^{24}Mg(^{16}O,α2pγ) 2005Ma03

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Ninel Nica, Balraj Singh	NDS 113, 1563 (2012)	28-May-2012

Includes ^{27}Al(^{12}C,αpγ) reaction.

2005Ma03: ^{24}Mg(^{16}O,α2pγ) E=70 keV. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma\gamma(\theta)$, $\gamma(\theta)$, lifetimes with γ-array GASP (40 Compton-suppressed HPGe detectors and multiplicity filter of 80 BGO scintillators). Channel selection and kinematical reconstruction with 4π charged-particle detector ISIS (40 ΔE-E Si telescopes). DSAM analysis for lifetimes.

^{27}Al target J$^\pi$: 5/2$^+$.

1976Me03: ^{27}Al(^{12}C,αnγ) E=31 MeV (^{27}Al target J$^\pi$=5/2$^+$). Used Ge(Li) detector for DSAM.

^{34}S Levels

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$[#]	Comments
0.0[@]	0$^+$		
2127.7[@] *5*	2$^+$		J$^\pi$: E2 ΔJ=2 γ to 0$^+$, g.s.; 2$^+$ In 2005Ma03.
3304.6 *5*	2$^+$		J$^\pi$: E2 ΔJ=2 γ to 0$^+$, g.s.; 2$^+$ In 2005Ma03.
4624.6[&] *6*	3$^-$		J$^\pi$: D ΔJ=1 γ to 2$^+$, 3305; 3$^-$ In 2005Ma03.
4689.2[@] *6*	4$^+$		J$^\pi$: E2 ΔJ=2 γ to 2$^+$, 2128; 4$^+$ In 2005Ma03.
4877.0 *6*			J$^\pi$: 3$^+$ In 2005Ma03.
5679.5[a] *6*	3$^-$		J$^\pi$: D ΔJ=1 γ from 4, 6252; 3$^-$ In 2005Ma03.
5690.7[&] *6*	5$^-$	36.7 ps *17*	J$^\pi$: E2 ΔJ=2 γ to 3, 4625 and D ΔJ=1 γ to 4$^+$, 4689; 5$^-$ In 2005Ma03. T$_{1/2}$: mean lifetime τ in ps: 52.9 *24* (1976Me03).
6251.5[a] *6*	4$^-$		J$^\pi$: E2 ΔJ=2 γ from 6, 7791; 4$^-$ In 2005Ma03.
7790.7[a] *7*	6$^-$	132 fs *35*	J$^\pi$: M1+E2 ΔJ=1 γ to 5, 5691; 6$^-$ In 2005Ma03.
8371.1[&] *7*	7$^-$	85 fs *28*	J$^\pi$: E2 ΔJ=2 γ to 5, 5691 and D ΔJ=1 γ to 6, 7791; 7$^-$ In 2005Ma03.
8503.8[@] *7*	6$^+$		J$^\pi$: D ΔJ=1 γ to 5, 5691; π=+ from band structure; 6$^+$ In 2005Ma03.
8734.9 *8*	6$^-$		J$^\pi$: D+Q ΔJ=1 γ to 5, 5691; 6$^-$ In 2005Ma03.
8970.7 *7*	6$^-$		J$^\pi$: from 2005Ma03.
9413.9 *7*	6		J$^\pi$: D+Q ΔJ=1 γ to 5, 5691; 6$^-$ In 2005Ma03.
9912.8 *7*	7$^+$	184 fs *38*	J$^\pi$: D ΔJ=1 γ to 6$^+$, 8504; 7$^+$ In 2005Ma03.
10399.8[a] *7*	8$^-$		J$^\pi$: Q ΔJ=2 γ to 6, 7791; 8$^-$ In 2005Ma03.
10651.6[@] *8*	8$^+$	35 fs *17*	J$^\pi$: E2 ΔJ=2 γ to 6$^+$, 8504; 8$^+$ In 2005Ma03.
11374.2 *8*	8$^+$		J$^\pi$: D ΔJ=1 γ to 7, 8371; 8$^+$ In 2005Ma03.
11807.4 *8*	8$^+$		J$^\pi$: D ΔJ=1 γ to 7, 8371; 8$^+$ In 2005Ma03.
12141.3 *7*	9$^+$	173 fs *35*	J$^\pi$: E2 ΔJ=2 γ to 7, 9912; 9$^+$ In 2005Ma03.
12985.5 *8*	(9$^+$)		J$^\pi$: from 2005Ma03.
13320.2[&] *11*	(9$^-$)		J$^\pi$: based on ΔJ=2 band structure; (9$^-$) In 2005Ma03.
13341.6 *8*	10$^+$	180 fs *28*	J$^\pi$: E2 ΔJ=2 γ to 8, 11374 and M1+E2 γ to (9$^+$), 12986; 10$^+$ In 2005Ma03.
13960.5[@] *11*	(10$^+$)		J$^\pi$: based on ΔJ=2 band structure; (10$^+$) In 2005Ma03.
14576.4 *12*	(10$^+$)		J$^\pi$: from 2005Ma03.
15244.4 *10*			
15281.0[a] *18*	(10)		J$^\pi$: based on ΔJ=2 band structure.
16649.1[@] *14*			

[†] From least-squares fit to Eγ data.

[‡] ADOPTED by evaluators assuming that spins increase with increasing excitation energy. For specific arguments see comments, where the assignments of 2005Ma03 are given for completeness.

[#] From 2005Ma03 (by DSAM).

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

[&] Band(B): γ-sequence based on 4624 level.

[a] Band(C): γ-sequence based on 5680 level.

^{24}Mg(^{16}O,α2pγ) 2005Ma03 (continued)

γ(^{34}S)

Measured γ-ray Angular Distribution from Oriented nuclei (ADO) and ratio R(ADO) defined as R(ADO)=$I_{\gamma1}$(at 34° gated by γ_2)/$I_{\gamma1}$(at 90° gated by γ_2); the gate on the γ_2 transition is set on the axis where all the detectors are added together. ADO ratios were obtained for γ-rays whose low statistics did not allow for the determination of full angular distributions.

E_γ	I_γ	E_i(level)	J^π_i	E_f	J^π_f	Mult.†	δ‡	Comments
356.3 *6*	0.2 *1*	13341.6	10$^+$	12985.5	(9$^+$)	D		Mult.: based on RUL.
572.0 *1*	0.8 *4*	6251.5	4$^-$	5679.5	3$^-$	D		R(ADO)=0.72 *13*.
580.3 *6*	0.6 *3*	8371.1	7$^-$	7790.7	6$^-$	D		R(ADO)=0.88 *12*.
942.3 *5*	2.0 *6*	9912.8	7$^+$	8970.7	6$^-$	D		A_2=−0.24 *8*; A_4=−0.01 *13*
986.8 *9*	0.8 *4*	10399.8	8$^-$	9413.9	6			
1001.6 *5*	42 *4*	5690.7	5$^-$	4689.2	4$^+$	D		A_2=−0.28 *6*; A_4=+0.02 *15* R(ADO)=0.81 *1*.
1043.8 *7*	0.7 *4*	9413.9	6	8371.1	7$^-$			
1055.4 *8*	0.2 *1*	5679.5	3$^-$	4624.6	3$^-$			
1066.2 *5*	35 *4*	5690.7	5$^-$	4624.6	3$^-$	E2		A_2=+0.28 *3*; A_4=−0.09 *4* R(ADO)=1.35 *3*.
1177.3 *5*	22.5 *23*	3304.6	2$^+$	2127.7	2$^+$			
1178 *1*	1.0 *5*	9912.8	7$^+$	8734.9	6$^-$			
1178 *1*	0.5 *3*	12985.5	(9$^+$)	11807.4	8$^+$			
1180 *1*	0.2 *1*	8970.7	6$^-$	7790.7	6$^-$			
1200.4 *7*	3.2 *7*	13341.6	10$^+$	12141.3	9$^+$	M1+E2		Mult.: in the text 2005Ma03 state that R(ADO) indicates pure M1, but in table I, authors give mult=D+Q. R(ADO)=0.93 *9*.
1320.1 *5*	27 *3*	4624.6	3$^-$	3304.6	2$^+$	D		A_2=−0.29 *7*; A_4=−0.01 *20* R(ADO)=0.78 *2*.
1375.0 *5*	2.8 *6*	6251.5	4$^-$	4877.0				
1384.5 *14*	0.3 *2*	4689.2	4$^+$	3304.6	2$^+$			
1408.6 *9*	2.1 *6*	9912.8	7$^+$	8503.8	6$^+$	D		R(ADO)=0.8 *1*.
1461.7 *9*	3.7 *8*	11374.2	8$^+$	9912.8	7$^+$	D(+Q)		R(ADO)=0.87 *7*.
1489.2 *6*	0.7 *4*	12141.3	9$^+$	10651.6	8$^+$			
1539.6 *5*	5.0 *10*	7790.7	6$^-$	6251.5	4$^-$	E2		A_2=+0.29 *4*; A_4=−0.18 *6*
1541.5 *5*	0.9 *5*	9912.8	7$^+$	8371.1	7$^-$			
1562.5 *5*	2.9 *6*	6251.5	4$^-$	4689.2	4$^+$			
1572.5 *5*	3.2 *7*	4877.0		3304.6	2$^+$			
1611.5 *7*	0.6 *3*	12985.5	(9$^+$)	11374.2	8$^+$			
1626.7 *5*	1.3 *3*	6251.5	4$^-$	4624.6	3$^-$			
1741.6 *5*	1.2 *3*	12141.3	9$^+$	10399.8	8$^-$			
1894.6 *6*	1.5 *3*	11807.4	8$^+$	9912.8	7$^+$			
1902.7 *6*	0.9 *5*	15244.4		13341.6	10$^+$			
1966.8 *9*	2.6 *6*	13341.6	10$^+$	11374.2	8$^+$	E2		R(ADO)=1.2 *1*.
2028.8 *6*	3.3 *7*	10399.8	8$^-$	8371.1	7$^-$			
2099.6 *8*	27 *3*	7790.7	6$^-$	5690.7	5$^-$	M1+E2	−1.8 *1*	A_2=−0.9 *3*; A_4=+0.4 *7* R(ADO)=0.37 *1*. Mult.: from $\gamma(\theta)$.
2122.9 *6*	7.0 *10*	9912.8	7$^+$	7790.7	6$^-$			
2127.5 *6*	100	2127.7	2$^+$	0.0	0$^+$	E2		A_2=+0.28 *4*; A_4=−0.15 *7* R(ADO)=1.23 *3*.
2147.2 *6*	4.7 *10*	10651.6	8$^+$	8503.8	6$^+$	E2		A_2=+0.49 *6*; A_4=−0.29 *9* R(ADO)=1.5 *1*.
2228.8 *6*	9.5 *11*	12141.3	9$^+$	9912.8	7$^+$	E2		R(ADO)=1.18 *7*.
2280.4 *10*	4.7 *10*	10651.6	8$^+$	8371.1	7$^-$	D		A_2=−0.11 *8*; A_4=+0.02 *14* R(ADO)=0.74 *4*.
2333.8 *7*	1.2 *5*	12985.5	(9$^+$)	10651.6	8$^+$			
2375.4 *7*	0.4 *2*	5679.5	3$^-$	3304.6	2$^+$			

Continued on next page (footnotes at end of table)

^{24}Mg(^{16}O,α2pγ) 2005Ma03 (continued)

γ(^{34}S) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.†	Comments
2496.5 8	12.3 12	4624.6	3−	2127.7	2+	D	A_2=−0.31 9; A_4=−0.14 22 R(ADO)=0.77 4.
2561.1 6	68 7	4689.2	4+	2127.7	2+	E2	A_2=+0.33 5; A_4=−0.12 8 R(ADO)=1.24 4.
2608.6 6	7.1 10	10399.8	8−	7790.7	6−	Q	A_2=+0.45 3; A_4=−0.23 5 R(ADO)=1.27 6.
2680.5 6	30 3	8371.1	7−	5690.7	5−	E2	A_2=+0.40 2; A_4=−0.19 2 R(ADO)=1.3 2.
2688.4 8	0.7 4	16649.1		13960.5	(10+)		
2749.6 6	3.6 8	4877.0		2127.7	2+		
2768.9 9	0.7 4	14576.4	(10+)	11807.4	8+		
2812.7 9	7.7 14	8503.8	6+	5690.7	5−	D	A_2=−0.41 21; A_4=0.0 3 R(ADO)=0.69 5.
2920.1 10	0.5 3	13320.2	(9−)	10399.8	8−		
3002.8 6	4.1 8	11374.2	8+	8371.1	7−	D	A_2=−0.36 24; A_4=0.0 3 R(ADO)=0.65 5.
3044.1 6	3.1 7	8734.9	6−	5690.7	5−	D+Q	R(ADO)=1.06 8.
3280.0 6	3.5 7	8970.7	6−	5690.7	5−		
3304.6 7	17.8 18	3304.6	2+	0.0	0+	E2	A_2=+0.34 8; A_4=−0.14 11
3308.8 8	3.0 6	13960.5	(10+)	10651.6	8+		
3436.1 6	1.5 6	11807.4	8+	8371.1	7−	D	R(ADO)=0.67 8.
3551.2 6	0.6 3	5679.5	3−	2127.7	2+		
3562.7 6	1.2 5	5690.7	5−	2127.7	2+	[E3]	
3722.6 6	3.3 7	9413.9	6	5690.7	5−	D+Q	R(ADO)=0.91 9.
3813.6 7	3.9 8	8503.8	6+	4689.2	4+		
4880.8 16	1.8 5	15281.0	(10)	10399.8	8−		
4949.3 18	1.9 4	13320.2	(9−)	8371.1	7−		

† D, Q, or D+Q character adopted by 2005Ma03 based on angular distribution coefficients and R(ADO). For R(ADO)≈0.75: stretched ΔJ=1, D transitions; for R(ADO)≈1.25: stretched ΔJ=2, Q. For levels with measured T1/2 (in this dataset, or from Adopted Levels dataset), based on RUL: for Q transitions E2 was adopted by evaluators, and for D+Q transitions M1+E2 was adopted by evaluators. For other types of assignments see comments.

‡ From 2005Ma03 based on angular distribution coefficients.

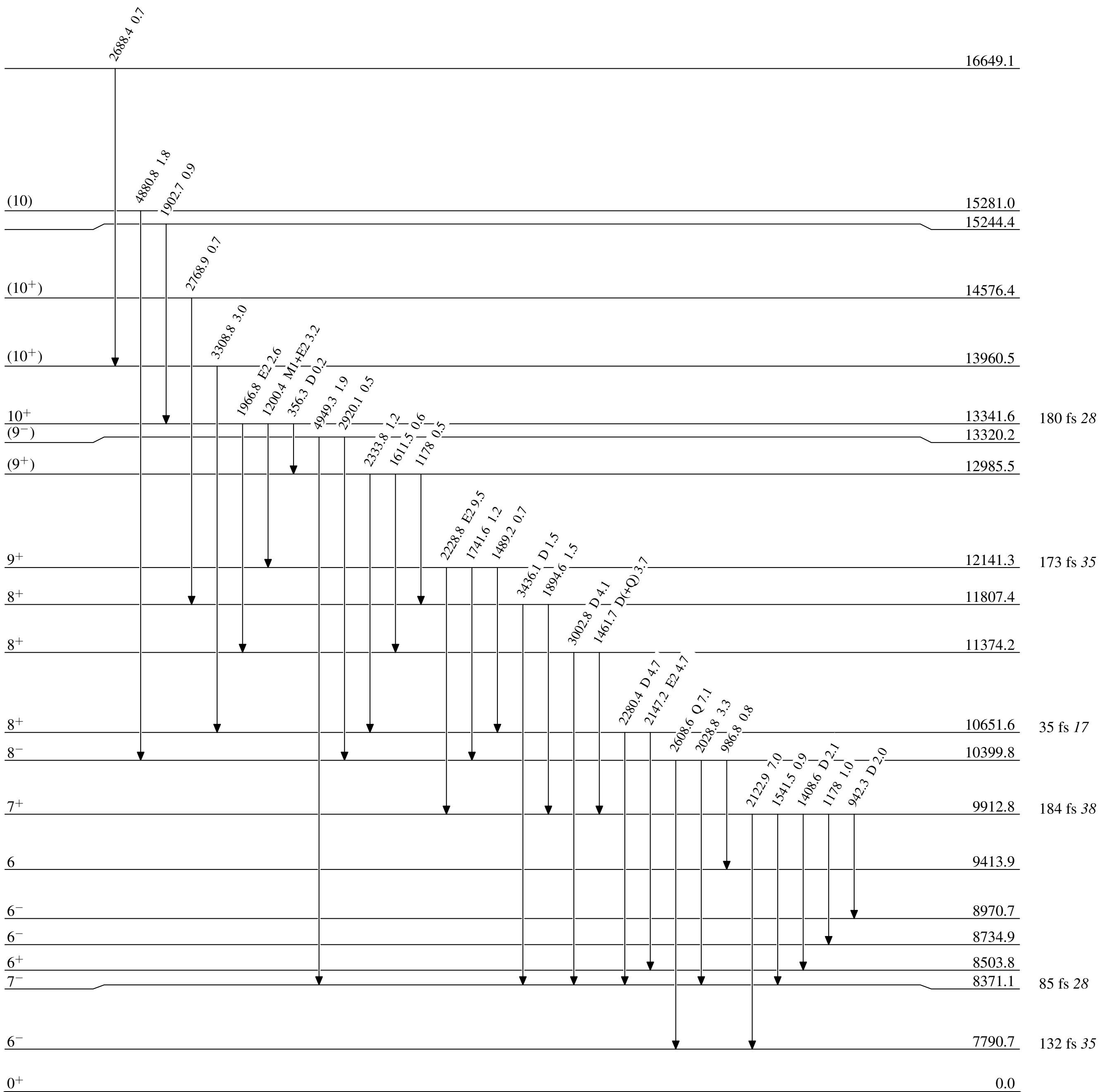
$^{24}Mg(^{16}O,\alpha 2p\gamma)$ 2005Ma03

Level Scheme

Intensities: Relative I_γ

Legend

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



$^{34}_{16}S_{18}$

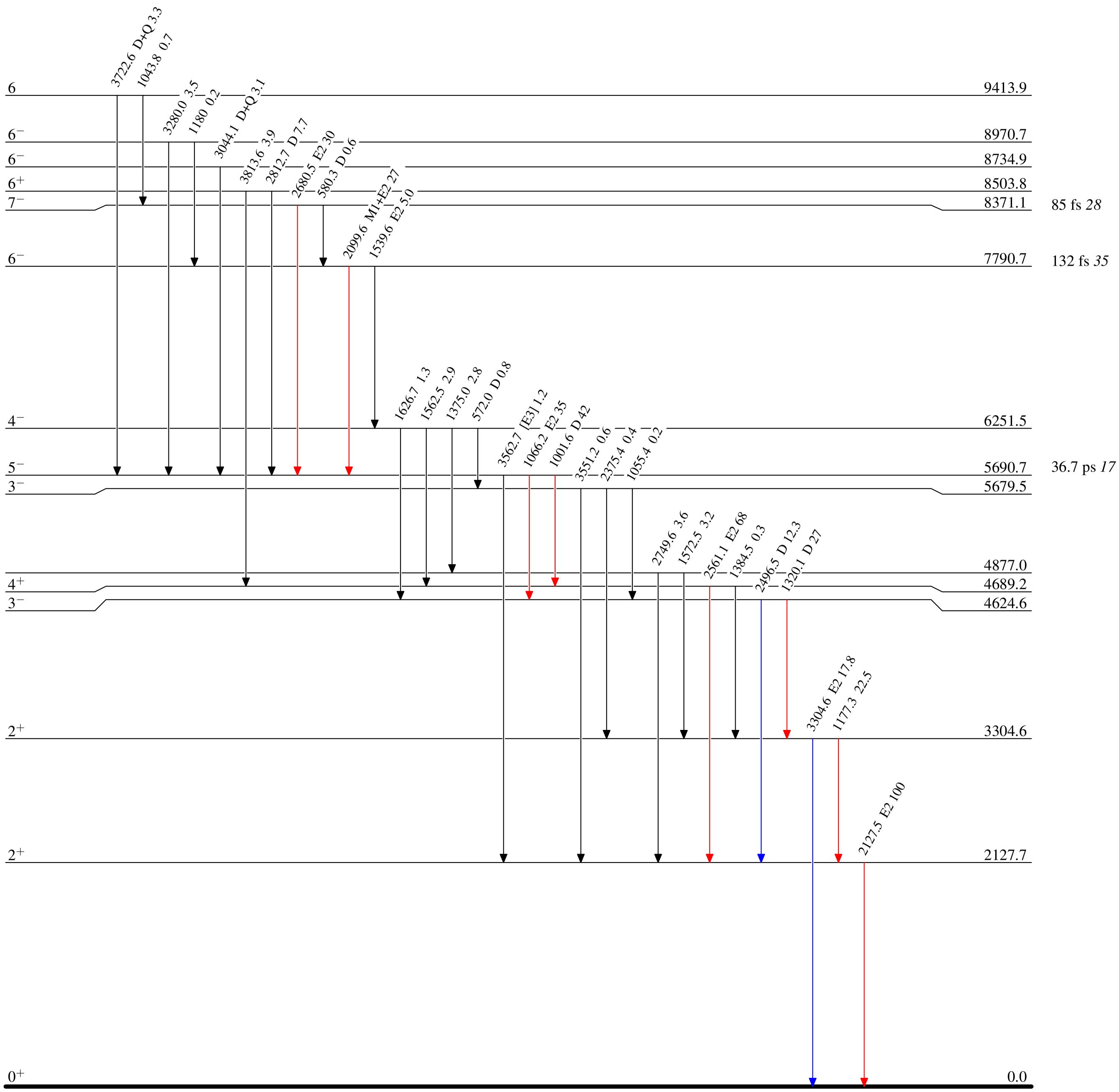
$^{24}Mg(^{16}O,\alpha 2p\gamma)$ 2005Ma03

Level Scheme (continued)

Intensities: Relative I_γ

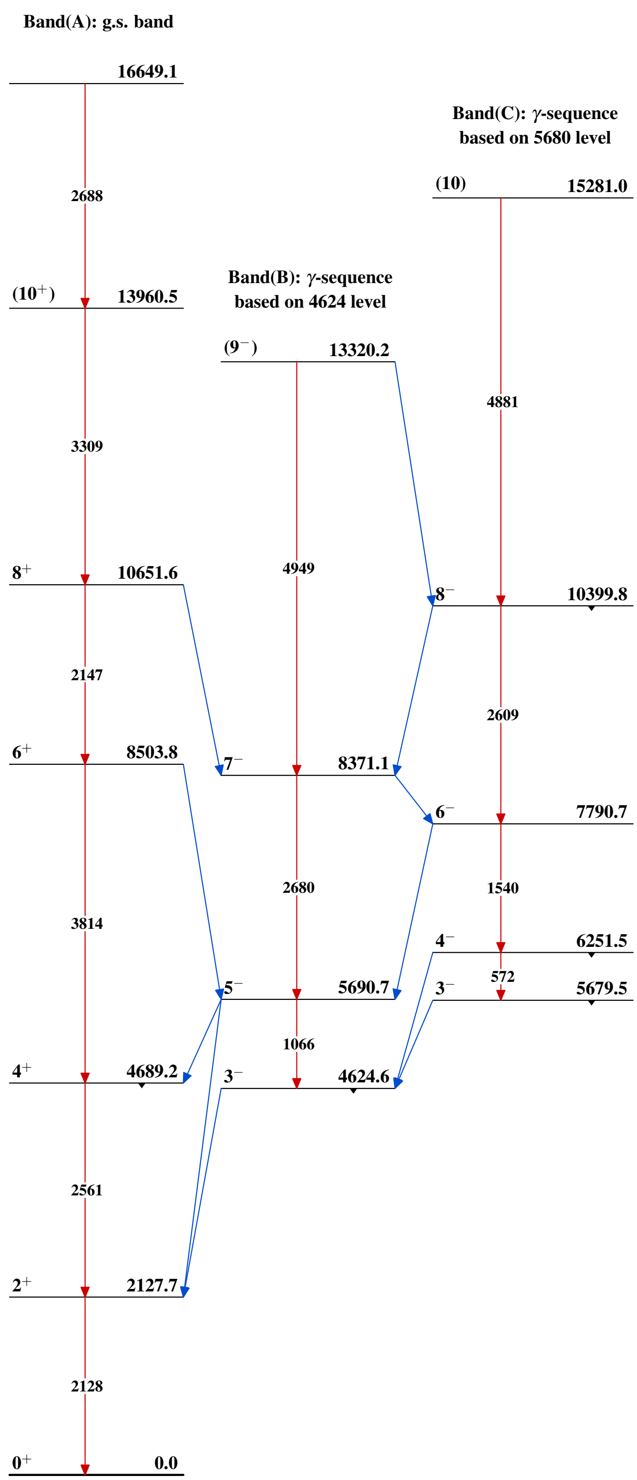
Legend

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



$^{34}_{16}S_{18}$

^{24}Mg(^{16}O,α2pγ) 2005Ma03



$^{34}_{16}S_{18}$