^{28}Si(^{24}Mg,n3pγ),^{24}Mg(^{28}Si,n3pγ) 2002Br42

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 179, 1 (2022)	30-Nov-2021

Also includes ^{27}Al(^{24}Mg,2pnγ) from 1978MoZZ and 1976Mo26.

2002Br42: E=100 MeV ^{24}Mg beam on a 0.4 mg/cm^2 ^{28}Si target and E=115 MeV ^{28}Si beam on a 0.8 mg/cm^2 ^{24}Mg target were produced from the LNL accelerator facility. γ rays were detected with the GASP array consisting of 40 Compton-suppressed HPGe detectors and an 80-element BGO ball; light charged particles were detected with the ISIS array consisting of 40 E-E Si telescopes. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma\gamma$-coin, particle-γ-con, Doppler-shift attenuation. Deduced levels, J, π, $T_{1/2}$, band structures, configurations, γ-ray branching ratios, transition strengths. Comparisons with large-scale shell-model calculations. See also 2002Me28 for the report of the same lifetime measurements.

Other measurements:

1978MoZZ,1976Mo26: ^{27}Al(^{24}Mg,2pnγ) ^{24}Mg beam was from the CN Van de Graaff generator of Laboratori Nazionali di Legnaro. Measured Eγ, $\gamma\gamma$-coin. Deduced levels, band structure. 1976Mo26 and 1978MoZZ also report data from ^{35}Cl(^{16}O,2pnγ) and (p,nγ).

^{48}V Levels

Additional information 1.

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$[@]	E(level)[†]	J$^\pi$[‡]	$T_{1/2}$[@]
0.0[&]	4$^+$		3980.8[d] *3*	(8$^-$)[#]	0.152 ps *21*
308.30[a] *8*	2$^+$		4073.1[e] *4*	(8$^-$)[#]	0.097 ps *28*
420.73[a] *11*	1$^+$	<1 ns	4150.1[&] *4*	(10$^+$)[#]	
427.88[b] *12*	5$^+$		4306.7[b] *4*	(11$^+$)	0.36 ps *4*
518.56[c] *11*	1$^-$		4360.4[c] *5*	(8$^-$)[#]	0.083 ps *28*
613.37[a] *9*	4$^+$		4368.0[a] *5*	(9$^+$)	
627.13[&] *15*	6$^+$		4395.6[d] *3*	(9$^-$)	0.90 ps *14*
744.94[c] *11*	2$^-$		4580.8[e] *3*	(9$^-$)[#]	0.39 ps *4*
764.97[a] *8*	3$^+$		4968.8[a] *5*	(10$^+$)[#]	
1055.76[c] *12*	3$^-$		5204.1[e] *4*	(10$^-$)[#]	0.28 ps *7*
1099.03[d] *23*	4$^-$		5568.7[a] *6*	(11$^+$)[#]	
1254.57[b] *23*	7$^+$	0.41 ps *10*	5897.7[e] *4*	(11$^-$)[#]	0.62 ps *7*
1264.48[a] *17*	5$^+$		6214.7[&] *6*	(12$^+$)[#]	
1557.45[c] *14*	4$^-$	0.97 ps *28*	6242.9[b] *6*	(13$^+$)	0.194 ps *28*
1685.48[d] *25*	5$^{(-)}$	0.60 ps *7*	7334.2[a] *6*	(12$^+$)[#]	
1750.5[a] *5*	(6$^+$)[#]		7334.8[e] *7*	(12$^-$)[#]	0.118 ps *21*
2061.90[c] *22*	5$^{(-)}$	0.76 ps *21*	7943.4[e] *8*	(13$^-$)[#]	0.090 ps *14*
2231.2[&] *3*	8$^+$	0.215 ps *35*	7972.9[a] *7*	(13$^+$)[#]	<0.14 ps
2398.19[d] *24*	6$^-$	0.222 ps *21*	8495.1[&] *7*	(14$^+$)[#]	<0.07 ps
2626.2[b] *3*	9$^+$	0.56 ps *8*	8712.1[b] *7*	(15$^+$)[#]	0.118 ps *28*
2702.9[a] *5*	(7$^+$)[#]		9911.5[e] *10*	(14$^-$)[#]	<0.056 ps
2779.0[c] *3*	(6$^-$)	0.194 ps *28*	10448.8[e] *12*	(15$^-$)[#]	<0.056 ps
3174.3[d] *3*	(7$^-$)[#]	0.139 ps *14*	12642.9[e] *10*	(16$^-$)[#]	
3209.9[a] *4*	(8$^+$)[#]		13280.9[e] *13*	(17$^-$)[#]	
3423.1[c] *3*	(7$^-$)[#]	0.132 ps *28*			

† From a least-squares fit to γ-ray energies.

‡ From Adopted Levels. Assignments from this dataset are as noted.

Continued on next page (footnotes at end of table)

^{28}Si(^{24}Mg,n3pγ),^{24}Mg(^{28}Si,n3pγ) 2002Br42 (continued)

^{48}V Levels (continued)

[#] Assignment from 2002Br42. Assignments for the yrare band based on comparison of experimental to theoretical branching ratios. $T_{1/2}$ measurements allowed assignment of M1 character to some dipole transitions from these levels assuming an upper limit of 3×10^{-4} for E1 (1999Br40); note that RUL assumes 0.010 for E1. Except for the 16$^-$ and 17$^-$ members of the K^π=8$^-$ band, parentheses have been added by the evaluator.
[@] From DSAM in 2002Br42, unless otherwise noted.
[&] Band(A): K^π=4$^+$, α=0, g.s. yrast band.
[a] Band(B): K^π=1$^+$, yrare band. Configuration=π3/2[321]-ν5/2[312] (2002Br42).
[b] Band(C): K^π=4$^+$, α=1, g.s. yrast band.
[c] Band(D): K^π=1$^-$ rotational band.
[d] Band(E): K^π=4$^-$ rotational band.
[e] Band(F): K^π=8$^-$ rotational band. Configuration=$d^{-1}_{3/2}\otimes f^{n+1}_{7/2}$ (2002Br42).

γ(^{48}V)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Comments
308.30	2$^+$	308.3 *1*	100	0.0	4$^+$	I_{rel}=9.
420.73	1$^+$	112.4 *1*	100	308.30	2$^+$	I_{rel}=3.5.
427.88	5$^+$	427.8 *4*	100	0.0	4$^+$	I_{rel}=100.
518.56	1$^-$	97.7 *1*	34 *7*	420.73	1$^+$	I_{rel}=3.5.
		210.3 *1*	66 *7*	308.30	2$^+$	I_{rel}=6.5.
613.37	4$^+$	185.5 *1*	11 *2*	427.88	5$^+$	I_{rel}=0.02.
		(305)	<5	308.30	2$^+$	
		613.4 *1*	89 *2*	0.0	4$^+$	I_{rel}=0.17.
627.13	6$^+$	199.3 *2*	43 *5*	427.88	5$^+$	I_{rel}=87.
		627.2[‡] *3*	57[‡] *5*	0.0	4$^+$	I_{rel}=110.
744.94	2$^-$	226.3 *1*	92 *2*	518.56	1$^-$	I_{rel}=9.0.
		324.3 *1*	3.1 *8*	420.73	1$^+$	I_{rel}=0.3.
		436.6 *1*	4.9 *9*	308.30	2$^+$	I_{rel}=0.5.
764.97	3$^+$	151.7 *2*		613.37	4$^+$	
		(344)	<2	420.73	1$^+$	
		456.7 *1*		308.30	2$^+$	
		764.9 *1*		0.0	4$^+$	
1055.76	3$^-$	310.8 *1*	89 *3*	744.94	2$^-$	I_{rel}=8.0.
		537.2 *1*	5 *1*	518.56	1$^-$	I_{rel}=0.5.
		1056.1 *4*	5 *2*	0.0	4$^+$	I_{rel}=0.5.
1099.03	4$^-$	671.2 *4*	3.9 *9*	427.88	5$^+$	I_{rel}=0.9.
		1099.2 *4*	96.1 *9*	0.0	4$^+$	I_{rel}=20.
1254.57	7$^+$	627.4[‡] *4*	98.0[‡] *3*	627.13	6$^+$	I_{rel}=160.
		826.5 *3*	2.0 *3*	427.88	5$^+$	I_{rel}=3.
1264.48	5$^+$	(499)	<5	764.97	3$^+$	
		637.3 *2*	21 *5*	627.13	6$^+$	I_{rel}=0.04.
		651.2 *2*	79 *5*	613.37	4$^+$	I_{rel}=0.17.
		(836)	<5	427.88	5$^+$	
		(1264)	<5	0.0	4$^+$	
1557.45	4$^-$	501.7 *1*	85 *3*	1055.76	3$^-$	I_{rel}=7.0.
		812.4 *2*	15 *3*	744.94	2$^-$	I_{rel}=1.1.
1685.48	5$^{(-)}$	586.5 *4*	91 *2*	1099.03	4$^-$	I_{rel}=19.
		1685.3 *4*	9.1 *17*	0.0	4$^+$	I_{rel}=1.9.
1750.5	(6$^+$)	486 *1*	15 *6*	1264.48	5$^+$	I_{rel}=0.1.
		(1124)	<5	627.13	6$^+$	
		(1137)	<6	613.37	4$^+$	
		1322 *1*	85 *6*	427.88	5$^+$	I_{rel}=0.56.
2061.90	5$^{(-)}$	504.7 *3*	65 *5*	1557.45	4$^-$	I_{rel}=6.1.

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^{28}Si(^{24}Mg,n3pγ),^{24}Mg(^{28}Si,n3pγ) 2002Br42 (continued)

γ(^{48}V) (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Comments
2061.90	$5^{(-)}$	1006.2 *3*	35 *5*	1055.76	3^-	I_{rel}=1.0.
2231.2	8^+	976.6 *4*	54 *3*	1254.57	7^+	I_{rel}=50.
		1604.2 *4*	46 *3*	627.13	6^+	I_{rel}=42.
2398.19	6^-	712.4 *4*	86.6 *15*	1685.48	$5^{(-)}$	I_{rel}=15.
		1299.3 *4*	6.8 *13*	1099.03	4^-	I_{rel}=1.2.
		1771.2 *4*	6.6 *11*	627.13	6^+	I_{rel}=1.1.
2626.2	9^+	394.9 *4*	45 *3*	2231.2	8^+	I_{rel}=91.
		1371.4 *4*	55 *3*	1254.57	7^+	I_{rel}=110.
2702.9	(7^+)	953 *1*	63 *6*	1750.5	(6^+)	I_{rel}=0.50.
		(1438)	<6	1264.48	5^+	
		1448 *1*	11 *4*	1254.57	7^+	I_{rel}=0.09.
		2076 *1*	26 *5*	627.13	6^+	I_{rel}=0.21.
		(2275)	<6	427.88	5^+	E_γ: from level energy difference. Eγ=2334 listed in Table II of 2002Br42 is incorrect.
2779.0	(6^-)	717.1 *4*	72 *5*	2061.90	$5^{(-)}$	I_{rel}=5.3.
		1221.1 *3*	28 *5*	1557.45	4^-	I_{rel}=1.5.
3174.3	(7^-)	775.7 *4*	71 *4*	2398.19	6^-	I_{rel}=11.
		1489.0 *4*	22 *4*	1685.48	$5^{(-)}$	I_{rel}=4.
		2547.4 *6*	6.5 *2*	627.13	6^+	I_{rel}=1.2.
3209.9	(8^+)	507 *1*	28 *6*	2702.9	(7^+)	I_{rel}=0.30.
		584 *1*	33 *7*	2626.2	9^+	I_{rel}=0.35.
		(979)	<10	2231.2	8^+	
		(1459)	<10	1750.5	(6^+)	
		1955 *1*	39 *7*	1254.57	7^+	I_{rel}=0.40.
3423.1	(7^-)	643.6 *4*	35 *6*	2779.0	(6^-)	I_{rel}=2.1.
		1026.1 *6*	35 *6*	2398.19	6^-	I_{rel}=2.1.
		1362.0 *5*	30 *5*	2061.90	$5^{(-)}$	I_{rel}=1.5. E_γ: uncertainty of 5 keV quoted by 2002Br42 seems unusually large and could be a typo, which could be 0.5 keV.
3980.8	(8^-)	558 *1*	2.1 *6*	3423.1	(7^-)	I_{rel}=11 listed in Table III of 2002Br42 could be in error since it is inconsistent with the branching ratio.
		806.4 *4*	68 *5*	3174.3	(7^-)	I_{rel}=9.
		1582.3 *4*	30 *4*	2398.19	6^-	I_{rel}=4.
4073.1	(8^-)	898.9 *5*	62 *5*	3174.3	(7^-)	I_{rel}=3.0.
		1676 *1*	38 *5*	2398.19	6^-	I_{rel}=1.6.
4150.1	(10^+)	(941)	<2	3209.9	(8^+)	
		1523.5 *8*	78 *5*	2626.2	9^+	I_{rel}=26.
		1918.5 *8*	22 *5*	2231.2	8^+	I_{rel}=3.5.
4306.7	(11^+)	157.0 *4*	3.0 *6*	4150.1	(10^+)	I_{rel}=3.6.
		1680.3 *4*	97.0 *6*	2626.2	9^+	I_{rel}=120.
4360.4	(8^-)	937.4 *6*	54 *6*	3423.1	(7^-)	I_{rel}=1.4.
		1581.3 *6*	46 *6*	2779.0	(6^-)	I_{rel}=1.1.
4368.0	(9^+)	1158 *1*	55 *7*	3209.9	(8^+)	I_{rel}=0.2.
		(1665)	<10	2702.9	(7^+)	
		1742 *1*	45 *7*	2626.2	9^+	I_{rel}=0.2.
		(2137)	<15	2231.2	8^+	
4395.6	(9^-)	323 *1*	5 *2*	4073.1	(8^-)	I_{rel}=0.4.
		414.5 *4*	57 *4*	3980.8	(8^-)	I_{rel}=4.
		1185.4 *5*	0.7 *3*	3209.9	(8^+)	I_{rel}=0.1.
		(1222)	<5	3174.3	(7^-)	
		1769.3 *4*	35.5 *30*	2626.2	9^+	I_{rel}=2.5.
		2164.4 *4*	3.8 *9*	2231.2	8^+	I_{rel}=0.3.
4580.8	(9^-)	507.7 *4*	20 *4*	4073.1	(8^-)	I_{rel}=1.5.
		600.0 *4*	27 *4*	3980.8	(8^-)	I_{rel}=2.
		1158.2 *5*	2.7 *6*	3423.1	(7^-)	I_{rel}=0.2.

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^{28}Si(^{24}Mg,n3pγ),^{24}Mg(^{28}Si,n3pγ) 2002Br42 (continued)

γ(^{48}V) (continued)

E_i(level)	J^π_i	E_γ †	I_γ †	E_f	J^π_f	Comments
4580.8	(9⁻)	1406.4 *5*	34 *5*	3174.3	(7⁻)	I_{rel}=3.
		2349.5 *6*	17 *4*	2231.2	8⁺	I_{rel}=1.9.
4968.8	(10⁺)	(601)	<6	4368.0	(9⁺)	
		662 *1*	5 *2*	4306.7	(11⁺)	I_{rel}=0.1.
		818 *1*	9 *2*	4150.1	(10⁺)	I_{rel}=0.2.
		(1759)	<6	3209.9	(8⁺)	
		2343 *1*	86 *9*	2626.2	9⁺	I_{rel}=2.0.
5204.1	(10⁻)	(623)	<5	4580.8	(9⁻)	
		807.9 *5*	95 *2*	4395.6	(9⁻)	I_{rel}=4.
		(1132)	<5	4073.1	(8⁻)	
		(1224)	<5	3980.8	(8⁻)	
		2578 *1*	5 *2*	2626.2	9⁺	I_{rel}=0.2.
5568.7	(11⁺)	600 *1*	20 *6*	4968.8	(10⁺)	I_{rel}=0.5.
		(1201)	<5	4368.0	(9⁺)	
		1262 *1*	60 *8*	4306.7	(11⁺)	I_{rel}=1.5.
		1418 *1*	20 *6*	4150.1	(10⁺)	I_{rel}=0.5.
5897.7	(11⁻)	693.4 *8*	13 *3*	5204.1	(10⁻)	I_{rel}=0.8.
		929 *1*	19.8 *40*	4968.8	(10⁺)	I_{rel}=1.1.
		1317.0 *4*	55 *7*	4580.8	(9⁻)	I_{rel}=3.
		1502 *1*	6 *2*	4395.6	(9⁻)	I_{rel}=0.4.
		1747 *1*	5.0 *9*	4150.1	(10⁺)	I_{rel}=0.3.
6214.7	(12⁺)	646.0 *8*	13 *4*	5568.7	(11⁺)	I_{rel}=1.8.
		(1246)	<2	4968.8	(10⁺)	
		1908.4 *8*	54 *6*	4306.7	(11⁺)	I_{rel}=9.
		2064.0 *8*	33 *6*	4150.1	(10⁺)	I_{rel}=3.6.
6242.9	(13⁺)	(28)	<3	6214.7	(12⁺)	
		(674)	<3	5568.7	(11⁺)	
		1937 *1*	100	4306.7	(11⁺)	I_{rel}=92.
7334.2	(12⁺)	1092 *1*	16 *4*	6242.9	(13⁺)	I_{rel}=0.6.
		(1119)	<7	6214.7	(12⁺)	
		1766 *1*	72 *8*	5568.7	(11⁺)	I_{rel}=1.6.
		(2365)	<5	4968.8	(10⁺)	
		3028 *2*	12 *3*	4306.7	(11⁺)	I_{rel}=0.3.
7334.8	(12⁻)	(1437)	<10	5897.7	(11⁻)	
		2130 *1*	100	5204.1	(10⁻)	I_{rel}=2.1.
7943.4	(13⁻)	(608)	<4	7334.8	(12⁻)	
		2046 *1*	100	5897.7	(11⁻)	I_{rel}=0.5.
7972.9	(13⁺)	639 *1*	55 *6*	7334.2	(12⁺)	I_{rel}=1.8.
		1730 *1*	30 *5*	6242.9	(13⁺)	I_{rel}=1.0.
		(1759)	<5	6214.7	(12⁺)	
		2404 *1*	15 *5*	5568.7	(11⁺)	I_{rel}=0.5.
8495.1	(14⁺)	522.8 *8*	15 *3*	7972.9	(13⁺)	I_{rel}=1.9.
		(1161)	<3	7334.2	(12⁺)	
		2252 *1*	85 *3*	6242.9	(13⁺)	I_{rel}=11.
		(2280)	<4	6214.7	(12⁺)	
8712.1	(15⁺)	217.1 *5*	12 *2*	8495.1	(14⁺)	I_{rel}=3.6.
		(739)	<3	7972.9	(13⁺)	
		2469 *1*	88 *2*	6242.9	(13⁺)	I_{rel}=23.
9911.5	(14⁻)	(1968)	<8	7943.4	(13⁻)	
		2576 *2*	100	7334.8	(12⁻)	I_{rel}=0.5.
10448.8	(15⁻)	2505 *2*	100	7943.4	(13⁻)	I_{rel}=1.5.
12642.9	(16⁻)	2194 *1*	50 *20*	10448.8	(15⁻)	I_{rel}=1.0.
		(2731)	<10	9911.5	(14⁻)	
		3931	50 *20*	8712.1	(15⁺)	E_γ,I_γ: γ shown in Figure 1 of 2002Br42; not listed in Table III. Iγ assumed by the evaluator.

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^{28}Si(^{24}Mg,n3pγ),^{24}Mg(^{28}Si,n3pγ) 2002Br42 (continued)

γ(^{48}V) (continued)

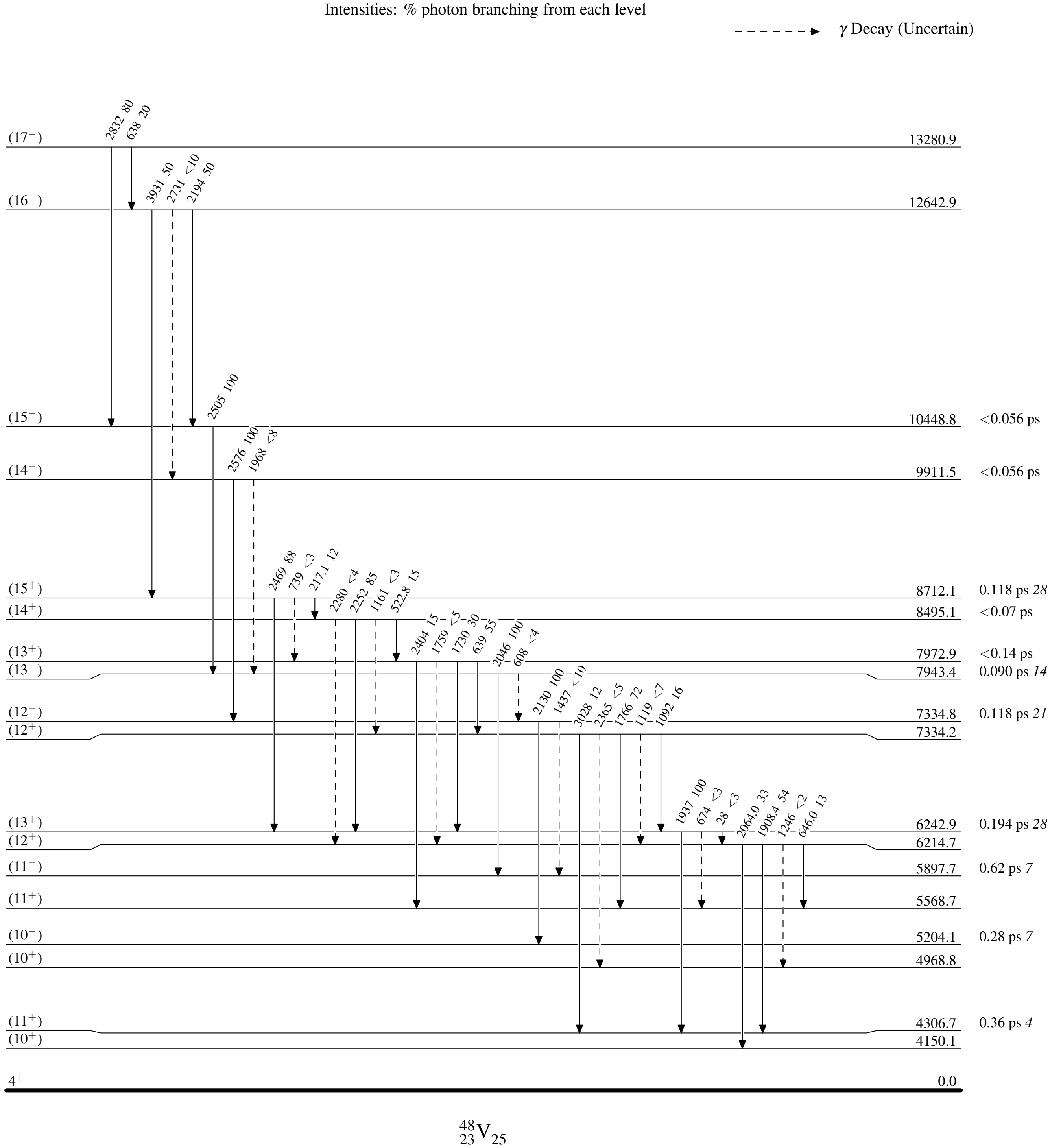
E_i(level)	J^{π}_i	E_γ †	I_γ †	E_f	J^{π}_f	Comments
13280.9	(17⁻)	638 *1*	20 *10*	12642.9	(16⁻)	I_{rel}=0.3.
		2832 *2*	80 *10*	10448.8	(15⁻)	I_{rel}=1.1.

† From 2002Br42. Quoted values of Iγ are for %photon branching from each level, obtained by gating on a feeding transition (2002Br42). Relative intensities (I_{rel}) are given under comments, obtained by gating on lower transitions.
‡ Multiply placed with intensity suitably divided.

$^{28}Si(^{24}Mg,n3p\gamma),^{24}Mg(^{28}Si,n3p\gamma)$ 2002Br42

Level Scheme

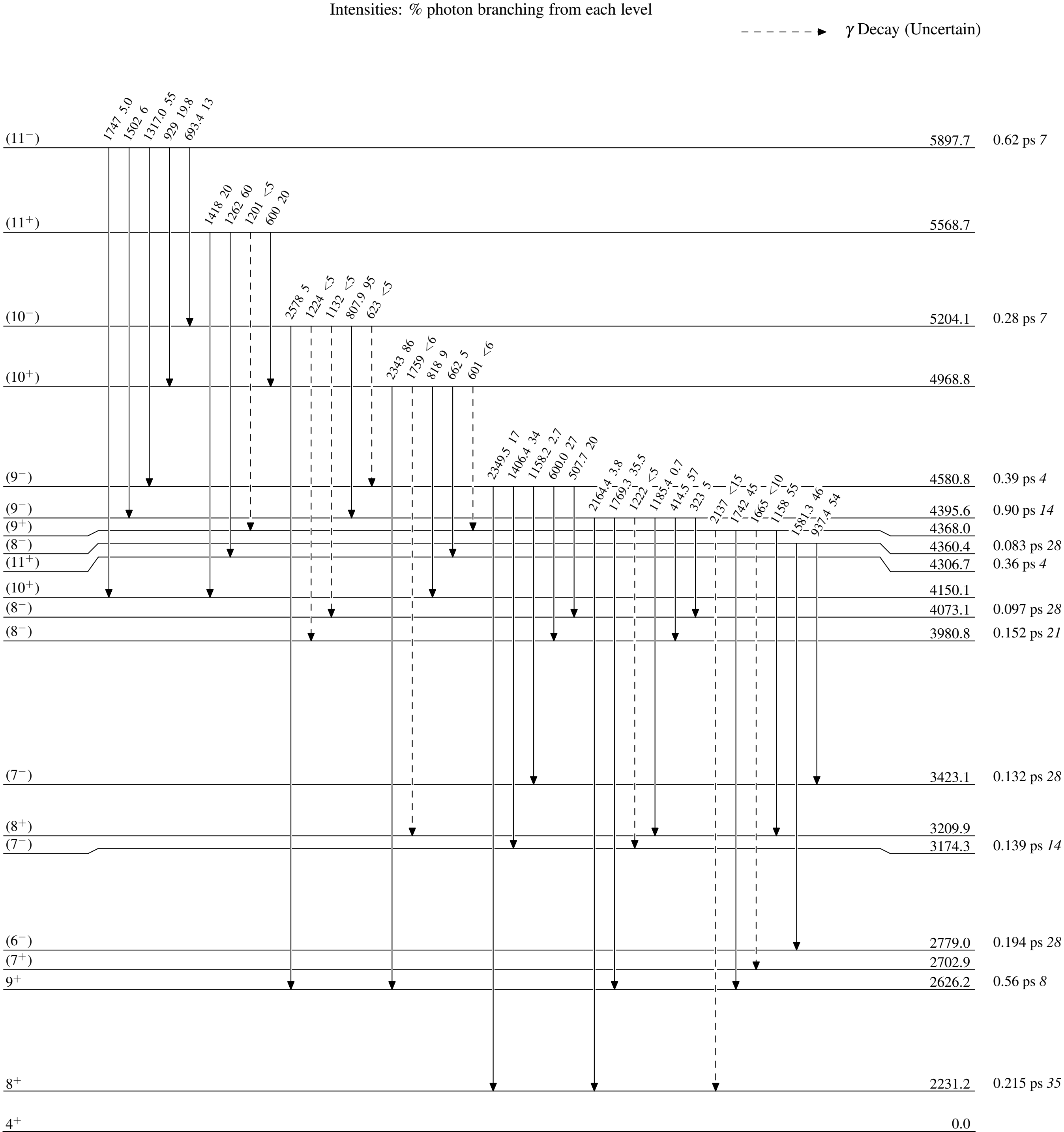
Intensities: % photon branching from each level



^{28}Si(^{24}Mg,n3pγ),^{24}Mg(^{28}Si,n3pγ) 2002Br42

Level Scheme (continued)

Intensities: % photon branching from each level

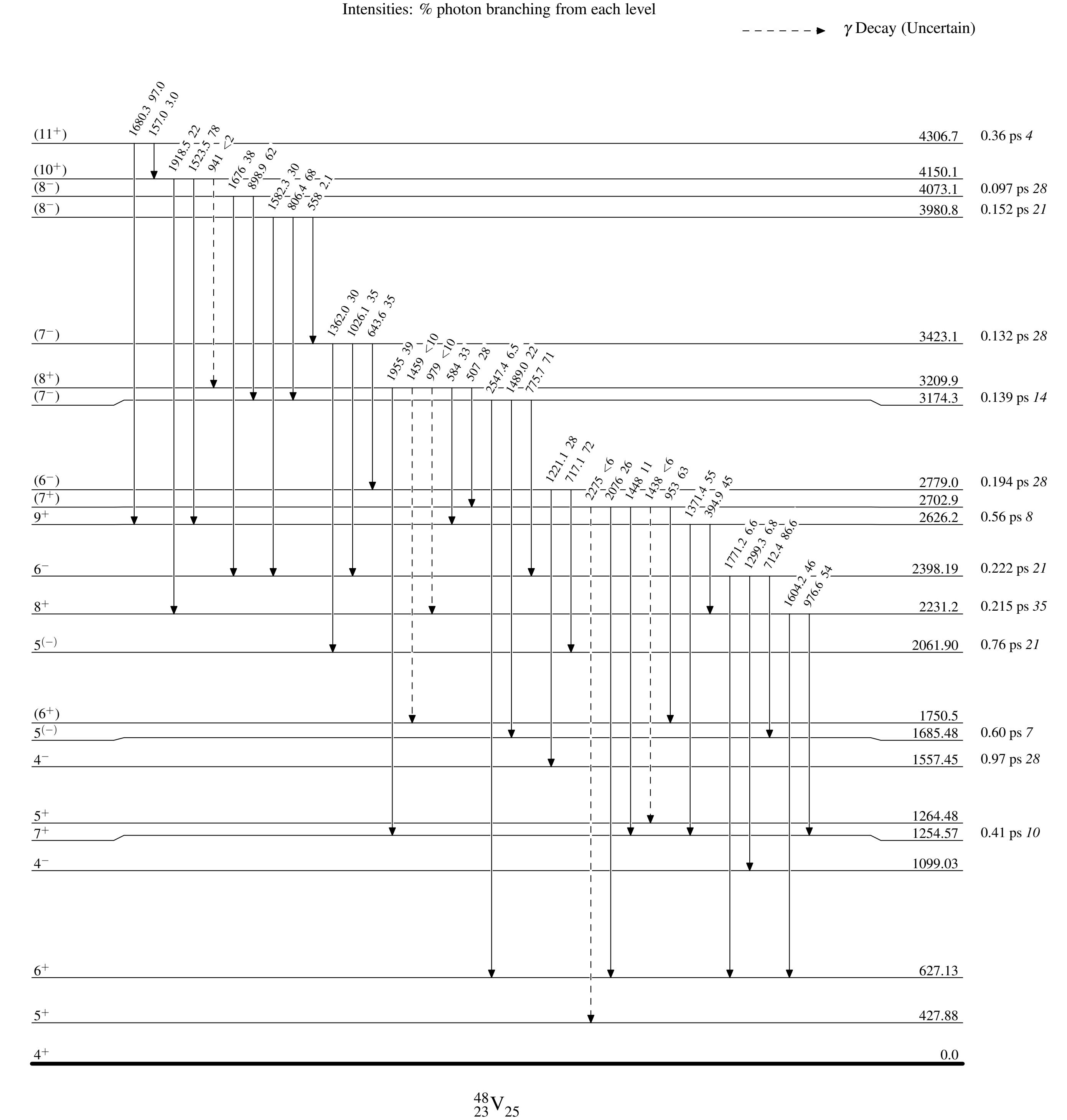


$^{48}_{23}V_{25}$

^{28}Si(^{24}Mg,n3pγ),^{24}Mg(^{28}Si,n3pγ) 2002Br42

Level Scheme (continued)

Intensities: % photon branching from each level



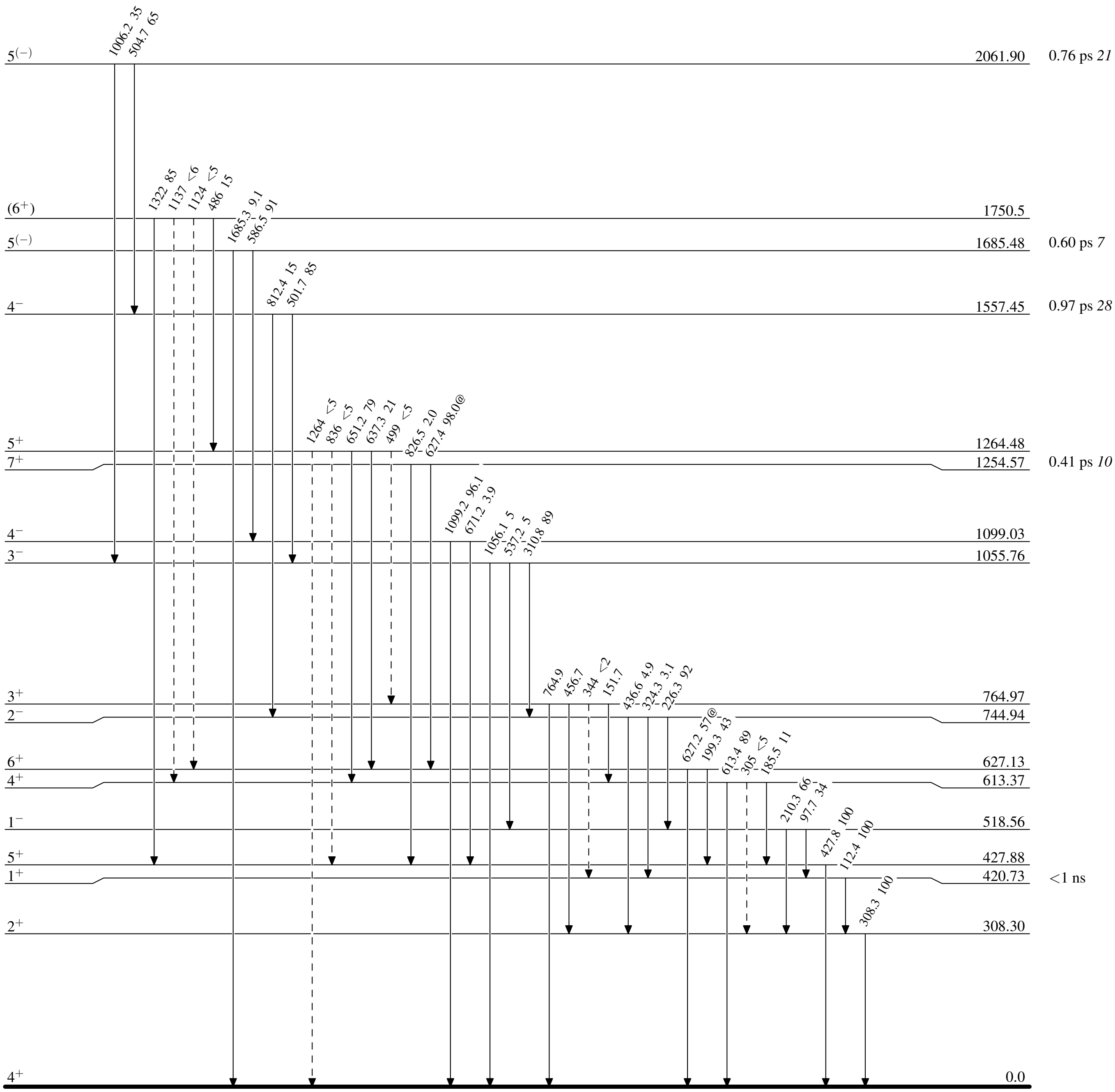
^{28}Si(^{24}Mg,n3pγ),^{24}Mg(^{28}Si,n3pγ) 2002Br42

Level Scheme (continued)

Intensities: % photon branching from each level
@ Multiply placed: intensity suitably divided

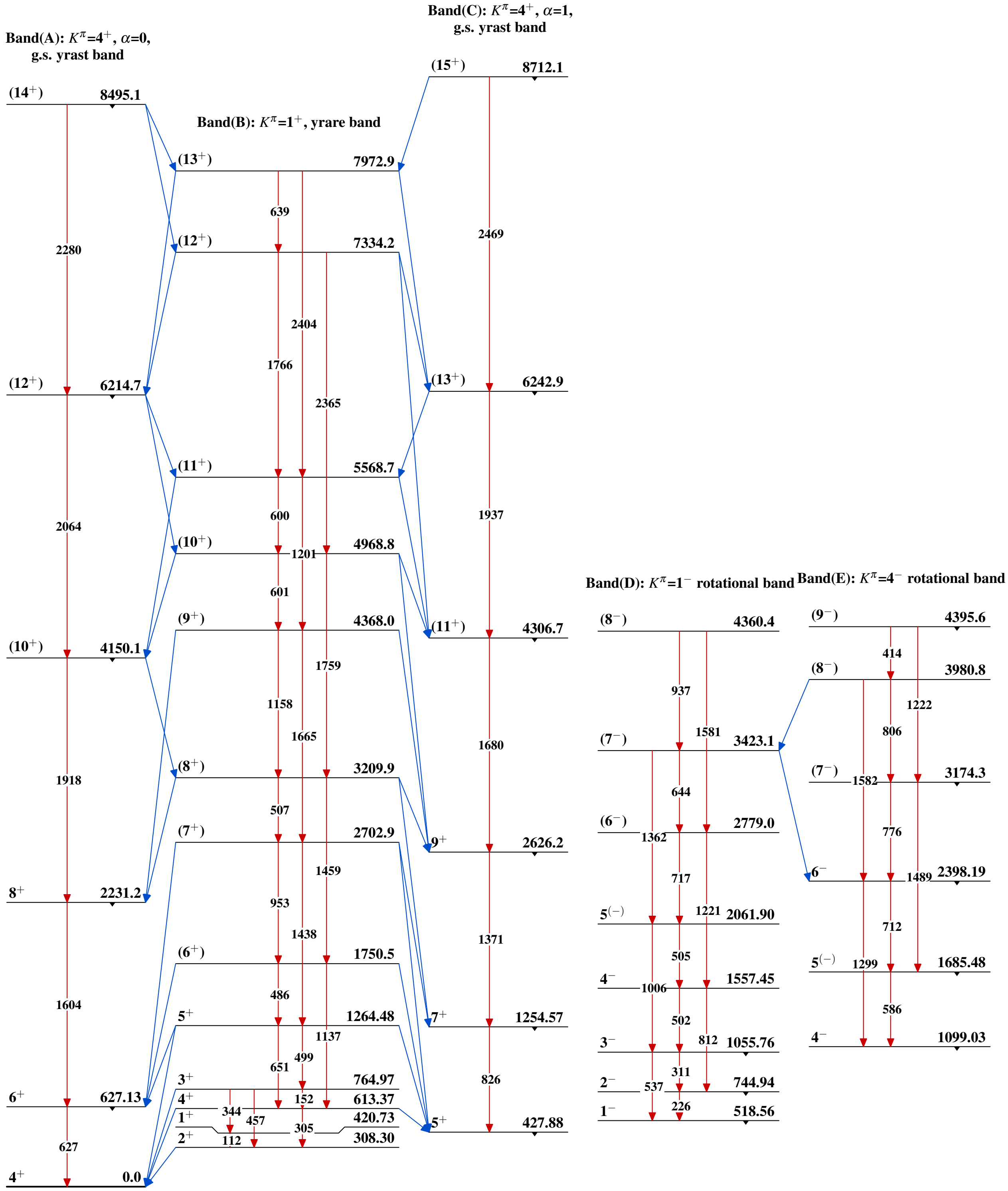
Legend

γ Decay (Uncertain)



$^{48}_{23}V_{25}$

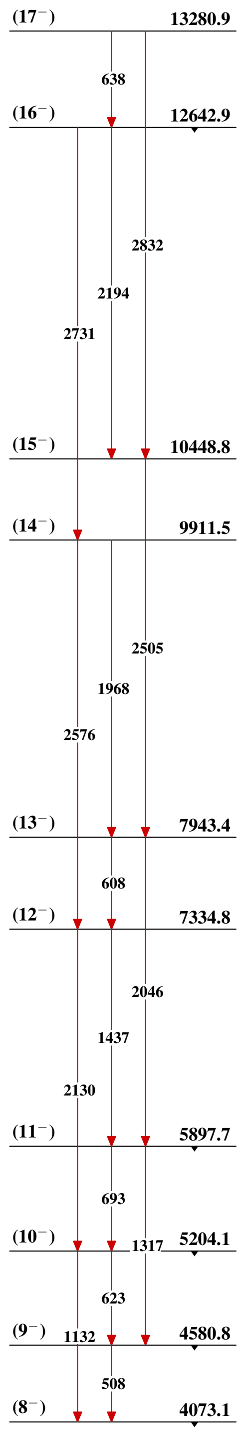
$^{28}Si(^{24}Mg,n3p\gamma),^{24}Mg(^{28}Si,n3p\gamma)$ 2002Br42



$^{48}_{23}V_{25}$

^{28}Si(^{24}Mg,n3pγ),^{24}Mg(^{28}Si,n3pγ) 2002Br42 (continued)

Band(F): K^{π}=8^{-} rotational band



$^{48}_{23}V_{25}$