Adopted Levels

S(n)=18.68×10^3 *11*; S(p)=0.50×10^3 *12*; 2012Wa38

^{19}Mg decays by 2p emission; while the ground state appears to decay by "true 2p emission" the excited states decay sequentially via states in ^{18}Na. Theoretical analysis of the systematics for 2p emission in nuclear decay using the T- and Y- Jacobi coordinate systems is given in (2000Gr16,2001Gr16,2001Gr29,2003Gr24,2010GR06). See also (2003GR01,2003Gr04) and (2013Ol02).

Rigorous shell-model predictions are presented for the ^{19}Mg ground state (2010Fo07,2011Fo05,2012Fo10,2012Fo05) and excited state (2013Fo05) structures.

^{19}Mg Levels

Cross Reference (XREF) Flags

A ^{9}Be(^{36}Ar,^{19}Mg)
B ^{9}Be(^{20}Mg,2p17ne)

E(level)	J$^\pi$	Γ	XREF	Comments
0	1/2$^-$	1.14×10^{-4} eV	B	%2p≈100 Decays to ^{17}Ne+2p.
1.38×10^3 *24*	(3/2$^-$)	0.4 MeV *2*	B	%p≈100 Decays to ^{18}Na*(0,320).
2.14×10^3 *21*	(5/2$^-$)	0.6 MeV *6*	B	%p≈100 Γ: 0.6 MeV *+6−4*. Decays to ^{18}Na*(320,854).
2.84×10^3 *21*	(3/2$^-$)	<0.2 MeV	B	%p≈100 Decays to states in ^{18}Na.
4.74×10^3 *21*	(3/2$^-$)	2.0 MeV *8*	B	%p≈100 Decays to ^{18}Na*(320).

^{9}Be(^{36}Ar,^{19}Mg) 2003Fr31

Products from fragmentation of a 150 MeV/A ^{36}Ar beam on a 9Be target were analyzed in the NSCL/A1900 fragment separator and identified using ΔE-E amd ΔE-Time of flight techniques. Expected yields from, for example, the EPAX1 and EPAX2 abrasion-ablation models were of order 4000 events, while no ^{19}Mg nuclei were detected. Analysis indicated an upper limit of $T_{1/2} < 22$ ns (2003FR31,2004FR33).

^{9}Be(^{20}Mg,2p17ne) 2012Mu05

Proton unbound states in ^{19}Mg and ^{18}Na were measured by fragmenting a ^{20}Mg beam in a ^{9}Be target and analyzing the p_1-p_2, p_1-^{17}Ne and p_2-^{17}Ne particle correlations.

A beam of ^{20}Mg ions (produced by fragmenting a 450 MeV/A ^{24}Mg beam) impinged on a 2 g/cm^2 ^{9}Be target at the midplane of the GSI FRS. The target was surrounded by an array of four position sensitive detector telescopes that measured the breakup particle charged particle angular correlations (p_1-p_2, p_1-^{17}Ne and p_2-^{17}Ne). Two prominent peaks appear in the p-^{17}Ne angular correlation distribution; first is a peak consistent with 2p decay of the $^{19}Mg_{g.s.}$ directly to ^{17}Ne+2p with E_{res}=0.75 MeV *5*, second is a peak corresponding to ^{19}Mg excited states decaying sequentially through proton unbound states in ^{18}Na.

The excited states in ^{19}Mg appear as “arc bands” in the $\theta(p_1$-$^{17}Ne)$ vs. $\theta(p_2$-$^{17}Ne)$ angular correlation spectrum. Analysis of events along a fixed or constant radius provides details about the initial ^{19}Mg state and the ^{18}Na states populated in the sequential decay to $^{17}Ne_{g.s.}$+2p; Monte Carlo simulations are used to extract “best fit” values for energies and widths of ^{19}Mg and ^{18}Na states.

Arguments based on the extracted widths and the Wigner Limits are used to constrain Jπ values.

Also see (2007Mu15,2008Mu13,2009Mu17).

Theoretical analysis of the systematics for 2p emission in nuclear decay using the T- and Y- Jacobi coordinate systems is given in (2000Gr16,2001Gr16, 2001Gr29,2003Gr24,2010GR06). See also (2003GR01,2003Gr04).

^{19}Mg Levels

E(level)	J$^\pi$	Γ	Comments
0	1/2$^-$	1.14×10^{-4} eV	from Q(p+^{17}Ne)=0.76 MeV *6*. Decays to ^{17}Ne+2p.
1.38×10^3 *24*	(3/2$^-$)	0.4 MeV *2*	from Q(p+^{17}Ne)=2.14 MeV *23*. Decays to ^{18}Na*(0,320).
2.14×10^3 *21*	(5/2$^-$)	0.6 MeV *6*	Γ: 0.6 MeV *+6−4*. from Q(p+^{17}Ne)=2.9 MeV *2*. Decays to ^{18}Na*(320,854).
2.84×10^3 *21*	(3/2$^-$)	<0.2 MeV	from Q(p+^{17}Ne)=3.6 MeV *2*. Decays to states in ^{18}Na.
4.74×10^3 *21*	(3/2$^-$)	2.0 MeV *8*	from Q(p+^{17}Ne)=5.5 MeV *2*. Decays to ^{18}Na*(320).

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