *4* (1989Si17) and 2148.02 *12* (1993Di09,1994Mo06). Other: 2150 *7* (1967Bu17) and 2148 *2* (1969La03). I_γ: weighted average of 0.034 *6* (1989Si17), 0.029 *2* (1994Mo06) and 0.050 *10* (2000Sa32).
2160.4[†] *3*	0.004 *1*	2769.91	$(1,2^+)$	609.318	2^+			E_γ: from 1993Di09 and 1994Mo06. I_γ: from 1994Mo06; other: 0.026 *1* (2000Sa32).
2176.52 *19*	0.011 *4*	2785.97	$(1,2^+)$	609.318	2^+			E_γ: weighted average of 2176.8 *6* (1989Si17) and 2176.49 *19* (1993Di09,1994Mo06). I_γ: unweighted average of 0.007 *1* (1994Mo06) and 0.015 *6* (2000Sa32); other: ≈0.0085 (1989Si17).
2184.8[†] *6*		2794.1		609.318	2^+			E_γ: from 1993Di09 and 1994Mo06.
2192.58 *16*	0.086 *9*	2192.536	$(2)^+$	0.0	0^+			E_γ: weighted average of 2192.5 *5* (1969Li10), 2192.6 *2* (1989Si17) and 2192.58 *16* (1993Di09,1994Mo06). Other: 2193 *2* (1969La03). I_γ: weighted average of 0.132 *23* (1989Si17), 0.073 *6* (1994Mo06) and 0.093 *5* (2000Sa32).
2193.3[†] *6*		2802.54		609.318	2^+			E_γ: from 1993Di09 and 1994Mo06.
2204.10 *4*	10.82 *5*	2204.103	1^+	0.0	0^+	M1	0.00333 *5*	E_γ: weighted average of 2204.3 *3* (1969Li10), 2204.12 *7* (1989Si17), 2204.215 *40* (1993Di09,1994Mo06) and 2204.051 *23* (2002MoZP). Other: 2204 *2* (1967Bu17) and 2204 *2* (1969La03). Mult.: from α(K)exp=0.0029 *3* (1960Lu07); other: 0.0026 (1967Ma51). I_γ: weighted average of 10.83 *19* (1989Si17), 11.02 *9* (1994Mo06), 10.89 *24* (1998Mo14), 11.1 *3* (2000Sa32), 10.75 *9* (2002MoZP) and 10.76 *5* (2004Mo07).
2251.55 *15*	0.012 *1*	2860.93	$(1,2^+)$	609.318	2^+			E_γ: weighted average of 2251.2 *4* (1989Si17) and 2251.60 *15* (1993Di09,1994Mo06). I_γ: weighted average of 0.015 *9* (1989Si17) and 0.012 *1* (1994Mo06).
2260.32 *20*	0.019 *1*	2869.63	$(2^-,3^-)$	609.318	2^+			E_γ: weighted average of 2259.7 *4* (1989Si17) and 2260.39 *13* (1993Di09,1994Mo06). I_γ: weighted average of 0.019 *9* (1989Si17), 0.019 *1* (1994Mo06) and 0.020 *3* (2000Sa32).
2266.52 *13*	0.037 *2*	2266.41	2^+	0.0	0^+	[E2]	2.00×10^{-3} *3*	E_γ: weighted average of 2266.4 *6* (1969Li10), 2266.6 *3* (1989Si17) and 2266.51 *13* (1993Di09,1994Mo06).

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γ(^{214}Po) (continued)

E_γ	I_γ[@]	E_i(level)	J^π_i	E_f	J^π_f	Comments
						I_γ: weighted average of 0.038 *6* (1989Si17), 0.037 *2* (1993Di09,1994Mo06) and 0.034 *4* (2000Sa32).
2270.9 *4*	0.0029 *5*	2880.36	(1$^-$,2$^+$)	609.318	2$^+$	E_γ: from 1993Di09 and 1994Mo06. I_γ: from 1993Di09 and 1994Mo06; other: 0.010 *5* (2000Sa32).
2284.33 *18*	0.011 *1*	2893.60	(1,2$^+$)	609.318	2$^+$	E_γ: weighted average of 2284.4 *7* (1989Si17) and 2284.33 *18* (1993Di09,1994Mo06). I_γ: weighted average of 0.011 *1* (1989Si17), 0.011 *1* (1994Mo06) and 0.011 *3* (2000Sa32).
2287.65[†] *23*	0.010 *1*	2896.98		609.318	2$^+$	E_γ,I_γ: from 1993Di09 and 1994Mo06.
2293.38 *3*	0.679 *10*	2293.362	(1$^+$,2$^+$)	0.0	0$^+$	E_γ: weighted average of 2293.7 *3* (1969Li10), 2293.36 *12* (1989Si17), 2293.45 *12* (1993Di09,1994Mo06) and 2293.37 *3* (2002MoZP). Other: 2292 *4* (1967Bu17) and 2293 *2* (1969La03). I_γ: weighted average of 0.70 *4* (1989Si17), 0.67 *3* (1994Mo06), 0.72 *6* (2000Sa32) and 0.677 *10* (2002MoZP).
2310.2[†] *3*	0.003 *2*	2919.5		609.318	2$^+$	E_γ,I_γ: from 1993Di09 and 1994Mo06.
2312.45 *15*	0.020 *2*	2921.89	(1,2$^+$)	609.318	2$^+$	E_γ: weighted average of 2312.5 *10* (1969Li10), 2312.2 *4* (1989Si17) and 2312.48 *15* (1993Di09,1994Mo06). I_γ: weighted average of 0.026 *6* (1989Si17), 0.019 *2* (1994Mo06) and 0.018 *5* (2000Sa32).
2319.3[a] *3*	0.0009 *3*	2928.55	(1,2$^+$)	609.318	2$^+$	E_γ: from 1993Di09 and 1994Mo06. I_γ: from 1994Mo06; other: <0.0021 (1989Si17) and 0.005 *1* (2000Sa32).
2325.18 *25*	0.0037 *4*	2934.54	(1,2$^+$)	609.318	2$^+$	E_γ: weighted average of 2324.8 *10* (1989Si17) and 2325.20 *25* (1993Di09,1994Mo06). I_γ: weighted average of 0.0043 *21* (1989Si17), 0.0037 *4* (1994Mo06); other: 0.009 *3* (2000Sa32).
2331.38 *12*	0.051 *7*	2940.67	(1$^-$,2$^+$)	609.318	2$^+$	E_γ: weighted average of 2331.7 *4* (1969Li10), 2331.3 *3* (1989Si17) and 2331.36 *12* (1993Di09,1994Mo06). I_γ: weighted average of 0.047 *6* (1989Si17), 0.048 *3* (1994Mo06) and 0.076 *7* (2000Sa32).
2348.0[†] *13*	0.0003 *2*	2348.3	(1,2$^+$)	0.0	0$^+$	E_γ,I_γ: from 1994Mo06.
2353.5[†] *7*	0.0008 *3*	2962.8		609.318	2$^+$	E_γ,I_γ: from 1993Di09 and 1994Mo06.
2358.0[†] *6*		2967.6		609.318	2$^+$	E_γ: from 1993Di09 and 1994Mo06.
2360.99 *19*	0.0036 *5*	2360.97	(1,2$^+$)	0.0	0$^+$	E_γ: weighted average of 2360.9 *6* (1989Si17) and 2361.00 *19* (1993Di09,1994Mo06). I_γ: weighted average of 0.0041 *13* (1989Si17), 0.0033 *3* (1994Mo06) and 0.0060 *10* (2000Sa32).
2369.56 *17*	0.006 *1*	2978.93	(1,2$^+$)	609.318	2$^+$	E_γ: weighted average of 2369.3 *6* (1989Si17) and 2369.58 *17* (1993Di09,1994Mo06). I_γ: weighted average of 0.006 *1* (1994Mo06) and 0.008 *3* (2000Sa32); other: 0.0064 (1989Si17).
2376.89 *13*	0.020 *2*	2986.22	(2$^-$,3)	609.318	2$^+$	E_γ: weighted average of 2377.2 *5* (1969Li10), 2377.0 *2* (1989Si17) and 2376.83 *13* (1993Di09,1994Mo06). I_γ: weighted average of 0.025 *4* (1989Si17), 0.019 *1* (1994Mo06) and 0.034 *7* (2000Sa32).
2390.82 *21*	0.0035 *3*	3000.00	(1$^-$,2$^+$)	609.318	2$^+$	E_γ: weighted average of 2390.9 *6* (1989Si17) and 2390.81 *21* (1993Di09,1994Mo06). I_γ: weighted average of 0.0043 *13* (1989Si17), 0.0034 *3* (1994Mo06) and 0.006 *3* (2000Sa32).
2396.5[†] *6*		3005.8		609.318	2$^+$	E_γ: from 1993Di09 and 1994Mo06.
2405.1 *5*	0.0009 *3*	3014.11	(1,2$^+$)	609.318	2$^+$	E_γ: from 1993Di09 and 1994Mo06. I_γ: from 1993Di09 and 1994Mo06; others: ≈0.0021 (1989Si17) and 0.0040 *10* (2000Sa32).
2413.1[†] *4*		3022.3	(2$^-$,3,4$^+$)	609.318	2$^+$	E_γ: from 1993Di09 and 1994Mo06.
2421.0[†] *6*		3030.3		609.318	2$^+$	E_γ: from 1993Di09 and 1994Mo06.
2423.32 *13*	0.011 *1*	2423.25	(1,2$^+$)	0.0	0$^+$	E_γ: weighted average of 2423.7 *6* (1969Li10), 2423.5 *3* (1989Si17) and 2423.27 *13*

γ(^{214}Po) (continued)

E_γ	$I_\gamma$$^{@}$	E_i(level)	J^π_i	E_f	J^π_f	Mult.	$\alpha$$^{\&}$	Comments
								(1993Di09,1994Mo06). I_γ: weighted average of 0.013 2 (1989Si17), 0.010 1 (1994Mo06) and 0.018 4 (2000Sa32).
2430.0† 6		3039.3		609.318	2^+			E_γ: from 1993Di09 and 1994Mo06.
2444.7 7	0.017 5	3053.88	$(1,2^+)$	609.318	2^+			E_γ: weighted average of 2444.6 7 (1989Si17) and 2444.9 8 (1993Di09,1994Mo06). I_γ: weighted average of 0.017 9 (1989Si17) and 0.017 5 (2000Sa32).
2447.69 3	3.40 2	2447.701	1^-	0.0	0^+	E1	1.42×10^{-3} 2	E_γ: weighted average of 2448.0 3 (1969Li10), 2447.71 10 (1989Si17), 2447.860 100 (1993Di09,1994Mo06) and 2447.67 3 (2002MoZP). Other: 2448 2 (1969La03). I_γ: weighted average of 3.37 4 (1989Si17), 3.42 3 (1994Mo06), 3.46 9 (1998Mo14), 3.30 10 (2000Sa32), 3.41 4 (2002MoZP) and 3.40 2 (2004Mo07). Mult.: from α(K)exp≈0.0004 (1960Lu07) and α(K)exp≈0.0003 (1967Ma51).
2459.0† 8		3068.3		609.318	2^+			E_γ: from 1993Di09 and 1994Mo06.
2469.4† 6		3078.7		609.318	2^+			E_γ: from 1993Di09 and 1994Mo06.
2472.9	0.0050 17	3081.84	$(1,2^+)$	609.318	2^+			E_γ: from 1989Si17, assigned to ^{210}Pb in 1993Di09. I_γ: from 2000Sa32; other: <0.0021 (1989Si17).
2482.8 4	0.0022 4	2482.460	$(1^-,2^+)$	0.0	0^+			E_γ: weighted average of 2482.8 4 (1989Si17) and 2482.7 4 (1993Di09,1994Mo06). Other: 2482 3 (1967Bu17). I_γ: weighted average of 0.0043 19 (1989Si17) and 0.0021 4 (1994Mo06).
2482.8‡ 4	0.0045 19	3093.48	$(1^-,2^+)$	609.318	2^+			E_γ,I_γ: from 1989Si17.
2505.46 13	0.0124 21	2505.34	$(1^-,2^+)$	0.0	0^+			E_γ: weighted average of 2505.6 4 (1969Li10), 2505.6 2 (1989Si17) and 2505.39 13 (1993Di09,1994Mo06). Other: 2505 3 (1969La03). I_γ: weighted average of 0.0128 21 (1989Si17), 0.012 1 (1994Mo06) and 0.025 7 (2000Sa32).
2529.7† 8		3139.0		609.318	2^+			E_γ: from 1993Di09 and 1994Mo06.
2540.3† 8		3149.2	$(1,2^+)$	609.318	2^+			E_γ: from 1993Di09 and 1994Mo06.
2550.6 7	0.0007 2	3160.4	$(1,2^+)$	609.318	2^+			E_γ: weighted average of 2551.0 10 (1989Si17) and 2550.4 7 (1993Di09,1994Mo06). I_γ: from 1993Di09 and 1994Mo06.
2553.0† 6	≈0.0002	2553.0		0.0	0^+			E_γ,I_γ: from 1994Mo06.
2555.1† 8		3164.4		609.318	2^+			E_γ: from 1993Di09 and 1994Mo06.
2562.0† 6	0.0004 2	2562.4		0.0	0^+			E_γ,I_γ: from 1994Mo06.
2564.0† 6	0.0003 2	3173.3		609.318	2^+			E_γ,I_γ: from 1993Di09 and 1994Mo06.
2574.2‡	<0.0011	3183.6	$(1,2^+)$	609.318	2^+			E_γ: from 1989Si17, assigned to ^{210}Pb in 1993Di09. I_γ: from 1989Si17.
2604.5 5	0.0009 2	2604.68	(2^+)	0.0	0^+			E_γ: weighted average of 2604.5 10 (1989Si17) and 2604.5 5 (1993Di09,1994Mo06). I_γ: weighted average of 0.0010 3 (1989Si17) and 0.0008 2 (1994Mo06).
2630.9 3	0.0019 4	2630.84	$(1,2^+)$	0.0	0^+			E_γ: weighted average of 2630.9 5 (1989Si17) and 2630.90 28

$\gamma(^{214}$Po) (continued)

E_γ	I_γ @	E_i(level)	J^π_i	E_f	J^π_f	Mult.	α &	Comments
								(1993Di09,1994Mo06). I_γ: weighted average of 0.0021 *11* (1989Si17), 0.0018 *3* (1994Mo06) and 0.0050 *17* (2000Sa32).
2662.4 *7*	0.0005 *1*	2662.33	(2$^+$)	0.0	0$^+$			E_γ: weighted average of 2662.0 *10* and 2662.6 *7* (1993Di09,1994Mo06). I_γ: weighted average of 0.0010 *3* (1989Si17), 0.0006 *2* (1994Mo06) and 0.0004 *1* (2000Sa32).
2694.66 *13*	0.066 *3*	2694.62	(1$^-$,2$^+$)	0.0	0$^+$			E_γ: weighted average of 2695.1 *4* (1969Li10), 2694.8 *2* (1989Si17) and 2694.55 *13* (1993Di09,1994Mo06). I_γ: weighted average of 0.070 *4* (1989Si17), 0.066 *3* (1994Mo06) and 0.062 *4* (2000Sa32).
2699.21 *20*	0.0061 *5*	2698.60	(1,2)$^+$	0.0	0$^+$			E_γ: weighted average of 2699.5 *10* (1969Li10), 2699.4 *3* (1989Si17) and 2699.12 *20* (1993Di09,1994Mo06). I_γ: weighted average of 0.0064 *19* (1989Si17) and 0.0061 *5* (1994Mo06).
2719.32 *19*	0.0039 *4*	2719.26	1$^+$	0.0	0$^+$	[M1]	0.00256 *4*	E_γ: weighted average of 2719.4 *10* (1969Li10), 2719.4 *3* (1989Si17) and 2719.28 *19* (1993Di09,1994Mo06). I_γ: weighted average of 0.0043 *11* (1989Si17) and 0.0038 *4* (1994Mo06).
2769.92 *15*	0.054 *3*	2769.91	(1,2$^+$)	0.0	0$^+$			E_γ: weighted average of 2770.3 *4* (1969Li10), 2770.0 *2* (1989Si17) and 2769.83 *15* (1993Di09,1994Mo06). I_γ: weighted average of 0.055 *4* (1989Si17), 0.053 *3* (1994Mo06) and 0.048 *15* (2000Sa32).
2785.93 *15*	0.012 *1*	2785.97	(1,2$^+$)	0.0	0$^+$			E_γ: weighted average of 2786.1 *4* (1969Li10), 2786.1 *2* (1989Si17) and 2785.81 *15* (1993Di09,1994Mo06). I_γ: weighted average of 0.013 *2* (1989Si17), 0.012 *1* (1994Mo06) and 0.030 *11* (2000Sa32).
2826.96 *19*	0.0053 *6*	2826.82	(1,2$^+$)	0.0	0$^+$			E_γ: weighted average of 2827.6 *10* (1969Li10), 2827.0 *3* (1989Si17) and 2826.92 *19* (1993Di09,1994Mo06). I_γ: weighted average of 0.0064 *6* (1989Si17), 0.0048 *4* (1994Mo06) and 0.011 *6* (2000Sa32).
2861.1 *4*	0.0009 *2*	2860.93	(1,2$^+$)	0.0	0$^+$			E_γ: weighted average of 2860.9 *8* (1989Si17) and 2861.1 *4* (1993Di09,1994Mo06). I_γ: weighted average of 0.0007 *4* (1989Si17), 0.0009 *2* (1994Mo06) and 0.0008 *5* (2000Sa32).
2880.35 *14*	0.022 *3*	2880.36	(1$^-$,2$^+$)	0.0	0$^+$			E_γ: weighted average of 2280.7 *4* (1969Li10), 2280.4 *3* (1989Si17) and 2280.29 *14* (1993Di09,1994Mo06). I_γ: weighted average of 0.019 *3* (1989Si17), 0.020 *2* (1994Mo06) and 0.030 *3* (2000Sa32).
2893.59 *14*	0.013 *1*	2893.60	(1,2$^+$)	0.0	0$^+$			E_γ: weighted average of 2893.7 *4* (1969Li10), 2893.6 *2* (1989Si17) and 2893.46 *14* (1993Di09,1994Mo06). I_γ: weighted average of 0.015 *3* (1989Si17), 0.012 *1* (1994Mo06) and 0.017 *3* (2000Sa32).
2921.97 *15*	0.030 *2*	2921.89	(1,2$^+$)	0.0	0$^+$			E_γ: weighted average of 2922.2 *4* (1969Li10), 2922.1 *2* (1989Si17) and 2921.86 *15* (1993Di09,1994Mo06). I_γ: weighted average of 0.034 *2* (1989Si17), 0.029 *1* (1994Mo06) and 0.035 *4* (2000Sa32).

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γ(^{214}Po) (continued)

E_γ	I_γ[@]	E_i(level)	J^π_i	E_f	J^π_f	Comments
2928.53 *22*	0.0024 *2*	2928.55	(1,2$^+$)	0.0	0$^+$	E_γ: weighted average of 2928.7 *8* (1989Si17) and 2928.52 *22* (1993Di09,1994Mo06). I_γ: weighted average of 0.0021 *13* (1989Si17), 0.0024 *2* (1994Mo06).
2934.54 *25*	0.0010 *2*	2934.54	(1,2$^+$)	0.0	0$^+$	E_γ: weighted average of 2934.9 *8* (1989Si17) and 2934.51 *25* (1993Di09,1994Mo06). I_γ: weighted average of 0.0012 *5* (1989Si17, 0.012 listed as a typo from Priv. Comm. from B. Singh with Y. A. Akovali, May 1995), 0.0010 *2* (1994Mo06) and 0.005 *3* (2000Sa32).
2940.0	0.008 *3*	2940.67	(1$^-$,2$^+$)	0.0	0$^+$	E_γ: from 1989Si17. I_γ: from 2000Sa32; other: <0.0004 (1989Si17).
2978.94 *15*	0.030 *1*	2978.93	(1,2$^+$)	0.0	0$^+$	E_γ: weighted average of 2979.0 *4* (1969Li10), 2978.8 *2* (1989Si17) and 2979.01 *15* (1993Di09,1994Mo06). I_γ: weighted average of 0.031 *2* (1989Si17), 0.030 *1* (1994Mo06) and 0.034 *7* (2000Sa32).
3000.0 *2*	0.019 *2*	3000.00	(1$^-$,2$^+$)	0.0	0$^+$	E_γ: weighted average of 3000.1 *4* (1969Li10), 3000.0 *2* (1989Si17) and 2999.8 *3* (1993Di09,1994Mo06). I_γ: weighted average of 0.019 *4* (1989Si17), 0.019 *1* (1994Mo06) and 0.030 *5* (2000Sa32).
3053.9 *2*	0.046 *5*	3053.88	(1,2$^+$)	0.0	0$^+$	E_γ: weighted average of 3054.0 *4* (1969Li10), 3053.9 *2* (1989Si17) and 3053.8 *5* (1993Di09,1994Mo06). I_γ: weighted average of 0.049 *4* (1989Si17), 0.041 *2* (1994Mo06) and 0.057 *3* (2000Sa32).
3081.79 *25*	0.013 *4*	3081.84	(1,2$^+$)	0.0	0$^+$	E_γ: weighted average of 3081.7 *4* (1969Li10), 3081.7 *3* (1989Si17) and 3081.89 *25* (1993Di09,1994Mo06). I_γ: unweighted average of 0.0085 *17* (1989Si17), 0.011 *1* (1994Mo06) and 0.020 *4* (2000Sa32).
3094.0 *4*	0.0013 *4*	3093.48	(1$^-$,2$^+$)	0.0	0$^+$	E_γ: weighted average of 3093.9 *8* (1989Si17) and 3094.0 *4* (1993Di09,1994Mo06). I_γ: unweighted average of 0.0021 *4* (1989Si17), 0.0008 *1* (1994Mo06) and 0.0010 *3* (2000Sa32).
[x]3136.3 *10*	0.0008 *3*					E_γ: from 1969Li10. I_γ: from 2000Sa32.
3142.6 *4*	0.0027 *3*	3142.6	(1,2$^+$)	0.0	0$^+$	E_γ: weighted average of 3142.5 *7* (1969Li10), 3142.6 *4* (1989Si17) and 3142.5 *4* (1993Di09,1994Mo06). I_γ: weighted average of 0.0043 *13* (1989Si17), 0.0026 *2* (1994Mo06) and 0.0060 *28* (2000Sa32).
3149.0[†] *5*	≈0.00019	3149.2	(1,2$^+$)	0.0	0$^+$	E_γ,I_γ: from 1993Di09 and 1994Mo06.
3160.7 *6*	0.0012 *3*	3160.4	(1,2$^+$)	0.0	0$^+$	E_γ: weighted average of 3161.2 *10* (1969Li10), 3160.5 *7* (1989Si17) and 3160.6 *6* (1993Di09,1994Mo06). I_γ: weighted average of 0.0021 *5* (1989Si17), 0.0010 *2* (1994Mo06) and 0.0030 *17* (2000Sa32).
3183.6 *4*	0.0030 *5*	3183.6	(1,2$^+$)	0.0	0$^+$	E_γ: weighted average of 3182.8 *10* (1969Li10), 3183.6 *4* (1989Si17) and 3183.6 *4* (1993Di09,1994Mo06). I_γ: weighted average of 0.0042 *11* (1989Si17), 0.0028 *2* (1994Mo06) and 0.0060 *10* (2000Sa32).
[x]3233.2 *24*	0.0005 *3*					E_γ: from 1993Di09; other: ≈3233.3 (1975Ha31). I_γ: from 2000Sa32.
[x]3269.7 *15*	0.0004 *3*					E_γ: from 1993Di09; others: ≈3269.7 (1975Ha31). I_γ: from 2000Sa32.

[†] Placed in level scheme only by 1994Mo06 based on $\gamma\gamma$ coincidence.

[‡] Placed in level scheme only by 1989Si17 based on $\gamma\gamma$ coincidence.

[#] Possible multiply-placed transitions.

[@] For absolute intensity per 100 decays, multiply by 0.4544 *19*.

[&] 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.

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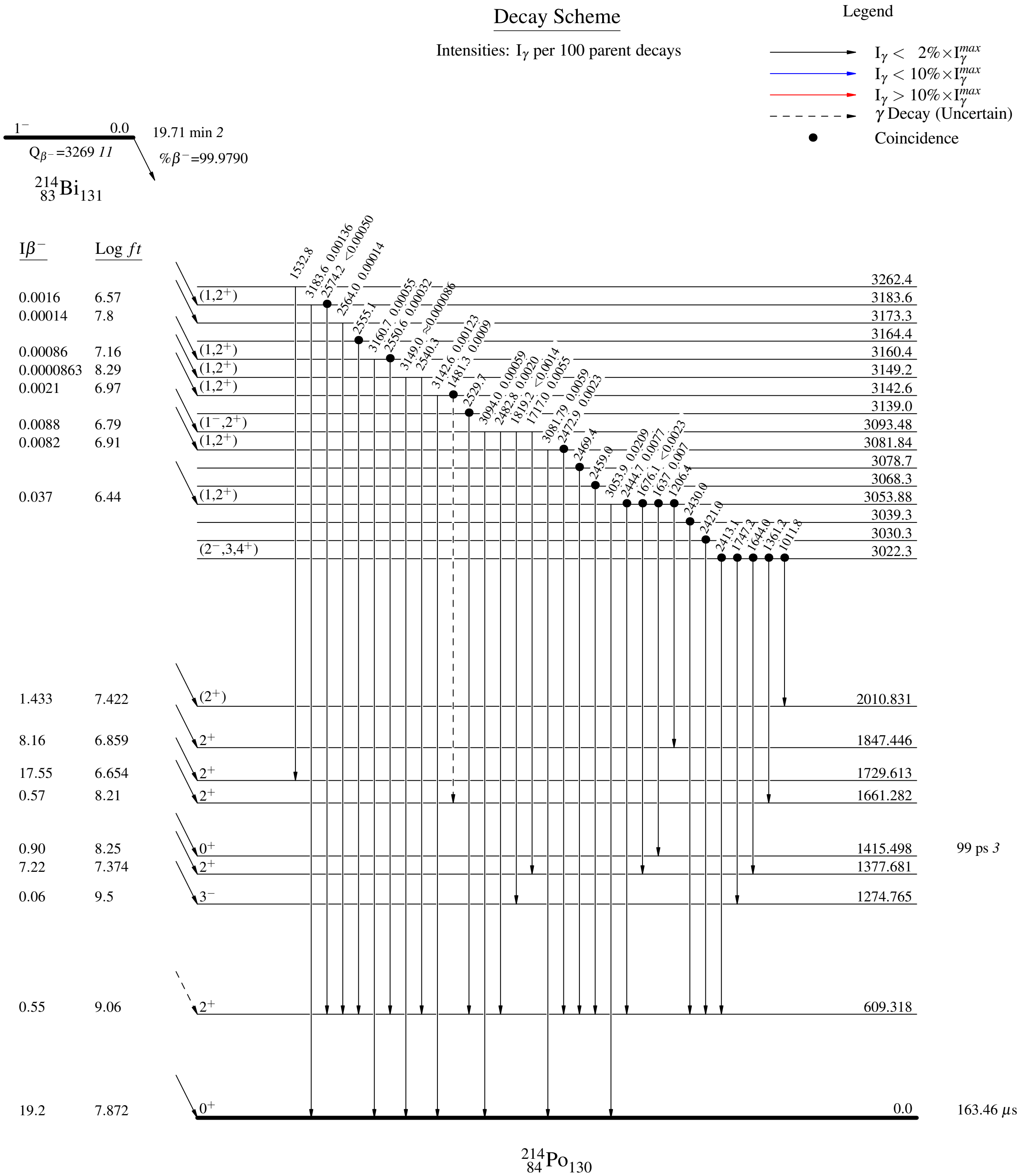
^{214}Bi β^- decay 1994Mo06,1989Si17

Decay Scheme

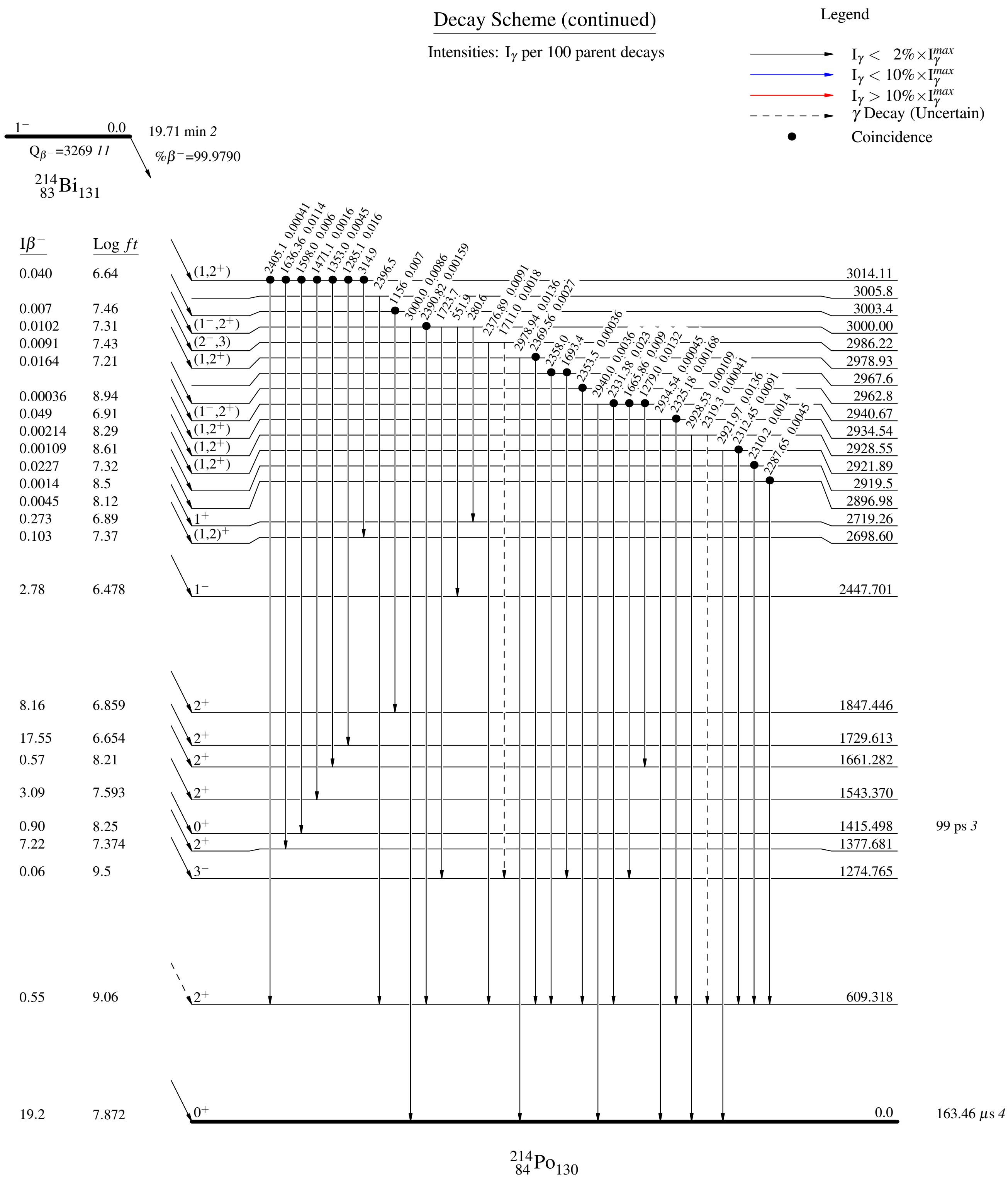
Intensities: I_γ per 100 parent decays



^{214}Bi β^- decay 1994Mo06,1989Si17

Decay Scheme (continued)

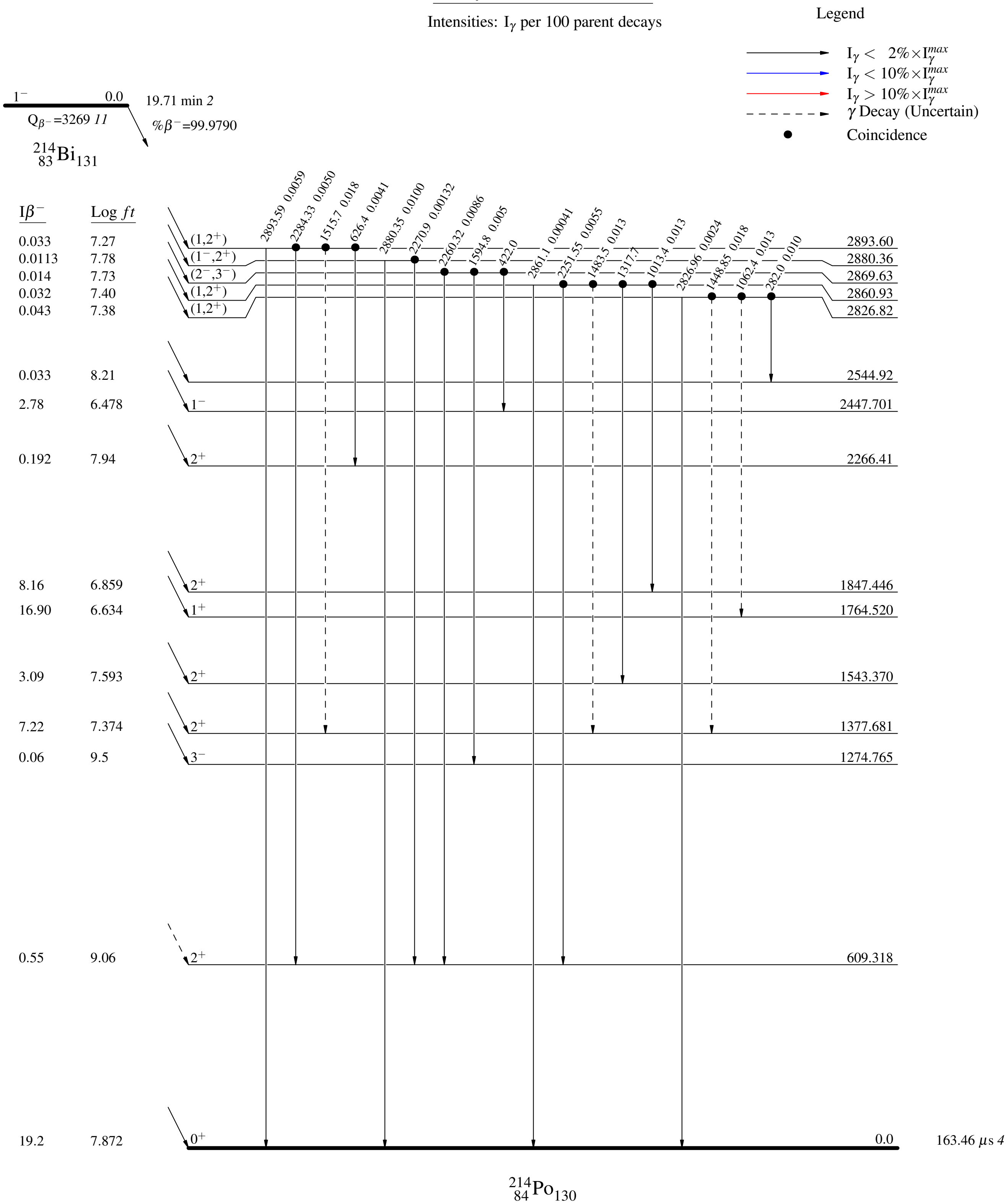
Intensities: I_γ per 100 parent decays



^{214}Bi β^- decay 1994Mo06,1989Si17

Decay Scheme (continued)

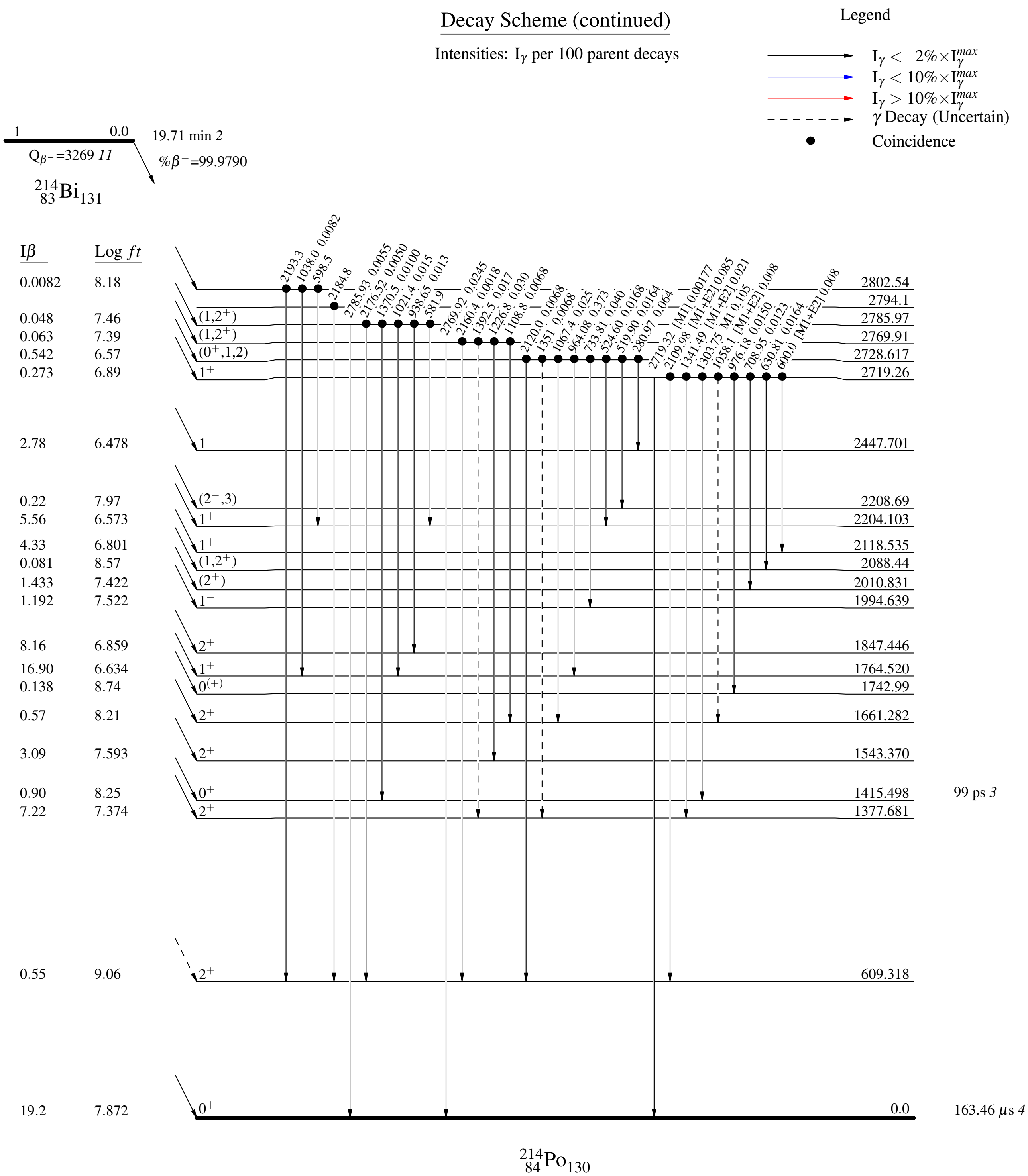
Intensities: I_γ per 100 parent decays



^{214}Bi β^- decay 1994Mo06,1989Si17

Decay Scheme (continued)

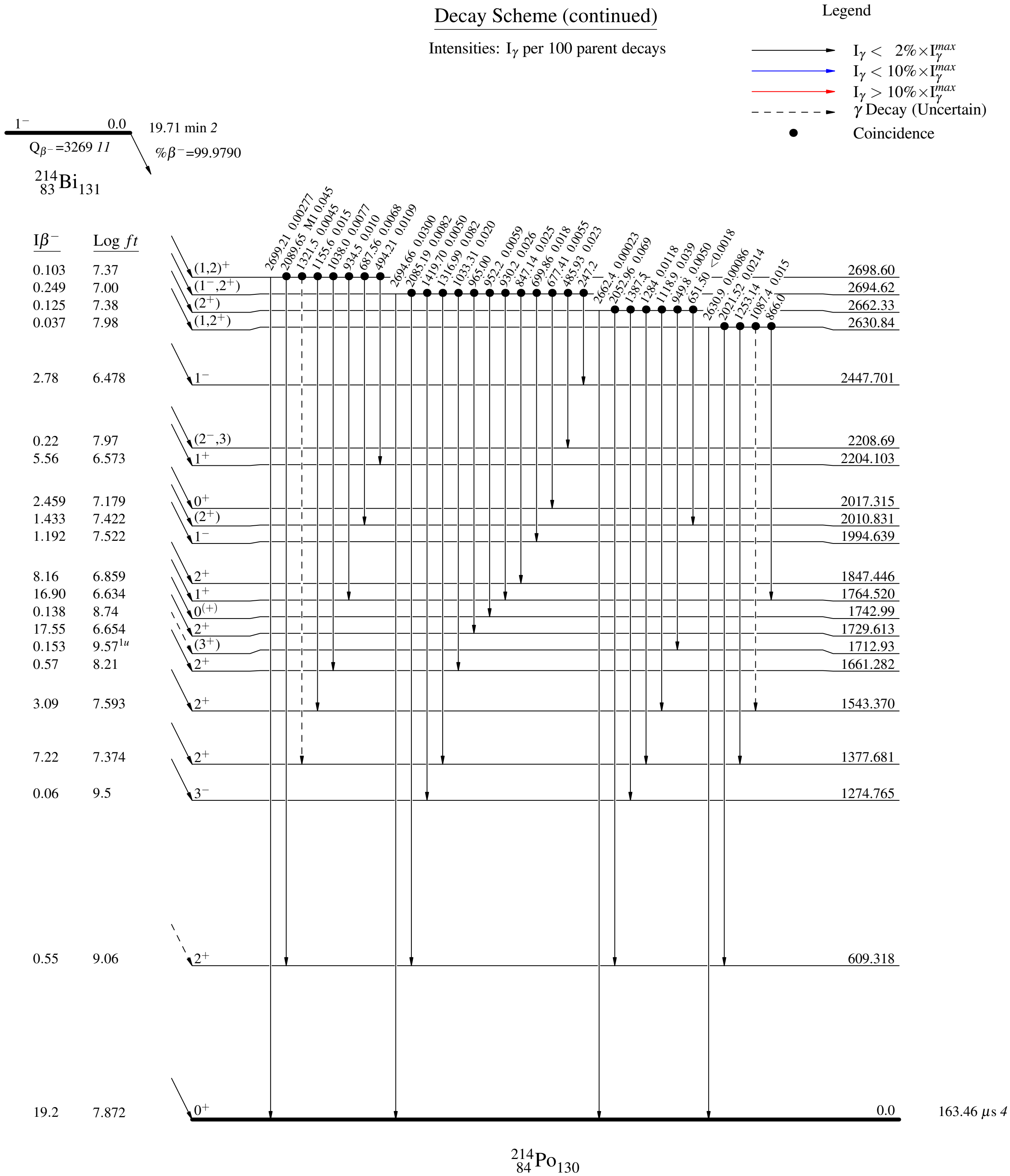
Intensities: I_γ per 100 parent decays



^{214}Bi β^- decay 1994Mo06,1989Si17

Decay Scheme (continued)

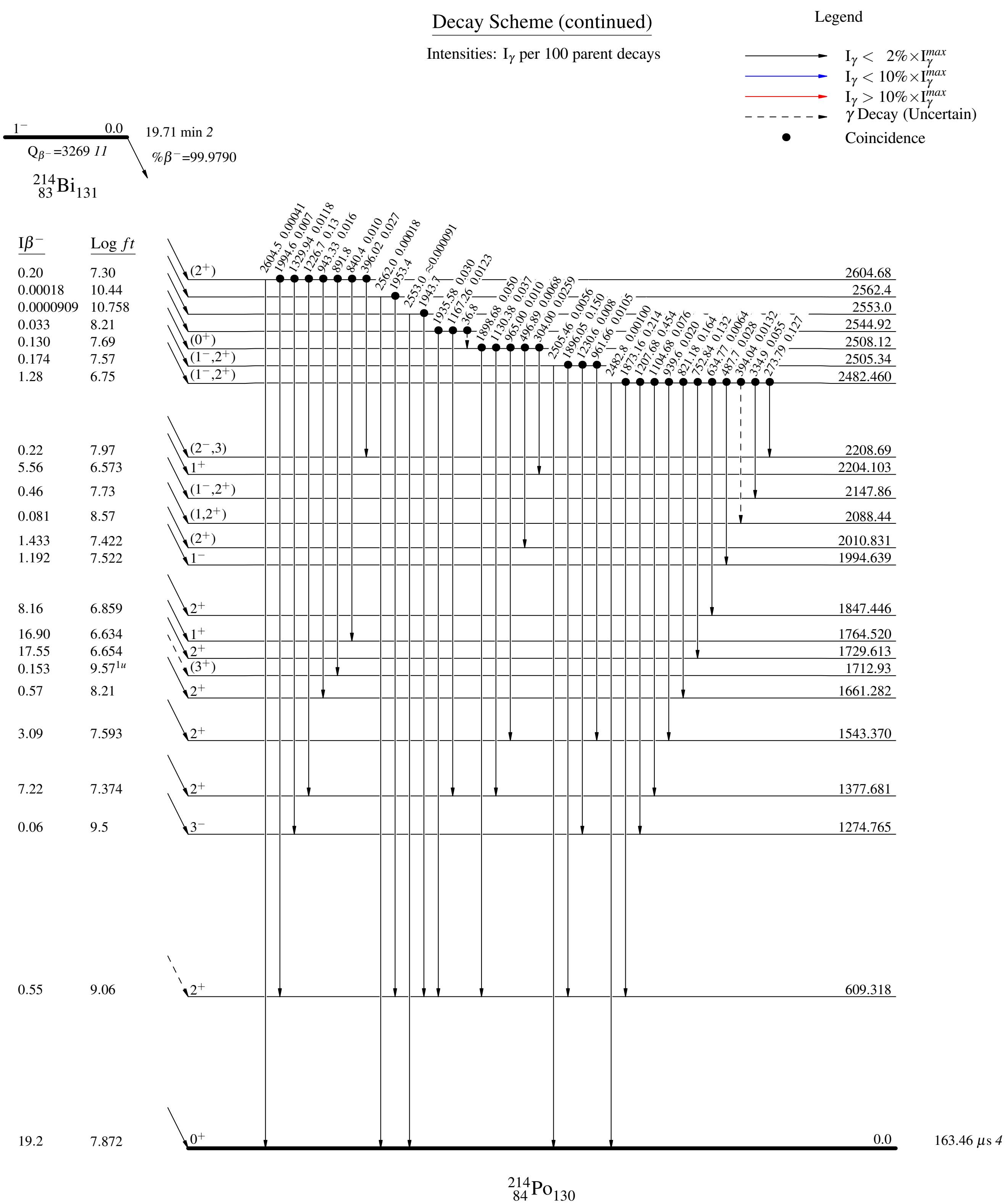
Intensities: I_γ per 100 parent decays



^{214}Bi β^- decay 1994Mo06,1989Si17

Decay Scheme (continued)

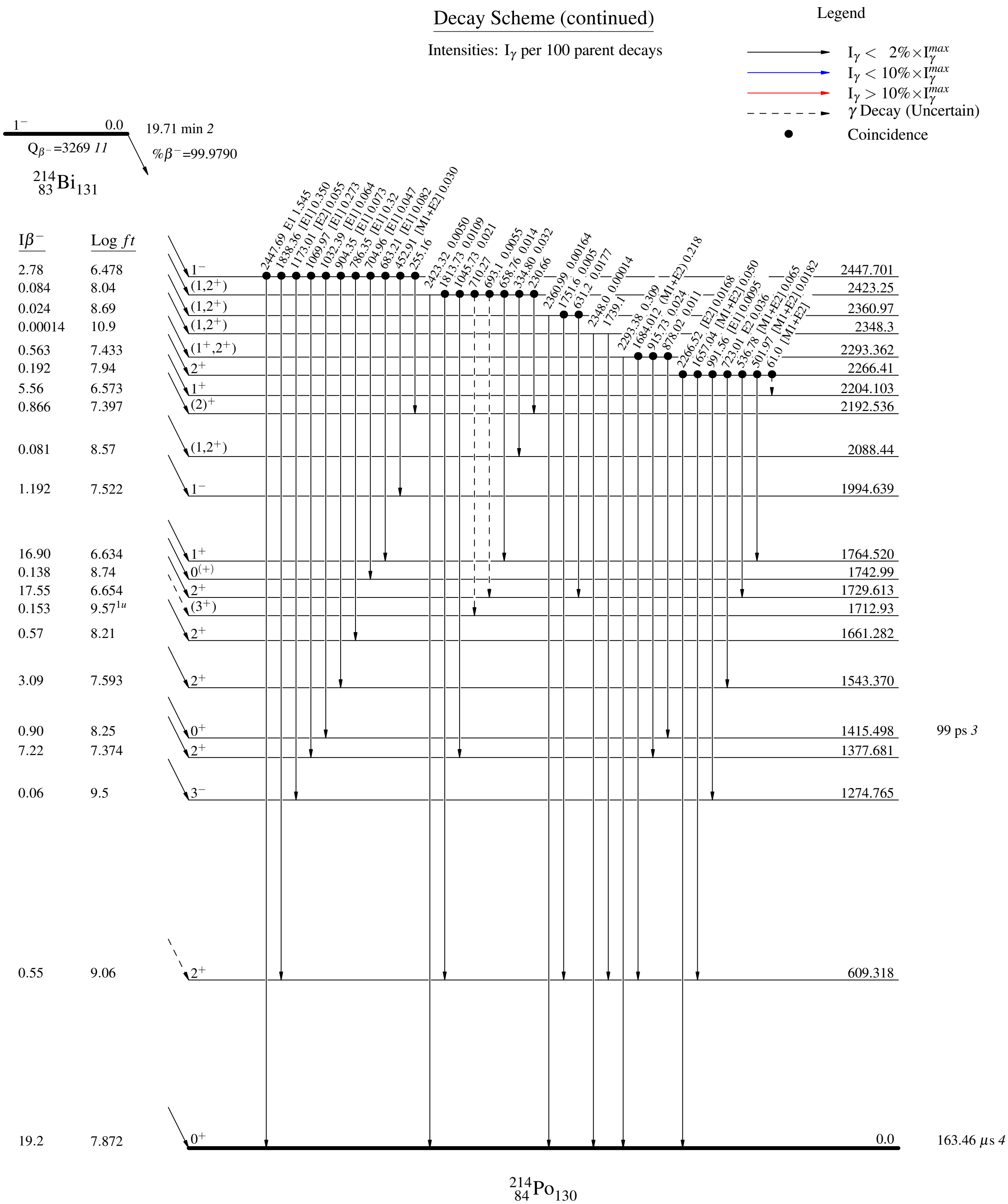
Intensities: I_γ per 100 parent decays

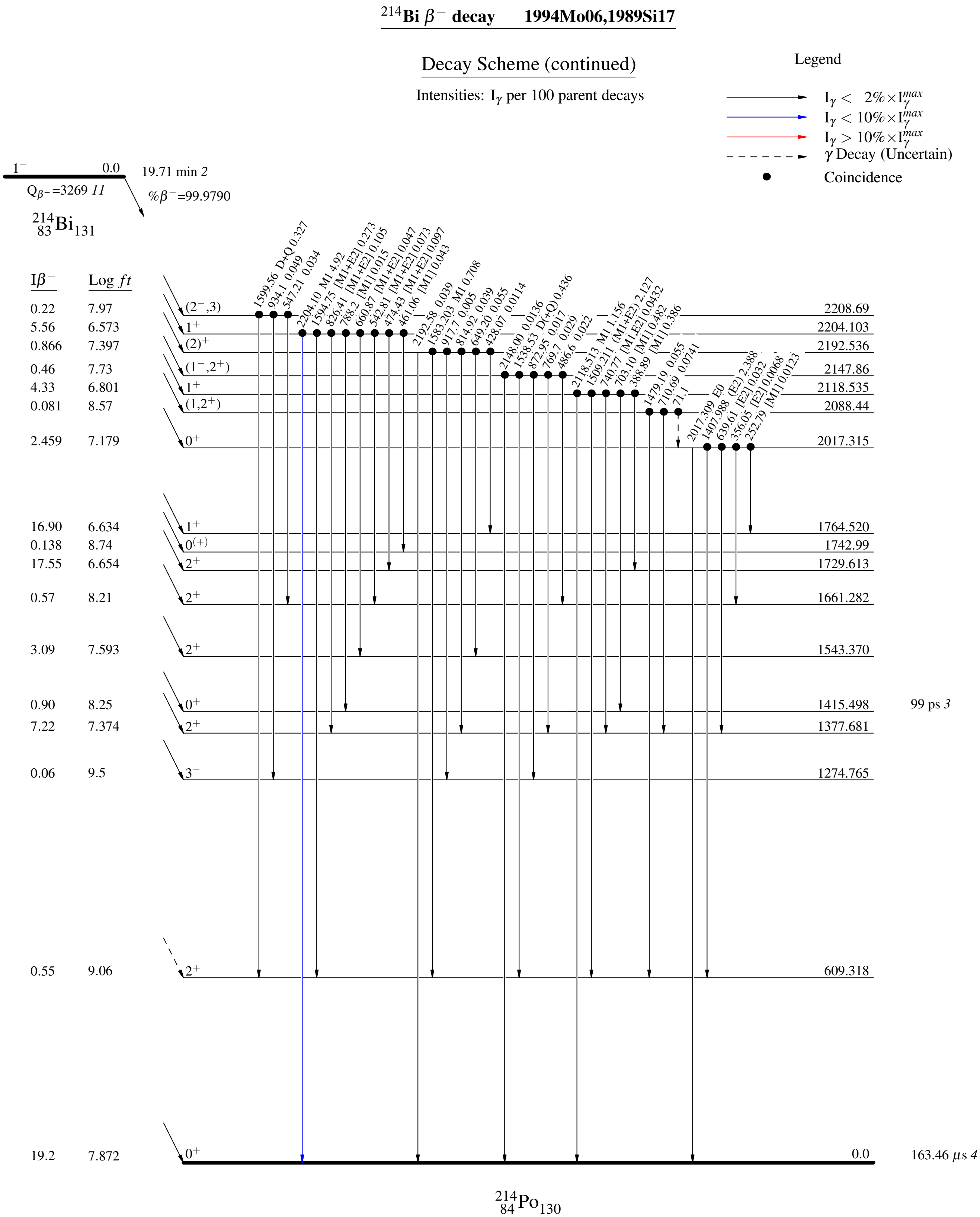


^{214}Bi β^- decay 1994Mo06,1989Si17

Decay Scheme (continued)

Intensities: I_γ per 100 parent decays



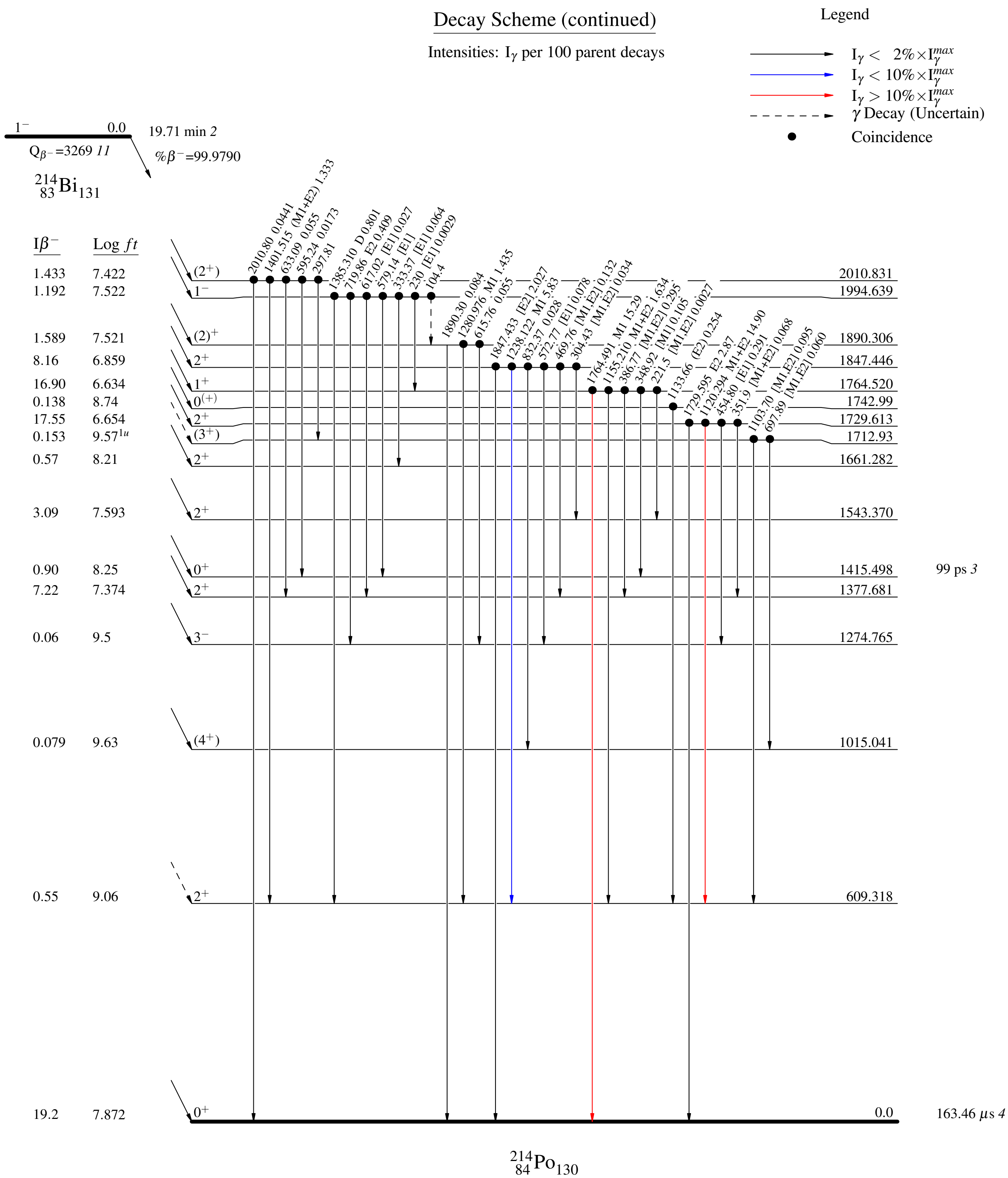


^{214}Bi β^- decay 1994Mo06,1989Si17
Decay Scheme (continued)
Intensities: I_γ per 100 parent decays
Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)
Coincidence
1^- 0.0 19.71 min 2
Q_{β^-}=3269 11
%β^-=99.9790
$^{214}_{83}Bi_{131}$
$I\beta^-$ Log ft
0.22 7.97 $(2^-,3)$ 2208.69
5.56 6.573 1^+ 2204.103
0.866 7.397 $(2)^+$ 2192.536
0.46 7.73 $(1^-,2^+)$ 2147.86
4.33 6.801 1^+ 2118.535
0.081 8.57 $(1,2^+)$ 2088.44
2.459 7.179 0^+ 2017.315
16.90 6.634 1^+ 1764.520
0.138 8.74 $0^{(+)}$ 1742.99
17.55 6.654 2^+ 1729.613
0.57 8.21 2^+ 1661.282
3.09 7.593 2^+ 1543.370
0.90 8.25 0^+ 1415.498 99 ps 3
7.22 7.374 2^+ 1377.681
0.06 9.5 3^- 1274.765
0.55 9.06 2^+ 609.318
19.2 7.872 0^+ 0.0 163.46 μs 4
1599.56 D+Q 0.327
934.1 0.049
547.21 0.034
2204.10 M1 4.92
1594.75 [M1+E2] 0.273
826.41 [M1+E2] 0.105
788.2 [M1] 0.015
660.87 [M1+E2] 0.047
542.81 [M1+E2] 0.073
474.43 [M1+E2] 0.097
461.06 [M1] 0.043
2192.58 0.039
1583.203 M1 0.708
917.7 0.005
814.92 0.039
649.20 0.055
428.07 0.0114
2148.00 0.0136
1538.53 D(+Q) 0.436
872.95 0.017
769.7 0.029
486.6 0.022
2118.513 M1 1.156
1509.211 (M1+E2) 2.127
740.77 [M1+E2] 0.0432
703.10 [M1] 0.482
388.89 [M1] 0.386
1479.19 0.055
710.69 0.0741
71.1
2017.309 E0
1407.988 (E2) 2.388
639.61 [E2] 0.032
356.05 [E2] 0.0068
252.79 [M1] 0.0123
$^{214}_{84}Po_{130}$

^{214}Bi β^- decay 1994Mo06,1989Si17

Decay Scheme (continued)

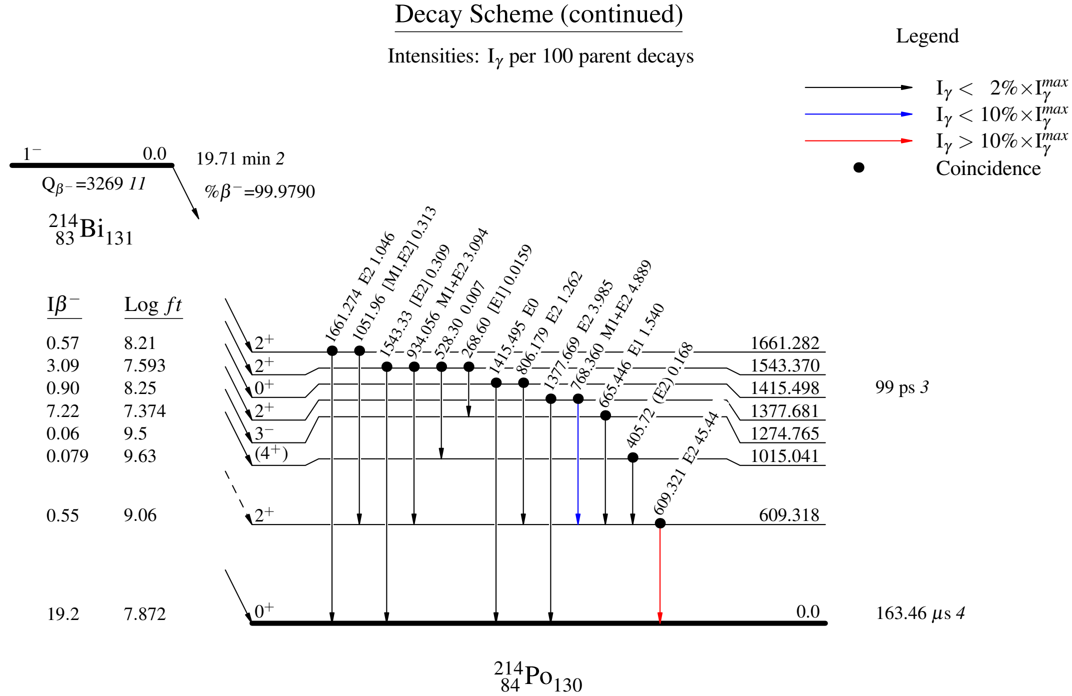
Intensities: I_γ per 100 parent decays



^{214}Bi β^- decay 1994Mo06,1989Si17

Decay Scheme (continued)

Intensities: I_γ per 100 parent decays



^{208}Pb(^{16}O,Xγ) 2011As02

2011As02: A 100 mg/cm^2 ^{208}Pb target was bombarded by a 85-MeV ^{18}O beam provided by the Vivitron tandem of the IReS (Strasbourg). Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma(\theta)$ using Euroball IV array of 71 Compton-suppressed HPGe detectors (15 clusters, 26 clovers and 30 tapered single crystals) with total 239 HPGe crystals grouped into 13 angles with respect to the beam axis.

^{214}Po Levels

E(level)†	J$^\pi$#	T$_{1/2}$	Comments
0.0‡	0$^+$		
609.0‡ *5*	2$^+$		
1014.4‡ *7*	4$^+$		
1338.8‡ *9*	6$^+$		
1582.9‡ *10*	8$^+$	13 ns *1*	T$_{1/2}$: from $\gamma\gamma$(t) (2011As02).
1589.0 *10*			
1684.9? *9*			
1736.8 *10*			
1822.5 *12*	8$^+$		
1842.3 *10*			
1981.7 *10*	7		
2157.3 *12*	9		
2178.7 *12*	10$^+$		
2271.5 *13*	9		
2377.0 *13*	10$^+$		
2604.5 *14*			
2611.9 *13*	12$^+$		
2669.4 *14*			
2733.8 *14*	12$^+$		

† From a least squares fit to Eγ′s by evaluators, Eγ uncertainty taken as 0.5 keV although it was stated as 0.1 to 0.5 keV in 2011As02.
‡ Seq.(A): Yrast cascade.
# From 2011As02.

γ(^{214}Po)

E$_\gamma$	I$_\gamma$	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Mult.†	δ	α‡	Comments
239.6 *5*	15 *2*	1822.5	8$^+$	1582.9	8$^+$	M1+E2	0.73 *+26−23*	0.70 *10*	Mult.,δ: from α_{tot}=0.7 *1*; R$_{ADO}$=0.95 *5* (2011As02).
244.1 *5*	44 *5*	1582.9	8$^+$	1338.8	6$^+$	E2		0.240 *4*	Mult.: from α_{tot}=0.25 *5*; R$_{ADO}$=1.31 *7*, A$_2$=+0.30 *15* (2011As02).
250.2 *5*	2.0 *8*	1589.0		1338.8	6$^+$				
292.4 *5*	1.2 *6*	2669.4		2377.0	10$^+$				
324.4 *5*	70 *5*	1338.8	6$^+$	1014.4	4$^+$	E2		0.1001 *15*	Mult.: from R$_{ADO}$=1.30 *8*, A$_2$=+0.3 *1* (2011As02).
333.0 *5*	2.0 *8*	2604.5		2271.5	9				
356.8 *5*	4 *1*	2733.8	12$^+$	2377.0	10$^+$	E2		0.0765 *11*	Mult.: from R$_{ADO}$=1.3 *3* (2011As02).
398.0 *5*	1.8 *6*	1736.8		1338.8	6$^+$				
405.4 *5*	100	1014.4	4$^+$	609.0	2$^+$	E2		0.0542 *8*	Mult.: from R$_{ADO}$=1.26 *8*, A$_2$=+0.25 *5* (2011As02).
433.2 *5*	2.5 *10*	2611.9	12$^+$	2178.7	10$^+$	E2		0.0457 *7*	Mult.: from R$_{ADO}$=1.2 *2* (2011As02).
449.0 *5*	7.4 *12*	2271.5	9	1822.5	8$^+$	D			Mult.: from R$_{ADO}$=0.76 *11* (2011As02).

Continued on next page (footnotes at end of table)

$^{208}Pb(^{16}O,X\gamma)$ 2011As02 (continued)

$\gamma(^{214}Po)$ (continued)

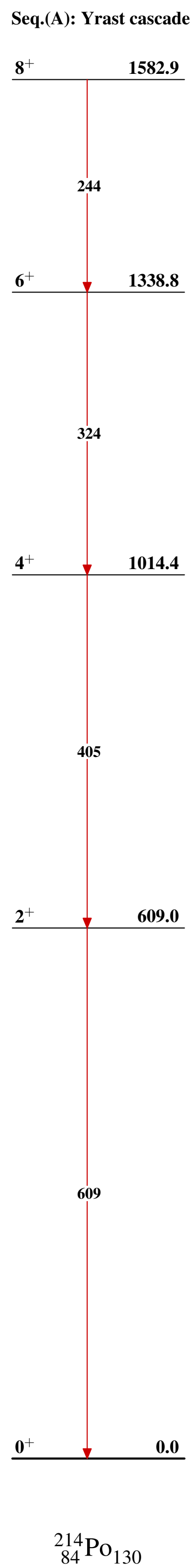
E_γ	I_γ	E_i(level)	J^π_i	E_f	J^π_f	Mult.†	α‡	Comments
503.5 *5*	3 *1*	1842.3		1338.8	6^+			
554.5 *5*	8.5 *13*	2377.0	10^+	1822.5	8^+	E2	0.0252 *4*	Mult.: from R_{ADO}=1.34 *17* (2011As02).
574.4 *5*	3.8 *11*	2157.3	9	1582.9	8^+	D		Mult.: from R_{ADO}=0.8 *2* (2011As02).
595.8 *5*	11 *1*	2178.7	10^+	1582.9	8^+	E2	0.02142 *30*	Mult.: from R_{ADO}=1.32 *15* (2011As02).
609.0 *5*		609.0	2^+	0.0	0^+	E2	0.02041 *29*	Mult.: from R_{ADO}=1.24 *8*, A_2=+0.34 *5* (2011As02).
642.9 *5*	3.7 *11*	1981.7	7	1338.8	6^+	D		Mult.: from R_{ADO}=0.6 *2* (2011As02).
670.5# *5*	3.8 *12*	1684.9?		1014.4	4^+			

† From $\gamma(\theta)$, $R_{ADO}(I\gamma(39.3°)/I\gamma(76.6°))$. Evaluators adopt E2 for stretched Q transitions due to their observed prompt character and assignment to the g.s. band.

‡ 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.

^{208}Pb(^{16}O,Xγ) 2011As02



Adopted Levels, Gammas

Q(β^-)=941 *10*; S(n)=4871 *6*; S(p)=4015 *5*; Q(α)=8988 *4* 2021Wa16
S(2n)=10894 *4*; S(2p)=9839 *4* (2021Wa16).

^{214}At Levels

Cross Reference (XREF) Flags

A ^{218}Fr α decay (1.1 ms)
B ^{218}Fr α decay (21.9 ms)

E(level)†	J$^\pi$	T$_{1/2}$	XREF	Comments
0.0	1$^-$	558 ns *10*	AB	%α=100 Only α decay has been observed. J$^\pi$: favored α decay to 1$^-$ state in ^{210}Bi, and the α fine structure populates only low-spin states in ^{210}Bi (1982Ew01,1999Sh03). Configuration=((π h$_{9/2}$)$^{+3}$(ν g$_{9/2}$)$^{+3}$). T$_{1/2}$: from 1982Ew01.
59? *9*		265 ns *30*		%α<100 Only observed by 1982Ew01, but no evidence found by 1999Sh03. E(level): from Q$_\alpha$ with the assumption of E(α)=8877 *8* of this isomer and E(α)=8819 *4* of 558-ns g.s. both feeding the g.s. in ^{210}Bi; and the coincidence of 8877α with the 7875α from the 21.9-ms state of ^{218}Fr to the 78-keV level in ^{214}At (1982Ew01). T$_{1/2}$: from 1982Ew01. J$^\pi$: possible J$^\pi$=0$^+$,1$^\pm$,2$^\pm$,3$^-$ on the basis of 59γ being M1, E1 or E2 with HF >4.0 for α-decay from this state to ^{210}Bi.
78.0 *10*	(0$^-$)		AB	J$^\pi$: γ to 1$^-$, γ from (1$^-$, 2$^-$), no ^{218}Fr α-decay from 1$^-$, α-decay from the 21.9-ms state of ^{218}Fr with HF≥3872. Configuration=((π h$_{9/2}$)$^{+3}$(νg$_{9/2}$)$^{+3}$).
145.1 *5*	(2)$^-$		AB	J$^\pi$: M1 to 1$^-$; α-decay from 1$^-$ state of ^{218}Fr with HF=75; α-decay from the 21.9-ms state of ^{218}Fr with HF≥2360. Configuration=((π h$_{9/2}$)$^{+3}$(ν g$_{9/2}$)$^{+3}$).
187.0 *9*	(3$^-$)#		AB	J$^\pi$: γ to 1$^-$, α-decay from the 21.9-ms state of ^{218}Fr with HF≥2402.
228.1 *12*	(4$^-$)#		B	J$^\pi$: γ to (2)$^-$; no α-decay from the 1$^-$ state of ^{218}Fr.
231‡ *7*	9$^-$	760 ns *15*	B	%α≤100 J$^\pi$: favored α decay to 9$^-$ state in ^{210}Bi; α from the 21.9-ms state of ^{218}Fr with HF≥388. T$_{1/2}$: from 1982Ew01. %α: only α decay observed, IT decay is possible but not observed.
277.9 *10*	(7$^-$)#		B	J$^\pi$: γ to 9$^-$, no α from 1$^-$, α from the 21.9-ms state of ^{218}Fr with HF≥89.
302.1 *15*	(6$^-$)#		B	J$^\pi$: γ to (4$^-$); α from the 21.9-ms state of ^{218}Fr with HF≥105.
304.0 *12*	(1$^-$,2$^-$)		A	J$^\pi$: γ to 1$^-$ and (3)$^-$; α from the 1.1-ms, 1$^-$ state of ^{218}Fr with HF=7.
334.0 *14*			A	
343.0 *10*	(8)$^-$		B	J$^\pi$: M1 to 9$^-$; α from the 21.9-ms state of ^{218}Fr with HF≥24.
412‡ *7*			B	
455‡ *8*			B	
495?‡ *6*			A	
504.1 *23*			B	
565.1 *23*			B	
631‡ *12*			B	
728.4 *15*	(8$^-$)		B	J$^\pi$: γ to (7)$^-$; γ to 9$^-$; α from the 21.9-ms state of ^{218}Fr with HF≥5.9.
790‡ *6*			B	
864‡ *7*			B	
883‡ *16*			B	
975‡ *9*			B	

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Adopted Levels, Gammas (continued)

^{214}At Levels (continued)

E(level)†	XREF
1018‡ *7*	B
1138‡ *9*	B

† From least square fit to Eγ's by evaluator, unless otherwised noted as from Eα and Q_α.
‡ From Eα and Q(α).
# Configuration=((π $h_{9/2}$)$^{+3}$(ν $g_{9/2}$)$^{+3}$); tentative spin assignment.

γ(^{214}At)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.†	α‡
78.0	(0⁻)	78		0.0	1⁻		
145.1	(2)⁻	145.1 *5*	100	0.0	1⁻	M1	4.19 *7*
187.0	(3⁻)	187 *1*	100	0.0	1⁻		
228.1	(4⁻)	83 *1*	100	145.1	(2)⁻		
277.9	(7⁻)	46 *1*	100	231	9⁻		
302.1	(6⁻)	74 *1*	100	228.1	(4⁻)		
304.0	(1⁻,2⁻)	117 *1*	100	187.0	(3⁻)		
		226 *2*	75	78.0	(0⁻)		
		304 *4*	100	0.0	1⁻		
334.0		147 *1*	100	187.0	(3⁻)		
343.0	(8)⁻	111 *1*	100	231	9⁻	M1	8.98 *27*
504.1		276 *2*	100	228.1	(4⁻)		
565.1		337 *2*	100	228.1	(4⁻)		
728.4	(8⁻)	451 *2*	100	277.9	(7⁻)		
		496 *2*	50	231	9⁻		

† From ^{218}Fr α decay (1999Sh03).
‡ 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.

^{218}Fr α decay (1.1 ms) 1999Sh03

Parent: ^{218}Fr: E=0.0; J$^{\pi}$=1^{-}; $T_{1/2}$=1.1 ms *+5−4*; Q(α)=8013.7 *14*; %α decay=100.0
^{218}Fr-Q(α): from 2021Wa16.
^{218}Fr-J$^{\pi}$,$T_{1/2}$: from Adopted Levels of ^{218}Fr (2019Si39).
1999Sh03: Radioactivity of ^{218}Fr produced from ^{222}Ac decay (following Th(p,X)^{222}Ac); ISOCELE Mass and chemical separation of source. Measured Eα, Eγ, $\alpha\gamma$-, $\gamma\gamma$-coin; deduced levels J^{π}, α-branching.
Other measurements: 1964Mc21 and 1982Ew01.

^{214}At Levels

E(level)†	J$^{\pi}$‡	$T_{1/2}$	Comments
0.0	1^{-}	558 ns *10*	$T_{1/2}$: from Adopted Levels.
78.0 *10*	(0^{-})		
145.1 *5*	(2)$^{-}$		
187.0 *9*	(3^{-})		
304.0 *12*	(1^{-},2^{-})		
334.0 *14*			
495? *6*			E(level): from Eα and Q(α). Marked as a tentative level in 1999Sh03.

† From a least squares fit to Eγ's by evaluators, except the 495 keV level.
‡ From the Adopted Levels.

α radiations

Eα	E(level)	Iα†#	HF‡	Comments
7381 *6*	495?	1.0 *5*	9 *7*	Eα: from 1999Sh03; other: 7362 *10* (1964Mc21) adjusted to 7384 *10* (1996FiZX). Iα: from 1999Sh03; other:<0.5 (1964Mc21).
7531 *8*	334.0	0.5 *2*	61 *37*	Eα: from 1999Sh03; other: 7520 *15* (1964Mc21) adjusted to 7542 *15* (1996FiZX). Iα: from 1999Sh03; other: 1 (1964Mc21).
7569 *5*	304.0	5 *1*	8 *4*	Eα: from 1999Sh03; other: 7550 *10* (1964Mc21) adjusted to 7572 *5* (1996FiZX). Iα: from 1999Sh03; other: 5 (1964Mc21).
7726 *7*	145.1	1.5 *5*	77 *44*	Eα: from 1999Sh03; other: 7710 *10* (1964Mc21) adjusted to 7732 *10* (1996FiZX). Iα: from 1999Sh03; other:< 0.5 (1964Mc21).
7866.6 *14*	0.0	92 *2*	3.4 *16*	Eα: weighted average of 7866 *2* (1999Sh03), 7867 *2* (1973BoXL,1982Bo04), 7868 *5* (1982Ew01) and 7870 *20* (1972Es03). Other: 7.87 MeV *1* (1972Es03), 7.85 MeV *2* (1968Ha14), 7845 *10* (1964Mc21), 7.85 MeV *4* (1958To25) and 7.85 MeV *5* (1951Me10). Suggested adjustments to the original measured values (1991Ry01): −0.3 keV (1982Bo04), −0.8 keV (1972Es03) and +22 keV (1964Mc21). Iα: from 1999Sh03; other: 93 (1964Mc21,1982Ew01).

† α intensity per 100 α decays.
‡ r_0(^{214}At)=1.5615 *28*, unweighted average of r_0(^{212}Po)=1.5658 *59*, r_0(^{214}Po)=1.5606 *7*, r_0(^{214}Rn)=1.5655 *13*, r_0(^{216}Rn)=1.5539 *57* (2020Si16).
# Absolute intensity per 100 decays.

γ(^{214}At)

Eγ†	Iγ†	E_i(level)	J^{π}_i	E_f	J^{π}_f	Mult.	α‡	Comments
78		78.0	(0^{-})	0.0	1^{-}			
117 *1*	4	304.0	(1^{-},2^{-})	187.0	(3^{-})			
145.1 *5*	3	145.1	(2)$^{-}$	0.0	1^{-}	M1	4.19 *7*	Mult.: from the ratio of the IK-x ray to Iγ; measured value not explicitly given (1999Sh03).
147 *1*	3	334.0		187.0	(3^{-})			

Continued on next page (footnotes at end of table)

^{218}Fr α decay (1.1 ms) 1999Sh03 (continued)

$\gamma(^{214}At)$ (continued)

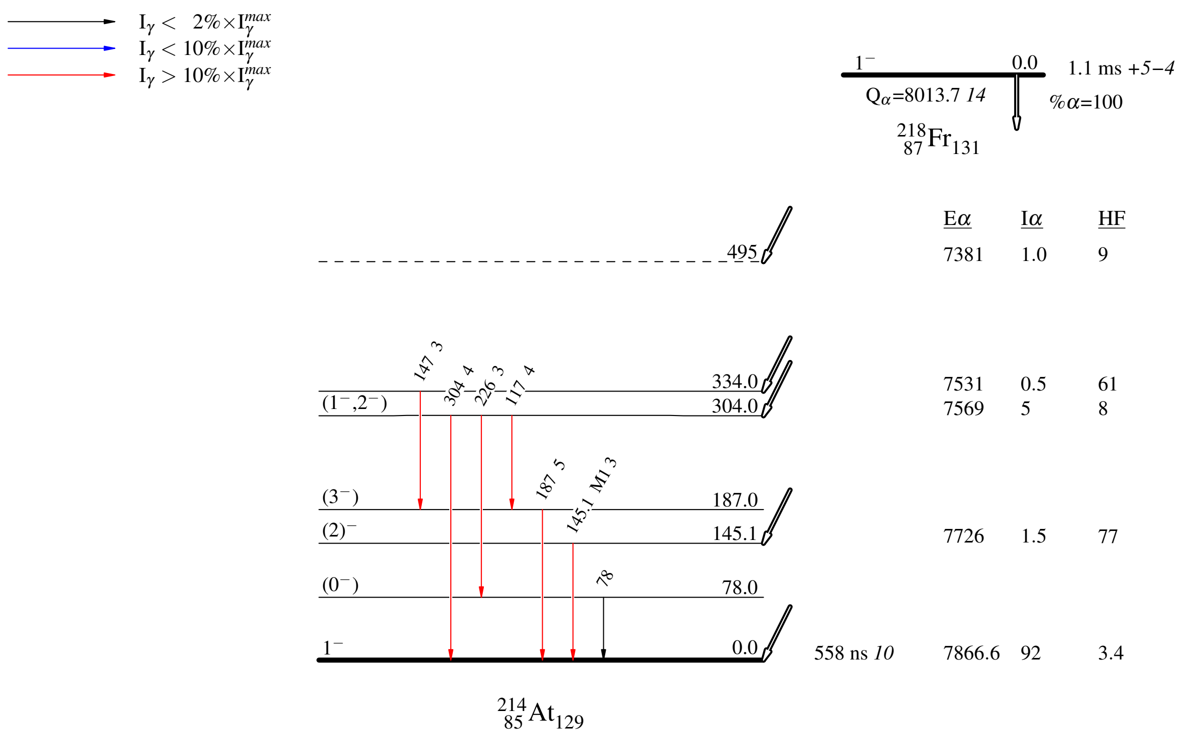
E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π
187 *1*	5	187.0	(3^-)	0.0	1^-
226 *2*	3	304.0	$(1^-,2^-)$	78.0	(0^-)
304 *4*	4	304.0	$(1^-,2^-)$	0.0	1^-

† From 1999Sh03.
‡ 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.

^{218}Fr α decay (1.1 ms) 1999Sh03

Decay Scheme

Intensities: Relative I_γ



^{218}Fr α decay (21.9 ms) 1999Sh03,1982Ew01

Parent: ^{218}Fr: E=86 *8*; J^π=(8$^-$,9$^-$); $T_{1/2}$=21.9 ms *5*; Q(α)=8013.7 *14*; %α decay≤100.0
^{218}Fr-Q(α): from 2021Wa16.
^{218}Fr-J^π,$T_{1/2}$: from Adopted Levels of ^{218}Fr (2019Si39).
1999Sh03: Radioactivity of ^{218}Fr produced from ^{222}Ac decay (following Th(p,X)^{222}Ac); ISOCELE mass and chemical separation of source. Measured Eα, Eγ, αγ-, γγ-coin; deduced levels, J^π, α-branching.
1982Ew01: Radioactivity of ^{218}Fr produced from ^{238}U(p,15n6p), ISOCELE isotope separator; measured Eα, Iα, αα–coin, $T_{1/2}$; deduced levels, J^π, α-branching.

^{214}At Levels

E(level)[†]	J^π[#]	$T_{1/2}$	Comments
0.0	1$^-$	558 ns *10*	$T_{1/2}$: from Adopted Levels.
79[‡] *6*	(0$^-$)		
145.1 *5*	(2)$^-$		
187.0 *10*	(3$^-$)		
228.1 *12*	(4$^-$)		
231[‡] *7*	9$^-$		
277.9 *10*	(7$^-$)		
302.1 *15*	(6$^-$)		
343.0 *10*	(8)$^-$		
412[‡] *7*			
455[‡] *8*			
504.1 *23*			
565.1 *23*			
631[‡] *12*			
728.4 *15*	(8$^-$)		
791[‡] *8*			
864[‡] *7*			
883[‡] *16*			
975[‡] *9*			
1018[‡] *7*			
1138[‡] *9*			

[†] From a least squares fit to Eγ′s by evaluators, unless otherwise noted.
[‡] From Eα and Q(α).
[#] From the Adopted Levels.

α radiations

Eα	E(level)	Iα[‡]	HF[†]	Comments
6835 *7*	1138	0.04 *1*	≥41	Eα: adjusted from 6837 *7* (1982Ew01) by 1991Ry01. Iα: from 1982Ew01.
6953 *5*	1018	0.51 *3*	≥11	Eα: adjusted from 6955 *5* (1982Ew01) by 1991Ry01. Iα: from 1982Ew01.
6995 *8*	975	0.037 *15*	≥137	Eα: adjusted from 6997 *8* (1982Ew01) by 1991Ry01. Iα: from 1982Ew01.
7085 *15*	883	0.33 *23*	≥16	Eα: adjusted from 7087 *15* (1982Ew01) by 1991Ry01. Iα: from 1982Ew01.
7104 *5*	864	1.61 *22*	≥11	Eα: adjusted from 7106 *5* (1982Ew01) by 1991Ry01. Iα: from 1982Ew01.
7176 *6*	791	0.89 *13*	≥35	Eα: adjusted from 7178 *6* (1982Ew01) by 1991Ry01.

Continued on next page (footnotes at end of table)

^{218}Fr α decay (21.9 ms) 1999Sh03,1982Ew01 (continued)

α radiations (continued)

Eα	E(level)	Iα‡	HF†	Comments
				Iα: from 1982Ew01.
7239 *4*	728.4	9.5 *4*	≥6	Eα: weighted average of 7240 *5* (1999Sh03) and 7238 *5* adjusted from 7240 *5* (1982Ew01). Iα: weighted average of 8 *2* (1999Sh03) and 9.6 *4* (1982Ew01).
7333 *11*	631	0.58 *14*	≥165	Eα: weighted average of 7335 *15* (1999Sh03) and 7331 *15* adjusted from 7332 *15* (1982Ew01). Iα: weighted average of 0.5 *2* (1999Sh03) and 0.65 *20* (1982Ew01). Partially overlaps with 7317α from ^{219}Fr (1982Ew01).
7397 *5*	565.1	3.4 *3*	≥55	Eα: weighted average of 7398 *10* (1999Sh03) and 7397 *5* adjusted from 7398 *5* (1982Ew01) by 1991Ry01. Iα: weighted average of 2 *1* (1999Sh03) and 3.4 *2* (1982Ew01).
7457 *4*	504.1	1.3 *1*	≥230	Eα: weighted average of 7458 *8* (1999Sh03) and 7457 *5* adjusted from 7458 *5* (1982Ew01) by 1991Ry01. Iα: weighted average of 1.0 *5* (1999Sh03) and 1.3 *1* (1982Ew01).
7505 *6*	455	0.93 *10*	≥446	Eα: adjusted from 7506 *6* (1982Ew01) by 1991Ry01. Iα: from 1982Ew01.
7548 *5*	412	0.76 *9*	≥736	Eα: adjusted from 7549 *5* (1982Ew01) by 1991Ry01. Iα: from 1982Ew01.
7616 *4*	343.0	41.3 *13*	≥24	Eα: weighted average of 7616 *5* (1999Sh03) and 7615 *5* adjusted from 7616 *5* (1982Ew01) by 1991Ry01. Iα: weighted average of 45 *5* (1999Sh03) and 41.1 *13* (1982Ew01).
7657 *5*	302.1	10.9 *17*	≥108	Eα: weighted average of 7657 *7* (1999Sh03) and 7656 *7* adjusted from 7657 *7* (1982Ew01) by 1991Ry01. Iα: weighted average of 9 *3* (1999Sh03) and 11.9 *21* (1982Ew01).
7681 *4*	277.9	15.9 *19*	≥91.4	Eα: weighted average of 7682 *5* (1999Sh03) and 7680 *7* adjusted from 7681 *7* (1982Ew01) by 1991Ry01. Iα: weighted average of 15 *4* (1999Sh03) and 16.1 *21* (1982Ew01).
7725 *5*	231	4.8 *8*	≥397	Eα: weighted average of 7726 *7* (1999Sh03) and 7724 *6* adjusted from 7725 *6* (1982Ew01) by 1991Ry01. Iα: weighted average of 7 *2* (1999Sh03) and 4.5 *7* (1982Ew01).
7769 *5*	187.0	1.14 *11*	≥2457	Eα: adjusted from 7770 *5* (1982Ew01) by 1991Ry01. Iα: from 1982Ew01.
7809 *5*	145.1	1.6 *1*	≥2415	Eα: adjusted from 7810 *5* (1982Ew01) by 1991Ry01. Iα: from 1982Ew01.
7874 *5*	79	1.4 *2*	≥3962	Eα: adjusted from 7875 *5* (1982Ew01) by 1991Ry01. Iα: from 1982Ew01.
7952 *4*	0.0	2.4 *1*	≥4353	Eα: weighted average of 7952 *5* (1999Sh03) and 7951 *5* (1991Ry01) adjusted from 7952 *5* (1982Ew01). Iα: weighted average of 2 *1* (1999Sh03) and 2.4 *1* (1982Ew01).

† r_0(^{214}At)=1.5615 *28*, unweighted average of r_0(^{212}Po)=1.5658 *59*, r_0(^{214}Po)=1.5606 *7*, r_0(^{214}Rn)=1.5655 *13*, r_0(^{216}Rn)=1.5539 *57* (2020Si16). The deduced HF values are lower limits due to the uncertain α branching from the 21.9-ms isomer.
‡ For absolute intensity per 100 decays, multiply by ≤1.0.

γ(^{214}At)

Eγ†	Iγ†	E_i(level)	J^π_i	E_f	J^π_f	Mult.	α‡	Comments
46 *1*	3	277.9	(7⁻)	231	9⁻			
74 *1*	3	302.1	(6⁻)	228.1	(4⁻)			
83 *1*	4	228.1	(4⁻)	145.1	(2)⁻			
111 *1*	14	343.0	(8)⁻	231	9⁻	M1	8.98 *27*	Mult.: from the ratio of the IK-x ray to Iγ, measured value not explicitly given (1999Sh03).

Continued on next page (footnotes at end of table)

^{218}Fr α decay (21.9 ms) 1999Sh03,1982Ew01 (continued)

$\gamma(^{214}At)$ (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α ‡	Comments
145.1 *5*	30	145.1	$(2)^-$	0.0	1^-	M1	4.19 *7*	Mult.: from the ratio of the IK-x ray to Iγ, measured value not explicitly given (1999Sh03).
187 *1*	2	187.0	(3^-)	0.0	1^-			
276 *2*	1	504.1		228.1	(4^-)			
337 *2*	1	565.1		228.1	(4^-)			
^{x}347 *2*	2							
451 *2*	2	728.4	(8^-)	277.9	(7^-)			
496 *2*	1	728.4	(8^-)	231	9^-			

† From 1999Sh03.

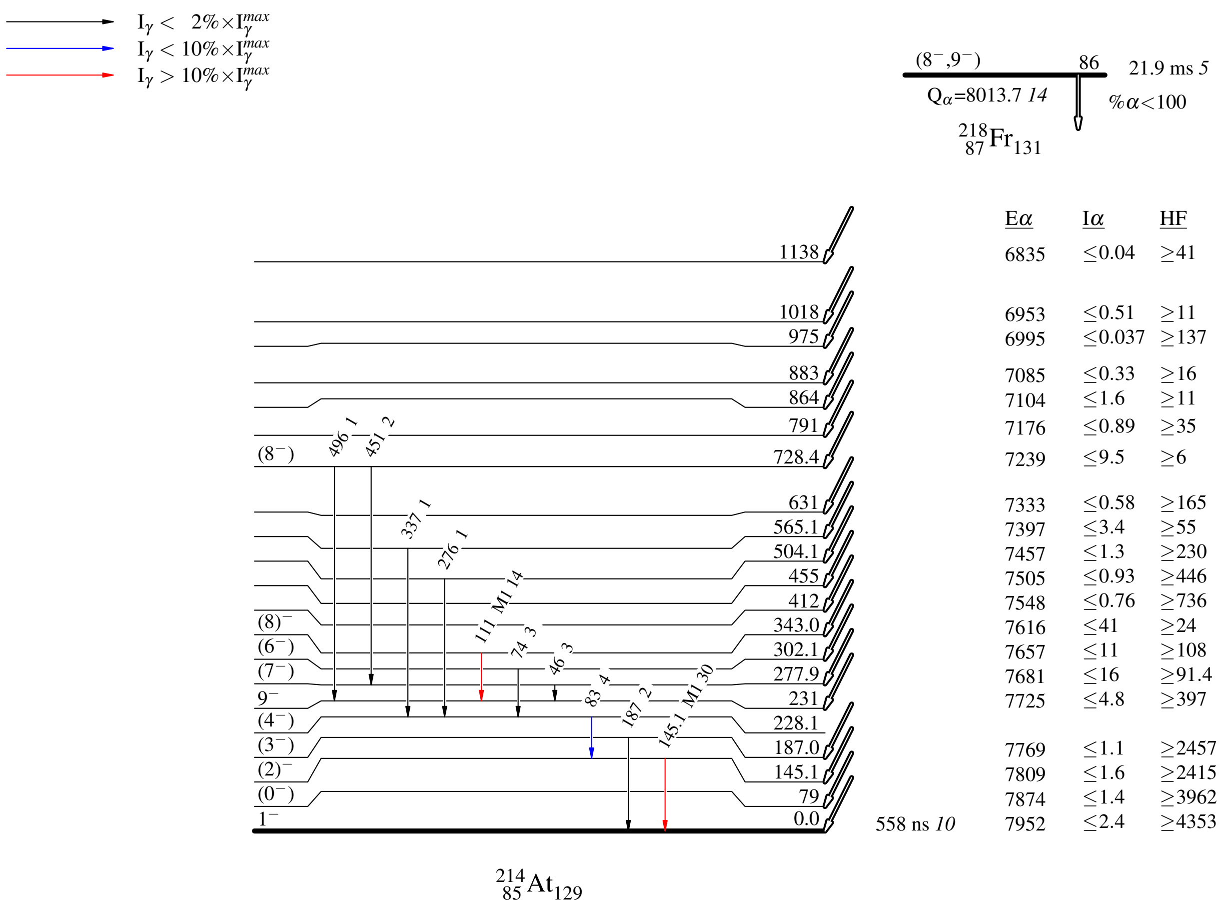
‡ Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

^{x} γ ray not placed in level scheme.

^{218}Fr α decay (21.9 ms) 1999Sh03,1982Ew01

Decay Scheme

Intensities: Relative I_γ



Adopted Levels, Gammas

$Q(\beta^-)=-3361$ *12*; S(n)=6695 *10*; S(p)=5029 *10*; $Q(\alpha)=9208$ *9* 2021Wa16
S(2n)=11803 *10*; S(2p)=8528 *9* (2021Wa16).

^{214}Rn Levels

Cross Reference (XREF) Flags

A ^{218}Ra α decay
B (HI,xnγ)

E(level)[†]	J^{π}[#]	$T_{1/2}$[‡]	XREF	Comments
0.0	0^+[@]	259 ns *3*	AB	$\%\alpha=100$ $T_{1/2}$: from 2019Pa45; other: 270 ns *20* (1970Va13).
694.7 *10*	2^+[@]	<1.4 ns	AB	J^{π}: E2 to 0^+.
1141.2 *15*	4^+[@]	<1.4 ns	B	J^{π}: E2 to 2^+.
1331.7 *15*			B	
1442.7 *18*	6^+[@]	0.69 ns *21*	B	$\%\alpha>0$; %IT<100 J^{π}: E2 to 4^+. %IT and $\%\alpha$: from (HI,xnγ) data.
1625.1 *20*	8^+[@]	6.5 ns *17*	B	%IT=95.9 *10*; $\%\alpha=4.1$ *10* J^{π}: E2 to 6^+. %IT and $\%\alpha$: from (HI,xnγ) data.
1800.5 *18*			B	
1928.0 *22*	10^+[&]	0.90 ns *21*	B	J^{π}: E2 to 8^+.
1944.9 *23*	$(10)^+$		B	J^{π}: (Q) to 8^+.
2028.2 *23*	$(10)^+$		B	J^{π}: (Q) to 8^+.
2099.7 *25*			B	
2208.6 *20*			B	
2320.5 *25*			B	
2377.1 *22*	(10^+)		B	J^{π}: γ to 10^+; (Q) to 8^+.
2394.7 *23*	11^-[a]	<1.4 ns	B	J^{π}: E1+M2 to 10^+; γ from 12^+.
2504.6 *23*			B	
2557.1 *24*	$(12)^+$		B	J^{π}: (Q) to 10^+.
2648.6 *24*	$(11,12)^-$		B	J^{π}: M1 to 11^-; γ from 12^+.
2668.2 *25*			B	
2676.1 *23*	13^-[b]	3.7 ns *3*	B	J^{π}: E2 to 11^-.
2682.2 *23*			B	
2689.1 *25*			B	
2878.2 *23*	12^+[@]	<1.4 ns	B	J^{π}: E2 to 10^+.
2917.1 *25*			B	
3148.0 *24*	14^+[@]	<1.4 ns	B	J^{π}: γ to 12^+; E1+M2 to 13^-.
3269 *3*	(14^+)[&]		B	J^{π}: γ to 14^+; γ from 16^+.
3328 *3*	16^+[@]	5.1 ns *3*	B	J^{π}: E2 to 14^+.
3465 *3*	(16^+)		B	J^{π}: (Q) to 14^+.
3490 *3*	18^+[&]	44 ns *3*	B	J^{π}: E2 to 16^+.
3540 *3*			B	
3579 *3*	(18^-)[a]		B	J^{π}: γ to 18^+; γ from 19^-.
3610.4 *24*	(16^+)[&]		B	J^{π}: γ to 14^+; γ to 13^-.
3746 *3*	19^-[a]	2.4 ns *3*	B	J^{π}: E1 to 18^+.
3753 *3*			B	
3791 *3*			B	
3827 *3*	(20^-)[b]		B	J^{π}: (M1+E2) to 19^-.
3907 *3*			B	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{214}Rn Levels (continued)

E(level)†	J^{π}#	$T_{1/2}$‡	XREF	Comments
3941 *3*			B	
4064 *3*	(20)		B	J^{π}: (D) to 19^-.
4220 *3*			B	
4250 *4*	(21)		B	J^{π}: (D) to (20^-).
4262 *3*			B	
4517 *4*			B	
4555 *3*			B	
4595 *4*	(22^+)	260 ns *35*	B	J^{π}: (M2) to $(20)^-$.
4751 *4*	(23^+)		B	J^{π}: (M1) to (22^+).
4859 *4*			B	
4977 *4*	(25^+)	8.0 ns *3*	B	J^{π}: (E2) to (23^+).
5051 *4*			B	

† From a least squares fit to adopted Eγ's by evaluators.
‡ Half-lives of all excited states are from (HI,xnγ).
\# Assigned using γ multipolarity from (HI,xnγ), unless otherwise noted.
@ Configuration=$(\pi\ h_{9/2})^{+4}(\nu\ g_{9/2})^{+2}$.
& Configuration=$(\pi\ h_{9/2})^{+4}(\nu\ g_{9/2})(\nu\ i_{11/2})$.
^{a} Configuration=$(\pi\ h_{9/2})^{+3}(\pi\ i_{13/2})(\nu\ g_{9/2})^{+2}$.
^{b} Configuration=$(\pi\ h_{9/2})^{+4}(\nu\ i_{11/2})(\nu\ j_{15/2})$.

$\gamma(^{214}Rn)$

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	δ	α[‡]	Comments
694.7	2^+	694.7	100	0.0	0^+	E2		0.01688 *24*	B(E2)(W.u.) > 0.032
1141.2	4^+	446.5	100	694.7	2^+	E2		0.0463 *6*	B(E2)(W.u.) > 0.28
1331.7		637.0	100	694.7	2^+				
1442.7	6^+	301.5	100	1141.2	4^+	E2		0.1360 *19*	B(E2)(W.u.)<4
1625.1	8^+	182.4	100	1442.7	6^+	E2		0.731 *10*	B(E2)(W.u.)=3.1 *9*
1800.5		468.8	100	1331.7					
1928.0	10^+	302.9	100	1625.1	8^+	E2		0.1341 *19*	B(E2)(W.u.)=2.9 *7*
1944.9	$(10)^+$	319.8	100	1625.1	8^+	(Q)			
2028.2	$(10)^+$	403.1	100	1625.1	8^+	(Q)			
2099.7		154.8	100	1944.9	$(10)^+$				
2208.6		765.9	100	1442.7	6^+				
2320.5		292.3	100	2028.2	$(10)^+$				
2377.1	(10^+)	449.2	60 *10*	1928.0	10^+				
		752.0	100 *10*	1625.1	8^+	(Q)			
2394.7	11^-	466.7	100	1928.0	10^+	E1+M2	0.147 *+13−14*	0.0235 *20*	B(E1)(W.u.) > 1.1×10^{-6}; B(M2)(W.u.) > 0.40
2504.6		296.0	100	2208.6					
2557.1	$(12)^+$	629.1	100	1928.0	10^+	(Q)			
2648.6	$(11,12)^-$	254.0	100	2394.7	11^-	M1		0.945 *13*	
2668.2		723.3	100	1944.9	$(10)^+$				
2676.1	13^-	281.5	100.0 *14*	2394.7	11^-	E2		0.1676 *23*	B(E2)(W.u.)=0.93 *8*
		748.2	5.2 *6*	1928.0	10^+	(E3)		0.0391 *5*	B(E3)(W.u.)=39 *6*
2682.2		305.1	75 *17*	2377.1	(10^+)				
		754.2	100 *17*	1928.0	10^+				
2689.1		744.2	100	1944.9	$(10)^+$				
2878.2	12^+	202.2	3.3 *3*	2676.1	13^-	[E1]		0.0838 *12*	B(E1)(W.u.) > 5.0×10^{-7}
		229.6	1.8 *4*	2648.6	$(11,12)^-$	[E1]		0.0619 *9*	B(E1)(W.u.) > 1.8×10^{-7}
		483.4	0.78 *21*	2394.7	11^-	[E1]		0.01180 *17*	B(E1)(W.u.) > 8.6×10^{-9}
		950.1	100 *4*	1928.0	10^+	E2		0.00897 *13*	B(E2)(W.u.) > 0.0064
2917.1		522.4	100	2394.7	11^-				
3148.0	14^+	269.9	29.3 *12*	2878.2	12^+	[E2]		0.1911 *27*	B(E2)(W.u.) > 0.78
		471.9	100.0 *18*	2676.1	13^-	E1+M2	0.13 *+2−3*	0.0206 *33*	B(E1)(W.u.) > 9.1×10^{-7}; B(M2)(W.u.) > 0.22
3269	(14^+)	120.6	100	3148.0	14^+				
3328	16^+	59[#]		3269	(14^+)				
		179.8	100.0 *18*	3148.0	14^+	E2		0.771 *11*	B(E2)(W.u.)<4.7 The limit given for B(E2)(W.u.) is due to unknown branching of 59γ.
3465	(16^+)	317.3	100	3148.0	14^+	(Q)			
3490	18^+	162.2	100	3328	16^+	E2		1.137 *16*	B(E2)(W.u.)=0.70 *6*
3540		212.2	100	3328	16^+				
3579	(18^-)	88.6	100	3490	18^+				
3610.4	(16^+)	462.4	100 *18*	3148.0	14^+				
		934.3	27 *9*	2676.1	13^-				

$\gamma(^{214}Rn)$ (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.†	α‡	Comments
3746	19^-	167.1	6.8 *7*	3579	(18^-)	[M1+E2]	2.0 *10*	
		255.8	100.0 *21*	3490	18^+	E1	0.0480 *7*	B(E1)(W.u.)=3.8×10^{-6} *6*
3753		425.4	100	3328	16^+			
3791		45.3	100	3746	19^-			
3827	(20^-)	81.7	100	3746	19^-	(M1+E2)	13 *8*	
3907		417.1	100	3490	18^+			
3941		475.5	100	3465	(16^+)			
4064	(20)	318.3	100	3746	19^-	(D)		
4220		474.6	100	3746	19^-			
4250	(21)	422.6	100	3827	(20^-)	(D)		
4262		355.0	100	3907				
4517		726.3	100	3791		(D)		
4555		808.9	100	3746	19^-			
4595	(22^+)	767.7	100	3827	(20^-)	(M2)	0.1209 *17*	B(M2)(W.u.)=0.0112 *15*
4751	(23^+)	155.4	100	4595	(22^+)	(M1)	3.75 *5*	
4859		341.3	100	4517				
4977	(25^+)	226.8	100	4751	(23^+)	(E2)	0.338 *5*	B(E2)(W.u.)=1.16 *5*
5051		300.2	100	4751	(23^+)			

† From (HI,xnγ).

‡ 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.

$^{214}_{86}Rn_{128}$-4

^{218}Ra α decay 2019Pa45

Parent: ^{218}Ra: E=0.0; $J^\pi=0^+$; $T_{1/2}$=25.91 μs *14*; Q(α)=8540 *3*; %α decay=100.0
^{218}Ra-Q(α): from 2021Wa16.
^{218}Ra-$T_{1/2}$: from Adopted Levels of ^{218}Ra (2019Si39).
2019Pa45: ^{218}Ra was the decay product of ^{222}Th produced in reaction ^{208}Pb(^{18}O,4n) with a beam at 95 MeV; evaporation residues (ER) were separated in-flight by the RITU gas-filled separator and implanted into one of the two double-sided silicon-strip detectors (DSSD) at the focal plane; charged particles emitted from the implants were detected by an array of p-i-n-diode detectors; x- and γ-rays from the implants were detected by three clover HPGe detectors surrounding the DSSDs. Eα and $T_{1/2}$ were measured by ER-α-α time and position correlations.
Other measurements: 1970Va13, 1970To07 and 1986Ki13.

^{214}Rn Levels

E(level)	J^π	$T_{1/2}$	Comments
0.0	0^+	259 ns *3*	$T_{1/2}$: from 2019Pa45 by $\alpha\alpha$(t).
695.0 *2*	2^+	<1.4 ns	E(level): from Eγ. J^π,$T_{1/2}$: from Adopted Levels.

α radiations

Eα	E(level)	Iα‡	HF†	Comments
7715 *40*	695.0	0.123 *11*	8.3 *8*	Eα,Iα: from 2019Pa45.
8383 *4*	0.0	99.88 *6*	1.000	Eα: weighted average of 8381 *4* (2019Pa45), 8385 *10* (1970Va13) and 8392 *8* (1970To07). Other: 8480 *20* (1986Ki13). Iα: from 2019Pa45; only one α group was observed before 2019Pa45.

† r_0(^{214}Rn)=1.5631 *19* is calculated from HF(8383α)=1.0.
‡ Absolute intensity per 100 decays.

γ(^{214}Rn)

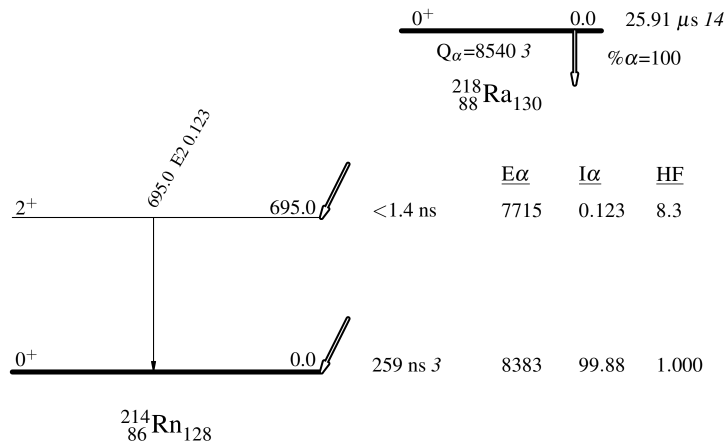
E_γ	I_γ†	E_i(level)	J^π_i	E_f	J^π_f	Mult.	α‡	$I_{(\gamma+ce)}$†	Comments
695.0 *2*	0.121 *11*	695.0	2^+	0.0	0^+	E2	0.01687 *24*	0.123 *11*	E_γ: from 2019Pa45. $I_{(\gamma+ce)}$: from I(7715α)=0.123 *11*. Mult.: from the Adopted Gammas. I_γ: deduced by evaluators from I(γ+ce) and α.

† 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.

^{218}Ra α decay 2019Pa45

Decay Scheme

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



(HI,xnγ) 1987Dr08,1983Lo01,1981Go06

1987Dr08: ^{208}Pb(^{9}Be,3nγ), E(^{9}Be)=45-57 MeV; measured Eγ, Iγ, I(ce), $\gamma(\theta)$, γ(t), $\gamma\gamma$(t). Levels, J^{π} and T$_{1/2}$ by $\gamma\gamma$(t) and pulsed beam-γ(t); Compton-suppressed Ge detectors, planar Ge detector for γ's and Si(Li) detector for conversion electrons.
1983Lo01: ^{208}Pb(^{13}C,α3nγ), E(^{13}C)=75-95 MeV; measured Eγ, Iγ, $\alpha\gamma$-coin., $\gamma\gamma$(t), $\gamma(\theta)$. Levels, J^{π} and T$_{1/2}$ by pulsed beam-γ(t); Ge(Li), Si(Li) detectors.
1981Go06: ^{208}Pb(^{12}C,α2nγ), E(^{12}C)=79 MeV; measured Eγ, Iγ, Eα, Iα, $\alpha\gamma$-coin., $\alpha\gamma$(t). Levels, J^{π} and T$_{1/2}$ by α-γ(t); ΔE-E, Si-surface barrier and Ge(Li) detector.

^{214}Rn Levels

E(level)[†]	J^{π}[‡]	T$_{1/2}$	Comments
0.0	0+[#]		%α=100
694.7 *10*	2+[#]	<1.4 ns	T$_{1/2}$: from τ<2 ns (1987Dr08).
1141.2 *15*	4+[#]	<1.4 ns	T$_{1/2}$: from τ<2 ns (1987Dr08).
1331.7 *15*			
1442.7 *18*	6+[#]	0.69 ns *21*	%α>0; %IT<100 %α: Eα measured without Iα determined (1981Go06). T$_{1/2}$: from τ=1.0 ns *3* (1987Dr08).
1625.1 *20*	8+[#]	6.5 ns *17*	%IT=95.7 *10*; %α=4.3 *10* T$_{1/2}$: unweighted average of 7.3 ns *15* (1981Go06); 9 ns *1* (1983Lo01) and 3.3 ns *2* (1987Dr08). %IT,%A\$from Iα=I(10630 from 8^{+})/I(9040 from g.s.)=0.043 *7* assuming I(IT from 8^{+})=I(α from g.s.) with additional %15 uncertainty due to side feeding to states below 8^{+} (1981Go06); other: %α≤14% from partial T$_{1/2}\alpha$(8^{+} to 0^{+})≈100 ns and T$_{1/2}\alpha$(8^{+} to 8^{+})≥180 ns with T$_{1/2}$(8^{+})=9 ns *1* (1983Lo01).
1800.5 *18*			
1928.0 *22*	10+[@]	0.90 ns *21*	T$_{1/2}$: from τ=1.3 ns *3* (1987Dr08); other: 22 ns *5* (1983Lo01). E(level): assigned to be 1787 keV decaying through Eγ=162.0 keV in 1983Lo01. From this level and above the proposed decay scheme was different drastically from 1983Lo01 to 1987Dr08.
1944.9 *23*	(10)		
2028.2 *23*	(10)		
2099.7 *25*			
2208.6 *20*			
2320.5 *25*			
2377.1 *22*			
2394.7 *23*	11−[&]	<1.4 ns	T$_{1/2}$: from τ<2 ns (1987Dr08).
2504.6 *23*			
2557.1 *24*	(12)		
2648.6 *24*	(11,12)$^{-}$		
2668.2 *25*			
2676.1 *23*	13−[a]	3.7 ns *3*	T$_{1/2}$: from τ=5.4 ns *4*; τ=6.4 ns in the level scheme drawing seems a typo (1987Dr08).
2682.2 *23*			
2689.1 *25*			
2878.2 *23*	12+[#]	<1.4 ns	T$_{1/2}$: from τ<2 ns (1987Dr08).
2917.1 *25*			
3148.0 *24*	14+[#]	<1.4 ns	T$_{1/2}$: from τ<2 ns (1987Dr08).
3268.7 *25*	(14^{+})[@]		
3327.8 *25*	16+[#]	5.1 ns *3*	T$_{1/2}$: from τ=7.4 ns *4* (1987Dr08). T$_{1/2}$(180γ)=116 ns *15* with different placement in the decay scheme (1983Lo01).
3465 *3*	(16^{+})		
3490 *3*	18+[@]	44 ns *2*	T$_{1/2}$: from τ=63 ns *3* (1987Dr08). T$_{1/2}$(162γ)=22 ns *15* with different placement in the decay scheme (1983Lo01).
3540 *3*			
3579 *3*	18−[&]		

Continued on next page (footnotes at end of table)

(HI,xnγ) 1987Dr08,1983Lo01,1981Go06 (continued)

^{214}Rn Levels (continued)

E(level)[†]	J^{π}[‡]	$T_{1/2}$	Comments
3610.4 *24*	(16^+)[@]		
3746 *3*	19^-[&]	2.4 ns *3*	$T_{1/2}$: from τ=3.4 ns *4* (1987Dr08).
3753 *3*			
3791 *3*			
3827 *3*	$(20)^-$[a]		
3907 *3*			
3941 *3*			
4064 *3*			
4220 *3*			
4250 *4*	(21^-)		
4262 *3*			
4517 *4*			
4555 *3*			
4595 *4*	(22^+)	260 ns *35*	$T_{1/2}$: from τ=380 ns *50* (1987Dr08); $T_{1/2}$=230 ns *30* with different placement in the decay scheme (1983Lo01).
4751 *4*	(23^+)		
4859 *4*			
4977 *4*	(25^+)		$T_{1/2}$: no life-time measured in 1987Dr08; while $T_{1/2}$(227γ)=8.0 ns *3* suggesting $T_{1/2}$=8.0 ns *3* for a level differently placed in the decay scheme (1983Lo01).
5051 *4*			

† From a least squares fit to adopted Eγ′s by evaluators, unless otherwise noted.
‡ From assignments in 1987Dr08.
\# Configuration=$(\pi\ h_{9/2})^{+4}(\nu\ g_{9/2})^{+2}$.
@ Configuration=$(\pi\ h_{9/2})^{+4}(\nu\ g_{9/2})(\nu\ i_{11/2})$.
& Configuration=$(\pi\ h_{9/2})^{+3}(\pi\ i_{13/2})(\nu\ g_{9/2})^{+2}$.
a Configuration=$(\pi\ h_{9/2})^{+4}(\nu\ i_{11/2})(\nu\ j_{15/2})$.

$\gamma(^{214}$Rn)

E_γ[†]	I_γ[‡]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	α[#]	Comments
^{x}29.7	1.8 *3*							
^{x}41	≈1							
45.3	3.6 *4*	3791		3746	19^-			
^{x}46	1.1 *4*							
^{x}48.5	2.0 *5*							
^{x}55.0	≈1							
^{x}57.1	1.8 *4*							I_γ: from E(^{9}Be)=45 MeV (1987Dr08).
59		3327.8	16^+	3268.7	(14^+)			E_γ: the observation is not conclusive, inferred from decay scheme (1987Dr08).
81.7	29 *5*	3827	$(20)^-$	3746	19^-	(M1+E2)	13 *8*	Mult.: from α(tot)exp=5.6 *10* (1987Dr08).
88.6	20 *1*	3579	18^-	3490	18^+	[E1]	0.1432 *20*	E_γ: from decay scheme, Eγ=88.1 listed in γ table seems a typo (1987Dr08).
120.6	7.5 *5*	3268.7	(14^+)	3148.0	14^+			
154.8	2 *1*	2099.7		1944.9	(10)			
155.4	8 *2*	4751	(23^+)	4595	(22^+)	(M1)	3.75 *5*	E_γ: other: 155.0 (1983Lo01). I_γ: others: 3 *1* with E(^{9}Be)=45 MeV (1987Dr08); ≤10 (1983Lo01). Mult.: on the basis of intensity balance with 226.8γ (1987Dr08); assigned as E1 based on Iγ(θ) and intensity balance referring to a incorrect theoretical α(tot)=8.3 for M1 transition (1983Lo01).
162.2	122 *2*	3490	18^+	3327.8	16^+	E2	1.137 *16*	E_γ: other: 162.0 (1983Lo01). I_γ: others: 46 *1* with E(^{9}Be)=45 MeV (1987Dr08); 44 (1983Lo01). Mult.: α(L)exp=0.58 *6*; A_2=+0.25 *3*; A_4=0.00 *5* (1987Dr08); A_2=+0.02 *3*; A_4=−0.03 *5* (1983Lo01).
167.1	10 *1*	3746	19^-	3579	18^-	[M1+E2]	2.0 *10*	I_γ: other: 3 *1* with E(^{9}Be)=45 MeV (1987Dr08).
179.8	167 *3*	3327.8	16^+	3148.0	14^+	E2	0.771 *11*	E_γ: other: 180.3 (1983Lo01). I_γ: others: 71 *1* with E(^{9}Be)=45 MeV (1987Dr08); 34 (1983Lo01). Mult.: from α(L)exp=0.46 *2*; A_2=+0.27 *3*; A_4=+0.06 *5* (1987Dr08); A_2=+0.11 *2*; A_4=−0.03 *4* (1983Lo01).
182.4	537 *3*	1625.1	8^+	1442.7	6^+	E2	0.731 *10*	E_γ: other: 182 (1981Go06) and 182.5 (1983Lo01). I_γ: others: 446 *2* with E(^{9}Be)=45 MeV (1987Dr08); 31 (1983Lo01). Mult.: from α(M)exp=0.14 *2*; α(tot)exp=0.7 *1*; A_2=+0.25 *1*; A_4=−0.06 *2* (1987Dr08); A_2=+0.12 *1*; A_4=−0.06 *3* (1983Lo01).
^{x}192.8	2.8 *3*							192.8γ might deexcite a possible level at 3682.9 keV to the 3490.1 level as tentatively suggested in 1987Dr08.
202.2	4.7 *4*	2878.2	12^+	2676.1	13^-	[E1]	0.0838 *12*	
212.2	4.5 *5*	3540		3327.8	16^+			
^{x}223.0	1.6 *4*							
226.8	24 *3*	4977	(25^+)	4751	(23^+)	(E2)	0.338 *5*	E_γ: other: 227.4 (1983Lo01). I_γ: other: 8 *2* with E(^{9}Be)=45 MeV (1987Dr08); 16 (1983Lo01). Mult.: from A_2=+0.16 *4*; A_4=−0.11 *7* (1983Lo01).
229.6	2.5 *5*	2878.2	12^+	2648.6	$(11,12)^-$	[E1]	0.0619 *9*	
254.0	19 *2*	2648.6	$(11,12)^-$	2394.7	11^-	M1	0.945 *13*	I_γ: other: 26 *1* with E(^{9}Be)=45 MeV (1987Dr08). Mult.: from α(K)exp=1.0 *2*; α(L)exp≤0.25; A_2=+0.18 *4*; A_4=+0.06 *6* (1987Dr08).

$\gamma(^{214}$Rn) (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[#]	Comments
								Mult.: from α(K)exp=1.0 *2*; α(L)exp≤0.25; A_2=+0.18 *4*; A_4=+0.06 *6* (1987Dr08).
255.8	146 *3*	3746	19^-	3490	18^+	E1	0.0480 *7*	E_γ: other 255.5 (1983Lo01). I_γ: others: 47 *1* with E(^{9}Be)=45 MeV (1987Dr08); 42 (1983Lo01). Mult.: from α(tot)exp<0.3; A_2=−0.26 *2*; A_4=−0.01 *4* (1987Dr08); A_2=−0.13 *3*; A_4=+0.04 *5* (1983Lo01).
^{x}261.4	2.0 *8*							
269.9	98 *4*	3148.0	14^+	2878.2	12^+	[E2]	0.1911 *27*	E_γ: other: 270.1 (1983Lo01). I_γ: others: 54 *1* with E(^{9}Be)=45 MeV (1987Dr08); ≈20 (1983Lo01). Mult.: from decay scheme (1987Dr08); assigned as E1 based on A_2=−0.04 *2*; A_4=−0.03 *3* (1983Lo01).
281.5	362 *5*	2676.1	13^-	2394.7	11^-	E2	0.1676 *23*	E_γ: other: 280.4 (1983Lo01). I_γ: others: 229 *1* with E(^{9}Be)=45 MeV (1987Dr08); 23 (1983Lo01). Mult.: from α(L)exp≤0.11; α(M)exp≤0.06; A_2=+0.23 *1*; A_4=−0.07 *1* (1987Dr08). Other: (E1), from A_2=−0.15 *7*; A_4=−0.01 *13* (1983Lo01).
292.3	2.8 *6*	2320.5		2028.2	(10)			
296.0	3.6 *9*	2504.6		2208.6				
300.2	6 *1*	5051		4751	(23^+)			
301.5	885 *10*	1442.7	6^+	1141.2	4^+	E2	0.1360 *19*	E_γ: others: 302 (1981Go06) and 302.5 (1983Lo01). I_γ: others: 862 *3* with E(^{9}Be)=45 MeV (1987Dr08); ≈65 (1983Lo01). Mult.: from α(K)exp(301.5γ+302.9γ)=0.077 *4*; α(L)exp(301.5γ+302.9γ)=0.055 *3*; α(M)exp(301.5γ+302.9γ)=0.020 *3* with both transitions are of E2 character; A_2=+0.26 *5*; A_4=−0.05 *1* (1987Dr08); A_2=−0.29 *3*; A_4=0.10 *4* (1983Lo01).
302.9	732 *8*	1928.0	10^+	1625.1	8^+	E2	0.1341 *19*	E_γ: other: 300.4 (1983Lo01). I_γ: others: 560 *3* with E(^{9}Be)=45 MeV (1987Dr08); ≈50 (1983Lo01). Mult.: from α(K)exp(301.5γ+302.9γ)=0.077 *4*; α(L)exp(301.5γ+302.9γ)=0.055 *3*; α(M)exp(301.5γ+302.9γ)=0.020 *3* with both transitions of E2 character; A_2=+0.22 *1*; A_4=−0.08 *1* (1987Dr08); A_2=+0.29 *3*; A_4=+0.10 *4* (1983Lo01).
305.1	9 *2*	2682.2		2377.1				I_γ: from data of E(^{9}Be)=48 MeV (1987Dr08).
317.3	12 *2*	3465	(16^+)	3148.0	14^+	(Q)		I_γ: other: 10 *1* with E(^{9}Be)=45 MeV (1987Dr08). Mult.: from A_2=+0.58 *10* (1987Dr08).
318.3	9 *1*	4064		3746	19^-	(D)		Mult.: from I$\gamma(\theta)$ (1987Dr08).
319.8	24 *2*	1944.9	(10)	1625.1	8^+	(Q)		I_γ: other: 30 *1* with E(^{9}Be)=45 MeV (1987Dr08). Mult.: from A_2=+0.10 *3*; A_4=−0.01 *5* (1987Dr08).
^{x}320.0	1.9 *5*							
341.3	1.9 *3*	4859		4517				
355.0	2.1 *6*	4262		3907				
403.1	20 *3*	2028.2	(10)	1625.1	8^+	(Q)		I_γ: other: 32 *1* with E(^{9}Be)=45 MeV (1987Dr08). Mult.: from A_2=+0.25 *4*; A_4=−0.07 *6* (1987Dr08).
417.1	18 *2*	3907		3490	18^+			I_γ: other: 6 *2* with E(^{9}Be)=45 MeV (1987Dr08).
422.6	12 *3*	4250	(21^-)	3827	$(20)^-$	(D)		Mult.: from I$\gamma(\theta)$ (1987Dr08).
425.4	29 *2*	3753		3327.8	16^+			I_γ: other: 33 *8* with E(^{9}Be)=45 MeV (1987Dr08).
446.5	963 *10*	1141.2	4^+	694.7	2^+	E2	0.0463 *6*	E_γ: others: 446 (1981Go06) and 446.0 (1983Lo01). I_γ: others: 928 *6* with E(^{9}Be)=45 MeV (1987Dr08); 79 (1983Lo01).

γ(^{214}Rn) (continued)

E_γ †	I_γ ‡	E_i(level)	J^π_i	E_f	J^π_f	Mult.	δ	α #	Comments
									Mult.: from α(K)exp=0.029 *2*; α(L)exp=0.011 *1*; α(M)exp=0.0032 *5*; A_2=+0.19 *2*; A_4=−0.06 *2* (1987Dr08); A_2=+0.09 *3*; A_4=−0.03 *6* (1983Lo01).
449.2	12 *2*	2377.1		1928.0	10^+				
462.4	22 *4*	3610.4	(16^+)	3148.0	14^+				
466.7	483 *8*	2394.7	11^-	1928.0	10^+	E1+M2	0.147 *+13−14*	0.0235 *20*	E_γ: other: 465.8 (1983Lo01). I_γ: others: 367 *2* with E(^{9}Be)=45 MeV (1987Dr08); 42 (1983Lo01). Mult.,δ: from α(K)exp=0.0163 *15*; α(L)exp=0.008 *1*; A_2=−0.26 *1*; A_4=−0.01 *1* (1987Dr08); A_2=−0.19 *5*; A_4=+0.25 *7* (1983Lo01).
468.8		1800.5		1331.7					
471.9	334 *6*	3148.0	14^+	2676.1	13^-	E1+M2	0.13 *+2−3*	0.0206 *33*	E_γ: other: 471.1 (1983Lo01). I_γ: others: 225 *1* with E(^{9}Be)=45 MeV (1987Dr08); 48 (1983Lo01). Mult.,δ: from α(K)exp=0.0150 *22*; α(L)exp=0.008 *2*; A_2=−0.24 *1*; A_4=+0.01 *1* (1987Dr08); A_2=−0.15 *6*; A_4=+0.16 *10* (1983Lo01).
474.6	9 *2*	4220		3746	19^-				
475.5	20 *3*	3941		3465	(16^+)				I_γ: from data of E(^{9}Be)=45 MeV (1987Dr08).
483.4	1.1 *3*	2878.2	12^+	2394.7	11^-	[E1]		0.01180 *17*	
522.4	15 *1*	2917.1		2394.7	11^-				I_γ: other: 17 *4* with E(^{9}Be)=45 MeV (1987Dr08).
^{x}563.4	9 *1*								I_γ: other: 21 *1* with E(^{9}Be)=45 MeV (1987Dr08).
^{x}583.4	8 *1*								E_γ: observation is inconclusive (1987Dr08).
^{x}616.4	11 *1*								616.4γ might feed the 2676.2 level from a level at 3292.6 keV as tentatively suggested in 1987Dr08.
629.1	15 *3*	2557.1	(12)	1928.0	10^+	(Q)			I_γ: other: 22 *1* with E(^{9}Be)=45 MeV (1987Dr08). Mult.: from A_2=+0.35 *9*; A_4=−0.11 *13* (1987Dr08).
637.0	7 *1*	1331.7		694.7	2^+				I_γ: other: 25 *1* with E(^{9}Be)=45 MeV (1987Dr08). A_2=−0.05 *6* (1987Dr08).
694.7	1000	694.7	2^+	0.0	0^+	E2		0.01688 *24*	E_γ: others: 696 (1981Go06) and 693.6 (1983Lo01). I_γ: others: 1000 with E(^{9}Be)=45 MeV (1987Dr08); 100 (1983Lo01). Mult.: from α(K)exp=0.0125 *9*; α(L)exp=0.0031 *2*; α(M)exp=0.00104 *2*; A_2=+0.18 *1*; A_4=−0.05 *2* (1987Dr08); A_2=+0.29 *6*; A_4=−0.09 *9* (1983Lo01).
^{x}722.8	5 *1*								722.8γ might feed the 3490.1 level from a level at 4212.9 keV as tentatively suggested in 1987Dr08.
723.3	5 *2*	2668.2		1944.9	(10)				
726.3	17 *2*	4517		3791		(D)			Mult.: from I$\gamma(\theta)$ (1987Dr08).
744.2	12 *3*	2689.1		1944.9	(10)				I_γ: other: 16 *1* with E(^{9}Be)=45 MeV (1987Dr08).
748.2	19 *2*	2676.1	13^-	1928.0	10^+	(E3)		0.0391 *5*	I_γ: other: 13 *1* with E(^{9}Be)=45 MeV (1987Dr08). Mult.: from A_2=+0.47 *10*; A_4=+0.05 *15* (1987Dr08).
^{x}748.5	≈2								E_γ: observation is inconclusive (1987Dr08).
752.0	20 *2*	2377.1		1625.1	8^+	(Q)			I_γ: other: 27 *1* with E(^{9}Be)=45 MeV (1987Dr08). Mult.: from A_2=+0.25 *4*; A_4=+0.01 *7* (1987Dr08).

$^{214}_{86}$Rn$_{128}$-11

$\gamma(^{214}Rn)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[#]	Comments
^{x}753.2	4 *1*							753.2γ might deexcite the 14^+ state at 3148.1 keV to the 11^- state at 2394.7 keV as tentatively suggested in 1987Dr08. E_γ: observation is inconclusive (1987Dr08). I_γ: other: 4 *1* with $E(^9Be)$=45 MeV (1987Dr08).
754.2	12 *2*	2682.2		1928.0	10^+			I_γ: from data of $E(^9Be)$=45 MeV (1987Dr08).
765.9	15 *2*	2208.6		1442.7	6^+			I_γ: other: 12 *1* with $E(^9Be)$=45 MeV (1987Dr08). A_2=+0.04 *10* (1987Dr08).
767.7	62 *4*	4595	(22^+)	3827	$(20)^-$	(M2)	0.1209 *17*	E_γ: other: 768.9 (1983Lo01). I_γ: others: 10 *3* with $E(^9Be)$=45 MeV (1987Dr08); 29 (1983Lo01). Mult.: from α(K)exp=0.11 *2*; α(L)exp=0.025 *4* with K conversion line contaminated by a transition in ^{213}Rn (1987Dr08); assigned as E3 based on A_2=+0.18 *6*; A_4=−0.01 *10* (1983Lo01).
^{x}769.9	3 *1*							E_γ: observation is inconclusive (1987Dr08).
808.9	6 *1*	4555		3746	19^-			
^{x}817.7								E_γ: observation is inconclusive (1987Dr08).
934.3	6 *2*	3610.4	(16^+)	2676.1	13^-			
950.1	141 *5*	2878.2	12^+	1928.0	10^+	E2	0.00897 *13*	E_γ: other: 947.1 (1983Lo01). I_γ: others: 104 *1* with $E(^9Be)$=45 MeV (1987Dr08); 24 (1983Lo01). Mult.: from α(K)exp=0.008 *1*; A_2=+0.25 *2*; A_4=−0.90 *4* (1987Dr08).
^{x}954.3	7 *2*							

† From 1987Dr08. Uncertainties on $E\gamma'$s are not given in 1987Dr08. ΔE=0.1-0.2 keV for the strongest gammas and ΔE=0.2-0.5 keV for all other gammas is estimated by the evaluator.

‡ From data in $^{208}Pb(^9Be,3n\gamma)$ reaction at $E(^9Be)$=48 MeV (1987Dr08), 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.

^{x} γ ray not placed in level scheme.

$^{214}_{86}Rn_{128}$-12

Adopted Levels, Gammas

$Q(\beta^-)=-1051$ *10*; S(n)=5475 *10*; S(p)=2551 *9*; $Q(\alpha)=8589$ *4* 2021Wa16
S(2n)=13585 *12*; S(2p)=6908 *9* (2021Wa16).

^{214}Fr Levels

Cross Reference (XREF) Flags

A ^{218}Ac α decay
B (HI,xnγ)

E(level)[†]	J^{π}[‡]	$T_{1/2}$[#]	XREF	Comments
0.0	(1^-)	5.5 ms *3*	AB	%α=100 μ=0.241 *16* (2016Fa11) J^{π}: based on ε feed from ^{214}Ra (1968To10), on systematics in analogy to the coupling $h_{9/2}$ proton and $g_{9/2}$ neutron orbital in isotone ^{210}Bi (1968To10, 1968Va18, and 1970To18), and on α decay to a state in ^{210}At with $J^{\pi}=4^+$. $T_{1/2}$: weighted average of 4.6 ms *7* (2005Li17), 5.0 ms *2* (1968To10), 5.5 ms *5* (1968Va18), 5.9 ms *4* (2015Kh09) and 6.0 ms *2* (2019Mi08). μ: Laser CRIS measurement assuming $J^{\pi}=1^-$; μ=0.288 *20* assuming $J^{\pi}=2^-$ (2016Fa11). $\Delta\langle r^2\rangle^{221,214}=-0.949$ fm^2 *13* from isotope shift measurement with uncertainty deduced by quadratic addition of statistical uncertainty of 0.009 and systematic uncertainty of 0.010 assuming $J^{\pi}=1^-$; while $\Delta\langle r^2\rangle^{221,214}=-0.962$ fm^2 *13* assuming $J^{\pi}=2^-$ (2016Fa11).
121 *5*	(8^-)[@]	3.38 ms *5*	B	%α=100 E(level): from energy differences of Eα(^{214g}Fr to ^{210g}At)=8427 keV *4* and Eα(^{214m}Fr to ^{210g}At)=8546 keV *3*. J^{π}: based on shell-model calculations with $J^{\pi}=8^-$ for 121-keV level and $J^{\pi}=9^-$ for 166-keV level, and being consistent with the 45-keV M1 transition connecting these two states (1994By01). $T_{1/2}$: weighted average of 3.35 ms *5* (1968To10), 3.6 ms *5* (1968Va18) and 3.5 ms *1* (2015Kh09); other: 3.9 ms (1962Gr20, 1966Ro12).
166 *5*	(9^-)[@]		B	J^{π}: based on shell-model calculations with $J^{\pi}=8^-$ for 121-keV level and $J^{\pi}=9^-$ for 166-keV level, and being consistent with the 45-keV M1 transition connecting these two states (1994By01).
638 *5*	(11^+)[&]	103 ns *4*	B	Q=0.82 *22* (1995Ne06); μ=5.62 *7* (1994By01) μ: from g=0.511 *6* of TDPAD measurement (1994By01). Q: LEMS measurement (1995Ne06). J^{π}: M2 to (9^-).
937 *5*	(11^+,12^+)		B	J^{π}: M1 to (11^+); M1 from (12^+).
1080 *5*	(12^+)		B	J^{π}: M1 to (11^+); γ from (13^-).
1367 *5*	(12^+)[c]		B	J^{π}: (E3) to (9^-); M1 from (12^+).
1544 *5*	(12^+)[&]		B	J^{π}: M1+E2 to (11^+).
1597 *5*	(13^-)[@]		B	J^{π}: E1 to (12^+).
1636 *5*	(11,12)		B	J^{π}: (D) to (11^+).
1661 *5*	(14^-)[b]	11 ns *2*	B	μ=8.5 *4* (1994By01) μ: from g=0.61 *3* of TDPAD measurement; combined value with g(1732,(15^-)) (1994By01). J^{π}: M1 to (13^-); M2 to (12^+); E3 to (11^+).
1732 *5*	(15^-)[@]	10 ns *2*	B	μ=9.2 *5* μ: from g=0.61 *3* of TDPAD measurement; value is combined with g(1661,(14^-)) (1994By01). J^{π}: M1 to (14^-); E2 to (13^-).
1850 *5*	(16^-)[a]		B	J^{π}: M1 to (15^-).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{214}Fr Levels (continued)

E(level)[†]	J^{π}[‡]	$T_{1/2}$[#]	XREF	Comments
2163 *5*	(17^+)[&]	≤7 ns	B	J^{π}: E1 to (16^-).
2163+x	(19^+)[&]		B	E(level),J^{π}: Proposed based on the comparision of levels above this level and results from shell-model calculations (1994By01).
2777.6+x *3*	(19)		B	J^{π}: (D) to (19^+), weakly populated non-yrast state.
2808.82+x *16*	(20^-)[a]		B	J^{π}: E1 to (19^+).
2901.48+x *18*	(20^-)		B	J^{π}: E1 to (19^+).
3054.50+x *16*	(21^+)[&]		B	J^{π}: E1 to (20^-); E2 to (19^+).
3087.07+x *25*	(20,21)		B	J^{π}: γ to (20^-); γ from (21^-).
3211.62+x *20*	(21^-)		B	J^{π}: M1 to (20^-).
3263.28+x *23*	(23^+)[&]	4.2 ns *7*	B	J^{π}: E2 to (21^+).
3328.6+x *3*	(22)		B	J^{π}: (D) to (21^+).
3338.0+x *3*	(24^+)		B	J^{π}: M1 to (23^+).
3462.2+x *4*			B	
3518.42+x *24*	(22^-)		B	J^{π}: M1(+E2) to (21^-).
3563.8+x *3*	(24^+)[d]		B	J^{π}: M1 to (23^+).
3838.8+x *4*	(24)		B	J^{π}: D to (23^+).
3895.4+x *4*	(25^+)[d]		B	J^{π}: M1 to (24^+).
4010.1+x *4*	(24,25)		B	J^{π}: (Q) to (24^-); weakly populated non-yrast state.
4196.0+x *4*	(25^-)		B	J^{π}: (E1) to (24^+); E2 from (27^-).
4229.2+x *3*	(25^-)[e]		B	J^{π}: E1 to (24^+).
4316.5+x *3*	(27^-)[e]	8.0 ns *2*	B	μ=+19.7 *8* (1994By01) μ: from g=0.73 *3* of TDPAD measurement (1994By01). J^{π}: E2 to (25^-); E3 to (24^+).
4575.3+x *4*	(26^+)		B	J^{π}: M1 to (25^+).
4704.0+x *5*			B	
4925.4+x *4*	(28^-)		B	J^{π}: M1 to (27^-). Proposed configuration=$((\pi\ h_{9/2})^{+3}(\pi\ i_{13/2})(\pi\ f_{7/2})(\nu\ j_{15/2}))$ or $(\pi\ h_{9/2})^3(\pi\ i_{13/2})^2(\nu\ i_{13/2})$ (1994By01).
4975.3+x *4*	(27^+)		B	J^{π}: (M1) to (26^+); γ to (25^+).
5000.3+x *5*			B	
5205.0+x *4*	(27,28,29)		B	Tentatively proposed configuration=$((\pi\ h_{9/2})^{+4}(\pi\ i_{13/2})\ (\nu\ g_{9/2})(\nu\ i_{13/2})(\nu\ p_{1/2})^{-1})$ (1994By01). J^{π}: γ to (27^-); γ to (28^-); (D) from (28).
5331.4+x *5*	(28^+)		B	J^{π}: E1 to (27^-).
5435.4+x *5*	(28)		B	J^{π}: (D) to (27^+).
5557.2+x *4*	(28^-)		B	J^{π}: γ to (27^-); γ from (29^-).
5627.4+x *6*			B	
5638.7+x *4*	(28^+)		B	J^{π}: E1 to (27^-).
5769.2+x *4*	(29^-)		B	J^{π}: E1 to (28^+).
6089.7+x *4*	(30^-)		B	J^{π}: M1 to (29^-).
6179.0+x *4*	(30^-)		B	J^{π}: M1 to (30^-); M1+E2 to (29^-).
6360.6+x *5*	(30^-)		B	J^{π}: M1+E2 to (29^-).
6475.3+x *5*	(31^-)		B	J^{π}: M1+E2 to (30^-).
6475+y	(33^+)	108 ns *7*	B	Q=2.2 *5* (1995Ne06); μ=+22 *3* (1994By01) μ: from g=0.68 *1* of TDPAD measurement (1994By01). Q: LEMS measurement (1995Ne06). J^{π}: Proposed configuration= $((\pi\ h_{9/2})^{+3}(\pi\ i_{13/2})(\nu\ g_{9/2})(\nu\ i_{11/2})\ (\nu\ p_{1/2})^{-1})$ (1994By01).
6521.4+x *5*	(29,30,31)		B	J^{π}: E2 to (27,28,29).
6812.0+y *3*	(34^+)		B	J^{π}: M1 to (33^+).
6915.9+x *6*			B	
7256.0+y *4*			B	
7543.0+y *3*	(36^-)	4.9 ns *14*	B	J^{π}: E3 to (33^+).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{214}Fr Levels (continued)

E(level)†	Jπ‡	XREF	Comments
			Proposed configuration= $((\pi\ h_{9/2})^{+3}(\pi\ i_{13/2})^{+2}(\nu\ i_{11/2})(\nu\ j_{15/2})\ (\nu\ p_{1/2})^{-1})$ (1994By01).
7547.0+y *5*	(35^+)	B	J^π: M1 to (34^+).
7846.1+y *5*		B	Proposed configuration= $((\pi\ h_{9/2})^{+3}(\pi\ i_{13/2})^{+2}(\nu\ g_{9/2})^{+2}(\nu\ i_{11/2})\ (\nu\ p_{1/2})^{-2})$, with $J^\pi=36^-$ (1994By01).
8142.0+y *5*	(37)	B	J^π: (D) to (36^-).
8656.3+y *6*		B	Proposed configuration= $((\pi\ h_{9/2})^{+3}(\pi\ i_{13/2})^{+2}(\nu\ g_{9/2})(\nu\ i_{11/2})^{+2}\ (\nu\ p_{1/2})^{-2})$, with $J^\pi=37^-$ (1994By01).

† From least square fit to adopted Eγ′s by evaluator, unless otherwise noted.

‡ Tentatively assigned using γ multipolarity from (HI,xnγ) on the basis of J^π(121 level)=(8^-) assignment which is not experimentally established, unless otherwise noted.

From (HI,xnγ) except for the g.s. and the 122-keV level.

@ Configuration=$((\pi\ h_{9/2})^{+5}(\nu\ g_{9/2}))$.

& Configuration=$((\pi\ h_{9/2})^{+4}(\pi\ i_{13/2})(\nu\ g_{9/2}))$.

a Configuration=$((\pi\ h_{9/2})^{+4}(\pi\ f_{7/2})(\nu\ g_{9/2}))$.

b Configuration=$((\pi\ h_{9/2})^{+4}(\pi\ i_{13/2})(\nu\ j_{15/2}))$.

c Configuration=$((\pi\ h_{9/2})^{+5}(\nu\ j_{15/2}))$.

d Configuration=$((\pi\ h_{9/2})^{+3}(\pi\ i_{13/2})(\pi\ f_{7/2})(\nu\ g_{9/2}))$.

e Configuration=$((\pi\ h_{9/2})^{+3}(\pi\ i_{13/2})^{+2}(\nu\ g_{9/2}))$.

Adopted Levels, Gammas (continued)

$\gamma(^{214}Fr)$

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.†	δ	α‡	Comments
166	(9⁻)	44.7 2	100	121	(8⁻)	M1+E2	0.09 10	33 10	
638	(11⁺)	471.7 1	100 3	166	(9⁻)	M2		0.547 8	B(M2)(W.u.)=0.227 10
		516.6# 2	3.5# 12	121	(8⁻)			0.1183 17	B(E3)(W.u.)=10 4
937	(11⁺,12⁺)	299.3 2	100	638	(11⁺)	M1+E2	0.2 6	0.64 18	
1080	(12⁺)	143.3 2	48 3	937	(11⁺,12⁺)	M1		5.15 7	
		442.7 2	100 7	638	(11⁺)	M1		0.2261 32	
1367	(12⁺)	1200.8 3	100	166	(9⁻)	(E3)		0.01361 19	
1544	(12⁺)	177.5 4	5.7 14	1367	(12⁺)	M1		2.81 4	
		607.5 3	36 10	937	(11⁺,12⁺)	(M1)		0.0972 14	
		906.7 2	100 9	638	(11⁺)	M1+E2	1.01 15	0.0220 19	
1597	(13⁻)	52.5 2	4.93 20	1544	(12⁺)	E1		0.598 10	
		516.6# 2	100# 7	1080	(12⁺)	(E1)		0.01067 15	
1636	(11,12)	998.0 3	100	638	(11⁺)	(D)			
1661	(14⁻)	63.9 2	2.0 7	1597	(13⁻)	M1		10.38 17	B(M1)(W.u.)=0.00011 4
		580.6 2	12.4 13	1080	(12⁺)	M2		0.292 4	B(M2)(W.u.)=0.105 23
		1023.1 2	100 4	638	(11⁺)	E3		0.01944 27	B(E3)(W.u.)=25 5
1732	(15⁻)	71.4 2	100 14	1661	(14⁻)	M1		7.50 12	B(M1)(W.u.)=0.00061 13
		135.1 2	41 6	1597	(13⁻)	E2		2.50 4	B(E2)(W.u.)=0.68 18
1850	(16⁻)	118.5 1	100	1732	(15⁻)	M1		8.84 13	
2163	(17⁺)	312.5 1	100	1850	(16⁻)	E1		0.0312 4	B(E1)(W.u.)≥8.6×10^{-7}
2777.6+x	(19)	614.6 3	100	2163+x	(19⁺)	(D)			
2808.82+x	(20⁻)	645.8 2	100	2163+x	(19⁺)	E1		0.00687 10	
2901.48+x	(20⁻)	738.5 2	100	2163+x	(19⁺)	E1		0.00533 7	
3054.50+x	(21⁺)	245.7 2	8.7 5	2808.82+x	(20⁻)	E1		0.0542 8	
		891.5 2	100 4	2163+x	(19⁺)	E2		0.01069 15	
3087.07+x	(20,21)	185.5 3	100	2901.48+x	(20⁻)				
3211.62+x	(21⁻)	124.5 3	23 7	3087.07+x	(20,21)				
		310.2 2	100 17	2901.48+x	(20⁻)	M1		0.594 8	
		402.7 3	50 10	2808.82+x	(20⁻)	(M1)		0.292 4	
3263.28+x	(23⁺)	208.8 2	100	3054.50+x	(21⁺)	E2		0.474 7	B(E2)(W.u.)=3.0 5
3328.6+x	(22)	274.1 2	100	3054.50+x	(21⁺)	(D)			
3338.0+x	(24⁺)	74.5 3	100	3263.28+x	(23⁺)	M1		6.63 12	
3462.2+x		250.6@ 3	100	3211.62+x	(21⁻)				
3518.42+x	(22⁻)	306.8 2	100 10	3211.62+x	(21⁻)	M1(+E2)	0.8 +3−8	0.43 19	
		431.3 3	19 6	3087.07+x	(20,21)				
3563.8+x	(24⁺)	(45.3 3)		3518.42+x	(22⁻)				E_γ: from level scheme. Existence of this γ was inferred in (HI,xnγ) from $\gamma\gamma$-coincidence data (1994By01).
		300.6 2	100	3263.28+x	(23⁺)	M1		0.647 9	
3838.8+x	(24)	575.5 3	100	3263.28+x	(23⁺)	D			
3895.4+x	(25⁺)	331.7 2	100	3563.8+x	(24⁺)	M1		0.494 7	
4010.1+x	(24,25)	446.3 3	100	3563.8+x	(24⁺)	(Q)			

$^{214}_{87}Fr_{127}$-4

Adopted Levels, Gammas (continued)

$\gamma(^{214}Fr)$ (continued)

E_i(level)	J_i^π	E_γ†	I_γ†	E_f	J_f^π	Mult.†	δ	α‡	Comments
4196.0+x	(25⁻)	858.0 *2*	100	3338.0+x	(24⁺)	(E1)		0.00404 *6*	
4229.2+x	(25⁻)	665.4 *2*	100 *4*	3563.8+x	(24⁺)	E1		0.00649 *9*	
		891.2@ *5*	≤24	3338.0+x	(24⁺)			0.00377 *5*	
4316.5+x	(27⁻)	87.3 *3*	50 *30*	4229.2+x	(25⁻)	E2		16.6 *4*	B(E2)(W.u.)=7.9 *13*
		120.3 *3*	19 *6*	4196.0+x	(25⁻)	E2		4.06 *7*	B(E2)(W.u.)=0.6 *4*
		752.7 *2*	100 *14*	3563.8+x	(24⁺)	E3		0.0407 *6*	B(E3)(W.u.)=35 *17*
		978.5 *3*	83 *17*	3338.0+x	(24⁺)	E3		0.02154 *30*	B(E3)(W.u.)=4.6 *23*
4575.3+x	(26⁺)	679.9 *3*	100	3895.4+x	(25⁺)	M1		0.0722 *10*	
4704.0+x		809@	100	3895.4+x	(25⁺)				
4925.4+x	(28⁻)	608.9 *2*	100	4316.5+x	(27⁻)	M1		0.0966 *14*	
4975.3+x	(27⁺)	400.0 *3*	100 *15*	4575.3+x	(26⁺)	(M1)		0.297 *4*	
		1080.5 *5*	35 *15*	3895.4+x	(25⁺)				
5000.3+x		683.8 *3*	100	4316.5+x	(27⁻)				
5205.0+x	(27,28,29)	279.0 *5*	5 *3*	4925.4+x	(28⁻)				
		888.6 *3*	100 *13*	4316.5+x	(27⁻)				
5331.4+x	(28⁺)	1014.9 *3*	100	4316.5+x	(27⁻)	E1		0.00299 *4*	
5435.4+x	(28)	460.2 *3*	100 *28*	4975.3+x	(27⁺)	(D)			
		509.5 *5*	73 *28*	4925.4+x	(28⁻)				
5557.2+x	(28⁻)	352.0 *3*	20 *7*	5205.0+x	(27,28,29)	(D)			
		853.2 *3*	100 *34*	4704.0+x					
		1240.7 *3*	33 *13*	4316.5+x	(27⁻)				
5627.4+x		1310.9 *5*	100	4316.5+x	(27⁻)				
5638.7+x	(28⁺)	1321.9 *3*	100	4316.5+x	(27⁻)	E1		1.94×10^{-3} *3*	
5769.2+x	(29⁻)	130.2 *3*	19 *3*	5638.7+x	(28⁺)	E1		0.249 *4*	
		211.9 *2*	21 *4*	5557.2+x	(28⁻)				
		844.0 *2*	100 *7*	4925.4+x	(28⁻)	M1,E2		0.026 *15*	
		1453.0 *5*	11 *3*	4316.5+x	(27⁻)	(Q)			
6089.7+x	(30⁻)	320.5 *3*	100	5769.2+x	(29⁻)	M1		0.543 *8*	
6179.0+x	(30⁻)	89.3 *3*	5.6 *8*	6089.7+x	(30⁻)	M1		3.91 *7*	
		409.8 *2*	100 *10*	5769.2+x	(29⁻)	M1+E2	1.0 *3*	0.17 *4*	
6360.6+x	(30⁻)	591.4 *3*	100	5769.2+x	(29⁻)	M1+E2	2.6 *+7−4*	0.035 *4*	
6475.3+x	(31⁻)	114.7 *5*	5.0 *17*	6360.6+x	(30⁻)	M1+E2	13 *12*	5.0 *23*	
		296.3 *2*	100 *17*	6179.0+x	(30⁻)	M1+E2	0.5 *5*	0.57 *16*	
6521.4+x	(29,30,31)	1316.4 *3*	100	5205.0+x	(27,28,29)	E2		0.00511 *7*	
6812.0+y	(34⁺)	337.0 *3*	100	6475+y	(33⁺)	M1		0.473 *7*	
6915.9+x		394.5 *3*	100	6521.4+x	(29,30,31)				
7256.0+y		781.0 *4*	100	6475+y	(33⁺)				
7543.0+y	(36⁻)	1068.0 *3*	100	6475+y	(33⁺)	E3		0.01764 *25*	B(E3)(W.u.)=56 *17*
7547.0+y	(35⁺)	735.0 *3*	100	6812.0+y	(34⁺)	M1		0.0588 *8*	
7846.1+y		303.1 *3*	100	7543.0+y	(36⁻)				
8142.0+y	(37)	599.0 *3*	100	7543.0+y	(36⁻)	(D)			
8656.3+y		810.2 *3*	100	7846.1+y					

$^{214}_{87}Fr_{127}$-5

Adopted Levels, Gammas (continued)

$\gamma(^{214}Fr)$ (continued)

† From (HI,xnγ).
‡ 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 with intensity suitably divided.
@ Placement of transition in the level scheme is uncertain.

^{218}Ac α decay 2017Su18,2019Mi08

Parent: ^{218}Ac: E=0.0; $J^\pi=(1^-)$; $T_{1/2}$=1.03 μs *5*; $Q(\alpha)=9.38\times10^3$ *6*; %α decay=100.0
^{218}Ac-Q(α): from 2021Wa16.
^{218}Ac-J^π,$T_{1/2}$: from Adopted Levels of ^{218}Ac (2019Si39).
2017Su18: ^{218}Ac was the decay product of ^{222}Pa produced in reactions ^{187}Re(^{40}Ar,α3n) with pulsed beams at 188 MeV; evaporation residues (ER) were separated in-flight by the recoil separator SHANS and implanted to a double-sided strip Si detector (DSSSD). α decay of ^{218}Ac was studied by ER-(α_1)-(α_2)-(α_3) chains using time and position correlations.
2019Mi08: ^{218}Ac was the decay product of ^{222}Pa produced in reactions ^{181}Ta(^{48}Ca,3n)^{226}Np or ^{181}Ta(^{48}Ca,3n)^{222}Pa with pulsed beams at 212, 217 and 226 MeV; evaporation residues (ER) were separated in-flight by the velocity filter SHIP and investigated using the COMPASS decay spectroscopy station with digital electronics at the focal plane. α decay of ^{218}Ac was studied by ER-(α_1)-(α_2)-(α_3) chains using time and position correlations.

^{214}Fr Levels

E(level)	J^π	$T_{1/2}$	Comments
0.0	(1^-)	5.5 ms *3*	J^π,$T_{1/2}$: from Adopted Levels. $T_{1/2}$=5.9 ms *4* (2015Kh09) and 6.0 ms *2* (2019Mi08).

α radiations

Eα	E(level)	Iα‡	HF†	Comments
9213 *10*	0.0	100	2.3 *3*	Eα: weighted average of 9205 *15* (1970Bo13), 9219 *15* (2017Su18) and 9220 *30* (2019Mi08); other: 9200 (1983Sc23).

† r_0(^{214}Fr)=1.566 *14*, unweighted average of r_0(^{212}Rn)=1.5433 *36*, r_0(^{214}Rn)=1.5655 *13*, r_0(^{214}Ra)=1.5487 *30*, r_0(^{216}Ra)=1.6051 *43* (2020Si16).
‡ Absolute intensity per 100 decays.

(HI,xnγ) 1994By01,1993De26

1994By01,1993By01: $^{205}Tl(^{13}C,4n\gamma)$, E(^{13}C)=75-84 MeV, $^{208}Pb(^{11}B,5n\gamma)$, E(^{11}B)=68-84 MeV; Enriched targets, pulsed beam, Ge detectors, Compton-suppressed, Superconducting solenoidal electron spectrometer, Si(Li) detector; measured Eγ, Iγ, Ice, $\gamma\gamma$, Ice(t), $\gamma\gamma$(t), $\gamma(\theta)$, $\gamma(\theta$,H,t). ^{214}Fr deduced levels, J^π, $T_{1/2}$, g-factors.

1993De26: $^{206}Pb(^{11}B,3n\gamma)$, E(^{11}B)=64-80 MeV, $^{208}Pb(^{11}B,5n\gamma)$, E(^{11}B)=64-80 MeV; pulsed beam, Compton-suppressed Ge detectors, BGO filter array, LN_2 cooled Si(Li) detector; measured Eγ, Iγ, I(ce), $\gamma\gamma$, γ(t), $\gamma\gamma$(t), $\gamma(\theta)$. ^{214}Fr deduced levels, J^π, $T_{1/2}$.

Others: 1968Va18, 1968To10, 1970To18.

The level scheme is presented as constructed by 1994By01. The proposed decay schemes and spin assignments for levels above the 15^- state deviate drastically from 1993De26. The authors of 1994By01 do not consider the levels above the 15^- state as being well established but appearing more convincing than that of 1993De26. (Priv. Comm. from A. Byrne with Y. A. Akovali (1995El07)).

^{214}Fr Levels

E(level)[†]	J^π[‡]	$T_{1/2}$	Comments
0.0	(1^-)	5.5 ms *3*	J^π,$T_{1/2}$: from the Adopted Levels.
121 *5*	8^-[#]	3.38 ms *5*	%α=100 E(level),$T_{1/2}$: from the Adopted Levels. J^π: based on shell-model calculations, and being consistent with the 45-keV M1 transition from 9^- (1994By01).
166 *5*	9^-[#]		
638 *5*	11^+[@]	103 ns *4*	Q=0.8; g=0.511 *6* $T_{1/2}$: deduced from τ= 148 ns *5* (1994By01); other: 174 ns *20* (1993De26). g: TDPAD measurement (1994By01). Q: LEMS measurement (1995Ne06).
937 *5*	11^+		
1080 *5*	12^+		
1367 *5*	$(12)^+$[b]		
1544 *5*	12^+[@]		
1597 *5*	13^-[#]		
1636 *5*			
1661 *5*	14^-[a]	11 ns *2*	g=0.61 *3* $T_{1/2}$: from τ=16 ns *3* (1994By01) and $T_{1/2}$=11 ns *2* (1993De26). g: TDPAD measurement; value is combined with $g(1732,15^-)$ (1994By01).
1732 *5*	15^-[#]	10 ns *2*	g=0.61 *3* $T_{1/2}$: from τ= 15 ns *3* (1994By01). g: TDPAD measurement; combined value with $g(1662,14^-)$ (1994By01).
1850 *5*	16^-[&]		
2163 *5*	17^+[@]	≤0.7 ns	$T_{1/2}$: from $\tau \le 1$ ns (1994By01).
2163+x	19^+[@]		E(level),J^π: Proposed based on the comparision of levels above this level and results from shell-model calculations (1994By01). This level was not proposed to exist, and levels above it in 1993De26 deviate from those in 1994By01.
2777.6+x *3*			
2808.82+x *16*	20^-[&]		
2901.48+x *18*	20^-		
3054.50+x *16*	21^+[@]		
3087.07+x *25*			
3211.62+x *20*	21^-		
3263.28+x *23*	23^+[@]	4.2 ns *7*	$T_{1/2}$: from τ=6 ns *1* (1994By01).
3328.6+x *3*	22		
3338.0+x *3*	24^+		
3462.2+x *4*			
3518.42+x *24*	$(22)^-$		
3563.8+x *3*	24^+[c]		

Continued on next page (footnotes at end of table)

(HI,xnγ) 1994By01,1993De26 (continued)

^{214}Fr Levels (continued)

E(level)[†]	J^{π}[‡]	$T_{1/2}$	Comments
3838.8+x *4*	24		
3895.4+x *4*	25^{+}[c]		
4010.1+x *4*			
4196.0+x *4*	25^{-}		
4229.2+x *3*	25^{-}[d]		
4316.5+x *3*	27^{-}[d]	8.0 ns *2*	g=0.73 *3* $T_{1/2}$: from τ=11.5 ns *2* (1994By01). g: TDPAD measurement (1994By01).
4575.3+x *4*	26^{+}		
4704.0+x *5*			E(level): 853γ from E(level)=5559+x, but no decay-out transition observed (1994By01).
4925.4+x *4*	28^{-}		Proposed configuration=((π $h_{9/2}$)$^{+3}$(π $i_{13/2}$)(π $f_{7/2}$)(ν $j_{15/2}$)) or (π $h_{9/2}$)^{3}(π $i_{13/2}$)^{2}(ν $i_{13/2}$) (1994By01).
4975.3+x *4*	(26^{+},27^{+})		
5000.3+x *5*			
5205.0+x *4*	(28^{+})		Tentatively proposed configuration=((π $h_{9/2}$)$^{+4}$(π $i_{13/2}$) (ν $g_{9/2}$)(ν $i_{13/2}$)(ν $p_{1/2}$)$^{-1}$) (1994By01).
5331.4+x *5*	28^{+}		
5435.4+x *5*			
5557.2+x *4*			
5627.4+x *6*			
5638.7+x *4*	28^{+}		
5769.2+x *4*	29^{-}		
6089.7+x *4*	30^{-}		
6179.0+x *4*	30^{-}		
6360.6+x *5*	30^{-}		
6475.3+x *5*	31^{-}		
6475+y	33^{+}	108 ns *7*	Q=2.2 *5*; g=0.68 *1* $T_{1/2}$: from τ=156 ns *10* (1994By01). E(level): proposed on the basis of the timing behaviors of γ rays decaying from the 6477+x level, however it is not certain (1994By01). g: TDPAD measurement (1994By01). Q: LEMS measurement (1995Ne06). Proposed configuration= ((π $h_{9/2}$)$^{+3}$(π $i_{13/2}$)(ν $g_{9/2}$)(ν $i_{11/2}$) (ν $p_{1/2}$)$^{-1}$) (1994By01).
6521.4+x *5*			
6812.0+y *3*	(34^{+})		
6915.9+x *6*			
7256.0+y *4*			
7543.0+y *3*	36^{-}	4.9 ns *14*	$T_{1/2}$: from τ=7 ns *2* (1994By01). Proposed configuration= ((π $h_{9/2}$)$^{+3}$(π $i_{13/2}$)$^{+2}$(ν $i_{11/2}$)(ν $j_{15/2}$) (ν $p_{1/2}$)$^{-1}$) (1994By01).
7547.0+y *5*	(35^{+})		
7846.1+y *5*			Proposed configuration= ((π $h_{9/2}$)$^{+3}$(π $i_{13/2}$)$^{+2}$(ν $g_{9/2}$)$^{+2}$(ν $i_{11/2}$) (ν $p_{1/2}$)$^{-2}$), with J^{π}=36^{-} (1994By01).
8142.0+y *5*			
8656.3+y *6*			Proposed configuration= ((π $h_{9/2}$)$^{+3}$(π $i_{13/2}$)$^{+2}$(ν $g_{9/2}$)(ν $i_{11/2}$)$^{+2}$ (ν $p_{1/2}$)$^{-2}$), with J^{π}=37^{-} (1994By01).

[†] From a least squares fit to Eγ′s by evaluators, unless otherwise noted.

[‡] As proposed by 1994By01 based on γ multipolarities and on comparison with shell-model calculations.

[#] Configuration=((π $h_{9/2}$)$^{+5}$(ν $g_{9/2}$)).

Continued on next page (footnotes at end of table)

(HI,xnγ) 1994By01,1993De26 (continued)

^{214}Fr Levels (continued)

[@] Configuration=$((\pi\ h_{9/2})^{+4}(\pi\ i_{13/2})(\nu\ g_{9/2}))$.
[&] Configuration=$((\pi\ h_{9/2})^{+4}(\pi\ f_{7/2})(\nu\ g_{9/2}))$.
[a] Configuration=$((\pi\ h_{9/2})^{+4}(\pi\ i_{13/2})(\nu\ j_{15/2}))$.
[b] Configuration=$((\pi\ h_{9/2})^{+5}(\nu\ j_{15/2}))$.
[c] Configuration=$((\pi\ h_{9/2})^{+3}(\pi\ i_{13/2})(\pi\ f_{7/2})(\nu\ g_{9/2}))$.
[d] Configuration=$((\pi\ h_{9/2})^{+3}(\pi\ i_{13/2})^{+2}(\nu\ g_{9/2}))$.

$\gamma(^{214}Fr)$

E_γ[†]	I_γ[‡]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	δ	α[b]	Comments
44.7 *2*	40 *10*	166	9^-	121	8^-	M1+E2	0.09 *10*	33 *10*	Mult.,δ: from α(tot)exp=33 *10* (1994By01).
45.3[#] *3*		3563.8+x	24^+	3518.42+x	$(22)^-$	[M2]		1.49×10^3 *5*	E_γ: from level scheme. Existence of this γ was inferred from γγ-coincidence data (1994By01). Intensity balance at the 3566+x level, when side feeding is neglected, yields Iγ=0.061 *25* (1994By01).
52.5 *2*	7.4 *3*	1597	13^-	1544	12^+	E1		0.598 *10*	E_γ: other: 53.2 *2* (1993De26). Mult.: from α(tot)exp=9 *4* (1994By01). I_γ: other: 0.7 *2* (1993De26).
63.9 *2*	16 *5*	1661	14^-	1597	13^-	M1		10.38 *17*	E_γ: other: 64.2 *2* (1993De26). Mult.: from α(tot)exp=3 *4* (1994By01). I_γ: 0.9 *2* (1993De26).
71.4 *2*	142 *20*	1732	15^-	1661	14^-	M1		7.50 *12*	E_γ: other: 71.5 *2* (1993De26). Mult.: from α(tot)exp=7 *1* (1994By01). I_γ: other: 8 *2* (1993De26).
74.5 *3*	21 *7*	3338.0+x	24^+	3263.28+x	23^+	M1		6.63 *12*	Mult.: from α(tot)exp=2.4 *15* (1994By01).
87.3 *3*	17 *11*	4316.5+x	27^-	4229.2+x	25^-	E2		16.6 *4*	Mult.: from α(tot)exp=17 *11* (1994By01).
89.3 *3*	2.8 *4*	6179.0+x	30^-	6089.7+x	30^-	M1		3.91 *7*	Mult.: from α(tot)exp=6 *6* (1994By01).
114.7 *5*	1.5 *5*	6475.3+x	31^-	6360.6+x	30^-	M1+E2	13 *12*	5.0 *23*	Mult.,δ: from α(tot)exp=5 *2* (1994By01).
118.5 *1*	85 *5*	1850	16^-	1732	15^-	M1		8.84 *13*	E_γ: other: 118.7 *2* (1993De26). Mult.: from α(tot)exp=9 *1*; A_2=−0.06 15 (1994By01). Proposed sequence of 312.5γ and 118.5γ by 1994By01, reversed from 118.5γ and 312.5γ proposed by 1993De26 on the basis of shell-model calculations (Priv. Comm. from A. Byrne with Y. A. Akovali (1995El07)). I_γ: other: 6.0 *4* (1993De26).
120.3 *3*	7 *2*	4316.5+x	27^-	4196.0+x	25^-	E2		4.06 *7*	Mult.: from α(tot)exp=4 *2* (1994By01).
124.5 *3*	7 *2*	3211.62+x	21^-	3087.07+x					A_2=−0.06 *64* (1994By01).
130.2 *3*	15 *2*	5769.2+x	29^-	5638.7+x	28^+	E1		0.249 *4*	Mult.: from α(tot)exp=0.1 *3*; A_2=−0.32 *26* (1994By01).
135.1 *2*	58 *8*	1732	15^-	1597	13^-	E2		2.50 *4*	Mult.: from α(tot)exp=1 *1*; A_2=+0.49 *23* (1994By01). I_γ: other: 3.4 *7* (1993De26).
143.3 *2*	44 *3*	1080	12^+	937	11^+	M1		5.15 *7*	Mult.: from α(tot)exp=7 *2*; A_2=−0.37 *27* (1994By01). I_γ: other: 1.7 *3* (1993De26).
[x]159.0	≤22								
[x]168.8	5 *1*								
177.5 *4*	4 *1*	1544	12^+	1367	$(12)^+$	M1		2.81 *4*	Mult.: from α(tot)exp=5 *2* (1994By01).
185.5 *3*	11 *3*	3087.07+x		2901.48+x	20^-				A_2=+0.02 *31* (1994By01).
[x]197.7 *3*	7 *3*								
208.8 *2*	460 *10*	3263.28+x	23^+	3054.50+x	21^+	E2		0.474 *7*	Mult.: from α(tot)exp=0.5 *2*; A_2=+0.37 *4* (1994By01).
211.9 *2*	17 *3*	5769.2+x	29^-	5557.2+x					A_2=+0.35 *44* (1994By01).
[x]228.0[a]	3.0 *5*								
245.7 *2*	55[@] *3*	3054.50+x	21^+	2808.82+x	20^-	E1		0.0542 *8*	Mult.: from α(tot)exp=0.3 *1* with some signal contaminated; A_2=+0.09 *8* (1994By01).

$\gamma(^{214}Fr)$ (continued)

E_γ†	I_γ‡	E_i(level)	J_i^π	E_f	J_f^π	Mult.	δ	α[b]	Comments
250.6 *3*	8 *2*	3462.2+x		3211.62+x	21⁻				A_2=−0.18 *26* (1994By01). Another possible placement from energy fit only could be between the 3340+x and 3089+x levels.
ˣ254.3 *3*	8 *3*								
274.1 *2*	21 *3*	3328.6+x	22	3054.50+x	21⁺	(D)			Mult.: from A_2=−0.15 *19* (1994By01).
279.0 *5*	2 *1*	5205.0+x	(28⁺)	4925.4+x	28⁻				
296.3 *2*	30 *5*	6475.3+x	31⁻	6179.0+x	30⁻	M1(+E2)	0.5 *5*	0.57 *16*	Mult.: from α(tot)exp=0.75 *25*; α(K)exp=0.26 *15* (with some contamination from ^{215}Fr); α(L)exp=0.12 *2*; A_2=−0.58 *11* (1994By01).
ˣ299.2 *3*	11 *5*								
299.3 *2*	192 *10*	937	11⁺	638	11⁺	M1+E2	0.2 *6*	0.64 *18*	E_γ: other: 299.2 *2* (1993De26). Mult.,δ: from α(K)exp=0.50 *10*; α(L)exp(299.2γ+299.3γ)=0.12 *1*; A_2=0.00 *7* (1994By01); α(K)exp=0.45 *18*; α(L)exp=0.16 *6*; α(M)exp=0.048 *20* (1993De26). I_γ: other: 13 *2* (1993De26).
300.6 *2*	329 *20*	3563.8+x	24⁺	3263.28+x	23⁺	M1		0.647 *9*	Mult.: from α(K)exp=0.74 *23*. α(L)exp(299.2γ+300.6γ)=0.12 *1*; A_2=−0.70 *5* (1994By01).
303.1 *3*	10 *6*	7846.1+y		7543.0+y	36⁻				
306.8 *2*	52 *5*	3518.42+x	(22)⁻	3211.62+x	21⁻	M1+E2	0.8 *+3−8*	0.43 *19*	Mult.: from α(K)exp=0.34 *6*, α(L)exp=0.11 *2*; A_2=−0.05 *11* (1994By01).
310.2 *2*	30 *5*	3211.62+x	21⁻	2901.48+x	20⁻	M1		0.594 *8*	Mult.: from α(K)exp=0.36 *12*; A_2=+0.80 *26* (1994By01).
312.5 *1*	1066 *20*	2163	17⁺	1850	16⁻	E1		0.0312 *4*	E_γ: other: 312.7 *2* (1993De26). Mult.: from α(K)exp=0.026 *2*; α(L)exp=0.011 *7*; A_2=−0.17 *2* (1994By01); α(K)exp=0.032 *13* (1993De26). I_γ: other: 100 *5* (1993De26). The total transition intensity of the 312.5γ is greater than that of 118.5γ which is placed cascading below the 312.5γ. If the placements of these γ′s are correct, the intensity balance at the 1851-keV level suggests that the measured Iγ(312.5γ) possibly includes some impurity.
320.5 *3*	18 *3*	6089.7+x	30⁻	5769.2+x	29⁻	M1		0.543 *8*	Mult.: from α(K)exp=0.69 *18*; A_2=−0.23 *27* (1994By01).
331.7 *2*	47 *5*	3895.4+x	25⁺	3563.8+x	24⁺	M1		0.494 *7*	Mult.: from α(K)exp=0.56 *8*, α(L)exp=0.10 *3*; A_2=−0.24 *5* (1994By01).
337.0 *3*	9 *1*	6812.0+y	(34⁺)	6475+y	33⁺	M1		0.473 *7*	Mult.: from α(K)exp=0.39 *9*; α(L)exp=0.15 *4*; A_2=−0.52 *40* (1994By01).
352.0 *3*	3 *1*	5557.2+x		5205.0+x	(28⁺)	(D)			A_2=−1.30 *43* (1994By01).
ˣ371.3 *3*	4 *2*								
ˣ382.8 *3*	11 *3*								E_γ: other: 382.4 2 (1993De26). I_γ: other: 12 2 (1993De26).
ˣ387.8 *3*	7 *3*								
394.5 *3*	5 *3*	6915.9+x		6521.4+x					A_2=+0.05 *74* (1994By01).

$^{214}_{87}Fr_{127}$-12

$\gamma(^{214}$Fr) (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	δ	α [b]	Comments
400.0 *3*	20 *3*	4975.3+x	(26$^+$,27$^+$)	4575.3+x	26$^+$	(M1)		0.297 *4*	Mult.: from α(K)exp(400.0γ+402.7γ)=0.26 *5*, α(L)exp(400.0γ+402.7γ)=0.10 *2*; A_2=+0.50 *17* (1994By01).
402.7 *3*	15 *3*	3211.62+x	21$^-$	2808.82+x	20$^-$	(M1)		0.292 *4*	Mult.: from α(K)exp(400γ+402γ)=0.26 *5*; α(L)exp(400γ+402γ)=0.10 *2*; A_2=−0.35 *20* (1994By01).
^{x}405.0 *5*	12 *3*								
409.8 *2*	50 *5*	6179.0+x	30$^-$	5769.2+x	29$^-$	M1+E2	1.0 *3*	0.17 *4*	Mult.: from α(K)exp=0.14 *3*; A_2=−0.08 *8* (1994By01).
431.3 *3*	10 *3*	3518.42+x	(22)$^-$	3087.07+x					A_2=−0.04 *20* (1994By01).
442.7 *2*	92 *6*	1080	12$^+$	638	11$^+$	M1		0.2261 *32*	E_γ: other: 442.8 *2* (1993De26). Mult.: from α(K)exp=0.17 *2*, α(L)exp=0.05 *1*; A_2=+0.03 *6* (1994By01); α(K)exp=0.22 *4*; α(L)exp=0.042 *9*; α(M)exp=0.0054 *20* (1993De26). I_γ: other: 5.2 *6* (1993De26).
446.3 *3*	52 *5*	4010.1+x		3563.8+x	24$^+$	(Q)			Mult.: from A_2=+0.27 *11* (1994By01).
^{x}455.0 *3*	5 *2*								
460.2 *3*	11 *3*	5435.4+x		4975.3+x	(26$^+$,27$^+$)	(D)			A_2=−0.54 *49* (1994By01).
471.7 *1*	851 *20*	638	11$^+$	166	9$^-$	M2		0.547 *8*	Mult.: from α(K)exp=0.47 *2*, α(L)exp=0.110 *4*, α(M)exp=0.035 *3*; A_2=+0.36 *3* (1994By01); α(K)exp=0.41 *8*; α(L)exp=0.10 *2*; α(M)exp=0.023 *4* (1993De26). E_γ: other: 471.8 *2* (1993De26). I_γ: other: 63 *3* (1993De26).
^{x}498.0 *3*	5 *3*					M1		0.1649 *23*	Mult.: from α(K)exp=0.10 *1* (1994By01).
509.5 *5*	8 *3*	5435.4+x		4925.4+x	28$^-$				A_2=+1.02 *16* (1994By01).
516.6 [c] *2*	30 *10*	638	11$^+$	121	8$^-$	[E3]		0.1183 *17*	Mult.: from α(K)exp=0.036 *7*; α(L)exp=0.011 *1*; A_2=−0.12 *5* for both 516γs (1994By01). I_γ: given in 1994By01 as one of the γ doublets.
516.6 [c] *2*	150 *10*	1597	13$^-$	1080	12$^+$	(E1)		0.01067 *15*	Mult.: from α(K)exp=0.036 *7*; α(L)exp=0.011 *1*; A_2=−0.12 *5* for both 516γs (1994By01); α(K)exp=0.018 *5*; α(L)exp=0.004 *2* (1993De26). I_γ: given in 1994By01 as one of the γ doublets; other: 19 *3* (1993De26).
^{x}528.0 [a] *2*	3.5 *7*								E_γ,I_γ: from 1993De26.
^{x}569.5 *3*	12 *3*								
575.5 *3*	43 *4*	3838.8+x	24	3263.28+x	23$^+$	D			Mult.: from A_2=−0.56 *15* (1994By01).
580.6 *2*	98 *10*	1661	14$^-$	1080	12$^+$	M2		0.292 *4*	E_γ: other: 580.5 *2* (1993De26). Mult.: from α(K)exp=0.21 *1*, α(L)exp=0.053 *2*, α(M)exp=0.025 *5*; A_2=+0.60 *23* (1994By01). α(K)exp=0.23 *4*; α(L)exp=0.073 *15*; α(M)exp=0.037 *8* (1993De26). I_γ: other: 7.4 *7* (1993De26).
^{x}586.0 *5*	15 *2*								

$^{214}_{87}Fr_{127}$-13

$\gamma(^{214}Fr)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	δ	α[b]	Comments
591.4 *3*	53 *5*	6360.6+x	30^-	5769.2+x	29^-	M1+E2	2.6 *+7−4*	0.035 *4*	Mult.,δ: from α(K)exp=0.026 *3*; A_2=−0.19 *15* (1994By01).
599.0 *3*	6 *2*	8142.0+y		7543.0+y	36^-	(D)			Mult.: from A_2=−0.26 *19* (1994By01).
607.5 *3*	25 *7*	1544	12^+	937	11^+	(M1)		0.0972 *14*	E_γ: other: 607.0 *2* (1993De26). Mult.: from α(K)exp=0.097 *10*; α(L)exp(607.5γ+608.9γ)=0.016 *3* (1994By01). I_γ: other: 2.6 *5* (1993De26).
608.9 *2*	160 *10*	4925.4+x	28^-	4316.5+x	27^-	M1		0.0966 *14*	Mult.: from α(K)exp(607.5+608.9)=0.097 *10*; α(L)exp(607.5+608.9)=0.016 *3*; A_2=−0.29 *8* (1994By01).
614.6 *3*	18 *3*	2777.6+x		2163+x	19^+	(D)			Mult.: from A_2=−1.18 *17* (1994By01).
645.8 *2*	100 *10*	2808.82+x	20^-	2163+x	19^+	E1		0.00687 *10*	Mult.: from α(K)exp=0.005 *1*; A_2=−0.17 *8* (1994By01).
665.4 *2*	295 *10*	4229.2+x	25^-	3563.8+x	24^+	E1		0.00649 *9*	Mult.: from α(K)exp<0.01 (contaminated); A_2=−0.22 *4* (1994By01).
679.9 *3*	40 *5*	4575.3+x	26^+	3895.4+x	25^+	M1		0.0722 *10*	Mult.: from α(K)exp=0.056 *26*; A_2=−0.22 *10* (1994By01).
683.8 *3*	7 *3*	5000.3+x		4316.5+x	27^-				
[x]694.5 *3*	6 *3*								
735.0 *3*	9 *3*	7547.0+y	(35^+)	6812.0+y	(34^+)	M1		0.0588 *8*	Mult.: from α(K)exp=0.058 *12*; A_2=−0.62 *22* (1994By01).
738.5 *2*	90 *5*	2901.48+x	20^-	2163+x	19^+	E1		0.00533 *7*	E_γ: other: 738.3 *2* (1993De26). Mult.: from α(K)exp=0.006 *1* (1994By01). I_γ: other: 11 *2* (1993De26).
752.7 *2*	36 *5*	4316.5+x	27^-	3563.8+x	24^+	E3		0.0407 *6*	Mult.: from α(K)exp=0.035 *3*; α(L)exp=0.012 *2*; A_2=+0.66 *6* (1994By01).
[x]757.6 *3*	5 *3*					(M2)		0.1353 *19*	Mult.: from α(K)exp=0.09 *3*; A_2=0.46 *26* (1994By01).
781.0 *4*	3 *1*	7256.0+y		6475+y	33^+				
809[d]		4704.0+x		3895.4+x	25^+				E_γ: tentative transition, not observed (1994By01).
810.2 *3*	2 *1*	8656.3+y		7846.1+y					
844.0 *2*	80 *5*	5769.2+x	29^-	4925.4+x	28^-	M1,E2		0.026 *15*	Mult.: from α(K)exp=0.014 *1*, α(L)exp=0.0018 *3*; A_2=−0.01 *5* (1994By01).
853.2 *3*	15 *5*	5557.2+x		4704.0+x					A_2=+0.14 *14* (1994By01).
858.0 *2*	36 *5*	4196.0+x	25^-	3338.0+x	24^+	(E1)		0.00404 *6*	Mult.: from A_2=−0.17 *10* (1994By01).
888.6 *3*	39 *5*	5205.0+x	(28^+)	4316.5+x	27^-				A_2=+0.27 *31* (1994By01).
891.2[&d] *5*	≤72	4229.2+x	25^-	3338.0+x	24^+	[E1]		0.00377 *5*	
891.5 *2*	630 *20*	3054.50+x	21^+	2163+x	19^+	E2		0.01069 *15*	E_γ: other: 892.0 *2* (1993De26). Mult.: from α(K)exp=0.0070 *15*, α(L)exp=0.0014 *5*; A_2=+0.47 *5* (1994By01). α(K)exp=0.0070 *10* (1993De26). I_γ: other: 47 *9* (1993De26).
906.7 *2*	70 *6*	1544	12^+	638	11^+	M1+E2	1.01 *15*	0.0220 *19*	E_γ: other: 906.5 *2* (1993De26). Mult.,δ: from α(K)exp=0.017 *1*; A_2=−0.19 *3* (1994By01); α(K)exp=0.039 *8*; α(L)exp=0.0065 *12* (1993De26). I_γ: other: 3.0 *3* (1993De26).
978.5 *3*	30 *6*	4316.5+x	27^-	3338.0+x	24^+	E3		0.02154 *30*	Mult.: from α(K)exp=0.021 *2*, α(L)exp=0.005 *1*; A_2=+0.58 *13* (1994By01).
998.0 *3*	18 *3*	1636		638	11^+	(D)			Mult.: from A_2=−0.11 *9* (1994By01).
1014.9 *3*	49 *5*	5331.4+x	28^+	4316.5+x	27^-	E1		0.00299 *4*	Mult.: from α(K)exp<0.003; A_2=−0.12 *14* (1994By01).

γ(^{214}Fr) (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[b]	Comments
1023.1 *2*	791 *26*	1661	14⁻	638	11⁺	E3	0.01944 *27*	E_γ: other: 1023.0 *2* (1993De26). Mult.: α(K)exp=0.0120 *5*, α(L)exp=0.0048 *2*, α(M)exp=0.0010 *2*; A_2=+0.52 *2* (1994By01); α(K)exp=0.015 *3*; α(L)exp=0.0042 *8*; α(M)exp=0.0008 *3* (1993De26). I_γ: other: 84 *4* (1993De26).
1068.0 *3*	35 *5*	7543.0+y	36⁻	6475+y	33⁺	E3	0.01764 *25*	Mult.: from α(K)exp=0.014 *4*, α(L)exp=0.007 *2*; A_2=0.65 *17* (1994By01).
1080.5 *5*	7 *3*	4975.3+x	(26⁺,27⁺)	3895.4+x	25⁺			Mult.: from A_2=+0.07 *17* (1994By01).
1200.8 *3*	24 *3*	1367	(12)⁺	166	9⁻	(E3)	0.01361 *19*	Mult.: from α(K)exp=0.010 *3*; A_2=+0.33 *10* (1994By01).
1240.7 *3*	5 *2*	5557.2+x		4316.5+x	27⁻			
[x]1293.2 *5*	10 *2*					(Q)		Mult.: from A_2=0.37 *11* (1994By01).
1310.9 *5*	6 *3*	5627.4+x		4316.5+x	27⁻			A_2=+0.10 *25* (1994By01).
1316.4 *3*	15 *5*	6521.4+x		5205.0+x	(28⁺)	E2	0.00511 *7*	Mult.: from α(K)exp=0.003 *1*; A_2=+0.85 *9* (1994By01).
1321.9 *3*	19 *3*	5638.7+x	28⁺	4316.5+x	27⁻	E1	1.94×10^{-3} *3*	Mult.: from α(K)exp=0.001 *2*; A_2=+0.10 *35* (1994By01).
1453.0 *5*	9 *2*	5769.2+x	29⁻	4316.5+x	27⁻	(Q)		Mult.: from A_2=+0.41 *16* (1994By01).

[†] From 1994By01, unless otherwise noted.
[‡] From 1994By01 following ^{208}Pb(^{11}B,5nγ) reaction at 75 MeV bombarding energy.
[#] Existence was inferred by coincidences (1994By01).
[@] In self-coincidence (1994By01).
[&] Unconfirmed transition (1994By01).
[a] Measurement of 1993De26; γ is not listed in 1994By01.
[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.
[x] γ ray not placed in level scheme.

$^{214}_{87}$Fr$_{127}$-15

Adopted Levels, Gammas

Q(β^-)=−6341 *15*; S(n)=8324 *11*; S(p)=3642 *7*; Q(α)=7273 *3* 2021Wa16
S(2n)=15851 *12*; S(2p)=5826 *6* (2021Wa16).

^{214}Ra Levels

Cross Reference (XREF) Flags

- A ^{218}Th α decay
- B ^{214}Ra IT decay
- C (HI,xnγ)
- D ^{214}Ac ε decay

E(level)[†]	J$^\pi$[#]	T$_{1/2}$[‡]	XREF	Comments
0.0	0$^+$[@]	2.438 s *20*	ABCD	%ε=0.059 *4*; %α=99.941 *4* %ε: deduced from the ratio of Iα(^{214}Ra) and Iα(^{214}Fr) (1968To10); other: %ε=0.09 *3* (1967Va22). T$_{1/2}$: weighted average of 2.6 s *2* (1967Va22), 2.5 s *1* (1968Lo15), 2.46 s *3* (1973Be33), 2.4 s *1* (1974Ho27), 2.435 s *20* (2012No08), and 2.36 s *6*; others: 2.6 s (1961Gr42) and 2.27 s *+98−53* (2018Br13). $<r^2>^{1/2}$=5.608 fm *18* for ^{214}Ra from a global fit to charge radius data for all nuclides (2013An02). Isotope shifts for Ra isotopes were measured with respect to ^{214}Ra (2012Wa24).
1382.30 *10*	2$^+$[@]		BC	J$^\pi$: E2 to 0$^+$.
1639.30 *14*	4$^+$[@]	35.1 ns *3*	BC	J$^\pi$: E2 to 2$^+$.
1819.70 *17*	6$^+$[@]	118 ns *7*	BC	J$^\pi$: E2 to 4$^+$.
1865.2 *11*	8$^+$[@]	67.8 μs *15*	BC	%α=0.09 *7*; %ε+%β^+=99.91 *7* μ=7.10 *2* %α: branching estimated using ratio of Iα and Iγ from the isomeric decay (2006Ku26). μ: from *g*=0.887 *3* of weighted average of 0.88 *1* from NMR measurement (1974Ya09), 0.890 *4* from TDPAD measurement (1976Ha37) and 0.885 *4* from TDPAD measurement (1977Be56). J$^\pi$: E2 to 6$^+$. T$_{1/2}$: weighted average of 67 μs *3* (1971MaXH,1971MaXI), 67 μs *3* (1992St09) and 68.6 μs *20* (2006Ku26); other: 57 μs *6* (1972Co18).
2073.9 *14*	8$^+$[&]		C	J$^\pi$: M1 to 8$^+$; E3 from 11$^-$.
2683.2 *14*	11$^-$[a]	295 ns *7*	C	μ=11.97 *7* μ: from *g*=1.088 *6* of weighted average of 1.085 *10* (1979Ho06) and 1.089 *7* (1992St09). Both values were from TDPAD measurements. J$^\pi$: E3 to 8$^+$ isomer.
2944.1 *14*	10$^+$[@]		C	J$^\pi$: E2 to 8$^+$.
3256.4 *14*	12$^+$[&]		C	J$^\pi$: E2 to 10$^+$, E1 to 11$^-$.
3329.4 *15*	12$^+$[@]		C	J$^\pi$: M1 to 12$^+$, E1 to 11$^-$.
3478.4 *16*	14$^+$[&]	279 ns *4*	C	μ=14.29 *6* μ: from *g*=1.021 *4* of weighted average of 1.022 *9* (1979Ho06) and 1.021 *4* (1992St09). Both values were from TDPAD measurements. J$^\pi$: E2 to 12$^+$. T$_{1/2}$: other: 285 ns (1979Ho06).
3771.4 *16*	13$^-$[a]		C	J$^\pi$: E2 to 11$^-$.
3850.1 *17*	14$^+$[b]		C	J$^\pi$: M1 to 14$^+$, D from 15$^-$.
3990.1 *16*	15$^-$[a]	3.6 ns *2*	C	J$^\pi$: E2 to 13$^-$.
4146.8 *17*	17$^-$[a]	225 ns *4*	C	μ=17.37 *5* μ: from *g*=1.022 *3* of weighted average of 1.028 *7* (1979Ho06) and 1.021 *3*

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{214}Ra Levels (continued)

E(level)[†]	J^{π}[#]	$T_{1/2}$[‡]	XREF	Comments
				(1992St09). Both values were from TDPAD measurements. J^{π}: E2 to 15^-; E3 to 14^+.
4170.1 *18*	15^-[e]		C	J^{π}: E1 to 14^+.
4237.2 *17*	16^+[&]		C	J^{π}: E2 to 14^+.
4376.8 *18*	(16^-)		C	J^{π}: (M1) to 15^-.
4401.5 *17*	17^-[c]		C	J^{π}: M1 to 17^-; E1 from 18^+.
4618.3 *18*	16^+[b]		C	J^{π}: E2 to 14^+.
4810.2 *17*	18^+[b]	0.76 ns *21*	C	J^{π}: E1 to 17^-.
4921.9 *18*	19^-		C	J^{π}: E2 to 17^-.
4930.9 *20*	17^-		C	J^{π}: E2 to 15^-.
4984.4 *20*	18^-		C	J^{π}: M1 to 17^-.
5180.4 *18*	19^-[c]		C	J^{π}: E1 to 18^+; E2 to 17^-.
5243.8 *18*	20^+		C	J^{π}: E1 to 19^-.
5390.3 *19*	21^-[c]	1.5 ns *3*	C	J^{π}: E1 to 20^+; E2 to 19^-.
5461.8 *20*	$(20)^-$		C	J^{π}: (M1) to 19^-.
5948.1 *20*	$(21)^-$		C	J^{π}: M1 to 21^-, γ to (20^-).
6030.1 *20*	22^-[c]		C	J^{π}: M1 to 21^-, γ from 23^-.
6056.6 *19*	22^+		C	J^{π}: E1 to 21^-; E2 to 20^+.
6117.8 *21*	(21,22)		C	J^{π}: γ to 21^-; weakly populated, non-yrast state in (HI, xnγ).
6290.0 *20*	22^+		C	J^{π}: M1+E2 to 22^+, γ to 21^-, γ from (24^+).
6305.0 *22*	(22)		C	J^{π}: γ to 22^+; weakly populated, non-yrast state in (HI, xnγ).
6479.2 *24*	(22)		C	J^{π}: γ to (22); weakly populated, non-yrast state in (HI, xnγ).
6482.1 *22*	23^+		C	J^{π}: M1 to 22^+.
6530.2 *22*	(24^+)[d]	1.6 ns *3*	C	J^{π}: γ to 22^+ and 23^+.
6565.0 *23*	$(23,24)^+$		C	J^{π}: M1 to 23^+.
6577.0 *24*	(25^-)	128 ns *4*	C	μ=16.5 *3* J^{π}: E1 to (24^+). μ: from g=0.66 *1* of TDPAD measurement (1992St09).
6612.6 *20*	23^-		C	J^{π}: E2 to 21^-.
6660.4 *22*			C	
6765.7 *22*	$(22^+,23^+)$		C	J^{π}: (M1) to 22^+.
6929.5 *24*	$(24^+,25^+)$		C	J^{π}: (M1+E2) to $(23,24)^+$.
6936.7 *23*			C	
7016 *3*			C	
7118 *3*	$(25^-,26^-)$		C	J^{π}: (M1) to (25^-).
7243 *3*			C	
7301.8 *25*			C	
7394.3 *24*			C	
7542 *3*			C	
7870.0 *23*	(24)		C	J^{π}: D to 23^+.

† From a least squares fit to Eγ′s by evaluators, assuming 1 keV uncertainty for Eγ′s without ΔEγ′s .
‡ From (HI,xnγ) (1992St09) unless otherwise noted.
# Assigned using γ multipolarity from (HI,xnγ), unless otherwise noted.
@ Proposed configuration=$(\pi\ h_{9/2})^{+6}$ (1971MaXH,1979Ho06,1992St09).
& Proposed Configuration=$(\pi\ h_{9/2})^{+5}(\pi\ f_{7/2})$ (1979Ho06 and 1992St09).
a Proposed configuration=$(\pi\ h_{9/2})^{+5}(\pi\ i_{13/2})$ (1979Ho06,1992St09).
b Configuration=$(\pi\ h_{9/2})^{+4}(\pi\ f_{7/2})^{+2}$ (1992St09).
c Configuration=$(\pi\ h_{9/2})^{+4}(\pi\ f_{7/2})(\pi\ i_{13/2})$ (1992St09).
d Configuration=$(\pi\ h_{9/2})^{+4}(\pi\ i_{13/2})^{+2}$ (1992St09).
e Possible configuration=$(\pi\ h_{9/2})^{+3}\ (\pi f_{7/2})^{+2}(\pi\ i_{13/2})$ (1992St09).

Adopted Levels, Gammas (continued)

γ(^{214}Ra)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.†	δ†	α‡	Comments
1382.30	2+	1382.3 *1*	100	0.0	0+	E2		0.00493 *7*	E_γ: from IT decay (2006Ku26); others: 1381.2 *10* (1971MaXI, 1971MaXH), 1381.9 *5* (2004He25) and 1382.4 (1992St09).
1639.30	4+	257.0 *1*	100	1382.30	2+	E2		0.2472 *35*	B(E2)(W.u.)=0.1516 *14* E_γ: from IT decay (2006Ku26); others: 255.9 *5* (1971MaXH, 1971MaXI), 256.6 *2* (1972Co18), 256.8 *4* (2004He25) and 256.9 (1992St09).
1819.70	6+	180.4 *1*	100	1639.30	4+	E2		0.856 *12*	B(E2)(W.u.)=0.178 *11* E_γ: from IT decay (2006Ku26); others: 179.4 *5* (1971MaXH, 1971MaXI), 180.4 *2* (1972Co18), 180.7 *4* (2004He25) and 180.4 (1992St09).
1865.2	8+	45.5	100	1819.70	6+	E2		414 *6*	B(E2)(W.u.)=0.00136 *16*
2073.9	8+	208.7	100	1865.2	8+	M1		1.941 *27*	
2683.2	11−	609.3	89.7 *7*	2073.9	8+	E3		0.0766 *11*	B(E3)(W.u.)=21.8 *6*
		818.0	100.0 *14*	1865.2	8+	E3		0.0350 *5*	B(E3)(W.u.)=3.09 *9*
2944.1	10+	1078.9	100	1865.2	8+	E2		0.00779 *11*	
3256.4	12+	312.3	53.0 *10*	2944.1	10+	E2		0.1349 *19*	
		573.2	100.0 *17*	2683.2	11−	E1		0.00898 *13*	
3329.4	12+	73.0	14 *2*	3256.4	12+	M1+E2	0.15 *10*	8.5 *13*	
		646.2	100.0 *14*	2683.2	11−	E1		0.00712 *10*	
3478.4	14+	148.9	66.9 *11*	3329.4	12+	E2		1.804 *25*	B(E2)(W.u.)=0.074 *3*
		222.1	100.0 *17*	3256.4	12+	E2		0.404 *6*	B(E2)(W.u.)=0.0150 *5*
3771.4	13−	1088.2	100	2683.2	11−	E2		0.00766 *11*	
3850.1	14+	371.7	100	3478.4	14+	M1		0.395 *6*	
3990.1	15−	140.0	100.0 *14*	3850.1	14+	D		0.2129 *30*	B(E1)(W.u.)=1.27×10^{-5} *8*
		218.7	20.3 *14*	3771.4	13−	E2		0.426 *6*	B(E2)(W.u.)=0.56 *5*
4146.8	17−	156.6	9.3 *6*	3990.1	15−	E2		1.476 *21*	B(E2)(W.u.)=0.0253 *17*
		668.4	100.0 *13*	3478.4	14+	E3		0.0591 *8*	B(E3)(W.u.)=25.8 *7*
4170.1	15−	691.7	100	3478.4	14+	E1		0.00626 *9*	
4237.2	16+	758.8	100	3478.4	14+	E2		0.01552 *22*	
4376.8	(16−)	206.7	100	4170.1	15−	(M1)		1.994 *28*	
4401.5	17−	(24.7)		4376.8	(16−)				E_γ: not observed; deduced from coincidence data (1992St09).
		254.7		4146.8	17−	M1+E2	0.36 *21*	1.02 *11*	
4618.3	16+	768.2	100	3850.1	14+	E2		0.01513 *21*	
4810.2	18+	191.9	11 *4*	4618.3	16+	[E2]		0.680 *10*	B(E2)(W.u.)=2.1 *9*
		408.7	64 *4*	4401.5	17−	E1		0.01790 *25*	B(E1)(W.u.)=1.2×10^{-6} *4*
		573.0	17 *4*	4237.2	16+	[E2]		0.0282 *4*	B(E2)(W.u.)=0.013 *5*
		663.4	100 *6*	4146.8	17−	E1		0.00677 *9*	B(E1)(W.u.)=4.2×10^{-7} *12*
4921.9	19−	775.1	100	4146.8	17−	E2		0.01486 *21*	
4930.9	17−	760.8	100	4170.1	15−	E2		0.01543 *22*	
4984.4	18−	582.9	100	4401.5	17−	M1		0.1178 *16*	
5180.4	19−	258.6	2 *1*	4921.9	19−	[M1+E2]		0.7 *4*	
		370.2	66 *1*	4810.2	18+	E1		0.02212 *31*	
		778.9	100 *3*	4401.5	17−	E2		0.01471 *21*	

$\gamma(^{214}Ra)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	δ[†]	α[‡]	Comments
5243.8	20+	63.4	4.3 *3*	5180.4	19−	[E1]		0.371 *5*	
		321.9	100 *2*	4921.9	19−	E1		0.0300 *4*	
5390.3	21−	146.5	32 *3*	5243.8	20+	E1		0.1908 *27*	B(E1)(W.u.)=6.8×10^{-6} *15*
		209.9	100 *3*	5180.4	19−	E2		0.492 *7*	B(E2)(W.u.)=6.5 *14*
5461.8	(20)−	540.0	100	4921.9	19−	(M1)		0.1444 *20*	
5948.1	(21)−	486.3	60 *10*	5461.8	(20)−				
		557.8	100 *10*	5390.3	21−	M1		0.1324 *19*	
6030.1	22−	639.8	100	5390.3	21−	M1		0.0920 *13*	
6056.6	22+	666.3	100 *10*	5390.3	21−	E1		0.00672 *9*	
		812.8	30 *2*	5243.8	20+	E2		0.01350 *19*	
6117.8	(21,22)	727.5	100	5390.3	21−				
6290.0	22+	233.4	100 *5*	6056.6	22+	M1(+E2)	<6	0.9 *5*	
		899.7	18 *3*	5390.3	21−	[E1]		0.00385 *5*	
6305.0	(22)	248.4	100	6056.6	22+				
6479.2	(22)	174.2	100	6305.0	(22)				
6482.1	23+	192.1	100	6290.0	22+	M1		2.450 *34*	
6530.2	(24+)	(48.1)		6482.1	23+				E_γ: not observed; deduced from coincidence data (1992St09).
		240.2	100 *50*	6290.0	22+				
6565.0	(23,24)+	82.9	100	6482.1	23+	M1		5.36 *8*	
6577.0	(25−)	46.8	100	6530.2	(24+)	E1		0.835 *12*	B(E1)(W.u.)=7.9×10^{-6} *6*
6612.6	23−	582.6	30 *15*	6030.1	22−	[M1]		0.1180 *17*	
		1222.3	100 *4*	5390.3	21−	E2		0.00616 *9*	
6660.4		603.8	100	6056.6	22+				
6765.7	(22+,23+)	475.7[#]	100[#]	6290.0	22+	(M1)		0.2027 *28*	
6929.5	(24+,25+)	364.4	100	6565.0	(23,24)+	(M1+E2)		0.25 *16*	
6936.7		324.1	100	6612.6	23−				
7016		438.6	100	6577.0	(25−)				
7118	(25−,26−)	540.7	100	6577.0	(25−)	(M1)		0.1439 *20*	
7243		665.9	100	6577.0	(25−)				
7301.8		365.1	100	6936.7		(M1+E2)		0.25 *16*	
7394.3		464.8	100	6929.5	(24+,25+)				
7542		240.1	100	7301.8					
7870.0	(24)	475.7[#]	14[#] *14*	7394.3					
		1304.9	57 *14*	6565.0	(23,24)+	D			Mult.: α(K)exp=0.018 *7* (1992St09) could be M1 or E1.
		1387.9	100 *14*	6482.1	23+	D			Mult.: α(K)exp=0.012 *4* (1992St09) could be M1 or E1.

† From (HI,xnγ) (1992St09) 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 with intensity suitably divided.

$^{214}_{88}Ra_{126}$-4

^{218}Th α decay

Parent: ^{218}Th: E=0.0; $J^\pi=0^+$; $T_{1/2}$=122 ns *5*; Q(α)=9849 *9*; %α decay=100.0
^{218}Th-Q(α): from 2021Wa16.
^{218}Th-$T_{1/2}$: from Adopted Levels of ^{218}Th (2019Si39).

^{214}Ra Levels

E(level)	J^π	$T_{1/2}$	Comments
0.0	0^+	2.444 s *20*	$T_{1/2}$: From the Adopted Levels.

α radiations

Eα	E(level)	Iα‡	HF†	Comments
9668 *10*	0.0	100	1.000	Eα: weighted average of 9665 *10* (1973No09) and 9680 *20* (1973Ha32). Other: 9700 *80* (1970Va13) and 9.72 MeV *7* (2018Br13). Iα: only one α group has been observed.

† r_0(^{214}Ra)=1.549 *3* is calculated from HF(9668α)=1.0.
‡ Absolute intensity per 100 decays.

^{214}Ac ε decay 1968Va04

Parent: ^{214}Ac: E=0.0; $J^{\pi}=5^{(+)}$; $T_{1/2}$=8.2 s *2*; Q(ε)=6341 *15*; %ε+%β^+ decay<14.0
^{214}Ac-J^{π},$T_{1/2}$: From the Adopted Levels of ^{214}Ac.
^{214}Ac-Q(ε): from 2021Wa16.
^{214}Ac-%ε+%β^+ decay: From the Adopted Levels of ^{214}Ac.
1968Va08: The ratio of ^{214}Ac and ^{214}Ra α activity in the ^{203}Tl(^{16}O,5n)^{214}Ac reaction at beam energies of below or at 90 MeV.
ε branching was deduced from the ratio of Iα(^{214}Ac) and Iα(^{214}Ra) at equilibrium.

^{214}Ra Levels

E(level)	J^{π}	$T_{1/2}$	Comments
0.0	0^+	2.444 s *20*	$T_{1/2}$: from the Adopted Levels.

^{214}Ra IT decay 2006Ku26

Parent: ^{214}Ra: E=1865.2 *11*; $J^{\pi}=8^{+}$; $T_{1/2}$=67.8 μs *15*; %IT decay=99.91 *7*

^{214}Ra-%IT decay: %IT=99.91 *7*, %α=0.09 *7*, estimated using ratio of Iα and Iγ from the isomeric decay (2006Ku26).

2006Ku26: ^{214m}Ra was produced in ^{170}Er(^{48}Ca,4n) reaction with a beam at 4.25 and 4.30 MeV/A; evaporation residues (ER) were separated in-flight by the velocity filter SHIP and implanted into 16-strip PIPS silicon detectors at the focal plane. γ rays from the decay were detected by a clover detector with four HPGe crystals. Measured Eγ, Iγ, $\gamma\gamma$, Eα, Iα, $\alpha\gamma$ coin, ce, lifetimes based on time and position correlations.

^{214}Ra Levels

E(level)†	J^{π}‡	$T_{1/2}$‡	Comments
0.0	0^{+}	2.444 s *20*	
1382.30 *10*	2^{+}		
1639.30 *15*	4^{+}		
1819.71 *18*	6^{+}		
1865.2 *11*	8^{+}	67.8 μs *15*	$T_{1/2}$: other: 68.6 μs *20* from 1382γ(t) (2006Ku26).

† From Eγ, assuming ΔE(45.5γ)=1 keV.
‡ From the Adopted Levels.

γ(^{214}Ra)

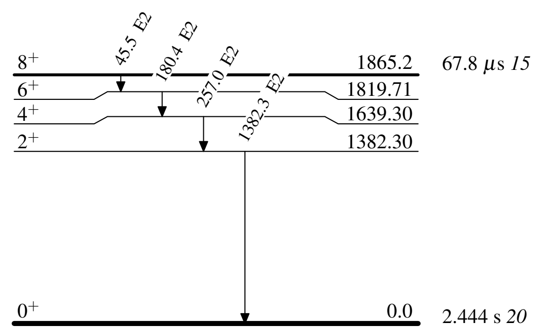
E_{γ}†	E_i(level)	J^{π}_i	E_f	J^{π}_f	Mult.‡	α#	Comments
45.5	1865.2	8^{+}	1819.71	6^{+}	E2	414 *15*	E_{γ}: not observed, taken from 1992St09 and 1996FiZX by 2006Ku26.
180.4 *1*	1819.71	6^{+}	1639.30	4^{+}	E2	0.856 *12*	
257.0 *1*	1639.30	4^{+}	1382.30	2^{+}	E2	0.2472 *35*	
1382.3 *1*	1382.30	2^{+}	0.0	0^{+}	E2	0.00493 *7*	

† From 2006Ku26 unless otherwise noted.
‡ From γ intensity balances (2006Ku26).
# 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.

^{214}Ra IT decay 2006Ku26

Decay Scheme

%IT=99.91 *7*



$^{214}_{88}Ra_{126}$

(HI,xnγ) 1992St09

1992St09: $^{206}Pb(^{12}C,4n\gamma)$, $E(^{12}C)$=66-84 MeV, $^{206}Pb(^{13}C,5n\gamma)$, $E(^{13}C)$=66-84 MeV; Enriched targets, pulsed-beam; Ge hyper-pure, planar Ge, Compton suppressed detectors, superconducting solenoidal electron spectrometer, Si(Li) detector; measured Eγ, Iγ, $\gamma(\theta)$, $\gamma\gamma$(t), Xγ(t), I(ce)(t), Iγ(E,t), I$\gamma(\theta$,H,t). ^{214}Ra deduced levels, J^π, $T_{1/2}$, g-factors, B(λ), ICC.
Others: 2004He25,1986AdZV,1979Ho06,1974Ya09,1971MaXH,1971MaXI.

^{214}Ra Levels

E(level)[†]	J^π[‡]	$T_{1/2}$[#]	Comments
0.0	0^+[@]		
1382.4 *10*	2^+[@]		
1639.3 *15*	4^+[@]	35.1 ns *3*	$T_{1/2}$: from 1992St09; other: 32 ns *8* (1971MaXH,1971MaXI).
1819.7 *18*	6^+[@]	118 ns *7*	$T_{1/2}$: from 1992St09.
1865.2 *20*	8^+[@]	67 μs *3*	g=0.887 *3* $T_{1/2}$: from 1971MaXH,1971MaXI and 1992St09; other: 57 μs *6* (1972Co18). g: weighted average of 0.88 *1* (1974Ya09), 0.890 *4* (1976Ha37), 0.885 *4* (1977Be56).
2073.9 *22*	8^+[&]		
2683.2 *22*	11^-[a]	295 ns *7*	g=1.088 *6* $T_{1/2}$: from 1992St09; other: 333 ns (1979Ho06). g: weighted average of 1.085 *10* (1979Ho06) and 1.089 *7* (1992St09).
2944.1 *22*	10^+[@]		
3256.4 *22*	12^+[&]		
3329.4 *23*	12^+[@]		
3478.4 *23*	14^+[&]	279 ns *4*	g=1.021 *4* $T_{1/2}$: from 1992St09; other: 285 ns (1979Ho06). g: weighted average of 1.022 *9* (1979Ho06) and 1.021 *4* (1992St09).
3771.4 *23*	13^-[a]		
3850.1 *24*	14^+[b]		
3990.1 *24*	15^-[a]	3.6 ns *2*	$T_{1/2}$: from 1992St09.
4146.8 *24*	17^-[a]	225 ns *4*	g=1.022 *3* $T_{1/2}$: from 1992St09; other: 230 ns (1979Ho06). g: weighted average of 1.028 *7* (1979Ho06) and 1.021 *3* (1992St09).
4170.1 *24*	15^-[e]		
4237.2 *24*	16^+[&]		
4376.8 *25*	(16^-)		
4401.5 *24*	17^-[c]		
4618.3 *24*	16^+[b]		
4810.2 *24*	18^+[b]	0.76 ns *21*	$T_{1/2}$: from 1992St09.
4921.9 *25*	19^-		
4931 *3*	17^-		
4984 *3*	18^-		
5180.4 *24*	19^-[c]		
5243.8 *25*	20^+		
5390.3 *25*	21^-[c]	1.5 ns *3*	$T_{1/2}$: from 1992St09.
5462 *3*	20^-		
5948 *3*	$(21)^-$		
6030 *3*	22^-[c]		
6057 *3*	22^+		
6118 *3*			
6290 *3*	22^+		
6305 *3*	(22)		
6479 *3*	(22)		
6482 *3*	23^+		
6530 *3*	(24^+)[d]	1.6 ns *3*	$T_{1/2}$: tentatively determined by 1992St09.
6565 *3*	23^+		

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(HI,xnγ) 1992St09 (continued)

^{214}Ra Levels (continued)

E(level)†	Jπ‡	$T_{1/2}$#	Comments
6577 *3*	(25⁻)	128 ns *4*	g=0.66 *1* $T_{1/2}$: from 1992St09. g: from 1992St09.
6613 *3*	23⁻		
6660 *3*			
6766 *3*	(⁺)		
6929 *3*	(24⁺)		
6937 *3*			
7016 *3*			
7118 *3*	(⁻)		
7243 *3*			
7302 *3*			
7394 *3*			
7542 *4*			
7870 *3*	(24⁺)		

† From a least squares fit to Eγ′s by evaluators, assuming 1 keV uncertainty for Eγ′s.
‡ Deduced from γ multipolarities and decay pattern by 1992St09 unless otherwise noted.
\# From pulsed beam-γ(t), γγ(t) (1992St09) unless otherwise noted.
@ Configuration=$(\pi\ h_{9/2})^{+6}$.
& Configuration=$(\pi\ h_{9/2})^{+5}(\pi\ f_{7/2})$.
a Configuration=$(\pi\ h_{9/2})^{+5}(\pi\ i_{13/2})$.
b Configuration=$(\pi\ h_{9/2})^{+4}(\pi\ f_{7/2})^{+2})$.
c Configuration=$(\pi\ h_{9/2})^{+4}(\pi\ f_{7/2})(\pi\ i_{13/2})$.
d Configuration=$(\pi\ h_{9/2})^{+4}(\pi\ i_{13/2})^{+2}$.
e Possible configuration==$(\pi\ h_{9/2})^{+3}\ (\pi f_{7/2})^{+2}(\pi\ i_{13/2})$.

γ(^{214}Ra)

Eγ†	Iγ†	E_i(level)	J^π_i	E_f	J^π_f	Mult.‡	δ	α#	Comments
(24.7)		4401.5	17⁻	4376.8	(16⁻)				Eγ: not observed; deduced from level energy difference by the authors of 1992St09.
45.5	2 *1*	1865.2	8⁺	1819.7	6⁺	E2		414 *6*	Mult.: from α(tot)exp=480 *240* (1992St09). Eγ: other: 47 *3* (1971MaXH, 1971MaXI).
46.8	1.7 *4*	6577	(25⁻)	6530	(24⁺)	E1		0.835 *12*	Mult.: from α(tot)exp<7 (1992St09).
(48.1)		6530	(24⁺)	6482	23⁺				Eγ: not observed; deduced from level energy difference by the authors of 1992St09.
63.4	3.6 *2*	5243.8	20⁺	5180.4	19⁻	[E1]		0.371 *5*	
73.0	19 *3*	3329.4	12⁺	3256.4	12⁺	M1+E2	0.15 *10*	8.5 *13*	Mult.,δ: from α(tot)exp=8.5 *13* (1992St09).
82.9	9 *1*	6565	23⁺	6482	23⁺	M1		5.36 *8*	Mult.: from 0.5<α(tot)exp<7 (1992St09).
140.0	69 *1*	3990.1	15⁻	3850.1	14⁺	D			Mult.: from A_2=−0.23 *4*; A_4=0 and decay pattern (1992St09).
146.5	34 *3*	5390.3	21⁻	5243.8	20⁺	E1		0.1908 *27*	Mult.: from α(tot)exp<0.29; A_2=−0.36 *5*; A_4= 0 (1992St09).

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(HI,xnγ) 1992St09 (continued)

γ(^{214}Ra) (continued)

E_γ†	I_γ†	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	δ	α#	Comments
148.9	121 *2*	3478.4	14^+	3329.4	12^+	E2		1.804 *25*	Mult.: from α(L)exp=1.2 *1*; α(M)exp=0.32 *5*; A_2=+0.15 *4*; A_4=−0.09 *5* (1992St09); A_2=+0.29 *14*; A_4=−0.34 *17* (1979Ho06). E_γ: other: 149.0 (1979Ho06).
156.6	29 *2*	4146.8	17^-	3990.1	15^-	E2		1.476 *21*	Mult.: from α(L)exp=0.78 *11*; A_2=+0.14 *7* (1992St09).
174.2	4 *1*	6479	(22)	6305	(22)				
180.4	502 *8*	1819.7	6^+	1639.3	4^+	E2		0.856 *12*	Mult.: from α(L)exp=0.447 *10*; α(M)exp=0.152 *6* (1992St09). E_γ: others: 179.4 *5* (1971MaXH, 1971MaXI), 180.4 *2* (1972Co18) and 180.7 *4* (2004He25).
191.9	5 *2*	4810.2	18^+	4618.3	16^+	[E2]		0.680 *10*	
192.1	17 *2*	6482	23^+	6290	22^+	M1		2.450 *34*	Mult.: from α(L)exp=0.29 *13* with contribution from the α(K 191.9γ) [E2] line; A_2=−0.33 *9*; A_4=0 (1992St09).
206.7	8 *2*	4376.8	(16^-)	4170.1	15^-	(M1)		1.994 *28*	Mult.: from α(L)exp=0.22 *9* (1992St09).
208.7	128 *3*	2073.9	8^+	1865.2	8^+	M1		1.941 *27*	Mult.,δ: from α(K)exp=1.1 *5*; α(L)exp=0.30 *1*; α(M)exp=0.12 *3* resulted in δ=0.0 *7* (1992St09). A_2=+0.21 *5*, A_4=−0.08 *7* (1992St09); A_2=+0.33 *10*; A_4=−0.06 *11* (1979Ho06). E_γ: other: 207.9 (1979Ho06).
209.9	106 *3*	5390.3	21^-	5180.4	19^-	E2		0.492 *7*	Mult.: from α(L)exp>0.07; α(M)exp=0.06 *2*; A_2=+0.29 *5*; A_4=−0.07 *8* (1992St09).
218.7	14 *1*	3990.1	15^-	3771.4	13^-	E2		0.426 *6*	Mult.: from A_2=+0.36 *13*, E2 is consistent with the half-life of the 3990.1-keV level (1992St09).
222.1	181 *3*	3478.4	14^+	3256.4	12^+	E2		0.404 *6*	Mult.: from α(K)exp=0.12 *3*; α(L)exp=0.20 *1*; α(M)exp=0.06 *1*; A_2=+0.16 *2*; A_4=−0.08 *4* (1992St09); A_2=+0.27 *4*; A_4=−0.11 *6* (1979Ho06). E_γ: other: 221.0 (1979Ho06).
233.4	39 *2*	6290	22^+	6057	22^+	M1(+E2)	<6	0.9 *5*	Mult.,δ: from α(L)exp=0.12 *5*; α(M)exp=0.06 *1* (1992St09); A_2=+0.38 *8*; A_4=−0.34 *12* (1992St09).
240.1	6 *2*	7542		7302					
240.2	2 *1*	6530	(24^+)	6290	22^+	[E2]		0.309 *4*	
248.4	8 *1*	6305	(22)	6057	22^+				
254.7	87 *2*	4401.5	17^-	4146.8	17^-	M1+E2	0.36 *21*	1.02 *11*	Mult.,δ: from α(K)exp=0.88 *15*; α(L)exp=0.155 *9* (1992St09). Mult.: A_2=+0.41 *8*; A_4=−0.6 *11* (1992St09).
256.9	720 *10*	1639.3	4^+	1382.4	2^+	E2		0.2475 *35*	Mult.: from α(K)exp=0.098 *3*; α(L)exp=0.115 *2*; α(M)exp=0.034 *2* (1992St09). E_γ: others: 255.9 *5* (1971MaXH, 1971MaXI), 256.6 *2* (1972Co18) and 256.8 *4* (2004He25).
258.6	2 *1*	5180.4	19^-	4921.9	19^-	[M1+E2]		0.7 *4*	
312.3	159 *3*	3256.4	12^+	2944.1	10^+	E2		0.1349 *19*	Mult.: from α(K)exp=0.1 *2*;

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(HI,xnγ) 1992St09 (continued)

$\gamma(^{214}Ra)$ (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult. ‡	α #	Comments
								α(L)exp=0.037 *2*; α(M)exp=0.016 *1*; A_2=+0.20 *2* (1992St09); A_2=+0.33 *7*; A_4=−0.08 *9* (1979Ho06). E_γ: other: 311.3 (1979Ho06).
321.9	83 *2*	5243.8	20^+	4921.9	19^-	E1	0.0300 *4*	Mult.: from α(K)exp<0.05; α(L)exp<0.006; A_2=−0.30 *3* A_4=0 1992St09.
324.1	15 *1*	6937		6613	23^-			
364.4	8 *1*	6929	(24^+)	6565	23^+	(M1+E2)	0.25 *16*	Mult.: from α(K 364.4γ)+α(K 365.1γ)≈0.12 suggesting M1+E2 for both γ's (1992St09).
365.1	8 *1*	7302		6937		(M1+E2)	0.25 *16*	Mult.: from α(K 364.4γ)+α(K 365.1γ)≈0.12 suggesting M1+E2 for both γ's (1992St09).
370.2	62 *1*	5180.4	19^-	4810.2	18^+	E1	0.02212 *31*	Mult.: from α(K)exp<0.022; A_2=−0.27 *6*; A_4=0 (1992St09).
371.7	73 *3*	3850.1	14^+	3478.4	14^+	M1	0.395 *6*	Mult.: from α(K)exp=0.33 *2*; α(L)exp=0.070 *6*; α(M)exp=0.016 *4* (1992St09). A_2=+0.30 *3*, A_4=−0.01 *10* (1992St09).
408.7	30 *2*	4810.2	18^+	4401.5	17^-	E1	0.01790 *25*	Mult.: from α(K 408.7γ+K 407γ)<0.02 with contribution from the E1, 407γ in ^{215}Ra; A_2=−0.4 *1*; A_4=0 (1992St09).
438.6	4 *1*	7016		6577	(25^-)			
464.8	3 *1*	7394		6929	(24^+)			
475.7	12 *2*	6766	$(^+)$	6290	22^+	(M1)	0.2027 *28*	Mult.: from α(K)exp=0.053 *4*; α(M)exp=0.015 *2* with contribution from overlaping conversion-electron lines of other E2 transitions in ^{216}Ra, and another γ in ^{214}Ra and an E2 transition in ^{212}Rn (1992St09).
475.7	1 *1*	7870	(24^+)	7394				
486.3	6 *1*	5948	$(21)^-$	5462	20^-			
540.0	7 *1*	5462	20^-	4921.9	19^-	(M1)	0.1444 *20*	Mult.: from α(K)exp>0.047 (1992St09).
540.7	3 *1*	7118	$(^-)$	6577	(25^-)	(M1)	0.1439 *20*	Mult.: from α(K)exp>0.047 (1992St09).
557.8	10 *1*	5948	$(21)^-$	5390.3	21^-	M1	0.1324 *19*	Mult.,δ: from α(K)exp=0.15 *2* resulted in δ=0.0 *2* (1992St09).
573.0	8 *2*	4810.2	18^+	4237.2	16^+	[E2]	0.0282 *4*	
573.2	300 *5*	3256.4	12^+	2683.2	11^-	E1	0.00898 *13*	Mult.: from α(K)exp=0.0077 *7*; A_2=−0.23 *3*; A_4=0 (1992St09); A_2=−0.18 *4*; A_4=−0.01 *5*; polarization P(θ)=0.13 *16* (1979Ho06). E_γ: other: 573.0 (1979Ho06).
582.6	8 *4*	6613	23^-	6030	22^-	[M1]	0.1180 *17*	
582.9	20 *5*	4984	18^-	4401.5	17^-	M1	0.1178 *16*	Mult.: from α(K)=0.09 *1* with contribution from the α(K 582.6γ) line (1992St09).
603.8	7 *1*	6660		6057	22^+			
609.3	252 *2*	2683.2	11^-	2073.9	8^+	E3	0.0766 *11*	Mult.: from α(K)exp=0.042 *3*; α(L)exp=0.028 *2*; α(M)exp=0.0067 *6*; A_2=+0.31 *3*; A_4=+0.03 *4* (1992St09); A_2=+0.39 *5*; A_4=+0.02 *6*; polarization P(θ)=0.39 *21* (1979Ho06). E_γ: other: 608.8 (1979Ho06).
639.8	19 *1*	6030	22^-	5390.3	21^-	M1	0.0920 *13*	Mult.,δ: from α(K)exp=0.12 *2* resulted in δ=0.0 *3* (1992St09); A_2=−0.58 *15*; A_4=0.3 *2* (1992St09).
646.2	138 *2*	3329.4	12^+	2683.2	11^-	E1	0.00712 *10*	Mult.: from α(K)exp<0.016; A_2=−0.24 *3*; A_4=0 (1992St09); A_2=−0.15 *4*; A_4=−0.08 *5*, polarization P(θ)=0.04 *24* (1979Ho06). E_γ: other: 645.8 (1979Ho06).
663.4	47 *3*	4810.2	18^+	4146.8	17^-	E1	0.00677 *9*	Mult.: from α(K)exp=0.009 *7*; A_2=−0.27 *7*; A_4=0 (1992St09).
665.9	2 *1*	7243		6577	(25^-)			
666.3	61 *6*	6057	22^+	5390.3	21^-	E1	0.00672 *9*	Mult.: from α(K)exp<0.007; A_2=−0.27 *7*; A_4=0 (1992St09).

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(HI,xnγ) 1992St09 (continued)

γ(^{214}Ra) (continued)

E_γ †	I_γ †	E_i(level)	J^π_i	E_f	J^π_f	Mult. ‡	α #	Comments
668.4	312 *4*	4146.8	17−	3478.4	14+	E3	0.0591 *8*	Mult.: from α(K)exp=0.034 *1*; α(L)exp=0.019 *1*; α(M)exp=0.006 *1*; A_2=+0.38 *3*; A_4=−0.01 *4* (1992St09).
691.7	39 *4*	4170.1	15−	3478.4	14+	E1	0.00626 *9*	Mult.: from α(K)exp<0.008 (1992St09).
727.5	6 *1*	6118		5390.3	21−			
758.8	22 *1*	4237.2	16+	3478.4	14+	E2	0.01552 *22*	Mult.: from α(K)exp=0.02 *1*; α(L)exp=0.006 *3*; A_2=+0.15 *13* (1992St09).
760.8	8 *1*	4931	17−	4170.1	15−	E2	0.01543 *22*	Mult.: from α(K)exp=0.014 *7*; α(L)exp=0.009 *7* (1992St09).
768.2	17 *1*	4618.3	16+	3850.1	14+	E2	0.01513 *21*	Mult.: from α(K)exp=0.016 *5*; α(L)exp=0.009 *7* (1992St09).
775.1	134 *5*	4921.9	19−	4146.8	17−	E2	0.01486 *21*	Mult.: from α(K)exp=0.010 *1*; α(L)exp=0.004 *1*; α(M)exp=0.007 *4*; A_2=+0.24 *8*; A_4=−0.19 *10* (1992St09).
778.9	94 *3*	5180.4	19−	4401.5	17−	E2	0.01471 *21*	Mult.: from α(K)exp=0.013 *1*; α(L)exp=0.004 *1*; α(M)exp=0.001 *1*; A_2=+0.29 *8*; A_4=−0.08 *13* (1992St09).
812.8	18 *1*	6057	22+	5243.8	20+	E2	0.01350 *19*	Mult.: from α(K)exp=0.012 *2* (1992St09).
818.0	281 *4*	2683.2	11−	1865.2	8+	E3	0.0350 *5*	Mult.: from α(K)exp=0.0226 *5*; α(L)exp=0.0075 *4*; α(M)exp=0.0018 *2*; A_2=+0.30 *3* (1992St09) α(M)exp=0.018 *2* in 1992St09 appears to be a typo; A_2=+0.42 *6*; A_4=−0.01 *7*; polarization P(θ)=0.63 *24* (1979Ho06). E_γ: other: 817.4 (1979Ho06).
899.7	7 *1*	6290	22+	5390.3	21−	[E1]	0.00385 *5*	
1078.9	182 *3*	2944.1	10+	1865.2	8+	E2	0.00779 *11*	Mult.: from α(K)exp=0.0079 *12*; α(L)exp=0.0011 *1*; α(M)exp=0.0004 *1*; A_2=+0.21 *5*; A_4=−0.14 *8* (1992St09); A_2=+0.32 *5*; A_4=−0.11 *7*; polarization P(θ)=0.6 *3* (1979Ho06). E_γ: other: 1078.4 (1979Ho06).
1088.2	39 *1*	3771.4	13−	2683.2	11−	E2	0.00766 *11*	Mult.: from α(K)exp=0.0035 *10*; α(L)exp=0.0017 *6*; A_2=+0.23 *10*; A_4=−0.18 16 (1992St09).
1222.3	27 *1*	6613	23−	5390.3	21−	E2	0.00616 *9*	Mult.: from α(K)exp=0.0055 *5*; A_2=+0.14 *8* (1992St09).
1304.9	4 *1*	7870	(24+)	6565	23+	(M1)	0.01422 *20*	Mult.: from α(K)exp=0.018 *7* (1992St09).
1382.4	1000 *9*	1382.4	2+	0.0	0+	E2	0.00493 *7*	Mult.: from α(K)exp=0.0039 *1*; α(L)exp=0.00067 *2*; α(M)exp=0.00014 *3* (1992St09). E_γ: others: 1381.2 *10* (1971MaXI, 1971MaXH) and 1381.9 *5* (2004He25).
1387.9	7 *1*	7870	(24+)	6482	23+	(M1)	0.01214 *17*	Mult.: from α(K)exp=0.012 *4* (1992St09).

† From 1992St09.
‡ Deduced from ce and $\gamma(\theta)$ data (1992St09).
# 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.

Adopted Levels, Gammas

Q(β^-)=−4262 *17*; S(n)=7779 *18*; S(p)=1201 *17*; Q(α)=7351.9 *25* 2021Wa16
S(2n)=1.701E+4 *3*; S(2p)=4629 *16*; Q(εp)=2699 *14* (2021Wa16).

^{214}Ac Levels

Cross Reference (XREF) Flags

A ^{218}Pa α decay (107 μs)
B ^{218}Pa α decay (0.13 ms)

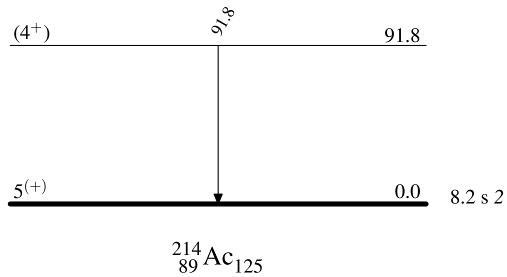
E(level)	J$^\pi$	T$_{1/2}$	XREF	Comments
0.0	5$^{(+)}$	8.2 s *2*	AB	%α≥89 *3*; %ε≤11 *3* Q=+0.14 *8*; μ=+4.84 *10* μ: deduced from g=0.967 *20* and J=5 measured in 2017Gr18 with uncertainty deduced by quadratic addition of statistical uncertainty of 0.014 and systematic uncertainty of 0.014 (1σ); other: μ=4.234 *8* referenced to a calculated value of μ=1.07 of ^{227}Ac (2017Gr18). Both values were from in-beam Laser measurements. Q: from 2016Fe11 and 2017Gr18 with uncertainty deduced by quadratic addition of statistical uncertainty of 0.06 and systematic uncertainty of 0.06. Δ<r^2>=−0.0770 fm^2 *10* relative to ^{215}Ac (2016Fe11) from isotope shift measurement with uncertainty deduced by quadratic addition of statistical uncertainty of 0.0004 (2σ) and systematic uncertainty of 0.0010 (1σ). T$_{1/2}$: from 1968Va04. Others: 12 s (1961Gr42), 8.6 s *+50−15* (1979Sc09), and 8.6 s *+70−27* (2020Zh01). J$^\pi$: J from fit of the observed hyperfine spectrum (2017Gr18), π based on systematics (2017Gr18, 2020Zh01). Proposed configuration=$\pi h_{9/2}\otimes\nu p^{-1}_{1/2}$ (2017Gr18, 2020Zh01). %ε: deduced from the ratio of Iα(^{214}Ac) and Iα(^{214}Ra) at equilibrium (1968Va04).
91.8 *4*	(4$^+$)		AB	E(level): from Eγ (2000He17, 2020Zh01). J$^\pi$: based on systematics (2020Zh01).

γ(^{214}Ac)

E$_i$(level)	J$^\pi_i$	E$_\gamma$	E$_f$	J$^\pi_f$	Comments
91.8	(4$^+$)	91.8 *4*	0.0	5$^{(+)}$	E$_\gamma$: weighted average of 91.8 *4* (2000He17) and 91.8 *8* (2020Zh01).

Adopted Levels, Gammas

Level Scheme



^{218}Pa α decay (107 μs) 2020Zh01

Parent: ^{218}Pa: E=0.0; J^{π}=(8^-); $T_{1/2}$=107 μs *5*; Q(α)=9791 *12*; %α decay=100.0
^{218}Pa-Q(α): from 2021Wa16.
^{218}Pa-$T_{1/2}$: from 2020Zh01. Other: 120 μs *+40−20* (1979Sc09), 113 μs *10* (2000He17).
^{218}Pa-J^{π}: based on systematics (2020Zh01).
2020Zh01: ^{218g}Pa was produced in ^{182}W(^{40}Ar,1p3n) reaction with a beam at 190 MeV at HIRFL, China; evaporation residues (ER) were separated in-flight by the SHANS gas-filled separator and implanted into PSSD silicon detectors at the focal plane. γ rays from the decay were detected by a clover detector with four HPGe crystals and two single crystal HPGe detectors. Eα, Iα and $T_{1/2}$ were measured by ER-α- and ER-α-γ time and position correlations. Measured Eα and Iα were assessed in comparison with those in 1979Sc09 and 2000He17.
Others: 1979Sc09 and 2000He17.

^{214}Ac Levels

E(level)	J^{π}†	$T_{1/2}$	Comments
0.0	$5^{(+)}$	8.2 s *2*	$T_{1/2}$: from the Adopted Levels.
91.8 *4*	(4^+)		E(level): from Eγ.

† From the Adopted Levels.

α radiations

Eα	E(level)	Iα‡	HF†	Comments
9524 *16*	91.8	26 *5*	334 *40*	Eα: from 2020Zh01. Others: 9535 *15* (1979Sc09) and 9544 *15* (2000He17), possibly summed with L-converted electrons. Iα: from 2020Zh01. Others: 35 *10* (1979Sc09) and 35 *5* (2000He17).
9613 *9*	0.0	74 *5*	189 *21*	Eα: weighted average of 9610 *14* (2020Zh01), 9615 *15* (2000He17) and 9614 *20* (1979Sc09). Iα: from 2020Zh01, Others: 65 *7* (2000He17), 69 *4* (1996An21) and 65 *10* (1979Sc09).

† Using r_0(^{214}Ac)=1.510 *23* from unweighted average of r_0(^{212}Ra)=1.4695 *14*, r_0(^{214}Ra)=1.5487 *30* and r_0(^{214}Th)=1.512 *14* (2020Si16). No data on r_0(^{216}Th) available.
‡ Absolute intensity per 100 decays.

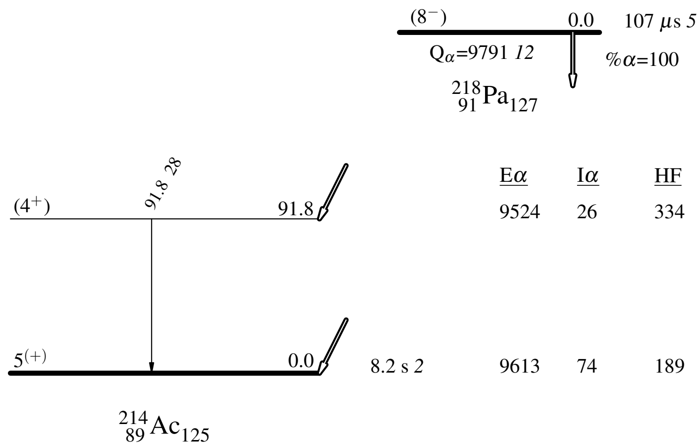
γ(^{214}Ac)

Eγ	E_i(level)	J^{π}_i	E_f	J^{π}_f	$I_{(\gamma+ce)}$†	Comments
91.8 *4*	91.8	(4^+)	0.0	$5^{(+)}$	26 *2*	Eγ: weighted average of 91.8 *4* (2000He17) and 91.8 *8* (2020Zh01). $I_{(\gamma+ce)}$: from I(9524α)=26 *2* to this level.

† Absolute intensity per 100 decays.

^{218}Pa α decay (107 μs) 2020Zh01

Decay Scheme



^{218}Pa α decay (0.13 ms) 2020Zh01

Parent: ^{218}Pa: E=83 *6*; $J^{\pi}=(1^{-})$; $T_{1/2}$=0.13 ms *+6−3*; Q(α)=9791 *12*; %α decay=100.0
^{218}Pa-E: from Q(α)(^{218m}Pa-^{214g}Ac)-Q(α)(^{218g}Pa-^{214g}Ac).
^{218}Pa-Q(α): from 2021Wa16.
^{218}Pa-$T_{1/2}$: from 2020Zh01.
^{218}Pa-J^{π}: based on systematics (2020Zh01).
2020Zh01: ^{218m}Pa was produced in ^{182}W(^{40}Ar,1p3n) reaction with a beam at 190 MeV at HIRFL, China; evaporation residues (ER) were separated in-flight by the SHANS gas-filled separator and implanted into PSSD silicon detectors at the focal plane. γ rays from the decay were detected by a clover detector with four HPGe crystals and two single crystal HPGe detectors. Eα, Iα and $T_{1/2}$ were measured by ER-α-α time and position correlations.

^{214}Ac Levels

E(level)†	J^{π}†	$T_{1/2}$	Comments
0.0	$5^{(+)}$	8.2 s *2*	$T_{1/2}$: from the Adopted Levels.
91.8 *4*	(4^{+})		

† From the Adopted Levels.

α radiations

Eα†	E(level)	Iα#	HF‡	Comments
9596 *21*	91.8	<10	>863.3	Eα: from 2020Zh01, tentatively assigned based on α-γ correlation with probability of being random less than 2×10^{-3}. Iα: estimated by evaluators from 9 ER-α1 correlation events and 1 α-γ event observed in 2020Zh01.
9691 *15*	0.0	>90	<423	Eα: from 2020Zh01, based on ER-α1−α2 correlation with α2 as ^{214}Ac decay. The probability of being random is less than 3×10^{-27}. Iα: estimated by evaluators from 9 ER-α1 correlation events and 1 α-γ event observed in 2020Zh01.

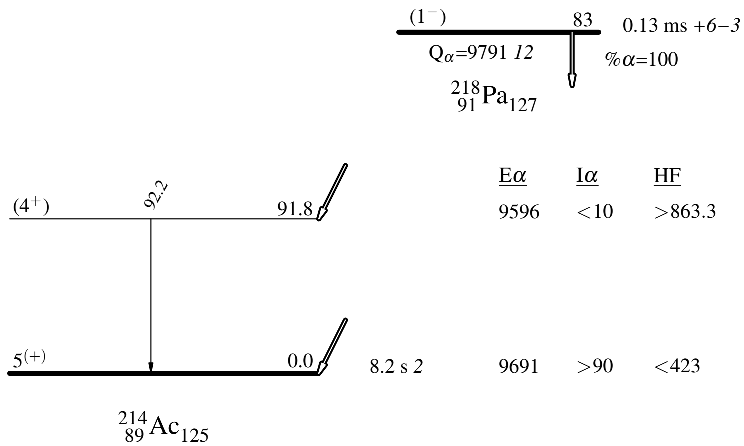
† From 2020Zh01.
‡ Using $r_0(^{214}Ac)$=1.510 *23* from unweighted average of $r_0(^{212}Ra)$=1.4695 *14*, $r_0(^{214}Ra)$=1.5487 *30* and $r_0(^{214}Th)$=1.512 *14* (2020Si16). No data on $r_0(^{216}Th)$ available.
# Absolute intensity per 100 decays.

γ(^{214}Ac)

E_{γ}	E_i(level)	J^{π}_i	E_f	J^{π}_f	Comments
92.2	91.8	(4^{+})	0.0	$5^{(+)}$	E_{γ}: from (2020Zh01).

^{218}Pa α decay (0.13 ms) 2020Zh01

Decay Scheme



Adopted Levels, Gammas

Q(β^-)=−8.76×10^3 *8*; S(n)=9496 *14*; S(p)=2735 *16*; Q(α)=7827 *5* 2021Wa16
S(2n)=17559 *15*; S(2p)=3684 *15*; Q(εp)=3060 *14* (2021Wa16).
1968Va18: ^{206}Pb(^{16}O,8n), excitation function.
1980Ve01: ^{177}Hf(^{40}Ar,3n), excitation function.
1984Sc13: ^{96}Zr(^{124}Sn,6n) E=570 MeV parent of ^{210}Ra, evaporation residual separation.
2005Li17: ^{9}Be(^{238}U,X) E=1 GeV/nucleon, fragment separator.
Mass measurement: 2006MaZY.

^{214}Th Levels

Cross Reference (XREF) Flags

A	^{218}U α decay (0.51 ms)
B	^{218}U α decay (0.56 ms)
C	^{164}Dy(^{54}Cr,4nγ)

E(level)	J$^\pi$	T$_{1/2}$	XREF	Comments
0.0†	0$^+$	87 ms *10*	ABC	%α=100 Only α decay has been observed. Calculated %β≈0.3 (2019Mo01). T$_{1/2}$: weighted average of 125 ms *25* (1968Va18), 80 ms *10* (1980Ve01), and 96 ms *30* (1984Sc13).
623.0† *10*	(2$^+$)		BC	XREF: B(606).
1453.0† *15*	(4$^+$)		C	
2092.0† *18*	(6$^+$)		C	
2181.0† *27*	(8$^+$)	1.21 μs *12*	C	%IT=100 T$_{1/2}$: weighted average of 1.18 μs *13* from implant-$\alpha\gamma$(t) (2021ZH24) and 1.24 μs *12* from ER-γ(t) (2007Kh22). Possible configuration=π[1h$_{9/2}$⊗2f$_{7/2}$].

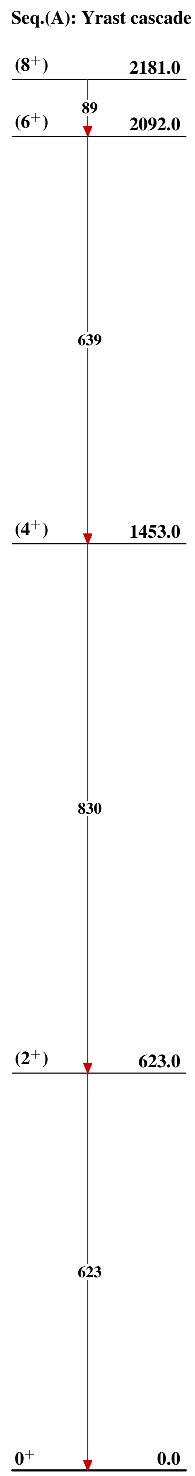
† Seq.(A): Yrast cascade.

γ(^{214}Th)

E$_i$(level)	J$^\pi_i$	E$_\gamma$†	I$_\gamma$†	E$_f$	J$^\pi_f$	Mult.†	α‡	Comments
623.0	(2$^+$)	623 *1*	100	0.0	0$^+$	(E2)		
1453.0	(4$^+$)	830 *1*	100	623.0	(2$^+$)	(E2)		
2092.0	(6$^+$)	639 *1*	100	1453.0	(4$^+$)	(E2)		
2181.0	(8$^+$)	89 *2*	100	2092.0	(6$^+$)	(E2)	19.5 *23*	B(E2)(W.u.)=0.053 *10*

† From ^{164}Dy(^{54}Cr,4nγ) (2007Kh22).
‡ 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.

Adopted Levels, Gammas



$^{214}_{90}Th_{124}$

^{218}U α decay (0.51 ms) 2005Le42,2007Le14

Parent: ^{218}U: E=0.0; $J^\pi=0^+$; $T_{1/2}$=0.51 ms *+17−10*; Q(α)=8775 *9*; %α decay=100.0
^{218}U-Q(α): from 2021Wa16.
^{218}U-$T_{1/2}$: from Adopted Levels of ^{218}U (2019Si39).
2005Le42,2007Le14: ^{218}U was produced in ^{182}W(^{40}Ar,4n) reaction with a beam at 186 MeV; evaporation residues (ER) were separated in-flight by the RITU gas-filled separator and implanted into PAD or DSSD silicon detectors at the focal plane. Eα and $T_{1/2}$ were measured by ER-α-α time and position correlations.

^{214}Th Levels

E(level)	J^π
0.0	0^+

α radiations

Eα	E(level)	Iα‡	HF†	Comments
8612 *9*	0.0	100	1.000	Eα: from 2005Le42 and 2007Le14. Other: 8625 *25* (1992An04). Iα: No α to 2^+ was observed.

† r_0(^{214}Th)=1.512 *17* is calculated from HF(8612α)=1.0.
‡ Absolute intensity per 100 decays.

^{218}U α decay (0.56 ms) 2005Le42,2007Le14

Parent: ^{218}U: E=2105; J^{π}=(8^{+}); $T_{1/2}$=0.56 ms *+26−14*; Q(α)=8775 *9*; %α decay=100.0

^{218}U-Q(α): from 2021Wa16.

^{218}U-E,J^{π},$T_{1/2}$: from Adopted Levels of ^{218}U (2019Si39).

2005Le42,2007Le14: ^{218m}U was produced in ^{182}W(^{40}Ar,4n) reaction with a beam at 186 MeV; evaporation residues (ER) were separated in-flight by the RITU gas-filled separator and implanted into the PAD or DSSD silicon detectors at the focal plane. Eα and $T_{1/2}$ were measured by ER-α-α time and position correlations.

^{214}Th Levels

E(level)	J^{π}	Comments
0.0	0^{+}	
606?	(2^{+})	E(level): estimated from E(α)=10083 keV (2007Le14).
x?	(8^{+})	No events were observed but the α transition is possible. Tentatively assigned in 2007Le14.

α radiations

Eα	E(level)	Iα‡	HF†	Comments
10083	606?			Assignment is uncertain with two events of incomplete α-α-α chains with probability of being random smaller than 10^{-6}, associated with $T_{1/2}$=0.27 ms (2007Le14).
10678 *17*	0.0	100	310	L=8 transition, possibly from $\pi h_{9/2}\pi f_{7/2}$ (8^{+}) to $\pi h^{2}_{9/2}$ (0^{+}) (2007Le14). HF: from 2007Le14.

† Using r_0(^{214}Th)=1.512 *17* calculated from HF(8612α)=1.0.

‡ Absolute intensity per 100 decays.

^{164}Dy(^{54}Cr,4nγ) 2007Kh22

Includes ^{176}Hf($^{40Ar,2n\gamma}$) by 2021Zh24.

2007Kh22: ^{214}Th was produced in ^{164}Dy(^{54}Cr,4n) with a pulsed beam at 246 MeV; evaporation residues (ER) were separated in-flight by the velocity filter SHIP and implanted in 16 strip Si detectors at the focal plane; γ rays from the decay were detected by a clover detector with four HPGe crystals. Isomeric decay of ^{214m}Th were established by ER-γ-α correlations. Measured Eγ and Iγ.

2021Zh24: E^{40}Ar)=183, 190 MeV; evaporation residues separated using the SHANS gas-filled recoil separator and implanted into three position-sensitive silicon strip detectors (PSSDs). Measured implant-$\alpha\gamma$(t); deduced $T_{1/2}$ of the 8^+ isomer.

^{214}Th Levels

E(level)†	J^π	$T_{1/2}$	Comments
0‡	0^+		
623.0‡ *10*	2^+		
1453.0‡ *15*	4^+		
2092.0‡ *18*	6^+		
2181‡ *3*	8^+	1.21 μs *12*	%IT=100 $T_{1/2}$: weighted average of 1.18 μs *13* from implant-$\alpha\gamma$(t) (2021ZH24) and 1.24 μs *12* from ER-γ(t) (2007Kh22). Configuration=$\pi[1h_{9/2}\otimes 2f_{7/2}]$.

† From Eγ's.

‡ Seq.(A): Yrast cascade.

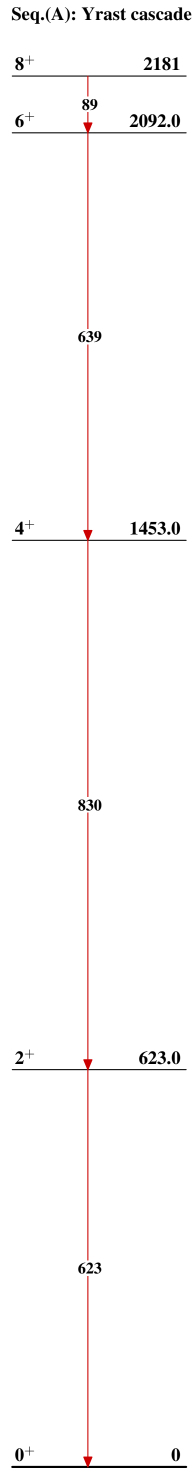
γ(^{214}Th)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.†	α‡	$I_{(\gamma+ce)}$
89 *2*	4.9 *16*	2181	8^+	2092.0	6^+	(E2)	19.5 *23*	106 *35*
623 *1*	100	623.0	2^+	0	0^+	(E2)		
639 *1*	104 *12*	2092.0	6^+	1453.0	4^+	(E2)		
830 *1*	102 *12*	1453.0	4^+	623.0	2^+	(E2)		

† From yrast cascade and intensity balance consistent with E2 .

‡ 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.

^{164}Dy(^{54}Cr,4nγ) 2007Kh22



$^{214}_{90}Th_{124}$

Adopted Levels

S(n)=8.27×10^{3} *10*; S(p)≈0; Q(α)=8.27×10^{3} *5* 2021Wa16
S(2n)=1.828E+4 *12*, S(2p)=2.42E+3 *8*; Q(εp)=6.03E+3 *8* (2021Wa16).
1995Ni05: Produced in ^{170}Er(^{51}V,7n) with a pulsed beam at 5.2-5.6 MeV/A; evaporation residues (ER) were separated in-flight by the velocity filter SHIP and implanted in PIPS detectors at the focal plane. ^{214}Pa was identified by ER-(α)-(α) time and position correlations.

^{214}Pa Levels

E(level)	$T_{1/2}$	Comments
0.0	17 ms *3*	%α=100 Only the α decay has been observed. Calculated %β≈0.3 (2019Mo01). $T_{1/2}$: from 2000He17 and 1995Ni05. Eα=8116 keV *15* (2000He17), other: 8116 keV *20* (1995Ni05). 2000He17 and 1995Ni05 reported the same measurement. Maximum production σ= 3.4 nb *1* at 5.3 MeV/A (1995Ni05).

Adopted Levels

Q(β^-)=6090 *CA*; S(n)=10310 *CA*; S(p)=1630 *CA*; Q(α)=8692 *18* 2021Zh22,2019Mo01
S(2n)=19070, S(2p)=1480 (theory, 2019Mo01).
Q(β^-), S(n) and S(p) (theory, 2019Mo01).
Q(α): Deduced from Eα=8533 keV *18* (2021Zh22).
2021Zh22: ^{214}U was produced in ^{182}W(^{36}Ar,4n) with a beam at 184 MeV bombarding a ^{182}W target with a thickness of 300-350 μg/cm^2; evaporation residues (ER) were separated in-flight by the the gas-filled recoil separator SHANS and implanted in three 16-strip position-sensitive silicon detectors (PSSDs) mounted side-by-side at the focal plane. ^{214}U was identified by ER-(α)-(α) time and position correlations.

^{214}U Levels

E(level)	J$^\pi$	T$_{1/2}$	Comments
0.0	0$^+$	0.52 ms *+95−21*	%α=100 Two ^{214}U α-decay events with Eα=8543 and Eα=8522 keV were identified. Production cross-section σ= 10 pb *+14−7*.

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