^{24}Mg(^{3}He,$\alpha\gamma$) 2016Ki03,1971En04,1970Ha02

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. S. Basunia[#], A. Chakraborty[##]	NDS 171, 1 (2021)	1-Jun-2020

Other references: 1968Bl02, 1967Da09, 1967Du04.

2016Ki03: ^{3}He(^{24}Mg,$\alpha\gamma$) E=3.125 MeV/nucleon; a γ-ray detector array consisting of four HPGe crystals is situated 7.83 cm downstream from the target. Measured Eγ, mean lifetime using Doppler Shift Attenuation Method.

1971En04: ^{24}Mg(^{3}He,α),(^{3}He,$\alpha\gamma$), E=6.4, 8.4 MeV. Measured E$\gamma(\theta)$, DSA.

1970Ha02: ^{24}Mg(^{3}He,$\alpha\gamma$) E=6.37, 8.05 MeV. σ(Eα,Eγ,$\theta(\alpha\gamma)$). Ge(Li) for Eγ and NaI(Tl) for $\alpha\gamma(\theta)$ measurements.

1968Bl02: ^{24}Mg(^{3}He,$\alpha\gamma$) E=9 MeV. σ(Eα,Eγ,$\theta(\alpha\gamma)$).

1967Da09: ^{24}Mg(^{3}He,$\alpha\gamma$), E=4.90-6.00 MeV, measured σ(Eα,Eγ,$\theta(\alpha\gamma)$). Deduced spin, mixing ratios, branching ratios.

^{23}Mg Levels

E(level)[†]	J$^{\pi}$[#]	T$_{1/2}$[@]	L	Comments
0.0	3/2^{+}		2	
450.8[‡] *7*	5/2^{+}	1.14 ps *17*	2	T$_{1/2}$: from τ=1.65 ps *25* (1971En04).
2052.3 *3*	7/2^{+}	65 fs *12*	4	T$_{1/2}$: Weighted average of 55 fs *14* (1971En04) and 72 fs *12* (2016Ki03).
2359[‡] *2*	1/2^{+}	575 fs *118*	0	
2715[‡] *2*	9/2,5/2	97 fs *21*		J$^{\pi}$: From angular correlation studies of 2262γ by 1970Ha02.
2769.9 *12*	1/2^{-}	75 fs *10*	1	T$_{1/2}$: Weighted average of 107 fs *21* (1971En04) and 68 fs *10* (2016Ki03).
2906.6 *11*	(3/2)$^{+}$	10.4[&] fs *21*	2	T$_{1/2}$: Other: <17 fs (1971En04).
3795.0 *13*	3/2^{-}	28.4[&] fs *42*	1	E(level): Other: 3789 *6* (1970Ha02). T$_{1/2}$: From 2016Ki03. Other: <14 ns, upper limit estimated from the coincidence resolving time in (^{3}He,$\alpha\gamma$) measurements (1970Ha02).
3968 *6*	5/2^{-}	<14 ns		E(level): From 1970Ha02. T$_{1/2}$: Upper limit estimated from the coincidence resolving time in (^{3}He,$\alpha\gamma$) measurements (1970Ha02).
4356.4 *20*	1/2^{+}	<7.6[&] fs	0	E(level): Other: 4352 *6* (1970Ha02). T$_{1/2}$: From 2016Ki03. Other: <14 ns, upper limit estimated from the coincidence resolving time in (^{3}He,$\alpha\gamma$) measurements (1970Ha02).
5288 *3*		<9.7[&] fs		
5453.5 *24*		<10.4[&] fs		
6239 *4*		<27.7[&] fs		
6375 *7*		<31.2[&] fs		
6908 *3*		<6.9[&] fs		
7444 *3*		<9.7[&] fs		
7495.0 *24*		<13.9[&] fs		
7787.1 *20*		<8.3[&] fs		dσ/dΩ $\approx$ 3-4 μb/sr for θ(c.m.)>159° (2016Ki03).

[†] From γ-ray energies, except otherwise noted.
[‡] From 1971En04.
[#] From Adopted Levels, except otherwise noted.
[@] From 1971En04, unless otherwise stated.
[&] From 2016Ki03.

^{24}Mg(^{3}He,$\alpha\gamma$) 2016Ki03,1971En04,1970Ha02 (continued)

$\gamma(^{23}Mg)$

E_i(level)	J_i^π	E_γ [†]	I_γ	E_f	J_f^π	Mult.[#]	δ	Comments
450.8	5/2$^+$	450.8	100	0.0	3/2$^+$	D+Q	−0.06 *2*	A_2=−0.46 *2*; A_4=−0.02 *2* (1970Ha02) A_2=−0.48 *6*; A_4=−0.12 *11* (1968Bl02) A_2=−0.50 *4*; A_4=−0.08 *7* (1967Da09) A_2=−0.57 *7*; A_4=−0.09 *7* (1967Du04) δ: Weighted average of −0.07 *5* (1970Ha02), −0.04 *4* (1968Bl02), −0.06 *2* (1967Da09), −0.075 *24* (1967Du04).
2052.3	7/2$^+$	1601.4 *13*	84 *2*	450.8	5/2$^+$	D+Q	−0.19 *2*	A_2=−0.66 *3*; A_4=+0.01 *4* (1970Ha02) A_2=−0.77 *6*; A_4=+0.05 *11* (1967Da09) A_2=−0.71 *5*; A_4=+0.01 *7* (1967Du04) A_2=−0.41 *9*; A_4=−0.15 *14* (1968Bl02) I_γ: Weighted average of 85 *3* (1970Ha02), 81 *5* (1968Bl02), and 84 *3* (1967Da09). δ: Weighted average of −0.18 *4* (1970Ha02), −0.08 *7* (1968Bl02), −0.23 *3* (1967Da09), and −0.182 *25* (1967Du04).
		2052.2	16 *2*	0.0	3/2$^+$	Q(+O)	+0.05 *5*	A_2=+0.17 *10*; A_4=−0.33 *15* (1970Ha02) A_2=+0.49 *10*; A_4=−0.05 *16* (1967Da09) A_2=−0.56 *11*; A_4=−0.03 *10* (1968Bl02) I_γ: Weighted average of 15 *3* (1970Ha02), 19 *5* (1968Bl02), and 16 *3* (1967Da09). δ: Wt. ave. of +0.06 *5* (1967Da09) and −0.14 *25* (1970Ha02).
2359	1/2$^+$	1908	69 *3*	450.8	5/2$^+$			A_2=+0.00 *3*; A_4=−0.03 *4* (1970Ha02) A_2=+0.02 *4*; A_4=+0.00 *6* (1967Da09) A_2=+0.01 *9*; A_4=+0.00 *12* (1967Du04) A_2=−0.02 *7*; A_4=+0.01 *9* (1968Bl02) I_γ: Wt. ave. of 71 *4* (1970Ha02), 68 *3* (1967Da09), 67 *5* (1968Bl02). δ: 0.08 *1* or −3.34 *17* for spin 3/2 (1967Da09).
		2359	31 *3*	0.0	3/2$^+$			A_2=−0.01 *5*; A_4=−0.03 *8* (1970Ha02) A_2=+0.13 *7*; A_4=+0.04 *10* (1967Da09) A_2=+0.06 *12*; A_4=+0.09 *20* (1967Du04) A_2=+0.04 *9*; A_4=−0.05 *10* (1968Bl02) I_γ: Wt. ave. of 29 *4* (1970Ha02), 32 *3* (1967Da09), and 33 *5* (1968Bl02). δ: 0.19 *3* or +15.5 *73* for spin 3/2 (1967Da09).
2715	9/2,5/2	663	33 *2*	2052.3	7/2$^+$			I_γ: Weighted average of 34 *5* (1970Ha02), 33 *5* (1968Bl02), and 32 *3* (1967Da09).
		2264	67 *2*	450.8	5/2$^+$			A_2=+0.06 *14*; A_4=−0.68 *21* (1970Ha02) I_γ: Weighted average of 66 *5* (1970Ha02), 67 *5* (1968Bl02), and 68 *3* (1967Da09).
2769.9	1/2$^-$	2769.7 *12*	100	0.0	3/2$^+$			A_2=0.00 *1*; A_4=0.00 *2* (1970Ha02) A_2=−0.10 *3*; A_4=−0.17 *4* (1967Du04) A_2=+0.04 *5*; A_4=−0.05 *6* (1968Bl02)
2906.6	(3/2)$^+$	2455.7	33 *2*	450.8	5/2$^+$	D+Q		A_2=−0.05 *5*; A_4=−0.24 *7* (1970Ha02) A_2=+0.12 *17*; A_4=−0.13 *26* (1967Da09) A_2=−0.11 *5*; A_4=+0.02 *7* (1967Du04) I_γ: Weighted average of 40 *4* (1970Ha02), 30 *5* (1968Bl02), and 32 *2* (1967Da09).
		2906.4 *11*	67 *2*	0.0	3/2$^+$	D+Q		A_2=+0.11 *3*; A_4=+0.15 *4* (1970Ha02) A_2=+0.17 *3*; A_4=+0.10 *4* (1967Da09) A_2=+0.07 *4*; A_4=+0.02 *5* (1967Du04) I_γ: Weighted average of 60 *4* (1970Ha02), 70 *5* (1968Bl02), and 68 *2* (1967Da09).
3795.0	3/2$^-$	1025.1	7 *3*	2769.9	1/2$^-$	D+Q		A_2=−0.33 *18*; A_4=−0.04 *31* (1970Ha02)

Continued on next page (footnotes at end of table)

^{24}Mg(^{3}He,$\alpha\gamma$) 2016Ki03,1971En04,1970Ha02 (continued)

$\gamma(^{23}Mg)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ	E_f	J_f^π	Mult.[#]	δ	Comments
								A_2=+0.19 *17*; A_4=+0.22 *25* (1968Bl02) I_γ: Weighted average of 6 *5* (1970Ha02) and 8 *3* (1968Bl02). δ: +0.08 *20* or −2.15 *21* (1970Ha02).
3795.0	3/2$^-$	3343.9 *13*	86 *5*	450.8	5/2$^+$	D(+Q)	+0.02 *4*	A_2=−0.09 *3*; A_4=+0.00 *5* (1970Ha02) A_2=−0.12 *4*; A_4=−0.02 *6* (1967Du04) A_2=−0.19 *4*; A_4=−0.10 *9* (1968Bl02) I_γ: Weighted average of 86 *5* (1970Ha02) and 85 *5* (1968Bl02). δ: Weighted average of +0.00 *14* (1970Ha02), +0.07 *7* (1968Bl02), and +0.011 *37* (1967Du04).
		3794.7	7 *2*	0.0	3/2$^+$	D+Q		A_2=−0.47 *8*; A_4=+0.06 *12* (1970Ha02) I_γ: Weighted average of 8 *5* (1970Ha02) and 7 *2* (1968Bl02). δ: −7.1 ≤ δ ≤ −0.4 (1970Ha02).
3968	5/2$^-$	1061	12[‡]	2906.6	(3/2)$^+$			
		1916	49[‡]	2052.3	7/2$^+$			
		3968	39[‡]	0.0	3/2$^+$	D+Q		A_2=−0.20 *4*; A_4=+0.40 *6* (1970Ha02) δ: −4.33 *9* in 1970Ha02 implies E2+M1 and consequently positive parity for the depopulating level. It is inconsistent with the adopted negative parity in Adopted Levels.
4356.4	1/2$^+$	1997	4[‡] *3*	2359	1/2$^+$			
		4356 *2*	96[‡] *3*	0.0	3/2$^+$			A_2=−0.02 *3*; A_4=−0.01 *4* (1970Ha02) A_2=−0.04 *17*; A_4=−0.03 *18* (1968Bl02)
5288		4837 *3*		450.8	5/2$^+$			
5453.5		3401 *2*		2052.3	7/2$^+$			
6239		4186 *3*		2052.3	7/2$^+$			
6375		4322 *6*		2052.3	7/2$^+$			
6908		6907 *3*		0.0	3/2$^+$			
7444		7443 *3*		0.0	3/2$^+$			
7495.0		5442 *2*		2052.3	7/2$^+$			
7787.1		7335 *2*		450.8	5/2$^+$			

[†] From 2016Ki03. γ rays without uncertainty − from level energy differences, recoil energy subtracted, calculated by evaluators after obtaining the level energies from the measured Eγ.
[‡] From 1970Ha02.
[#] From γ-ray angular distribution measurements (coefficients).

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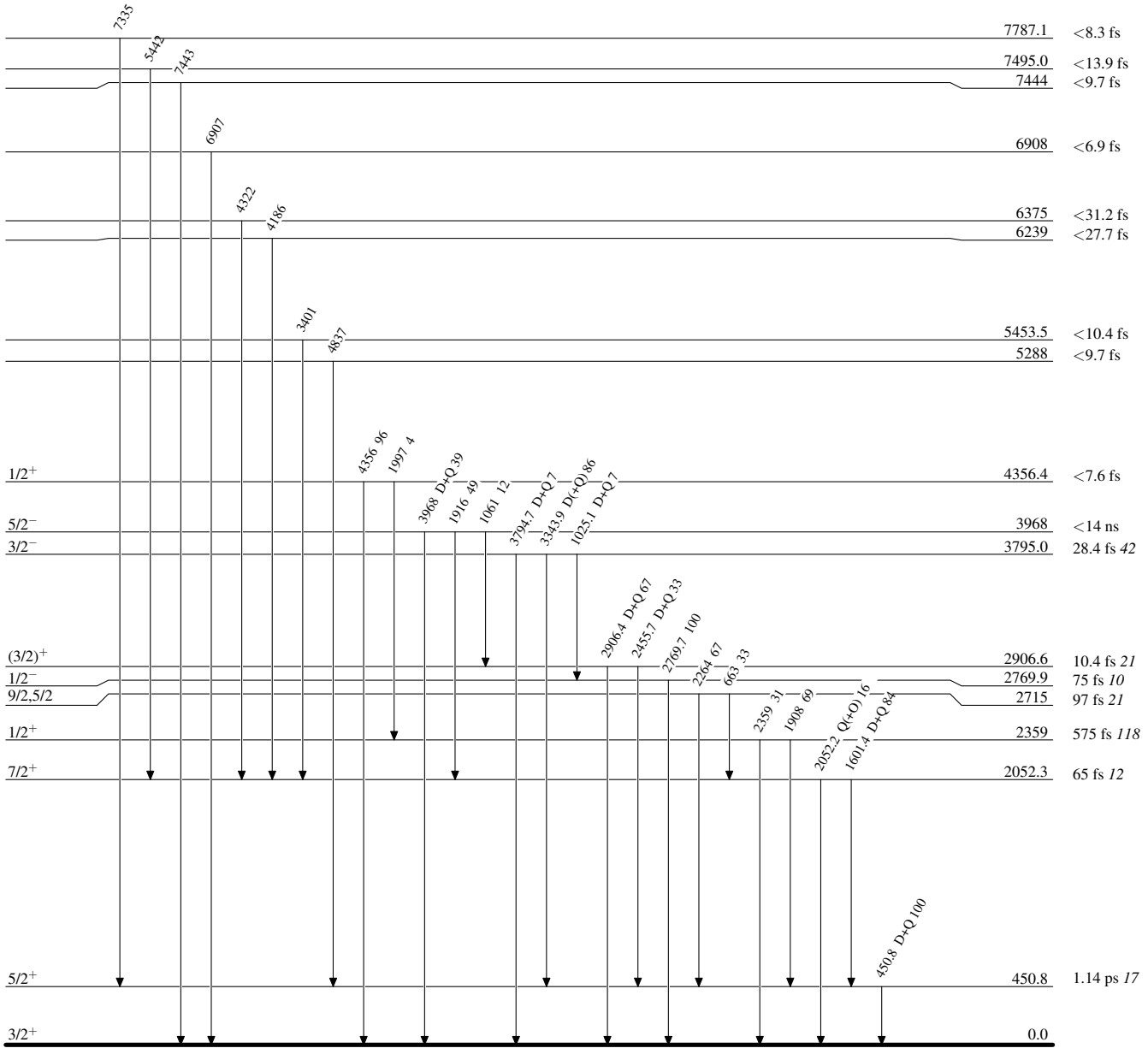
Level Scheme

Intensities: % photon branching from each level



$^{23}_{12}Mg_{11}$