New constraints on the ^{25}Al(p,γ) reaction and its influence on the flux of cosmic γ rays from classical nova explosions

L. Canete,[1] G. Lotay,[1] G. Christian,[2,3,4,*] D.T. Doherty,[1] W.N. Catford,[1] S. Hallam,[1] D. Seweryniak,[5] H.M. Albers,[5,†] S. Almaraz-Calderon,[5,‡] E.A. Bennett,[2,6] M.P. Carpenter,[5] C.J. Chiara,[5,7,§] J.P. Greene,[5] C.R. Hoffman,[5] R.V.F. Janssens,[8,9] J. José,[10,11] A. Kankainen,[12,13] T. Lauritsen,[5] A. Matta,[1,¶] M. Moukaddam,[1,**] S. Ota,[2] A. Saastamoinen,[2] R. Wilkinson,[1] and S. Zhu[5,††]

[1]*Department of Physics, University of Surrey, Guildford, GU2 7XH, United Kingdom*
[2]*Cyclotron Institute, Texas A&M University, College Station, Texas 77843, USA*
[3]*Department of Physics and Astronomy, Texas A&M University, College Station, Texas 77843, USA*
[4]*Nuclear Solutions Institute, Texas A&M University, College Station, Texas 77843, USA*
[5]*Physics Division, Argonne National Laboratory, Argonne, Illinois 60439, USA*
[6]*Los Alamos National Laboratory, Los Alamos, New Mexico 87545, USA*
[7]*Department of Chemistry and Biochemistry, University of Maryland, College Park, Maryland 20742, USA*
[8]*Department of Physics, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina 27599, USA*
[9]*Triangle Universities Nuclear Laboratory, Duke University, Durham, North Carolina 27708, USA*
[10]*Departament de Física, Universitat Politècnica de Catalunya, E-08019 Barcelona, Spain*
[11]*Institut d'Estudis Espacials de Catalunya (IEEC), E-08034 Barcelona, Spain*
[12]*School of Physics and Astronomy, University of Edinburgh, Edinburgh, EH9 3JZ, United Kingdom*
[13]*Department of Physics, University of Jyväskylä, FI-40014 Jyväskylä, Finland*

(Dated: July 23, 2021)

The astrophysical ^{25}Al$(p,\gamma)^{26}$Si reaction represents one of the key remaining uncertainties in accurately modelling the abundance of radiogenic ^{26}Al ejected from classical novae. Specifically, the strengths of key proton-unbound resonances in ^{26}Si, that govern the rate of the ^{25}Al(p,γ) reaction under explosive astrophysical conditions, remain unsettled. Here, we present a detailed spectroscopy study of the ^{26}Si mirror nucleus, ^{26}Mg. We have measured the lifetime of the 3^+, 6.125-MeV state in ^{26}Mg to be 19(3) fs and provide compelling evidence for the existence of a 1^- state in the $T = 1$, $A = 26$ system, indicating a previously unaccounted for $\ell = 1$ resonance in the ^{25}Al(p,γ) reaction. Using the presently measured lifetime, together with the assumption that the likely 1^- state corresponds to a resonance in the ^{25}Al + p system at 435.7(53) keV, we find considerable differences in the ^{25}Al(p,γ) reaction rate compared to previous works. Based on current nova models, we estimate that classical novae may be responsible for up to ∼15% of the observed galactic abundance of ^{26}Al.

PACS numbers: 23.20.Lv, 21.10.Dr, 26.50.+x, 27.30.+t

The space-based detection of diffuse 1.809-MeV γ rays, associated with the decay of ^{26}Al ($t_{1/2} = 7.2 \times 10^5$ yr), provided some of the first direct evidence of ongoing nucleosynthesis in our Galaxy [1]. These γ rays are now known to be localised in well-established star-forming regions [2], indicating that massive stars are the likely dominant source. However, a number of additional astrophysical environments are expected to make significant contributions to the observed galactic abundance of ^{26}Al of 2.7(7) $M_\odot$ [3, 4] and, hence, the exact situation remains contentious. In particular, it has been suggested that classical novae may enrich the interstellar medium with up to $0.4 - 0.8\ M_\odot$ of ^{26}Al [5, 6], introducing considerable background to the massive-star component of the 1.809-MeV line intensity. Therefore, it is imperative that the contribution of classical novae be accurately defined.

In this regard, the isolation of presolar stardust in meteorites may offer a unique solution [7]. These microscopic pieces of matter condense in the outflows of explosive stellar phenomena and in the strong winds produced by AGB stars, and are characterised by large isotopic anomalies that can only be explained by the nuclear processes that took place in the parent star, around which they were formed. Several grains, of possible nova or asymptotic giant branch (AGB) star origins, have recently been reported to exhibit high ^{26}Al/^{27}Al ratios [8–13]. However, uncertainties in the nuclear reactions that influence the abundance of ^{26}Al in stellar scenarios make assigning these ratios to a specific astrophysical source challenging. Furthermore, without significant constraints on the contribution of novae and AGB stars to the ob-

*Present address: Department of Astronomy and Physics, Saint Mary's University, Halifax, Nova Scotia B3H 3C3, Canada
†Present address: GSI Helmholtzzentrum für Schwerionenforschung GmbH, 64291 Darmstadt, Germany
‡Present address: Department of Physics, Florida State University, Tallahassee, Florida 32306, USA
§Present address: U.S. Army Research Laboratory, Adelphi, Maryland 20783, USA
¶Present address: Laboratoire de Physique Corpusculaire de Caen, 14050 CAEN CEDEX 4, France
**Present address: Université de Strasbourg, IPHC, 23 Rue du Loess, 67037 Strasbourg, France
††Present address: National Nuclear Data Center, Brookhaven National Laboratory, Upton, New York 11973, USA

served galactic abundance of ^{26}Al, it is not possible to use the 1.809-MeV line to accurately estimate the rate of core-collapse supernovae [3], or benchmark models of massive star nucleosynthesis [14], through comparisons with ^{60}Fe line intensities [15].

Modern hydrodynamic simulations of novae nucleosynthesis [16, 17] can now be constructed using reaction networks based almost entirely on experimental data [18]. In particular, the astrophysical reactions responsible for the production and destruction of the γ-ray emitting ground state of ^{26}Al, namely the ^{25}Mg(p,γ) and ^{26}Al(p,γ) reactions, have been measured directly over the energy range relevant for hydrogen burning in novae [19–21]. However, a key uncertainty relates to the ^{25}Al$(p,\gamma)^{26}$Si reaction, which, at peak nova temperatures ($T \sim 0.1-0.4$ GK), may bypass production of ^{26}Al, in its ground state, and result in the sole population of the short-lived isomer at 228 keV. This excited isomeric level undergoes a superallowed β^+ decay ($t_{1/2} = 6.3$ s) directly to the ^{26}Mg ground state and, as such, reduces the flux of 1.809-MeV γ rays.

Previous studies of the ^{25}Al$(p,\gamma)^{26}$Si reaction [5, 22–33] indicate that the rate is dominated by resonant capture to excited states in ^{26}Si above the proton-emission threshold energy of 5513.99(13) keV [34]. Specifically, a 3^+, 5927.6(10)-keV level in ^{26}Si, corresponding to an $\ell = 0$ capture resonance on the $5/2^+$ ground state of ^{25}Al, is expected to make the most significant contribution. That being said, it is possible that unknown negative-parity resonances, that have yet to be accounted for in the ^{25}Al(p,γ) reaction, may also strongly influence the rate over the peak temperature range of classical novae. A β-decay study of ^{26}P, performed by Bennett *et al.* [5], reported the first observation of a 1741.6(6)-keV γ-decay branch from the key 5928-keV, 3^+ state in ^{26}Si. That observation [5], coupled with an earlier measurement of the proton-partial width [22], allowed for the extraction of a resonance strength, $\omega\gamma$, of $23^{+6}_{-6}(\text{stat.})^{+11}_{-10}(\text{lit.})$ meV – where the latter uncertainty results from adopting literature data for β-decay branches [35]. This is significantly smaller than shell-model predictions [24] and Bennett *et al.* [5] note that no individual piece of evidence for the γ decay of the 3^+, 5928-keV level in ^{26}Si, following β decay of ^{26}P, was wholly conclusive on its own. In this regard, a very recent investigation of ^{26}P β decay by Liang *et al.* [33] also observed a 1742-keV transition, in agreement with Ref. [5], although a $\beta\gamma$ intensity >3 times higher was reported. Such an intensity would indicate a substantially higher resonance strength for the 5928-keV level than previously expected [5]. However, a value of $\omega\gamma$=$34.5^{+1.70}_{-1.57}$ meV was quoted in Ref. [33], based on a weighted mean between Refs. [5, 33, 36]. This procedure does not seem wholly well-justified, given the large discrepancy between the $\beta\gamma$-intensities of Ref. [33] and Refs. [5, 36], and present uncertainties in the 5928-keV resonance strength should be considered higher than earlier reported values might suggest.

In this respect, an accurate determination of the 5928-keV resonance strength, which is almost entirely dominated by the γ-ray partial width, Γ_γ, may be obtained from the lifetime of the analog 3^+, 6125.3(3)-keV state in ^{26}Mg [37]. Unfortunately, large uncertainties in this lifetime (∼45% [37]) currently prevent any definitive conclusions from being made. Consequently, the lifetime of the 3^+, 6125-keV level in ^{26}Mg now represents one of the key remaining uncertainties in constraining the astrophysical ^{25}Al$(p,\gamma)^{26}$Si reaction rate. Furthermore, a study of the ^{25}Al(p,γ) reaction by Chipps *et al.* [23] has raised significant questions over the spin-parity assignment of a neighbouring excited state in ^{26}Si at 5949.7(53) keV. This level does not seem to match any of the even-parity levels in the mirror nucleus, ^{26}Mg [38], or shell-model calculations [24], and thus, may represent a previously unreported, negative-parity resonance in the ^{25}Al(p,γ) reaction. Fascinatingly, an early study of the ^{25}Mg(d,p) reaction by Burlein *et al.* [39] reported the observation of a peak at $E_x = 5711(3)$ keV in ^{26}Mg that was best fit with both $\ell = 2$ and $\ell = 3$ transfer components, indicating a possible, closely-spaced doublet, consisting of a known 4^+_4 level and a previously unreported negative-parity state.

In this Letter, we present complementary ^{11}B(^{16}O,p) fusion-evaporation and ^{25}Mg(d,p) transfer reaction studies, performed at Argonne National Laboratory and Texas A&M University, that have allowed for a detailed determination of the spectroscopic properties of ^{26}Mg, up to excitation energies $E_x = 6.2$ MeV. In particular, lifetimes, neutron spectroscopic factors, and angular distributions of γ deexcitations have been extracted for a number of excited levels in ^{26}Mg, providing nuclear physics information necessary to estimate both the proton- (Γ_p) and γ-decay (Γ_γ) partial widths of key resonances in the astrophysical ^{25}Al$(p,\gamma)^{26}$Si reaction. A detailed description of the experimental analysis of all states will be reported in an upcoming full paper [40]. However, here, we focus solely on a discussion of excited states of relevance for astrophysics.

For an investigation of γ decays and lifetimes in ^{26}Mg, a ∼5 pnA, 19-MeV beam of ^{16}O ions, delivered by the Argonne ATLAS accelerator, was used to bombard a ∼300 μg/cm^2-thick target of ^{11}B for ∼100 hrs. The resulting γ decays were detected using the Gammasphere array [41, 42], which in this instance consisted of 99 detectors in standalone mode, while lifetimes for short-lived excited states were extracted using the Doppler shift attenuation method (see e.g. [43]). Experimental Doppler shifts were obtained by fitting the peak centroids of γ-ray transitions without Doppler correction at 14 different angles: 32°, 37°, 50°, 58°, 70°, 80°, 90°, 100°, 110°, 122°, 130°, 143°, 148°, and 163°. Then, by modelling the slowing down of recoiling nuclei within the target material using `SRIM` [44], and relating the measured velocity of the recoil to maximum recoil velocity, v_{Rmax}, level lifetimes could be determined for a number of excited states ($v_{Rmax} = 9.05 \times 10^6$ ms^{-1} for our experimental conditions). Our extracted lifetimes were found to be in good agreement with known values [38].

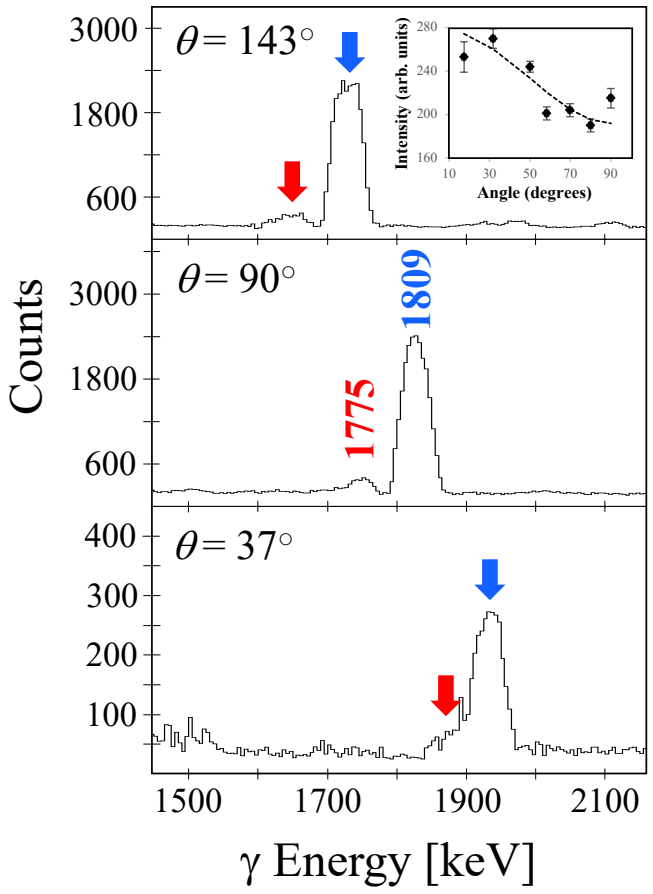

FIG. 1: (Color online) Centroid peak positions of the 1775- (red arrows) and 1809-keV (blue arrows) γ rays, with a gate placed on the 2541-keV, $3_2^+ \rightarrow 2_1^+$ transition, at angles of 37°, 90° and 143°, respectively. (Inset) Observed angular distribution of the 1775-keV γ ray, corresponding to the decay of the 3^+, 6125-keV state in ^{26}Mg to the 3^+, 4350-keV level.

In the present work, the 3_3^+, 6125-keV level in ^{26}Mg, that corresponds to the mirror analog of the key 5928-keV resonant state in the ^{25}Al + p system, was observed to decay by a dominant 1774.6(1)-keV γ ray, in agreement with previous work [38]. Angular distribution measurements of this γ ray, included in Fig. 1, have revealed coefficients of $a_2 = 0.27(3)$ and $a_4 = -0.02(4)$, consistent with a $\Delta J = 0$ transition, confirming its $3_3^+ \rightarrow 3_2^+$ assignment, while a DSAM analysis, also illustrated in Fig. 1, established a lifetime of 19(3) fs for the 6125-keV level in ^{26}Mg—the uncertainty quoted includes a 15% systematic uncertainty dominated by the adopted stopping power and initial target thickness. By adopting this result for the 413.6(10)-keV resonance in the ^{25}Al + p mirror system, we obtain a γ-ray partial width, Γ_γ, of 33(5) meV, in good agreement with Ref. [5], and in disagreement with Ref. [33]. In this regard, it should be noted that the γ-ray partial width determination of 60(3) meV of Ref. [33] relies on accurate knowledge of the $\beta\gamma$ intensity of the 1742-keV transition, from the key 3^+, 5928-keV state, and the proton partial width of the 414-keV resonance. As such, the present discrepancy between the current results and Ref. [33] is most likely related to the ∼75% uncertainty associated with the $\beta\gamma$ intensity of the 1742-keV transition [33] and the ∼35% uncertainty associated with the proton partial width of the 414-keV resonance [22].

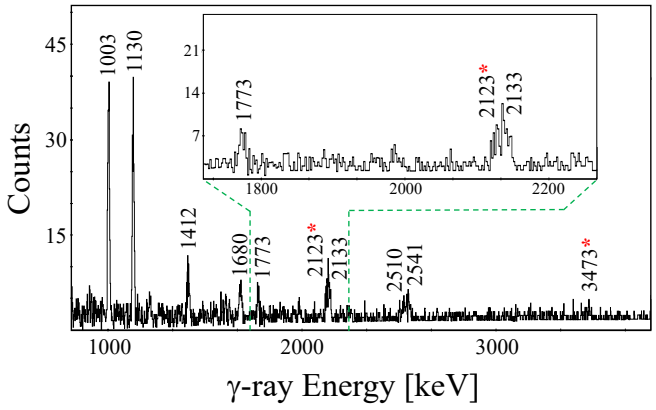

FIG. 2: (Color online) γ-γ-γ coincidence spectrum with gates placed at 1809 and 1778 keV, respectively. Transitions associated with decays to the 0_2^+, 3587-keV level in ^{26}Mg are denoted by red asterisks. We note that further known decays in ^{26}Mg [38], not associated with the 0_2^+ state, are also observed. This is due to a number of excited states in ^{26}Mg exhibiting γ-decay branches with energies ∼1778 keV [38]. (Inset) Expanded view of the energy region of the 2123-keV transition. Using fixed peak widths for observed γ-ray transitions, a double peak fit is necessary to account for the width of the 2123/2133-keV doublet.

Considering excited states below the 6125-keV level, a recent compilation [38] lists a level in ^{26}Mg at 5711.2(8) keV with possible spin-parity assignments of $(1^+,2^+)$. However, as stated earlier, a negative-parity assignment has also been suggested for this state [39]. Here, a 2123.0(30)-keV coincidence relationship was observed with the 0_2^+ level in ^{26}Mg, as shown in Fig 2, indicating an excited state at 5710.0(36) keV, whose spin is restricted to $J = 1$ or 2, in agreement with Ref. [38] (only $M1$, $E1$ and $E2$ transitions were observable in the present study). We note that several background γ rays, associated with high-spin states, are also observed in Fig. 2, due to a number of excited states in ^{26}Mg exhibiting decay transitions with energies ∼1778 keV. However, these are already well-established [38] and, therefore, are easily distinguishable from those transitions associated with the 0_2^+ level. The presently observed 2123-keV transition was also reported in a previous study by Bhattacharjee *et al.* [45], although it should be noted that no spectra providing evidence for the existence of such a decay were shown and the γ decay itself was illustrated as tentative in Fig. 8 of that work [45]. Thus, the current, clear observation of a 2123-keV decay to the 0_2^+ level in ^{26}Mg is significant in confirming the existence of a low-spin state at 5710 keV, that lies in close proximity to the known 4_4^+

excited level at 5715.9(1) keV [38].

To probe the possible negative-parity nature of the 5710-keV excited state in ^{26}Mg, we performed a single neutron transfer reaction on ^{25}Mg at Texas A&M University. Here, a ∼0.1 pnA, 10-MeV/u beam of ^{25}Mg ions was used to bombard a 200 μg/cm^2-thick target of polydeuterated ethylene $(CD_2)_n$. Light, charged-particles were detected with the TIARA Si array [46], while ^{26}Mg recoils were identified at the focal plane of the MDM-2 magnetic spectrometer [47], using the upgraded Oxford ionisation chamber [48, 49]. In this setup, elastically scattered deuterons were detected just forward of 90°, providing an absolute normalization of all differential cross sections, and protons resulting from the (d,p) reaction were detected over the angular range, θ_{lab} = 137° - 169°. Spectroscopic factors were extracted by comparing measured cross sections to theoretical values obtained from calculations in the adiabatic distorted wave approximation (ADWA), using the code TWOFNR [50]. Here, the Koning-Delaroche global optical model parameterization [51] was used to calculate the ^{25}Mg + d distorting potentials [52]. In general, spectroscopic factors are found to be in good agreement with earlier work [32, 39, 53] and current shell-model calculations. Shell-model calculations were performed for even-parity states using a USDA Hamiltonian, within the sd shell-model space [54], and on a WBP Hamiltonian, which includes an $sd-pf$ model space, for odd-parity levels [55]. As an example, we extract experimental spectroscopic factors of $C^2S_{(\ell=0)}$ = 0.14(3) and $C^2S_{(\ell=2)}$ = 0.30(6) for the 6125-keV level in ^{26}Mg, as shown in Fig. 3. Theoretical predictions indicate $C^2S_{(\ell=0)}$ = 0.13 and $C^2S_{(\ell=2)}$ = 0.26, for this state, while Refs. [32, 53] report values of $C^2S_{(\ell=0)}$ = 0.12 and 0.11(2), and $C^2S_{(\ell=2)}$ = 0.21 and 0.27(6), respectively.

Figure 3 illustrates the observed angular distribution of protons, from the experiment at Texas A&M, for the expected doublet at 5710 and 5716 keV. Given the ∼200 keV excitation energy resolution of the TIARA system, we do not expect any influence on the observed angular distribution from the neighbouring 5476- and 6125-keV levels in ^{26}Mg, known to be strongly populated in ^{25}Mg(d,p) transfer [32, 39, 53]. Furthermore, any noticeable contribution to the observed cross section from a known, 1^+, 5691.1(2)-keV state may also be ruled out based on the recent measurement of Hamill *et al.* [32]. In that work [32], the 5691-keV cross-section was found to be dominated by compound nuclear effects (which would not be observed in the current study due to the higher energies involved) and an upper limit of 0.0057 was established for its spectroscopic factor. Consequently, we conclude that the presently observed distribution of protons shown in Fig. 3 corresponds to the expected 5710- and 5716-keV doublet only. Here, an examination of the data reveals noticeable odd- and even-parity contributions to the observed cross section, for the 5710- and 5716-keV states, with spectroscopic factors, $C^2S_{(\ell=1)}$ = 0.010(4) and $C^2S_{(\ell=2)}$ = 0.06(2), respectively (a conservative 40% uncertainty has been estimated for the fitting

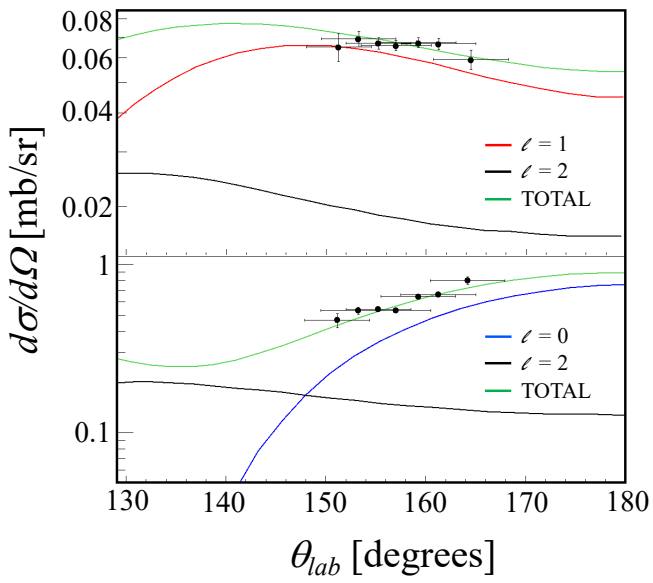

FIG. 3: (Color online) (Top) Differential cross section as a function of laboratory angle for the 5710/5716-keV doublet state in ^{26}Mg. (Bottom) Angular distribution of the 6125-keV state in ^{26}Mg. The expected $\ell = 0$ [$C^2S = 0.14(3)$] and $\ell = 2$ [$C^2S = 0.30(6)$] distributions for this 3^+ level are clearly observed.

of multiple levels within a single peak). In this case, a pure $\ell = 2$ contribution ($C^2S_{(\ell=2)} = 0.30$) may be ruled out based on shell-model calculations ($C^2S_{(\ell=2)} = 0.05$) and previous spectroscopic factor values of $C^2S_{(\ell=2)}$ = 0.06, obtained in the high-resolution, normal kinematics studies of both Burlein *et al.* [39] and Arciszewski *et al.* [53]. However, it is not presently possible to rule out a significant $\ell = 3$ contribution, due to the limited angular coverage of the experimental setup at Texas A&M. Indeed, a TWOFNR reanalysis of the data presented in Ref. [39], over a more complete angular range, reveals spectroscopic factors, $C^2S_{(\ell=1)} = 0.018$, $C^2S_{(\ell=2)} = 0.021$ and $C^2S_{(\ell=3)} = 0.28$, consistent with the current analysis (the $\ell = 2$ component is reduced due to the newly implied large $\ell = 3$ contribution, which does not affect $\ell = 1$). Here, the observed $\ell = 2$ component may be wholly ascribed to the known 4^+, 5716-keV excited state in ^{26}Mg. However, the 5716-keV state cannot be responsible for the odd-parity component and thus, this must be attributed with the 5710-keV level.

In summary, by combining the results of the Gammasphere and Texas A&M experiments, we may conclude that two excited states exist in ^{26}Mg at 5710 and 5716 keV, respectively, and that the 5710-keV level must correspond to a low-spin, negative parity state. Due to the restrictions placed on observable γ-ray transitions in the current work, the identification of a 2123-keV decay from the 5710-keV level to the 0_2^+ state [38] precludes all but a 1^- assignment for the 5710-keV level. It should be noted that shell-model calculations also predict the lowest-lying

TABLE I: Summary of resonant parameters used for an evaluation of the ^{25}Al$(p,\gamma)^{26}$Si reaction rate.

E_x (keV)	E_r (keV)	J^π	C^2S	Γ_p (eV)	Γ_γ (eV)	$\omega\gamma$ (meV)
5675	161	1^+	$<0.0057^a$	$<8.9 \times 10^{-9}$	0.12^b	$<2.2 \times 10^{-6}$
5890	376	0^+	0.042^a	4.2×10^{-3}	0.0088^b	0.24
5928	414	3^+	0.14	2.9^c	0.033^d	20
5950	436	1^-	0.01	0.14	0.066^e	11

[a] Adopted from Ref. [32]
[b] Adopted from Ref. [24]
[c] Adopted from Ref. [22]
[d] Determined from present lifetime of the 3^+, 6125-keV state in ^{26}Mg
[e] Based on the known lifetime of the 1^-, 7062-keV state in ^{26}Mg [38]

1^- level in ^{26}Mg to appear at ∼6.3 MeV, and an established, higher-lying 1^-, 7062-keV state is known to exhibit a strong 3473-keV decay branch to the 0^+_2 level [38], in similarity to the presently observed 5710-keV state, as illustrated in Fig. 2. In contrast, the two lowest-lying 3^- excited states have already been identified in ^{26}Mg [38] and all other negative-parity levels are not predicted to occur before excitation energies $\gtrsim$ 6.9 MeV. For completeness, we also note that the 1^+_1 and 2^+_5 excited levels in ^{26}Mg are well matched to shell-model states and the 1^+_2 and 2^+_6 ones are predicted at energies of ∼6.6 and ∼6.7 MeV, respectively. Consequently, we propose that the presently identified 5710-keV level in ^{26}Mg may only reasonably be assigned as the 1^-_1 excited state.

For an evaluation of the ^{25}Al(p,γ) stellar reaction rate, we consider the contribution of resonant states in ^{26}Si at 5675, 5890, 5928 and 5950 keV [23], respectively (direct capture is expected to be negligible for temperature ≥0.1 GK). The recently reported isotropic angular distributions of γ decays from the 5890-keV level in ^{26}Si [28], indicate a good isobaric pairing with the 0^+_4, 6256-keV excited state in ^{26}Mg, while the 1^+_1, 5675- and 3^+_3, 5928-keV states have already been previously well-matched to analog states in ^{26}Mg at 5691 and 6125 keV [29], respectively. In contrast, the spin-parity assignment of the 5950-keV level in ^{26}Si remains somewhat controversial. In particular, Chipps *et al.* [23] highlight specific difficulties with assigning this state either 0^+ or 4^+ quantum numbers. However, at the time of Ref. [23], all pairs of even-parity analog states up to ∼6.2 MeV in the $A = 26$ system (with typical mirror energy shifts of ∼100 − 200 keV) had already been well matched and it was thought that there were no missing levels in ^{26}Mg to be accounted for. As such, whilst the presently identified 1^-, 5710-keV excited state in ^{26}Mg may correspond to a previously unobserved excited state in ^{26}Si, we currently favour a mirror matching to the 5950-keV resonant level, as this is the only state in the region of expected energy shifts ($E_x \sim 5.5 - 6.2$ MeV) that does not have a unique spin-parity assignment. Proton and γ-ray partial widths, for the determination of resonance strengths, have been estimated from ^{26}Mg excited state spectroscopic factors and lifetimes (proton partial widths determined from spectroscopic factors are expected to be accurate to within a factor ∼1.7 [56]). Specifically, we estimate a resonance strength upper limit of 2.2×10^{-6} meV for the 5675-keV state and determine a value of 0.24 meV for the excited level at 5890 keV. However, for the 5928-keV state, we adopt the proton partial width, Γ_p, of Ref. [22], and for the 5950-keV resonant level, we calculate $\Gamma_p = 0.14$ eV, from the presently extracted $\ell = 1$ spectroscopic factor, and assume a γ-ray partial width based on the known 10 fs lifetime of the 1^-, 7062-keV level in ^{26}Mg [38]. Here, the 5928-keV state is found to have a resonance strength of 20 meV, in good agreement with Ref. [5], while the strength of the 5950-keV level is estimated to be ∼11 meV (we note that this value is ∼2 times larger than that predicted for a 4^+ assignment [33]). A summary of resonance parameters is given in Table I.

Over the temperature range 0.2 − 0.4 GK, we find that the key 3^+, 414-keV resonance dominates the rate of the ^{25}Al(p,γ) reaction, with a considerable contribution from the newly proposed 1^- state at 436 keV for temperatures > 0.3 GK (∼20% of total rate). That being said, the newly evaluated rate is a factor ∼1.5 lower than the estimate of Liang *et al.* [33], even with the introduction of an $\ell = 1$ resonance. In order to fully assess the astrophysical implications of the present work, we have performed a series of nova outburst simulations using the hydrodynamic, Lagrangian, time-implicit code `SHIVA` [16, 17]. This code, which relies on a standard set of differential equations of stellar evolution in finite-difference form, has been extensively used for simulations of nova outbursts [5]. Here, we have considered accreting 1.15, 1.25 and 1.35 $M_\odot$ white dwarfs, with characteristic values for initial luminosity (10^{-2} $L_\odot$) and mass-accretion rates (2×10^{-10} $M_\odot$ per year). Based on current simulations of 1.15 $M_\odot$ white dwarfs, and following a similar prescription to that used in Refs. [5, 6, 57], we estimate that classical novae may be responsible for the production of up to ∼0.4 $M_\odot$ of the observed galactic abundance of ^{26}Al (although we note that a more precise knowledge of the ONe novae rate/yr in our Galaxy is needed). In addition to this, only simulations of 1.35

$M_\odot$ white dwarfs, achieving peak temperatures of ∼0.31 GK, showed a ∼5% reduction in final ^{26}Al yields due to the ^{25}Al(p,γ) reaction. This is likely due to the limited peak temperatures achieved in the current models and, although such events are expected to be rare, it is possible that in scenarios involving a very cold underlying white dwarf or one with a mass very close to the Chandrasekhar limit, the ^{25}Al(p,γ) reaction will considerably reduce the abundance of the cosmic γ-ray emitting nucleus ^{26}Al.

The key remaining uncertainty in the ^{25}Al(p,γ) reaction now relates to the unknown spin-parity assignment of the 5950-keV excited state in ^{26}Si. In particular, confirmation of a 1^- assignment would clearly identify the missing $\ell = 1$ resonance in the ^{25}Al + p system and constrain the influence of the ^{25}Al(p,γ) reaction on ^{26}Al nucleosynthesis in classical novae. Consequently, we encourage experimental efforts in this regard, as well as direct investigations of the 436-keV resonance strength.

Acknowledgements – This work was supported by the US Department of Energy, Office of Science, Office of Nuclear Physics, under Contract No. DEAC02-06CH11357 and Grant Nos. DEFG02-94-ER40834, DEFG02-97-ER41041, DEFG02-97-ER41043 and DE-FG02-93ER4077. UK personnel were supported by the Science and Technologies Facilities Council (STFC). This work has been partially supported by the Spanish MINECO grant AYA2017-86274-P, by the E.U. FEDER funds, and by the AGAUR/Generalitat de Catalunya grant SGR-661/2017. This article benefited from discussions within the "ChETEC" COST Action (CA16117). This research uses resources of ANL's ATLAS facility, which is a DOE Office of Science User facility.

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