Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 158, 1 (2019)	16-May-2019

Q(β^-)=−345 *4*; S(n)=6782.94 *5*; S(p)=9998.2 *8*; Q(α)=−5304.6 *8* 2017Wa10
S(2n)=17533.7 *8*, S(2p)=18546.7 *27* (2017Wa10).
Other measurements:
1977BiZS: ^{74}Ge(pol d,t) E=16 MeV.
1982En04: (α,α) E=25 MeV, measured $\sigma(\theta)$.
1987Ro01: ^{73}Ge(d,^{3}He) E=25.2 MeV. Deduced g.s. proton occupation numbers.
1973Sa31, 1971Ka30: NMR study of ^{73}Ge.
1967Lu07: measured Larmor frequency relative to ^{2}H and ^{41}K.
Mass measurement: 1985El01 (also 1984ElZY), 1977De20 (also 1976De21).
Additional information 1.
See ^{72}Ge(n,γ),(n,n):resonances dataset for energies, J^π and widths for 16 neutron resonances from 0.252 to 39.6 keV.

^{73}Ge Levels

Cross Reference (XREF) Flags

A	^{73}Ga β^- decay (4.86 h)	F	^{72}Ge(n,γ) E=thermal	K	^{73}Ge(p,p′)
B	^{73}Ge IT decay (0.499 s)	G	^{72}Ge(n,γ),(n,n):resonances	L	^{74}Ge(p,d)
C	^{73}As ε decay (80.30 d)	H	^{72}Ge(d,p),(pol d,p)	M	^{74}Ge(^{3}He,α)
D	^{70}Zn(α,nγ)	I	^{73}Ge(γ,γ):Mossbauer	N	Coulomb excitation
E	^{70}Zn(^{7}Li,3npγ)	J	^{73}Ge(n,n′γ)		

E(level)†	J$^\pi$	T$_{1/2}$	XREF	Comments
0.0@	9/2$^+$	stable	ABCDEF HIJKLMN	μ=−0.8794677 *2* (1974Sa25,2014StZZ) Q=−0.196 *1* (1966Ch02,2008Py02,2016St14) Evaluated rms charge radius: <r^2>$^{1/2}$=4.0632 fm *14* (2013An02). T$_{1/2}$: >1.8×10^{23} y for charge non-conserving β^- decay (to ^{73}As) (2002Kl09); at 90% confidence limit. J$^\pi$: spin from microwave spectroscopy (1949To09); parity from L(d,p)=L(p,d)=L(^{3}He,α)=4 from 0$^+$. μ: from 1974Sa25 using NMR method. Others: 0.87917 *12* (1967Lu07), 1954Ak27, 1953Je16. Q: from 2008Py02 and 2016St14 evaluations: Measurements: −0.285 *43* (1966Ch02, from hyperfine structure constants in atomic beam method, this value corrected to −0.173 *26* by 1970Ol02 based on their hyperfine structure study for ^{69,71,75}Ge, and through private communication with authors of 1966Ch02); −0.21 *10* (1949To09, microwave spectroscopy, also Mays and Townes: Phys. Rev. 81, 940 (1951)). See 1999Ke17 for calculation of nuclear quadrupole moment from microwave data, and 1962Ko22 for theoretical calculation of electric field gradients for ^{73}Ge.
13.2845 *15*	5/2$^+$	2.91 μs *3*	ABC EF HIJ L N	μ=−1.08 *3* (1993Co17,2014StZZ) Q=0.70 *8* (1993Co17,2016St14) J$^\pi$: L(d,p)=2 from 0$^+$; 13.3γ E2 to 9/2$^+$. T$_{1/2}$: weighted average of 2.92 μs *2* from γ-(K x ray)(t) in ^{73}As ε decay and 2.88 μs *7* from delayed-coincidence summing in ^{73}Ge IT decay. μ,Q: from 1993Co17 using TDPAC. Other: μ=−0.0941 *25* (1975Ha37); Q=−0.4 *3* (1983Pf02, Mossbauer effect).
66.725 *9*	1/2$^-$	0.499 s *11*	ABC EF H J L	%IT=100 J$^\pi$: L(pol d,p)=1 and analyzing power; 53.44γ M2 to 5/2$^+$. T$_{1/2}$: from delayed γ-ray spectra in ^{73}Ge IT decay (1974Bu14).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{73}Ge Levels (continued)

E(level)[†]	Jπ	$T_{1/2}$	XREF	Comments
68.752[&] *7*	7/2+	1.78 ns *11*	A DEF IJK N	Jπ: 68.75γ M1+E2 to 9/2+ and 430.4γ M1+E2 from 7/2+ gives 7/2+ or 9/2+; 9/2+ is ruled out by 799.2γ Q (ΔJ=2) from the 868 level which has spin limited in (7/2,11/2) based on its 868.0γ D (ΔJ=1) to 9/2+ ground state. This also further determines J=11/2 for 868 level. See also comments for 868 level. $T_{1/2}$: weighted average of 1.86 ns *10* from Mossbauer Γ in (γ,γ):Mossbauer and 1.62 ns *14* from γ(t) in Coulomb excitation.
353.70[‡] *16*	(5/2)−		A DEF H J LM	Jπ: L(p,d)=L(^{3}He,α)=3 from 0+; 5/2 supported by shell model calculation (see 1976Fo07 in ^{73}Ga β^- decay).
364.03[#] *4*	3/2−		A EF H J L	Jπ: L(pol d,p)=L(p,d)=1 from 0+ and L+1/2 transfer from analyzing power in (pol d,p).
392.47 *5*	3/2−		A EF H J L	Jπ: L(pol d,p)=L(p,d)=1 from 0+ and L+1/2 transfer from analyzing power in (pol d,p).
499.07 *12*	7/2+		EF Jk mN	Jπ: 499.0γ M1+E2 (ΔJ=1) to 9/2+ and 485.9γ M1+E2 to 5/2+. $T_{1/2}$: 2.2 ps *+38−13* from B(E2)↑=0.0091 *5* and 499.0γ branching ratio=3.4% according to εB(E2)↑ ratio with the assumption of δ(E2/M1)=+1.2 *+5−7* for 499.0γ in 1972Sa27 in Coulomb excitation.
501.49 *15*	5/2+		F H JkLm	Jπ: L(pol d,p)=2 from 0+ and L+1/2 transfer from analyzing power in (pol d,p).
551? *10*	(5/2 to 13/2)+		K	Jπ: L(p,p′)=2 from 9/2+.
554.91 *8*	1/2+		A F H J L	Jπ: L(d,p)=L(p,d)=0 from 0+.
597.64 *20*	5/2−		F H J LM	Jπ: L(p,d)=L(^{3}He,α)=3 from 0+; 531γ to 1/2−.
639 *10*			M	
658.99 *10*	9/2+		D H JK	Jπ: L(pol d,p)=4 from 0+ and L+1/2 transfer from analyzing power.
741.6[#] *6*	7/2(−)		DE H J	XREF: H(727). Jπ: 741.5γ D (ΔJ=1) to 9/2+, 377.8γ Q (ΔJ=2) to 3/2−; band assignment.
776.66 *20*	3/2+,5/2+		F H JKL	XREF: F(?). Jπ: L(p,d)=2 from 0+.
809 *2*	5/2−,7/2−		LM	Jπ: L(p,d)=L(^{3}He,α)=3 from 0+.
820 *5*			H	
825.80[@] *10*	13/2+	2.68 ps *14*	DE JKL N	Jπ: 825.8γ E2 (ΔJ=2) to 9/2+; 5/2 is ruled out by γ(θ) in Coulomb excitation. $T_{1/2}$: from B(E2)↑=0.077 *4* in Coulomb excitation for J=13/2.
868.02[&] *7*	11/2+		DE JK N	Jπ: 868.0γ D (ΔJ=1) to 9/2+ determines J=7/2 or 11/2; 7/2 is ruled out by 799.2γ Q (ΔJ=2) to 68.75 level which has spin limited in (7/2,9/2) based on other evidence; π=+ from Coulomb excitation from 9/2+. This also further determines J=7/2 for 68.75 level. See also comments for 68.75 level.
894.1 *4*	1/2−,3/2−		A H J LM	Jπ: L(d,p)=L(p,d)=1 from 0+.
904 *5*	1/2−,3/2−		H	Jπ: L(d,p)=1 from 0+.
906.7 *7*	(5/2+)		J	Jπ: 5/2 from yield in (n,n′γ); 906.7γ to 9/2+.
915.45 *17*	5/2+		A F JKL	XREF: K(918)L(911). Jπ: L(p,d)=2 from 0+; weak 915.8γ to 9/2+; L(p,p′)=2 from 9/2+; J=5/2 also from yield in (n,n′γ).
931.73 *9*	(1/2+)		F H J L	Jπ: 1/2 from yield in (n,n′γ); 430.2γ to 5/2+.
993.7 *3*	(9/2)+		JK N	Jπ: 9/2 from yield in (n,n′γ); π=+ from Coulomb excitation from 9/2+.
1010.1 *6*	(5/2+)		E J	Jπ: 5/2 from yield in (n,n′γ); 1010.2γ to 9/2+.
1027 *5*			LM	E(level): weighted average of 1026 *5* from (p,d) and 1027 *5*

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{73}Ge Levels (continued)

E(level)†	J$^{\pi}$	XREF	Comments
			from (^{3}He,α).
1039 *4*	(5/2 to 13/2)$^+$	K	J$^{\pi}$: L(p,p′)=2 from 9/2$^+$.
1042.54 *6*	3/2$^-$	F H J L	J$^{\pi}$: L(pol d,p)=1 from 0$^+$ and L+1/2 transfer from analyzing power.
1130.3‡ *8*	(9/2$^-$)	DE J	J$^{\pi}$: 776.6γ Q (ΔJ=2) to (5/2)$^-$; band assignment.
1131.6 *10*	(5/2,7/2,9/2)$^+$	JK	J$^{\pi}$: L(p,p′)=2 from 9/2$^+$ gives (5/2 to 13/2)$^+$; 1062.8γ to 7/2$^+$; 1085.5γ from 5/2$^+$; yield in (n,n′γ) supports 7/2.
1131.87 *5*	1/2$^-$	A F H J l	J$^{\pi}$: L(pol d,p)=1 from 0$^+$ and L-1/2 transfer from analyzing power.
1133 *3*	5/2$^-$,7/2$^-$	l	J$^{\pi}$: L(p,d)=3(+1) from 0$^+$. L=(1) component probably corresponds to 1131.9, 1/2$^-$ level.
1152 *3*	5/2$^-$,7/2$^-$	LM	E(level): weighted average of 1153 *3* from (p,d) and 1150 *5* from (^{3}He,α). J$^{\pi}$: L(p,d)=3 and L(^{3}He,α)=(3) from 0$^+$.
1176 *10*		H	
1192 *3*		L	E(level),J$^{\pi}$: L(p,d)=3+4 implies doublet.
1246 *5*		M	
1260 *10*	1/2$^+$	H	J$^{\pi}$: L(d,p)=0 from 0$^+$.
1264.43 *6*	3/2$^-$	F J L	J$^{\pi}$: L(p,d)=1 from 0$^+$; 1250.1γ to 5/2$^+$; 3/2 supported by yield in (n,n′γ).
1312.7 *10*	1/2$^-$,3/2$^-$	h J LM	XREF: h(1322)M(1307). J$^{\pi}$: L(p,d)=1 from 0$^+$; 3/2 supported by yield in (n,n′γ).
1318 *10*	(5/2 to 13/2)$^+$	h K	XREF: h(1322). E(level): from (p,p′). J$^{\pi}$: L(p,p′)=2 from 9/2$^+$.
1339.73 *25*	(5/2)$^+$	F H JK	XREF: H(1329). J$^{\pi}$: L(p,p′)=2 from 9/2$^+$; 975.9γ to 3/2$^-$ and 784.7γ to 1/2$^+$; but 1/2 from yield in (n,n′γ) is inconsistent.
1386.1 *3*	(3/2$^-$)	A F H J	XREF: H(1376)J(1388.6). J$^{\pi}$: log *ft*=5.9 *1* from 3/2$^-$ parent; 3/2 from yield in (n,n′γ); primary 5395.9γ from 1/2$^+$ neutron capture state in (n,γ) E=thermal.
1525.3# *10*	11/2$^{(-)}$	DE J	J$^{\pi}$: 783.8γ Q (ΔJ=2) to 7/2$^{(-)}$ and band assignment. But J=(5/2,7/2) from yield in (n,n′γ) is inconsistent.
1528 *4*	5/2$^-$,7/2$^-$	L	J$^{\pi}$: L(p,d)=3 from 0$^+$.
1544.5? *15*		F	
1599 *10*	1/2$^+$	H	J$^{\pi}$: IAR of 1/2$^+$ state in ^{73}As; L(d,p)=(0) from 0$^+$.
1610.20 *12*	9/2$^+$	DE Jkl	XREF: k(1614)l(1611). J$^{\pi}$: 742.2γ D+Q (ΔJ=1) to 11/2$^+$; 9/2 from yield in (n,n′γ); it corresponds to the L(p,d)=4 component of the L(p,d)=3+4 doublet at 1611 *7*, and the L=3 component then corresponds to the 1624 *5* level in (^{3}He,α) with L=(3).
1624 *5*	5/2$^-$,7/2$^-$	lM	XREF: l(1611). E(level): from (^{3}He,α). J$^{\pi}$: L(^{3}He,α)=(3) from 0$^+$; L(p,d)=3 component of the L(p,d)=3+4 doublet at 1611. See also comments for 1610 level.
1633 *5*	5/2$^+$	H kL	XREF: k(1614)L(1635). E(level): weighted average of 1623 *10* in (pol d,p) and 1635 *5* in (p,d). J$^{\pi}$: L(pol d,p)=L(p,d)=2 from 0$^+$ and L+1/2 transfer from analyzing power.
1659 *10*		K	
1742 *5*	1/2$^+$	H L	E(level): weighted average of 1744 *5* in (p,d) and 1733 *10* in (d,p). J$^{\pi}$: L(d,p)=L(p,d)=0 from 0$^+$.
1757.9 *13*	7/2$^+$,9/2$^+$	H JKL	XREF: K(1767). J$^{\pi}$: L(d,p)=4 from 0$^+$; 7/2 supported by yield in (n,n′γ).
1804 *10*	3/2$^+$,5/2$^+$	H	J$^{\pi}$: L(d,p)=2 from 0$^+$.
1871.61@ *23*	17/2$^{(+)}$	DE J	J$^{\pi}$: 1045.9γ Q (ΔJ=2) to 13/2$^+$; 17/2 from yield in (n,n′γ); band assignment.
1892.1? *5*		F	
1912.4 *10*	5/2$^+$	H J	J$^{\pi}$: L(pol d,p)=2 from 0$^+$ and L+1/2 transfer from analyzing power.
1931.2& *7*	15/2$^{(+)}$	E	J$^{\pi}$: 1062.9γ Q (ΔJ=2) to 11/2$^+$, 1105.6γ D (ΔJ=1) to 13/2$^+$; band assignment.
1962 *10*	5/2$^+$	H	J$^{\pi}$: L(pol d,p)=2 from 0$^+$ and L+1/2 transfer from analyzing power.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{73}Ge Levels (continued)

E(level)[†]	J^π	XREF	Comments
1994.2 *10*	3/2+,5/2+	H J	J^π: L(d,p)=2 from 0+; yield in (n,n′γ) supports 5/2.
2003.7[‡] *10*	(13/2−)	DE	J^π: 873.4γ Q (ΔJ=2) to (9/2−), 478.4γ to 11/2(−); band assignment.
2003.8 *7*	(5/2+)	J	J^π: from yield in (n,n′γ); 2004.1γ to 9/2+.
2038.1 *10*	1/2−,3/2−	H J L	XREF: H(2030). J^π: L(p,d)=1 from 0+; 1/2 supported by yield in (n,n′γ). But L(d,p)=(2) is inconsistent.
2066.0 *10*	1/2+	H J	J^π: L(d,p)=0 from 0+.
2088 *10*	3/2+,5/2+	H K	J^π: L(d,p)=2 from 0+.
2101.2 *11*	(5/2+)	JKL	J^π: L(p,d)=(2); 5/2+ supported by yield in (n,n′γ).
2132.1 *15*	1/2−,3/2−	F L	J^π: L(p,d)=1 from 0+.
2141.5 *10*	3/2+,5/2+	J L	J^π: L(p,d)=2 from 0+; 3/2 supported by yield in (n,n′γ).
2164 *10*		H	
2188.7 *9*	1/2−,3/2−	F J L	J^π: L(p,d)=1 from 0+; 1/2 supported by yield in (n,n′γ).
2210.5? *15*		F	
2217.1 *15*	5/2+	H J	XREF: H(2225). J^π: L(pol d,p)=2 and L+1/2 transfer from analyzing power; 5/2 also supported by yield in (n,n′γ).
2267 *7*	1/2−,3/2−	L	J^π: L(p,d)=1 from 0+.
2290.8? *15*		F	
2312 *10*	3/2+,5/2+	H	J^π: L(d,p)=2 from 0+.
2319.3 *8*	3/2+	H J	XREF: H(2319). J^π: L(pol d,p)=2 from 0+ and L-1/2 transfer from analyzing power; 3/2 also supported by yield in (n,n′γ).
2335 *5*	1/2−,3/2−	H L	E(level): from (p,d). Other: 2337 *10* from (d,p). J^π: L(p,d)=1 from 0+.
2360.0[#] *12*	15/2(−)	E K	XREF: K(2364). J^π: 834.7γ Q (ΔJ=2) to 11/2(−); band assignment; a 2364 *10* in (p,p′) with L(p,p′)=3 from 9/2+ could be the same level.
2361.1? *11*	(1/2+)	J	J^π: 1/2 from yield in (n,n′γ); 1445.6γ to 5/2+.
2374 *10*	1/2+	H	J^π: L(d,p)=0 from 0+.
2401.6? *15*		F	
2419.3? *15*		F	
2454? *10*	(3/2 to 15/2)−	Kl	XREF: l(2462). J^π: L(p,p′)=3 from 9/2+.
2459 *10*	1/2+	H l	XREF: l(2462). J^π: L(d,p)=0 from 0+.
2470 *10*		H l	XREF: l(2462).
2483.5 *15*	1/2−,3/2−	F H L	XREF: H(2470). J^π: L(p,d)=1 from 0+.
2508 *7*	1/2−,3/2−	L	J^π: L(p,d)=1 from 0+.
2564.9 *15*	1/2−,3/2−	F L	J^π: L(p,d)=1 from 0+.
2576 *10*	5/2+	H	J^π: L(pol d,p)=2 from 0+ and L+1/2 transfer from analyzing power.
2618 *10*	(3/2+,5/2+)	H	J^π: L(d,p)=(2) from 0+.
2678 *7*	1/2−,3/2−	H L	XREF: H(2683). J^π: L(p,d)=1 from 0+, but L(d,p)=(2) for a level at 2683 *10* is inconsistent.
2696 *7*	1/2−,3/2−	l	J^π: L(p,d)=1 from 0+.
2706.4? *16*		F l	XREF: l(2696). E(level): possibly same as 2696 level.
2720.5? *15*		F	E(level): possibly same as 2732 level.
2732 *10*	1/2+	H	J^π: L(d,p)=0 from 0+.
2743 *7*	3/2+,5/2+	H L	J^π: L(p,d)=L(d,p)=2 from 0+.
2760.5 *10*		E	
2774.8? *15*		F	
2796 *7*	5/2−,7/2−	L	J^π: L(p,d)=3 from 0+.
2815.0[‡] *12*	(17/2−)	E	J^π: 811.3γ Q (ΔJ=2) to (13/2−), 455.0γ to 15/2(−); band assignment.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{73}Ge Levels (continued)

E(level)[†]	J^π	XREF	Comments
2836 *7*	(3/2$^+$,5/2$^+$)	H L	E(level): weighted average of 2831 *7* from (p,d) and 2846 *10* from (d,p). J^π: L(d,p)=(2) from 0$^+$.
2884.5? *15*		F	
2915 *10*	1/2$^+$	H	J^π: L(d,p)=0 from 0$^+$.
2930.5? *15*		F	
2973 *10*		H	
3006.8 *12*	(17/2$^-$)	E	J^π: proposed in (^{7}Li,3npγ) based on band structure.
3017 *7*	1/2$^-$,3/2$^-$	L	J^π: L(p,d)=1 from 0$^+$.
3037 *7*	1/2$^-$,3/2$^-$	H L	E(level): from (p,d). Other: 3037 *15* from (d,p). J^π: L(p,d)=1 from 0$^+$.
3058 *7*	1/2$^-$,3/2$^-$	L	J^π: L(p,d)=1 from 0$^+$.
3172 *7*	1/2$^-$,3/2$^-$	H L	E(level): from (p,d). Other: 3178 *15* from (d,p). J^π: L(p,d)=1 from 0$^+$.
3181.1[@] *11*	21/2$^{(+)}$	E	J^π: 1309.5γ Q (ΔJ=2) to 17/2$^{(+)}$; band assignment.
3199.4[&] *13*	(19/2$^+$)	E	J^π: band assignment.
3222.0[#] *15*	19/2$^{(-)}$	E	J^π: 862.0γ Q (ΔJ=2) to 15/2$^{(-)}$; band assignment.
3223 *15*		H	
3277 *15*		H	
3305 *15*		H	
3356 *7*	1/2$^-$,3/2$^-$	H L	E(level): from (p,d). Other: 3356 *15* from (d,p). J^π: L(p,d)=1 from 0$^+$.
3384 *7*		L	
3418 *15*	3/2$^+$,5/2$^+$	H	J^π: L(d,p)=2 from 0$^+$.
3514 *15*	(1/2$^+$)	H	J^π: L(d,p)=(0) from 0$^+$.
3551 *15*	(1/2$^+$)	H	J^π: L(d,p)=(0) from 0$^+$.
3623 *10*	(1/2 to 7/2)$^-$	L	J^π: L(p,d)=1+3 for a possible doublet.
3631 *7*		L	
3703 *7*		L	
3727 *15*	(3/2$^+$,5/2$^+$)	H	J^π: L(d,p)=(2) from 0$^+$.
3766 *15*	(3/2$^+$,5/2$^+$)	H	J^π: L(d,p)=(2) from 0$^+$.
3806 *10*		H L	E(level): weighted average of 3809 *15* from (d,p) and 3805 *10* from (p,d).
3849 *15*		H	
3875.5[‡] *13*	(21/2$^-$)	E	J^π: band assignment.
3923 *7*	1/2$^-$,3/2$^-$	H L	E(level): weighted average of 3918 *15* from (d,p) and 3924 *7* from (p,d). J^π: L(p,d)=1 from 0$^+$.
3945 *7*		L	
4002 *7*		H L	E(level): weighted average of 4009 *15* from (d,p) and 4000 *7* from (p,d). J^π: L(p,d)=(1+4).
4059 *7*		L	
4073 *7*		L	
4370 *7*		L	
4437 *7*		L	
4569 *7*		L	
4601 *7*		L	
4609.4 *15*	(25/2$^+$)	E	J^π: proposed in (^{7}Li,3npγ) assuming Mult(1428.3)=E2.
4653 *7*		L	
4667 *7*		L	
(6782.95 *5*)	1/2$^+$	F	J^π: s-wave capture in 0$^+$.

† From least-squares fit to γ-ray energies for levels from γ-ray studies, $\Delta E\gamma$=0.3 keV assumed if not given. Others are from particle-transfer reactions as noted.

‡ Band(A): $\nu f_{5/2}$ band, α=+1/2.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{73}Ge Levels (continued)

[#] Band(a): $\nu f_{5/2}$ band, $\alpha=-1/2$.
[@] Band(B): $\nu g_{9/2}$ band, $\alpha=+1/2$.
[&] Band(b): $\nu g_{9/2}$ band, $\alpha=-1/2$.

$\gamma(^{73}Ge)$

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.	δ	α‡	Comments
13.2845	5/2$^+$	13.2845 *15*	100	0.0	9/2$^+$	E2		1063	α(K)=299 *5*; α(L)=666 *10*; α(M)=96.5 *14* α(N)=1.529 *22* B(E2)(W.u.)=24.38 *42* E_γ: from ^{73}As ε decay. Others: 13.26 *5* from (n,γ) E=thermal. Mult.: from measured conversion coefficients in ^{73}As ε decay.
66.725	1/2$^-$	53.440 *9*	100	13.2845	5/2$^+$	M2		8.42	α(K)=7.20 *10*; α(L)=1.054 *15*; α(M)=0.1600 *23* α(N)=0.00926 *13* B(M2)(W.u.)=0.000867 *22* E_γ: weighted average of 53.437 *9* from ^{73}As ε decay, 53.45 *5* from ^{73}Ga β^- decay, 53.53 *6* from ^{73}Ge it decay, and 53.47 *5* from (n,γ) E=thermal. Mult.: from measured conversion coefficients in ^{73}As ε decay.
68.752	7/2$^+$	55.42 *10*		13.2845	5/2$^+$				E_γ: from (n,γ) E=thermal, with intensity negligible compared to I(68.753γ) from Fig. 3 of 1972We10.
		68.752 *7*	100	0.0	9/2$^+$	M1+E2	0.074 *4*	0.238	α(K)=0.211 *4*; α(L)=0.0234 *4*; α(M)=0.00350 *6* α(N)=0.000219 *4* B(M1)(W.u.)=0.0306 *19*; B(E2)(W.u.)=50 *6* E_γ: from Coulomb excitation. Others: 68.7 *2* from ^{73}Ga β^- decay, 68.9 *1* from (α,nγ), 68.84 *5* from (n,γ) E=thermal. Mult.: from Coulomb excitation and α(exp) in (n,γ) E=thermal. δ: from measured B(E2)↑=0.073 *7* in Coulomb excitation, adopted $T_{1/2}$ and theoretical α(M1) and α(E2) by BrIcc code. Other: δ=0.52 *13* from α(exp)=0.81 *22* in (n,γ) E=thermal and theoretical α(M1) and α(E2) values, but with the adopted $T_{1/2}$, it would give an unreasonably large B(E2)(W.u.)=1330, greatly exceeding RUL.
353.70	(5/2)$^-$	284.8 *2*	100.0 *16*	68.752	7/2$^+$	(D)			E_γ: weighted average of 284.9 *2* from ^{73}Ga β^- decay and 284.7 *2* from (n,γ) E=thermal. I_γ,Mult.: from (^{7}Li,3npγ), Mult. from γ(DCO).
		340.5	12.2 *22*	13.2845	5/2$^+$				E_γ: from (^{7}Li,3npγ) and (n,n′γ); no uncertainty is given. I_γ: unweighted average of 10.0 *5* from (^{7}Li,3npγ) and 14.4 *3* from (n,n′γ).
364.03	3/2$^-$	297.30 *5*	100 *2*	66.725	1/2$^-$				E_γ: weighted average of 297.32 *5* from ^{73}Ga β^- decay and 297.24 *8* from (n,γ) E=thermal.
		351.0 *4*	0.26 *4*	13.2845	5/2$^+$				I_γ: other: 2 *1* in (n,n′γ).
392.47	3/2$^-$	325.73 *9*	100 *2*	66.725	1/2$^-$				E_γ: weighted average of 325.70 *7* from ^{73}Ga β^- decay and 326.0 *2* from (n,γ) E=thermal.
		379.2 *1*	4.4 *2*	13.2845	5/2$^+$				
499.07	7/2$^+$	430.3 *2*	100	68.752	7/2$^+$	M1+E2		0.0029 *10*	E_γ: weighted average of 430.2 *2* from (n,γ) E=thermal and 430.4 *2* from coulomb excitation. I_γ: from Coulomb excitation. Other: 100 *2* from (n,n′γ). Mult.,δ: from Coulomb excitation based on $\gamma(\theta)$ and RUL with δ=+0.59 *+4−6* or −5.0 *10*.

$\gamma(^{73}Ge)$ (continued)

E_i(level)	J^{π}_i	E_{γ}†	I_{γ}†	E_f	J^{π}_f	Mult.	δ	α‡	Comments
499.07	7/2+	485.9 *2*	17.7 *14*	13.2845	5/2+	M1+E2	+3.7 *1*	0.00250	E_{γ},I_{γ}: from Coulomb excitation. Other: 485.3 *15* with Iγ=4.3 *5* in (n,γ) E=thermal. Mult.,δ: from Coulomb excitation based on γ(θ) and RUL.
		499.0 *2*	2.9 *5*	0.0	9/2+	M1+E2		0.0019 *5*	B(M1)(W.u.)=0.0008 *5*; B(E2)(W.u.)=6.3 *4* E_{γ},I_{γ}: from Coulomb excitation. Other: Iγ=0.5 in (n,n′γ). Mult.,δ: from Coulomb excitation based on γ(θ) and RUL with δ=+1.2 *+5−7* or +0.71 *+94−24*.
501.49	5/2+	432.7 *2*	100 *9*	68.752	7/2+				E_{γ},I_{γ}: from (n,γ) E=thermal.
		488.0# *2*	<80	13.2845	5/2+				E_{γ},I_{γ}: from (n,γ) E=thermal.
554.91	1/2+	191.0# *3*		364.03	3/2−				E_{γ}: from (n,γ) E=thermal only.
		488.2 *1*	21 *7*	66.725	1/2−				E_{γ}: ^{73}Ga β− decay. Other: 488.0 *2* in (n,γ) E=thermal. I_{γ}: from (n,n′γ). Others: <80 in (n,γ) E=thermal, 118 *8* in ^{73}Ga β− decay.
		541.8 *2*	100 *21*	13.2845	5/2+				E_{γ}: weighted average of 541.7 *2* from ^{73}Ga β− decay and 541.8 *2* from (n,γ) E=thermal. I_{γ}: from (n,n′γ). Others: 100 *5* in (n,γ) E=thermal, 100 *11* in (n,γ) E=thermal.
597.64	5/2−	233.6 *2*	77 *2*	364.03	3/2−				E_{γ}: from (n,γ) E=thermal. I_{γ}: from (n,n′γ). Other: 75 *16* in (n,γ) E=thermal.
		531.1 *10*	100 *4*	66.725	1/2−				E_{γ}: from (n,γ) E=thermal. I_{γ}: from (n,n′γ).
658.99	9/2+	590.0	39 *9*	68.752	7/2+				E_{γ},I_{γ}: from (n,n′γ).
		645.9	17.9 *9*	13.2845	5/2+				E_{γ},I_{γ}: from (n,n′γ).
		659.0 *1*	100 *2*	0.0	9/2+	(M1(+E2))	+0.03 *11*		E_{γ}: from (α,nγ). Other: 658.9 in (n,n′γ). I_{γ}: from (n,n′γ). Mult.,δ: D(+Q) from γ(θ) in (α,nγ).
741.6	7/2(−)	377.8	28 *2*	364.03	3/2−	Q			E_{γ}: from (^{7}Li,3npγ) and (n,n′γ). I_{γ}: weighted average of 29 *2* from (^{7}Li,3npγ) and 26 *2* from (n,n′γ). Mult.: from γ(DCO) in (^{7}Li,3npγ).
		387.7	100 *2*	353.70	(5/2)−	(D)			E_{γ},I_{γ}: from (^{7}Li,3npγ). Other: Iγ=100 3 in (n,n′γ). Mult.: from γ(DCO) in (^{7}Li,3npγ).
		741.5	40 *2*	0.0	9/2+	D			E_{γ},I_{γ}: from (^{7}Li,3npγ). Other: Iγ>6 in (n,n′γ). Mult.: from γ(DCO) in (^{7}Li,3npγ).
776.66	3/2+,5/2+	708.8	21 *4*	68.752	7/2+				E_{γ},I_{γ}: from (n,n′γ) only.
		763.3 *2*	100 *4*	13.2845	5/2+				E_{γ}: from (n,γ) E=thermal. Other: 764.1 in (n,n′γ). I_{γ}: from (n,n′γ).
825.80	13/2+	825.8 *1*	100	0.0	9/2+	E2		5.67×10^{-4}	B(E2)(W.u.)=30.3 *16*

From ENSDF

$\gamma(^{73}Ge)$ (continued)

E_i(level)	J_i^π	E_γ†	I_γ†	E_f	J_f^π	Mult.	Comments
							E_γ: weighted average of 825.8 *1* from (α,nγ) and 825.6 *2* from Coulomb excitation. Mult.: from Q+O with δ=+0.031 *+10−14* from $\gamma(\theta)$ in (α,nγ), Q from γ(DCO) in (^{7}Li,3npγ), and also from Coulomb excitation.
868.02	11/2$^+$	799.2 *1*	63 *2*	68.752	7/2$^+$	Q	E_γ: from (α,nγ). Other: 799.4 *5* from Coulomb excitation. I_γ: from Coulomb excitation. Others: 62 *4* from (^{7}Li,3npγ), 38 *2* from (n,n′γ). Mult.: from $\gamma(\theta)$ in (α,nγ) and γ(DCO) in (^{7}Li,3npγ).
		868.1 *1*	100	0.0	9/2$^+$	D	E_γ: from (α,nγ). Other: 868.0 *10* from Coulomb excitation. I_γ: from Coulomb excitation. Others: 100 *5* from (^{7}Li,3npγ), 100 *6* from (n,n′γ). Mult.: D+Q from $\gamma(\theta)$ in (α,nγ), D from γ(DCO) in (^{7}Li,3npγ).
894.1	1/2$^-$,3/2$^-$	501.6 *4*	100	392.47	3/2$^-$		
906.7	(5/2$^+$)	837.9	38 *5*	68.752	7/2$^+$		E_γ,I_γ: from (n,n′γ) only.
		906.7	100 *2*	0.0	9/2$^+$		E_γ,I_γ: from (n,n′γ) only.
915.45	5/2$^+$	561.6 *2*	100 *3*	353.70	(5/2)$^-$		E_γ: weighted average of 561.8 *4* from ^{73}Ga β^- decay and 560.3 *10* from (n,γ) E=thermal. Other: 562.5 in (n,n′γ). I_γ: from (n,n′γ).
		915.8	8 *1*	0.0	9/2$^+$		E_γ,I_γ: from (n,n′γ).
931.73	(1/2$^+$)	430.2 *2*	100	501.49	5/2$^+$		E_γ: from (n,γ) E=thermal.
993.7	(9/2)$^+$	335.3	6.9 *9*	658.99	9/2$^+$		E_γ,I_γ: from (n,n′γ) only.
		924.8 *4*	6.1 *4*	68.752	7/2$^+$		E_γ: from Coulomb excitation. Other: 925.3 in (n,n′γ). I_γ: from (n,n′γ). Other: 12 *2* in Coulomb excitation.
		993.9 *5*	100 *3*	0.0	9/2$^+$		E_γ: from Coulomb excitation. 993.9 also in (n,n′γ). I_γ: from (n,n′γ).
1010.1	(5/2$^+$)	412.4	100 *5*	597.64	5/2$^-$		
		617.6	63 *5*	392.47	3/2$^-$		
		1010.2	38 *8*	0.0	9/2$^+$		
1042.54	3/2$^-$	650.1 *4*	15 *5*	392.47	3/2$^-$		E_γ: from (n,γ) E=thermal. Other: 650.8 in (n,n′γ). I_γ: from (n,n′γ).
		679.3 *2*	15 *5*	364.03	3/2$^-$		E_γ: from (n,γ) E=thermal. 679.3 also in (n,n′γ). I_γ: from (n,n′γ).
		1030.0	100 *15*	13.2845	5/2$^+$		E_γ,I_γ: from (n,n′γ); not seen in (n,γ) E=thermal.
1130.3	(9/2$^-$)	776.6	100	353.70	(5/2)$^-$	Q	E_γ: from (n,n′γ). Mult.: from γ(DCO) in (^{7}Li,3npγ).
1131.6	(5/2,7/2,9/2)$^+$	1062.8	100	68.752	7/2$^+$		E_γ: from (n,n′γ).
1131.87	1/2$^-$	216.3 *4*	2.3 *6*	915.45	5/2$^+$		
		577.2 *3*	3.6 *9*	554.91	1/2$^+$		
		739.42 *5*	100 *6*	392.47	3/2$^-$		E_γ: others: 739.4 *6* in (n,γ) E=thermal, 739.4 in (n,n′γ). I_γ: other: 100 *14* in (n,γ) E=thermal.
		767.8 *1*	34 *2*	364.03	3/2$^-$		E_γ: others: 769.9 *6* in (n,γ) E=thermal, 768 in (n,n′γ). I_γ: others: 14 *2* in (n,γ) E=thermal, Iγ(768)/Iγ(739)=2.2 *11* in (n,n′γ).
		1065.1 *1*	30 *2*	66.725	1/2$^-$		
1264.43	3/2$^-$	1250.1 *15*	100	13.2845	5/2$^+$		E_γ: from (n,γ) E=thermal. Other: 1249.6 in (n,n′γ).
1312.7	1/2$^-$,3/2$^-$	920.2	100	392.47	3/2$^-$		E_γ: from (n,n′γ).

$^{73}_{32}Ge_{41}$-9

γ(^{73}Ge) (continued)

E_i(level)	J_i^π	E_γ†	I_γ†	E_f	J_f^π	Mult.	Comments
1339.73	(5/2)$^+$	784.7 3	87 14	554.91	1/2$^+$		E_γ,I_γ: from (n,γ) E=thermal. Other: Eγ=784.5, Iγ=40 20 in (n,n$'\gamma$). A 784.3γ is placed from 1610 level in (^{7}Li,3npγ).
		975.9 4	100 30	364.03	3/2$^-$		E_γ,I_γ: from (n,γ) E=thermal. Other: Eγ=975.4, Iγ=100 40 in (n,n$'\gamma$).
1386.1	(3/2$^-$)	993.6 3	100	392.47	3/2$^-$		E_γ: other: 996.1 in (n,n$'\gamma$).
1525.3	11/2$^{(-)}$	395.0#	6.9 7	1130.3	(9/2$^-$)		E_γ,I_γ: seen only in (^{7}Li,3npγ).
		783.8	100 3	741.6	7/2$^{(-)}$	Q	E_γ: from (n,n$'\gamma$). Other: 783.5 in (^{7}Li,3npγ). I_γ,Mult.: from (^{7}Li,3npγ); Mult. from γ(DCO). Other: Iγ=100 14 in (n,n$'\gamma$).
		1172.3#	11 3	353.70	(5/2)$^-$	[M3]	E_γ,I_γ: seen only in (n,n$'\gamma$). This γ is unlikely as it requires mult=M3.
1610.20	9/2$^+$	742.2 1	100 6	868.02	11/2$^+$	D+Q	E_γ: from (α,nγ). Others: 741.6 from (n,n$'\gamma$) and (^{7}Li,3npγ). I_γ: from (n,n$'\gamma$). Mult.,δ: +0.23 10 or +5.6 13 from $\gamma(\theta)$ in (α,nγ) giving ΔJ=1.
		784.3#	76 4	825.80	13/2$^+$		E_γ,I_γ: from (^{7}Li,3npγ). A γ at similar energy is placed from 1440 level in (n,γ) E=thermal and (n,n$'\gamma$).
		951.7	14 1	658.99	9/2$^+$		E_γ,I_γ: from (n,n$'\gamma$) only.
		1609.4 5	5 4	0.0	9/2$^+$		E_γ,I_γ: from (n,n$'\gamma$).
1757.9	7/2$^+$,9/2$^+$	851.2	100	906.7	(5/2$^+$)		E_γ: from (n,n$'\gamma$).
1871.61	17/2$^{(+)}$	1045.8 2	100	825.80	13/2$^+$	Q	E_γ: from (α,nγ). Mult.: from γ(DCO) in (^{7}Li,3npγ), Q(+O) with δ=+0.05 5 from $\gamma(\theta)$ in (α,nγ).
1912.4	5/2$^+$	1413.3	100	499.07	7/2$^+$		E_γ: from (n,n$'\gamma$).
1931.2	15/2$^{(+)}$	1062.9	100 3	868.02	11/2$^+$	Q	E_γ,I_γ,Mult.: from (^{7}Li,3npγ), Mult. from γ(DCO).
		1105.6	40 3	825.80	13/2$^+$	D	E_γ,I_γ,Mult.: from (^{7}Li,3npγ), Mult. from γ(DCO).
1994.2	3/2$^+$,5/2$^+$	729.8	100	1264.43	3/2$^-$		E_γ: from (n,n$'\gamma$).
2003.7	(13/2$^-$)	478.4	8.6 9	1525.3	11/2$^{(-)}$		E_γ,I_γ: from (^{7}Li,3npγ).
		873.4	100 3	1130.3	(9/2$^-$)	Q	E_γ,I_γ,Mult.: from (^{7}Li,3npγ); Mult. from γ(DCO).
2003.8	(5/2$^+$)	873.6	50 10	1130.3	(9/2$^-$)		E_γ,I_γ: from (n,n$'\gamma$).
		1610.9	70 20	392.47	3/2$^-$		E_γ,I_γ: from (n,n$'\gamma$).
		2004.1	100 20	0.0	9/2$^+$		E_γ,I_γ: from (n,n$'\gamma$).
2038.1	1/2$^-$,3/2$^-$	2024.8	100	13.2845	5/2$^+$		E_γ: from (n,n$'\gamma$).
2066.0	1/2$^+$	934.1	100	1131.87	1/2$^-$		E_γ: from (n,n$'\gamma$).
2101.2	(5/2$^+$)	1324.5	100	776.66	3/2$^+$,5/2$^+$		E_γ: from (n,n$'\gamma$).
2141.5	3/2$^+$,5/2$^+$	2072.7	100	68.752	7/2$^+$		E_γ: from (n,n$'\gamma$).
2188.7	1/2$^-$,3/2$^-$	1591.0	100	597.64	5/2$^-$		E_γ: from (n,n$'\gamma$).
2217.1	5/2$^+$	1085.5	100	1131.6	(5/2,7/2,9/2)$^+$		E_γ: from (n,n$'\gamma$).
2319.3	3/2$^+$	1541.7	100 25	776.66	3/2$^+$,5/2$^+$		E_γ,I_γ: from (n,n$'\gamma$).
		1821.1	38 8	499.07	7/2$^+$		E_γ,I_γ: from (n,n$'\gamma$).
2360.0	15/2$^{(-)}$	834.7	100	1525.3	11/2$^{(-)}$	Q	E_γ,Mult.: from (^{7}Li,3npγ); Mult. from γ(DCO).
2361.1?	(1/2$^+$)	1445.6	100	915.45	5/2$^+$		E_γ: from (n,n$'\gamma$).
2760.5		1150.3	100	1610.20	9/2$^+$		E_γ: from (^{7}Li,3npγ).
2815.0	(17/2$^-$)	455.0	34 2	2360.0	15/2$^{(-)}$		E_γ,I_γ: from (^{7}Li,3npγ).
		811.3	100 4	2003.7	(13/2$^-$)	Q	E_γ,I_γ,Mult.: from (^{7}Li,3npγ); Mult. from γ(DCO).
3006.8	(17/2$^-$)	646.8	<100	2360.0	15/2$^{(-)}$		E_γ,I_γ: from (^{7}Li,3npγ).
		1003.1	<100	2003.7	(13/2$^-$)		E_γ,I_γ: from (^{7}Li,3npγ).

$^{73}_{32}$Ge$_{41}$-10

$\gamma(^{73}Ge)$ (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.	Comments
3181.1	$21/2^{(+)}$	1309.5	100	1871.61	$17/2^{(+)}$	Q	E_γ,Mult.: from (^{7}Li,3npγ), Mult. from γ(DCO).
3199.4	$(19/2^+)$	1268.2	100	1931.2	$15/2^{(+)}$		E_γ: from (^{7}Li,3npγ).
3222.0	$19/2^{(-)}$	862.0	100	2360.0	$15/2^{(-)}$	Q	E_γ,Mult.: from (^{7}Li,3npγ), Mult. from γ(DCO).
3875.5	$(21/2^-)$	868.7	<100	3006.8	$(17/2^-)$		E_γ,I_γ: from (^{7}Li,3npγ).
		1060.5	<100	2815.0	$(17/2^-)$		E_γ,I_γ: from (^{7}Li,3npγ).
4609.4	$(25/2^+)$	1428.3	100	3181.1	$21/2^{(+)}$		E_γ: from (^{7}Li,3npγ).
(6782.95)	$1/2^+$	3852.4# *15*	3.1	2930.5?			
		3898.4# *15*	8	2884.5?			
		4008.0# *15*	5	2774.8?			
		4062.3# *15*	8	2720.5?			
		4076.6# *15*	9	2706.4?			
		4217.9 *15*	8	2564.9	$1/2^-,3/2^-$		
		4299.3 *15*	2.8	2483.5	$1/2^-,3/2^-$		
		4363.5# *15*	4	2419.3?			
		4381.2# *15*	3.1	2401.6?			
		4492.0# *15*	3.3	2290.8?			
		4572.3# *15*	2.5	2210.5?			
		4594.0 *15*	3.8	2188.7	$1/2^-,3/2^-$		
		4650.7 *15*	3.7	2132.1	$1/2^-,3/2^-$		
		4890.7# *4*	5.9 *17*	1892.1?			
		5238.3# *15*	3.0	1544.5?			
		5395.9 *15*	2.0	1386.1	$(3/2^-)$		
		5518.30 *4*	90 *9*	1264.43	$3/2^-$		
		5650.86 *8*	39 *4*	1131.87	$1/2^-$		
		5740.21 *4*	46 *4*	1042.54	$3/2^-$		
		5850.97 *8*	21.1 *22*	931.73	$(1/2^+)$		
		5867.12 *23*	7.1 *23*	915.45	$5/2^+$		
		6227.89 *16*	14.7 *19*	554.91	$1/2^+$		
		6390.17 *4*	100 *9*	392.47	$3/2^-$		
		6418.60 *4*	46 *4*	364.03	$3/2^-$		
		6716.9 *15*	13.6 *13*	66.725	$1/2^-$		

† From ^{73}Ga β^- decay if $\Delta E\gamma$ is present (up to 1386 level) and from (n,n′γ) if not (up to 2362 level), unless otherwise noted.

‡ Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

Placement of transition in the level scheme is uncertain.

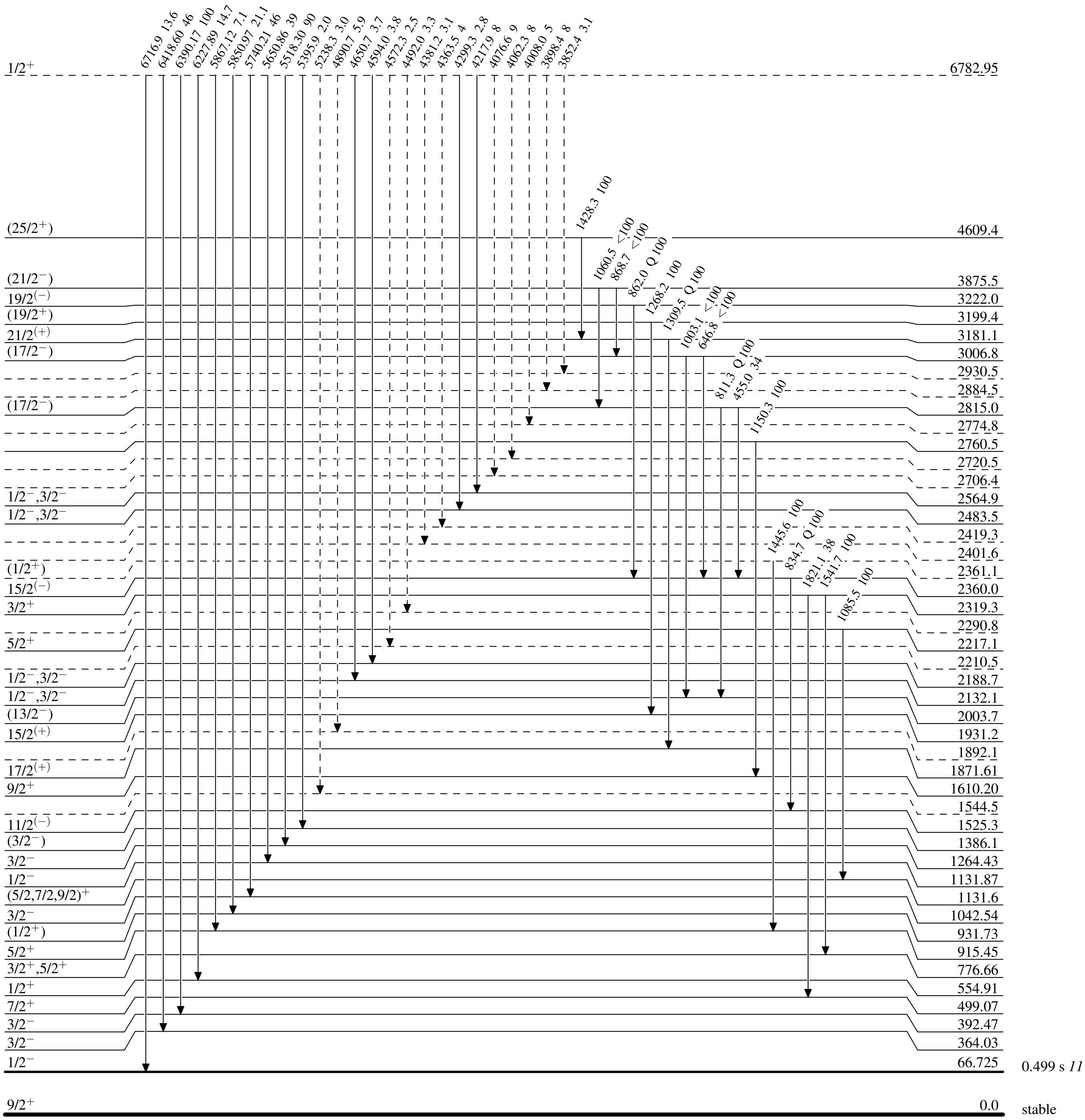
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

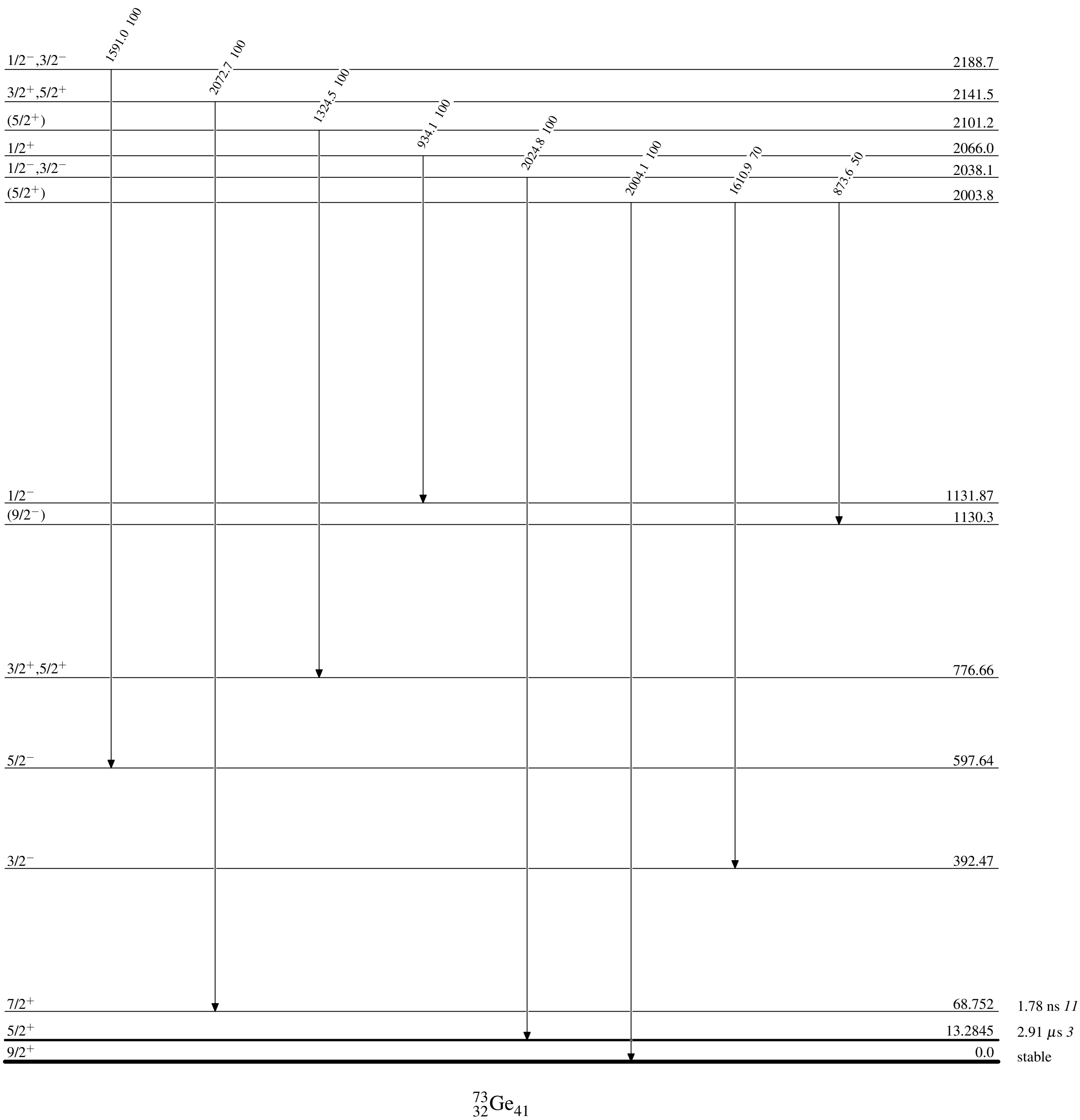


$^{73}_{32}Ge_{41}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



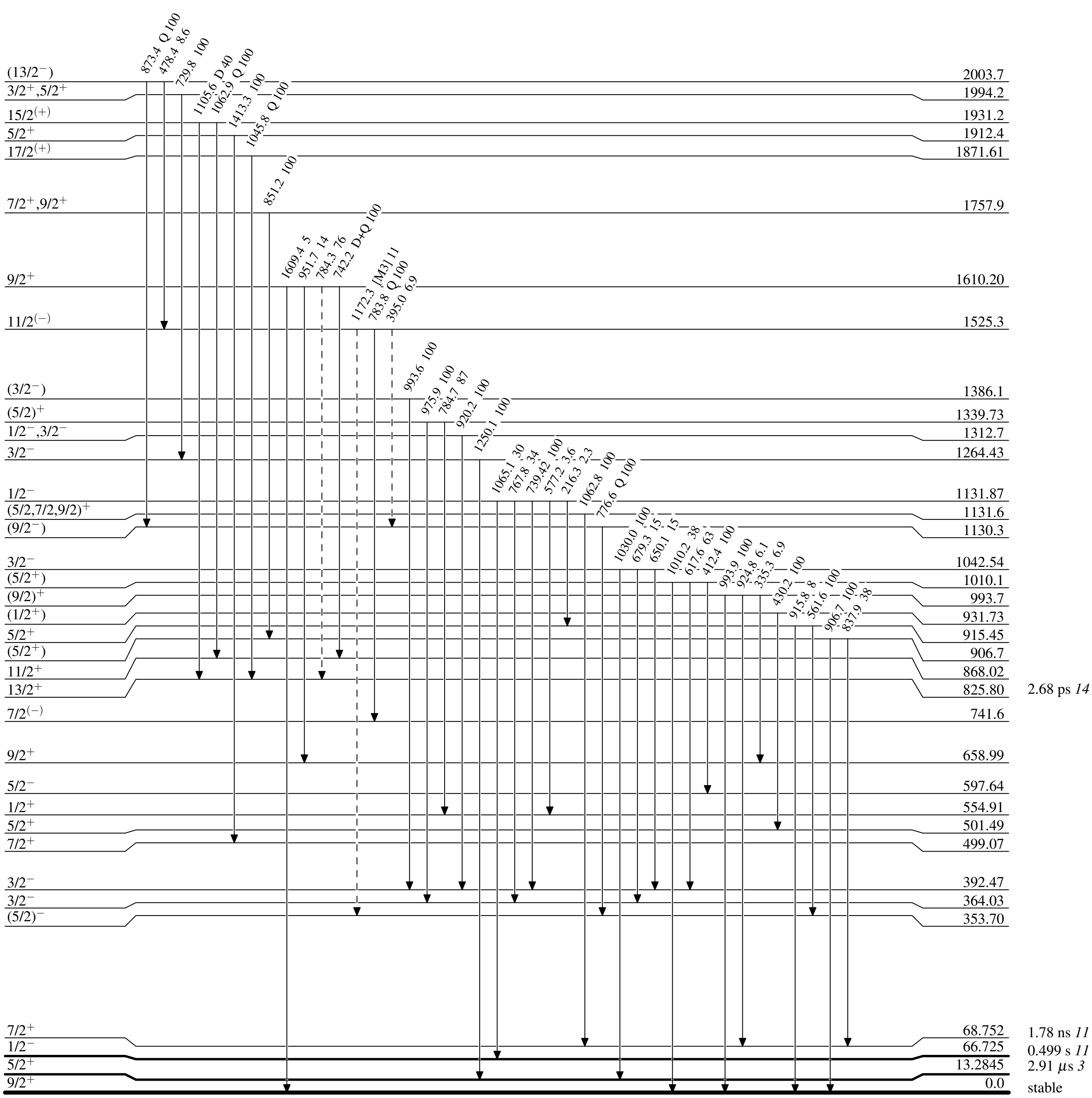
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

- - - - - -► γ Decay (Uncertain)

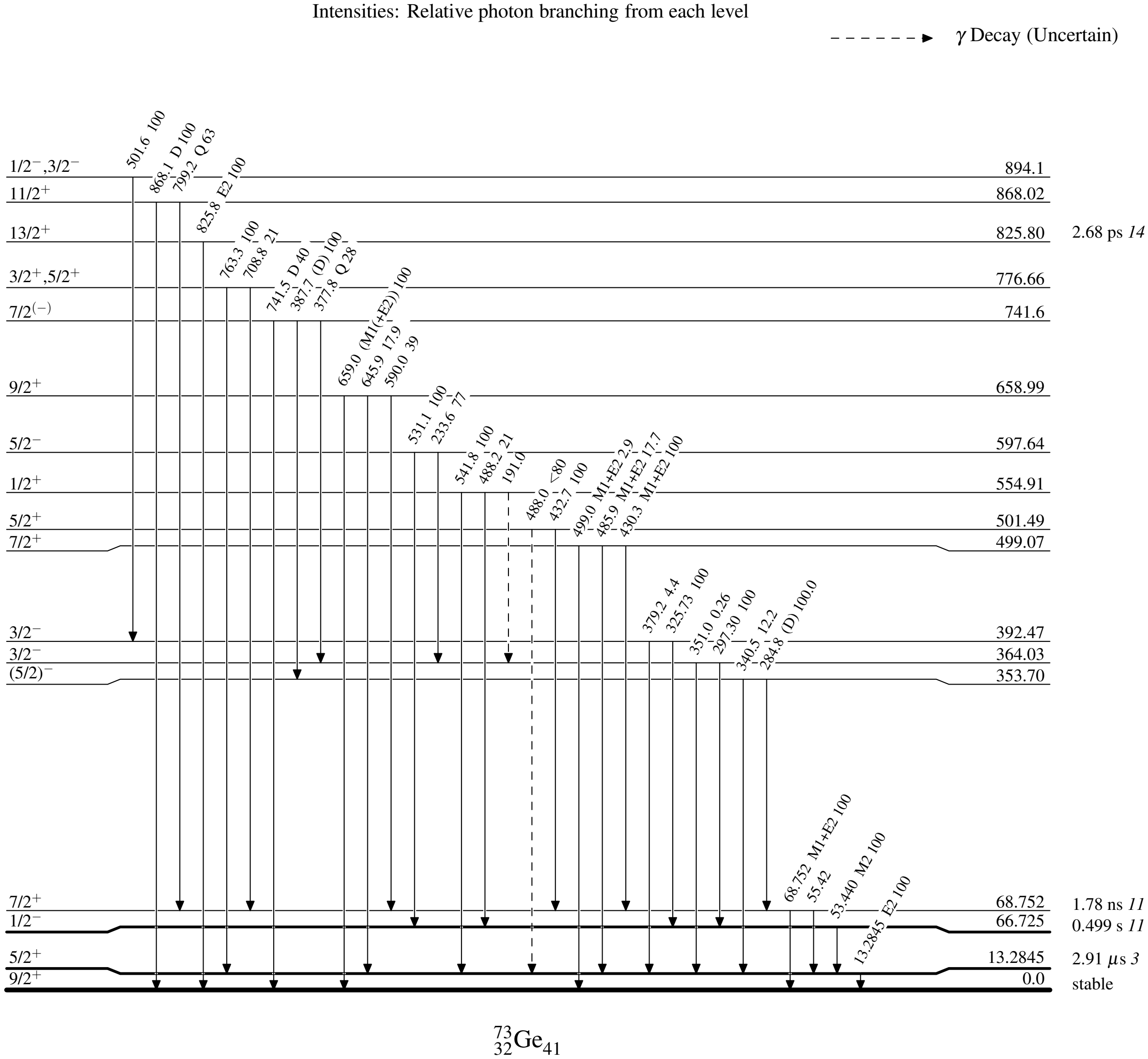


$^{73}_{32}Ge_{41}$

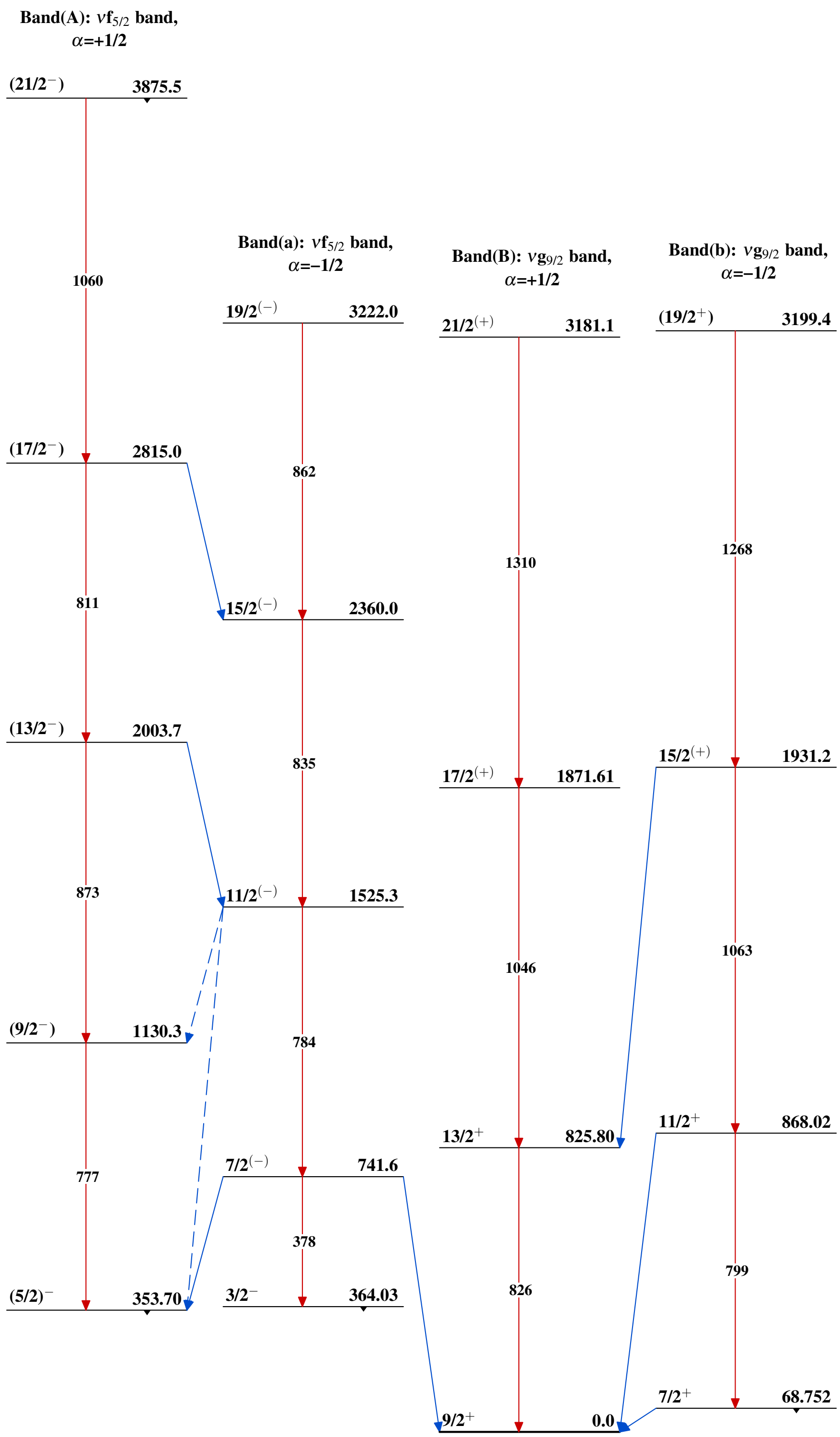
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



Adopted Levels, Gammas



$^{73}_{32}Ge_{41}$