Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	D. Abriola(a), A. A. Sonzogni	NDS 111,1 (2010)	1-May-2009

Q(β^-)=−4356 *4*; S(n)=10750.8 *9*; S(p)=9735.8 *9*; Q(α)=−5004.0 *10* 2012Wa38
Note: Current evaluation has used the following Q record −4356 4 *10750.5 109735.7 10*−5003.8 *11* 2009AuZZ.
α: Additional information 1.

^{72}Ge Levels

Cross Reference (XREF) Flags

A	^{72}Ga β^- decay	I	^{73}Ge(p,d)	Q	^{72}Ge(p,p′γ)
B	^{72}As ε decay	J	^{72}Ge(^{6}Li,^{6}Li′)	R	^{69}Ga(α,p)
C	^{72}Ge(p,p′), (pol p,p′)	K	^{72}Ge(d,d′), (pol d,d′)	S	^{68}Zn(^{6}Li,d)
D	^{71}Ga(^{3}He,d)	L	^{68}Zn(^{6}Li,npγ)	T	^{76}Se(d,^{6}Li)
E	^{72}Ge(α,α′)	M	^{75}As(p,α)	U	^{72}Ge(e,e′), (γ,γ′)
F	^{74}Ge(p,t)	N	Coulomb excitation	V	^{72}Ge(^{16}O,^{16}O′), (^{18}O,^{18}O′)
G	^{70}Ge(t,p)	O	^{72}Ge(n,n′γ)	W	^{72}Ge(α,α′γ)
H	^{70}Zn(α,2nγ), ^{70}Ge(α,^{2}He)	P	^{70}Zn(^{16}O,^{14}C)	X	^{72}Ge(γ,γ′)

E(level)[†]	J$^\pi$	T$_{1/2}$[c]	XREF	Comments
0[e]	0$^+$	stable	ABCDEFGHIJKLMNOPQRSTUVWX	
691.43[f] *4*	0$^+$‡	444.2 ns *8*	ABCD FG IJK MNOPQRST VW	T$_{1/2}$: from delayed auto-coincidence of a Ge(Li) detector (1984Br24). Others: 0.40 μs *11* in ^{72}Ga β^- decay; 427 ns *11* in (n,n′γ); 439 ns *4* in (p,p′γ); and 404 ns *45* in (α,α′γ).
834.011[e] *19*	2$^+$‡	3.35 ps *5*	ABCDEFGHIJKLMNOPQR TU	Q=−0.13 *6*; μ=+0.77 *5* T$_{1/2}$: from B(E2) in Coul excitation. Others: 3.3 ps *4* ^{72}Ge(γ,γ′); 2.8 ps *+21−7* ^{70}Zn(α,2nγ), DSA; 2.9 ps *2* (e,e′). μ: Weighted average of +0.734 *88*, +0.798 *66* from transient field IPAC (1987La20, 1984Pa20) and +0.74 *18* from IMPAC, recalculation (1989Ra17). Q: Coul excitation reorientation (1980Le16,2005St24).
1463.99[f] *3*	2$^+$‡	4.5 ps *+8−6*	ABCDEFGHIJKLMNOPQ	T$_{1/2}$: from Coul excitation. Other: 3 ps *+4−2* in ^{70}Zn(α,2nγ), DSA.
1728.30[e] *3*	4$^+$#	1.55 ps *16*	ABCDEFGHIJKLMNOP	T$_{1/2}$: from Coul excitation. Other: 1.2 ps *+14−3* in ^{70}Zn(α,2nγ).
2029 *3*	0$^+$#		CD FG	
2049 *10*	4$^+$‡		C F I K	XREF: F(2035). J$^\pi$: L(p,p′)=(2) is inconsistent with 4$^+$.
2064.93 *3*	3$^+$	≥2 ps	AB D F H LM O Q	J$^\pi$: from M1+E2 γ to 2$^+$ and $\gamma\gamma(\theta)$ in ^{72}Ga β^- decay.
2116.9 *4*	1[d]	0.41 fs *8*	X	
2396.10 *20*			c gH m r	
2402.30 *3*	2$^+$‡		ABcD Fg JK m r	
2463.90[f] *3*	4$^+$‡	1.4 ps *+35−7*	ABCD FGH L	
2505 *5*			I	L=1+4 doublet in (p,d).
2514.79[g] *3*	3$^-$‡	4.7 ps *9*	ABCDEFGH JKLMN P U	T$_{1/2}$: from B(E3)=0.061 *15* (average of (e,e′) and Coul ex.) and adopted branching. Other: 0.7 ps *+7−4* in (α,2nγ).
2572 *10*			C	

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Adopted Levels, Gammas (continued)

^{72}Ge Levels (continued)

E(level)[†]	Jπ	$T_{1/2}$[c]	XREF	Comments
2583.4? *4*			A	
2754.27 *12*	(0+)		ABCD G I S	Jπ: from L(t,p) and L(^{6}Li,d). However, J^π=3− to 6− from L(p,d)=1, and L(^{3}He,d)=1+3 not consistent with 0.
2772.03[e] *14*	6+	0.7 ps *+7–4*	C H L	Jπ: stretched E2 γ to 4+.
2875.61 *20*			H	
2897 *5*	0+[#]		CD G	
2939.96 *5*	1−		ABc I	Jπ: J^π=1,2+ from γ′s to 0+ and 2+; L(p,d)=3.
2943.47 *4*	3−[#]		ABc EFG J	
2950.4 *3*	1+,2+[@]		AB D K	
3034 *3*	2+[#]		CDEFG	XREF: E(3024).
3035.64 *4*	2−		AB I	Jπ: from γγ(θ) and circular polarization in β− decay.
3080.34 *20*	4+[‡]		CDEFGHIJKL	XREF: E(3062)K(3092).
3089.4 *9*	1[d]	0.38 fs *19*	X	
3094.18 *14*	2+[‡]		ABCDEF X	
3128.86[g] *11*	5−[&]	3.5 ps *+7–21*	C E GHI	Jπ: E2 γ to 3− and γ′s to 4+ and 6+.
3131 *10*	(4+)[b]		E	
3139 *3*	0+[‡]		F	
3182 *3*	4+[‡]		CD F J	
3223 *3*	+[@]		D	
3228 *10*	−[&]		I	
3250 *4*	3+,4+,5+[a]		C	
3325.01 *3*	3−		ABc E IJ	Jπ: from γγ(θ) and E1+M2 γ to 2+, D(+Q) to 4+.
3327 *3*	2+[‡]		cD FG	XREF: D(3324).
3338.0 *3*	1(+)[d]	89 ps *21*	AB X	
3341.76 *4*	(2)−		ABC	Jπ: from γγ(θ) and E1 γ to 2+ in β− decay.
3358.4 *24*	+[@]		CD	
3378 *3*	4+[‡]		F	
3394 *10*	5−[b]		E i	
3402.06[f] *12*	(6+)	1 ps *+4–1*	H	(E2) γ to 4+.
3403 *5*			c G i K	Possibly a doublet: J^π=(4+) from (t,p), (2+) from (d,d′), (pol d,d′).
3409 *10*	3−[b]		c E	
3419.79 *18*	2+[‡]		BCD F	
3427 *5*	4+[#]		G J	
3439.34 *10*	+[@]		A CD	Jπ: L(p,p′)=(6).
3455.32 *4*	2−,3−		AB	Jπ: from E1 γ to 2+ and log *ft*=7.3 from 3−, ^{72}Ga.
3468 *3*	0−,1−,2−[a]		CD	
3509 *3*	2+[‡]		CD F	
3511 *10*	4+[b]		E G	
3528 *3*	4+[‡]		C F	
3536 *10*	1−[b]		E	
3550.66 *17*	(1)−		BC EF I	Jπ: L(p,t)=(1); L(p,d)=1+3. Also L(p,p′)=1 for 3556 *4*, and L(α,α′)=(3) for 3551 *10*.
3565.9 *3*	(−)		A CD	Jπ: L(p,d)=1+3; probably the L=1 component of the 3554 *10* level.

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Adopted Levels, Gammas (continued)

^{72}Ge Levels (continued)

E(level)†	Jπ	$T_{1/2}$c	XREF		Comments
3586 *4*	0+‡		FG		
3591 *4*	3+,4+,5+a		C		
3619.3 *3*	2+‡		AB D G		
3624 *10*			C F		Jπ: L(p,p′)=(1), L(p,t)=(2).
3644 *10*	(+)b		C E		
3652 *5*			EFG I		Jπ: L(α,α′)=(3) for 3657 *10*.
3666.2 *5*	1+d			X	
3667.26 *23*	6+	>2.1 ps	c F H		Jπ: from γ(θ) and γγ(θ) and yield function in (α,2nγ).
3667.3 *3*	+@		BcD		
3678.08 *7*	2−,3−		ABC		Jπ: from E1 γ to 2+ and log *ft*=6.1 from 3−, ^{72}Ga.
3688 *10*	6−,7−,8−a		C		
3691 *3*	1+,2+,3+#		D G		Jπ: L(^{3}He,d)=1+3.
3708.5 *5*	2+‡		ABC F		
3722 *10*	3−b		E		
3745 *10*			C		
3757.2 *3*	−&		A I		
3760.50e *22*	8+	0.8 ps +5−2	H L		Jπ: stretched E2 γ to 6+.
3777 *3*	3+,4+,5+a		CDE G		Jπ: L(t,p)=(0+2), L(α,α′)=(2) for 3769 *10*.
3784.18g *17*	7−&	≥2.8 ps	C H		Jπ: E2 γ to 5− and yield function in (α,2nγ).
3803.55 *6*	1,2+		BC e I		Jπ: γ to 0+ and 2+.
3815.4 *3*	2−,3−		AB De		Jπ: L(^{3}He,d)=2+4. γ to 2+.
3821 *3*	5−‡		c F		
3840.2 *3*	4+‡		c E GH		
3858 *10*	3+,4+,5+a		CdEF		
3872.2 *4*	2+#		BCde		
3882 *5*	1+,2+,3+#		C e G		
3892 *10*	(3−)b		c E I		
3895.0 *5*	1@d		cD F	X	
3898.48 *21*	(7−)		C H		Jπ: from γ(θ), γγ(θ) in (α,2nγ).
3915 *10*			C		
3937 *10*	4−,5−,6−a		C E		Jπ: 5− if indeed excited in (α,α′).
3965 *10*	3−b		C E I		XREF: E(3954).
3966 *5*	2+#		cD fG		
3983.75 *16*			Bc ef		
3985.91 *15*			Bc e		
3995 *10*	0−,1−,2−a		C		
3995.24 *25*	1+d		B d G	X	XREF: d(4002). Jπ: L(^{3}He,d)=1+3 and (M1) γ to 0+.
4004 *10*			CdE g		
4017 *6*	4+‡		C F		
4027 *5*	3+,4+,5+#		c G		
4031 *10*	5−b		c E		
4041.0 *4*	0−,1−,2−a		BC		Possible multiplet: L(^{3}He,d)=1+3 at 4047 *3* implies Jπ=1+ to 3+; L(p,d)=1+3 at 4047 *10* implies Jπ=3− to 6−.
4046 *10*	+@		cDE		Jπ: L(α,α′)=(4).
4047 *10*	−&		c I		

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Adopted Levels, Gammas (continued)

^{72}Ge Levels (continued)

E(level)†	Jπ	$T_{1/2}$[c]	S	XREF	Comments
4049.6 *3*	1[d]		61 *5*	X	
4065 *10*	5−[b]			C E	
4075.8 *6*	5−‡			C F	
4077.57 *22*	8+	0.8 ps +*15*−*7*		H	Jπ: E2 γ to 6+, M1 γ to 8+.
4082 *10*	3+,4+,5+[a]			Cd	
4090.4 *5*	+@			B d	
4108 *3*	2+‡			F	
4144 *3*	4+‡			EF	
4147 *5*	+@			DE	
4171 *3*	+@			DE	
4191 *3*	0+‡			F	
4194 *5*	−&			I	
4228 *3*	3−[b]			DEF	
4245 *5*	+@			D	
4256.1 *3*	1[d]			X	
4257 *10*	(3−)[b]			E	
4285 *3*	3−[b]			EF	XREF: E(4269).
4291.85 *25*	+@	0.5 ps +*7*−*1*		D H	
4315 *5*	+@			D	
4335 *5*				D I	
4358.7 *3*	1[d]			X	
4369 *10*	3−[b]			E	
4374 *5*	+@			D	
4419 *5*				DE	Jπ: L(^{3}He,d)=(1+3), but L(α,α′)=(1).
4454 *3*	(2)−@			DE	
4458 *5*	−&			I	
4483 *5*				De	XREF: e(4498). Jπ: L(α,α′)=3 for 4498 *10*.
4512 *5*	(2)−@			De	XREF: e(4498).
4521.07? *24*				F H	Jπ: L(p,t)=(2).
4534 *10*	3−[b]			E	
4575 *5*				DE	Jπ: L(^{3}He,d)=(1+3), but L(α,α′)=(3).
4601 *10*				E	
4620 *3*	+@			DE	
4634 *10*	(5−)[b]			E	
4650 *5*	−@			DE	Jπ: L(α,α′)=(4) for 4659 *10*.
4679 *3*	−@			DE	Jπ: L(α,α′)=(4) for 4676 *10*.
4705 *5*	(4+)[b]			DE	
4724 *10*	(3−)[b]			E	
4741.34[g] *22*	9−	0.90 ps +*14*−*7*		H	Jπ: E2 γ to 7− and yield function in (α,2nγ).
4755 *5*	−@			D	
4766 *10*	(4+)[b]			E	
4804 *10*	(4+)[b]			E	
4820.0[e] *3*	(10+)	0.51 ps +*7*−*4*		H L	Jπ: stretched E2 γ to 8+.
4840 *3*	+@			D	

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Adopted Levels, Gammas (continued)

^{72}Ge Levels (continued)

E(level)[†]	Jπ	$T_{1/2}$[c]	XREF	Comments
4875	(+)[@]		DE	Jπ: L(α,α′)=(4).
4903 *5*	(4)+		DEF	Jπ: L(p,t)=4 for 4895, L(α,α′)=(4) for 4899 *10*.
4926 *10*			E	
4950.2 *3*			H	
5004 *5*			D	
5076 *5*	(2)−[@]		D	
5082.5 *3*			H	
5100 *3*	−[@]		D	
5160 *3*	−		D	
5164.8 *3*	1+[d]		X	
5199.2 *11*	1[d]		X	
5280.4 *6*	1[d]		X	
5315.0 *6*	1[d]		X	
5395.5? *3*			H	
5421.4? *3*			H	
5435.8 *5*	1+[d]		X	
5837.8[g] *3*	11−	0.9 ps +*4*−*2*	H	Jπ: E2 γ to 9− and yield function in (α,2nγ).
5849.8 *3*	1(−)[d]		X	
5919.8 *4*	1−[d]		X	
5974.6 *12*	1[d]		X	
6115.0[e] *4*	(12+)	0.33 ps +*7*−*4*	H	Jπ: stretched E2 γ to (10+).
6131.7 *7*	1[d]		X	
6146.0 *11*	1[d]		X	
6163.5 *4*	1(−)[d]		X	
6383.2 *7*	1[d]		X	
6470.0 *7*	1[d]		X	
6629.9 *6*	1[d]		X	
6736.8 *6*	1[d]		X	
6811.7 *12*	1−[d]		X	
7061.2 *10*	1[d]		X	
7450.4 *11*	1[d]		X	
7518.5 *8*	1[d]		X	
7673.7 *4*	1−[d]		X	
7805.0 *13*	1(−)[d]		X	
8441.7 *8*	1(−)[d]		X	
8486.9 *10*	1(−)[d]		X	
8867.9 *5*	1[d]		X	

[†] Level energies with accuracy better than 2 keV are from a least-squares fit to adopted γ-ray energies. Level energies deduced from scattered particles have the following typical accuracies: 3-5 keV ^{74}Ge(p,t), ^{70}Ge(t,p) and ^{71}Ga(^{3}He,d); 5-10 keV ^{73}Ge(p,d), ^{72}Ge(p,p′). Weighted averages have been calculated where possible.
[‡] From L(p,t).
[#] From L(t,p).
[@] From L(^{3}He,d).
[&] From L(p,d).

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Adopted Levels, Gammas (continued)

^{72}Ge Levels (continued)

[a] From L(p,p′).
[b] From L(α,α′).
[c] From ^{70}Zn(α,2nγ) DSA (1979Mo01), except as noted.
[d] From (γ,γ′).
[e] Band(A): Yrast cascade.
[f] Band(B): Cascaded based on $0+_2$.
[g] Band(b): Negative parity cascade.

Adopted Levels, Gammas (continued)

γ(^{72}Ge)

Eγ and Iγ data are mainly from ^{72}Ga β^- decay, ^{72}As ε decay and ^{70}Zn(α,2nγ). Also included: ^{72}Ge(n,n′γ) and ^{72}Ge(x,x′γ). Averages have been calculated.

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.[†]	δ[†]	α	$I_{(\gamma+ce)}$	Comments
691.43	0^+	689.6 *5*		0	0^+	E0			100	I_γ: totally internally converted E0 transition.
834.011	2^+	142.52 *5*	0.011	691.43	0^+	E2		0.197		α(K)=0.1731 *25*; α(L)=0.0205 *3*; α(M)=0.00303 *5*; α(N)=0.0001690 *24*; α(N+..)=0.0001690 *24* B(E2)(W.u.)=17.8 *3*
		834.01 *2*	100	0	0^+	E2		0.000553 *8*		α(K)=0.000494 *7*; α(L)=5.09×10^{-5} *8*; α(M)=7.59×10^{-6} *11*; α(N)=4.93×10^{-7} *7* α(N+..)=4.93×10^{-7} *7* B(E2)(W.u.)=23.5 *4*
1463.99	2^+	629.95 *3*	100.0 *12*	834.011	2^+	M1+E2	−10.3 *13*	0.001178 *17*		α(K)=0.001051 *15*; α(L)=0.0001094 *16*; α(M)=1.631×10^{-5} *23* α(N)=1.050×10^{-6} *15* B(E2)(W.u.)=62 *+9−11*; B(M1)(W.u.)=0.00016 *5* δ: other values: −2.9 *11* from ^{70}Zn(α,2nγ), and −5 *+3−1* from ^{72}Ge(n,n′γ).
		772.6 *3*	0.134 *11*	691.43	0^+	E2[#]		0.000674 *10*		α(K)=0.000602 *9*; α(L)=6.22×10^{-5} *9*; α(M)=9.28×10^{-6} *13*; α(N)=6.01×10^{-7} *9* α(N+..)=6.01×10^{-7} *9* B(E2)(W.u.)=0.030 *+5−6*
		1463.95 *15*	14.16 *17*	0	0^+	E2[#]		0.000226 *4*		α(K)=0.0001371 *20*; α(L)=1.393×10^{-5} *20*; α(M)=2.08×10^{-6} *3* α(N+..)=7.32×10^{-5} *1* B(E2)(W.u.)=0.130 *+18−24*
1728.30	4^+	894.26 *4*	100	834.011	2^+	E2(+M3)	≈0.0	0.000464		α(K)≈0.000414; α(L)≈4.26×10^{-5}; α(M)≈6.36×10^{-6}; α(N)≈4.14×10^{-7} B(E2)(W.u.)=37 *5* Mult.: Q+O from γγ(θ) in β^- decay; Q in (α,2nγ). M2 excluded by RUL. δ: β(M3)(W.u.) from RUL suggests δ≈0.
2064.93	3^+	336.63 *4*	1.93 *5*	1728.30	4^+					
		600.94 *3*	100.0 *15*	1463.99	2^+	M1+E2[‡]	≈+4.0	0.001327		α(K)≈0.001184; α(L)≈0.0001234; α(M)≈1.84×10^{-5} α(N)≈1.183×10^{-6} B(E2)(W.u.)<150; B(M1)(W.u.)<0.0023 δ: from γ(θ) and γγ(θ) in (α,2nγ).
		1230.83 *4*	26.2 *6*	834.011	2^+	D+Q	−2.0 *+15−25*			

Adopted Levels, Gammas (continued)

γ(^{72}Ge) (continued)

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.[†]	δ[†]	α	Comments
2116.9	1	2116.9 *4*	100	0	0^+	D			
2396.10		932.1 *2*	100	1463.99	2^+				
2402.30	2^+	938.50 *14*	19.8 *7*	1463.99	2^+				
		1568.19 *7*	51.7 *14*	834.011	2^+				
		1710.90 *6*	100.0 *25*	691.43	0^+				
		2402.2 *3*	6.3 *3*	0	0^+				
2463.90	4^+	735.59 *22*	46.0 *8*	1728.30	4^+	M1[‡]		0.000592 *9*	α(K)=0.000529 *8*; α(L)=5.41×10^{-5} *8*; α(M)=8.08×10^{-6} *12*; α(N)=5.32×10^{-7} *8* α(N+..)=5.32×10^{-7} *8* B(M1)(W.u.)=0.012 *+6−12*
		999.86 *4*	100.0 *18*	1463.99	2^+	E2[‡]		0.000354 *5*	α(K)=0.000316 *5*; α(L)=3.24×10^{-5} *5*; α(M)=4.84×10^{-6} *7*; α(N)=3.16×10^{-7} *5* α(N+..)=3.16×10^{-7} *5* B(E2)(W.u.)=15 *+8−15*
		1630 *1*	4.1 *7*	834.011	2^+	[E2]		0.000263 *4*	α(K)=0.0001106 *16*; α(L)=1.122×10^{-5} *16*; α(M)=1.675×10^{-6} *24* α(N)=1.103×10^{-7} *16* B(E2)(W.u.)=0.05 *+3−5*
2514.79	3^-	50.88 *4*	0.15 *2*	2463.90	4^+	[E1]		0.518	α(K)=0.462 *7*; α(L)=0.0488 *7*; α(M)=0.00718 *11*; α(N)=0.000418 *6*; α(N+..)=0.000418 *6* B(E1)(W.u.)=0.00057 *14*
		112.52 *3*	2.1 *5*	2402.30	2^+	[E1]		0.0484	α(K)=0.0433 *6*; α(L)=0.00447 *7*; α(M)=0.000662 *10*; α(N)=4.11×10^{-5} *6*; α(N+..)=4.11×10^{-5} *6* B(E1)(W.u.)=0.00074 *23*
		449.55 *21*	1.4 *3*	2064.93	3^+				
		786.44 *7*	46.2 *8*	1728.30	4^+	E1(+M2)	+0.02 *5*	0.000249 *6*	α(K)=0.000223 *6*; α(L)=2.26×10^{-5} *6*; α(M)=3.37×10^{-6} *9*; α(N)=2.20×10^{-7} *6* α(N+..)=2.20×10^{-7} *6* B(E1)(W.u.)=(4.8×10^{-5} *10*); B(M2)(W.u.)=(0.14 *+71−14*)
		1050.73 *4*	100.0 *13*	1463.99	2^+	E1+M2	−0.31 *5*	0.000182 *14*	α(K)=0.000163 *12*; α(L)=1.66×10^{-5} *13*; α(M)=2.48×10^{-6} *19* α(N+..)=1.63×10^{-7} *1* B(E1)(W.u.)=3.9×10^{-5} *8* B(M2)(W.u.): This mixing ratio leads to a B(M2)(W.u.)=16 *6*, which exceeds the RUL of 1.0.
		1680.75 *6*	12.1 *4*	834.011	2^+				
		2515.1 *3*	3.59 *12*	0	0^+	[E3]		0.000445 *7*	α(K)=7.72×10^{-5} *11*; α(L)=7.84×10^{-6} *11*; α(M)=1.170×10^{-6} *17* α(N+..)=0.000359 *5* B(E3)(W.u.)=29 *6*
2583.4?		2583.4[@] *4*	100	0	0^+				
2754.27	(0^+)	1920.21 *13*	100	834.011	2^+				

Adopted Levels, Gammas (continued)

γ(^{72}Ge) (continued)

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.[†]	δ[†]	α	Comments
2772.03	6+	1043.8 *2*	100	1728.30	4+	E2[‡]		0.000320 *5*	α(K)=0.000286 *4*; α(L)=2.93×10^{-5} *5*; α(M)=4.37×10^{-6} *7*; α(N)=2.86×10^{-7} *4* α(N+..)=2.86×10^{-7} *4* B(E2)(W.u.)=37 *+21−37*
2875.61		1411.6 *2*	100	1463.99	2+				
2939.96	1−	1475.90 *6*	79.6 *15*	1463.99	2+				
		2105.90 *17*	100 *4*	834.011	2+				
		2248.5 *1*	49.6 *19*	691.43	0+				
		2940.07 *12*	47 *3*	0	0+				
2943.47	3−	428.44 *11*	22 *4*	2514.79	3−				
		479.27 *11*	8.5 *5*	2463.90	4+				
		878.40 *18*	6.9 *4*	2064.93	3+				
		1215.14 *4*	76.1 *12*	1728.30	4+	D+Q			
		2109.52 *8*	100.0 *17*	834.011	2+				
2950.4	1+,2+	2116.5[@] *3*	100 *6*	834.011	2+				
		2950.0[@] *5*	17 *3*	0	0+				
3035.64	2−	520.74 *24*	0.210 *18*	2514.79	3−				
		970.55 *6*	4.3 *1*	2064.93	3+				
		1571.63 *12*	3.2 *1*	1463.99	2+				
		2201.69 *5*	100.0 *16*	834.011	2+	E1(+M2)	−0.05 *4*	0.000810 *12*	α(K)=3.70×10^{-5} *7*; α(L)=3.72×10^{-6} *7*; α(M)=5.54×10^{-7} *10*; α(N)=3.66×10^{-8} *7* α(N+..)=0.000769 *12*
		3034.6 *4*	0.018 *3*	0	0+	M2		0.000549 *8*	α(K)=5.65×10^{-5} *8*; α(L)=5.72×10^{-6} *8*; α(M)=8.53×10^{-7} *12*; α(N)=5.66×10^{-8} *8* α(N+..)=0.000486 *7*
3080.34	4+	1015.4 *2*	100	2064.93	3+				
3089.4	1	3089.3 *9*	100	0	0+	D			
3094.18	2+	1029.3 *5*	23.5 *14*	2064.93	3+				
		2402.89 *21*	95 *4*	691.43	0+				
		3093.92 *20*	100 *20*	0	0+	E2		0.000860 *12*	α(K)=3.55×10^{-5} *5*; α(L)=3.57×10^{-6} *5*; α(M)=5.33×10^{-7} *8*; α(N)=3.53×10^{-8} *5* α(N+..)=0.000820 *12*
3128.86	5−	357.0 *2*	56	2772.03	6+				
		614.2 *2*	71	2514.79	3−	E2[‡]		0.001270 *18*	α(K)=0.001133 *16*; α(L)=0.0001180 *17*; α(M)=1.760×10^{-5} *25* α(N)=1.131×10^{-6} *16* B(E2)(W.u.)=29 *+18−6*
		667.0 *5*	29	2463.90	4+				
		1400.4 *2*	100	1728.30	4+				
3325.01	3−	230.6 *6*	0.30 *9*	3094.18	2+				
		289.31 *7*	2.49 *17*	3035.64	2−				

$^{72}_{32}Ge_{40}$-9

Adopted Levels, Gammas (continued)

γ(^{72}Ge) (continued)

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.[†]	δ[†]	α	Comments
3325.01	3⁻	381.24 *8*	3.49 *13*	2943.47	3⁻				
		810.20 *9*	26.2 *5*	2514.79	3⁻				
		861.11 *5*	11.9 *3*	2463.90	4⁺				
		1260.10 *7*	14.7 *4*	2064.93	3⁺				
		1596.70 *7*	56 *5*	1728.30	4⁺	D(+Q)	+0.05 *6*		
		1861.09 *5*	68.4 *10*	1463.99	2⁺	D+Q			
		2490.98 *6*	100 *3*	834.011	2⁺	E1+M2	+0.15 *4*	0.000974 *16*	α(K)=3.20×10^{-5} *8*; α(L)=3.22×10^{-6} *9*; α(M)=4.80×10^{-7} *13*; α(N)=3.17×10^{-8} *9* α(N+..)=0.000939 *16*
		2633.9 *4*	0.19 *2*	691.43	0⁺				
		3324.6 *4*	0.040 *11*	0	0⁺				
3338.0	1⁽⁺⁾	3337.9 *3*	100	0	0⁺	(M1)		0.000866 *13*	α(K)=3.06×10^{-5} *5*; α(L)=3.08×10^{-6} *5*; α(M)=4.60×10^{-7} *7*; α(N)=3.04×10^{-8} *5* α(N+..)=0.000832 *12* B(M1)(W.u.)=6.7×10^{-6} *16*
3341.76	(2)⁻	306.0 *3*	0.165 *15*	3035.64	2⁻				
		401.3 *4*	0.254 *15*	2939.96	1⁻				
		587.44 *24*	0.95 *5*	2754.27	(0⁺)				
		939.36 *7*	2.03 *5*	2402.30	2⁺				
		1276.77 *6*	12.25 *13*	2064.93	3⁺				
		1877.90 *21*	1.81 *5*	1463.99	2⁺				
		2507.82 *6*	100.0 *15*	834.011	2⁺	E1+M2	+0.09 *5*	0.000993 *16*	α(K)=3.10×10^{-5} *8*; α(L)=3.11×10^{-6} *8*; α(M)=4.64×10^{-7} *11*; α(N)=3.07×10^{-8} *8* α(N+..)=0.000958 *16*
3402.06	(6⁺)	273.6[@] *2*	23	3128.86	5⁻				
		937.9 *2*	100	2463.90	4⁺	(E2)[‡]		0.000413 *6*	α(K)=0.000369 *6*; α(L)=3.79×10^{-5} *6*; α(M)=5.65×10^{-6} *8*; α(N)=3.68×10^{-7} *6* α(N+..)=3.68×10^{-7} *6* B(E2)(W.u.)=20 *+21−20*
		1673.6 *2*	93	1728.30	4⁺				
3419.79	2⁺	905.22 *22*	39 *7*	2514.79	3⁻				
		2585.3 *3*	100 *23*	834.011	2⁺				
3439.34	⁺	495.88 *24*	40 *3*	2943.47	3⁻				
		924.22 *18*	100 *3*	2514.79	3⁻				
		975.5 *5*	23 *7*	2463.90	4⁺				
		1037.2 *6*	14.4 *13*	2402.30	2⁺				
		1711.15 *15*	32 *7*	1728.30	4⁺				
		2605.5 *4*	13 *3*	834.011	2⁺				
3455.32	2⁻,3⁻	113.5 *1*	4.3 *7*	3341.76	(2)⁻				
		940.51 *10*	5.4 *6*	2514.79	3⁻				

$^{72}_{32}Ge_{40}$-10

Adopted Levels, Gammas (continued)

γ(^{72}Ge) (continued)

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.[†]	α	Comments
3455.32	2⁻,3⁻	1390.44 *5*	62.2 *19*	2064.93	3⁺			
		1991.16 *8*	85.6 *20*	1463.99	2⁺			
		2621.38 *16*	100.0 *18*	834.011	2⁺	E1	0.001063 *15*	α(K)=2.87×10⁻⁵ *4*; α(L)=2.89×10⁻⁶ *4*; α(M)=4.30×10⁻⁷ *6*; α(N)=2.84×10⁻⁸ *4* α(N+..)=0.001031 *15*
3550.66	(1)⁻	1148.4 *3*	58 *15*	2402.30	2⁺			
		2086.4 *3*	70 *4*	1463.99	2⁺			
		2716.7 *4*	58 *12*	834.011	2⁺			
		2859.9 *6*	93 *19*	691.43	0⁺			
		3550.4 *5*	100 *8*	0	0⁺			
3565.9	(⁻)	1500.9 *5*	9.1 *5*	2064.93	3⁺			
		1837.6 *3*	100 *5*	1728.30	4⁺			
3619.3	2⁺	1155.7[@] *6*	35 *6*	2463.90	4⁺			
		2785.1[@] *3*	100 *5*	834.011	2⁺			
3666.2	1⁺	3666.1 *5*		0	0⁺	M1	0.000985 *14*	α(K)=2.64×10⁻⁵ *4*; α(L)=2.65×10⁻⁶ *4*; α(M)=3.96×10⁻⁷ *6*; α(N)=2.62×10⁻⁸ *4* α(N+..)=0.000956 *14*
3667.26	6⁺	538.4 *2*	100	3128.86	5⁻	(E1)[‡]	0.000587 *9*	α(K)=0.000525 *8*; α(L)=5.35×10⁻⁵ *8*; α(M)=7.97×10⁻⁶ *12*; α(N)=5.19×10⁻⁷ *8* α(N+..)=5.19×10⁻⁷ *8* B(E1)(W.u.)<0.0012
3667.3	⁺	1939.0 *4*	91 *9*	1728.30	4⁺			
		2833.2 *6*	100 *18*	834.011	2⁺			
3678.08	2⁻,3⁻	738.5 *4*	12.7 *9*	2939.96	1⁻			
		1163.11 *13*	19 *3*	2514.79	3⁻			
		1613.6 *4*	9.1 *13*	2064.93	3⁺			
		2214.19 *15*	46 *5*	1463.99	2⁺			
		2843.99 *11*	100 *6*	834.011	2⁺	E1	0.001179 *17*	α(K)=2.57×10⁻⁵ *4*; α(L)=2.58×10⁻⁶ *4*; α(M)=3.85×10⁻⁷ *6*; α(N)=2.54×10⁻⁸ *4* α(N+..)=0.001150 *17*
3708.5	2⁺	1193.7 *5*	100	2514.79	3⁻			
3757.2	⁻	317.5 *4*	17.8 *16*	3439.34	⁺			
		2029.4 *5*	100 *5*	1728.30	4⁺			
3760.50	8⁺	988.6 *2*	100	2772.03	6⁺	E2[‡]	0.000364 *5*	α(K)=0.000325 *5*; α(L)=3.33×10⁻⁵ *5*; α(M)=4.97×10⁻⁶ *7*; α(N)=3.24×10⁻⁷ *5* α(N+..)=3.24×10⁻⁷ *5* B(E2)(W.u.)=42 *+11−27*
3784.18	7⁻	655.4 *2*	100	3128.86	5⁻	E2[‡]	0.001055 *15*	α(K)=0.000942 *14*; α(L)=9.79×10⁻⁵ *14*; α(M)=1.460×10⁻⁵ *21*; α(N+..)=9.41×10⁻⁷ B(E2)(W.u.)<47
		1011.9 *2*	100	2772.03	6⁺			
3803.55	1,2⁺	2339.72 *18*	36.4 *21*	1463.99	2⁺			
		3112.04 *5*	63 *10*	691.43	0⁺			
		3803.40 *21*	100 *6*	0	0⁺			
3815.4	2⁻,3⁻	2981.3 *3*	100	834.011	2⁺			

$^{72}_{32}Ge_{40}$-11

Adopted Levels, Gammas (continued)

γ(^{72}Ge) (continued)

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.[†]	α	Comments
3840.2	4^+	759.9 *2*	100	3080.34	4^+			
3872.2	2^+	3872.1 *4*	100	0	0^+			
3895.0	1	3894.9 *5*		0	0^+	D		
3898.48	(7^-)	1126.6 *2*	100	2772.03	6^+			
3983.75		1581.25 *21*	37 *8*	2402.30	2^+			
		3149.91 *24*	100 *14*	834.011	2^+			
3985.91		950.2 *4*	12 *7*	3035.64	2^-			
		1522.7 *6*	28 *7*	2463.90	4^+			
		2521.83 *17*	100 *5*	1463.99	2^+			
3995.24	1^+	3161.2 *5*	16.1 *16*	834.011	2^+			
		3304.5 *8*	15 *3*	691.43	0^+			
		3995.0 *3*	100.0 *16*	0	0^+	(M1)	0.001101 *16*	α(K)=2.31×10^{-5} *4*; α(L)=2.32×10^{-6} *4*; α(M)=3.46×10^{-7} *5*; α(N)=2.29×10^{-8} *4* α(N+..)=0.001075 *15*
4041.0	$0^-,1^-,2^-$	2577.6 *8*	100 *13*	1463.99	2^+			
		3206.7 *5*	35 *4*	834.011	2^+			
4049.6	1	4049.5 *3*	100	0	0^+	D		
4077.57	8^+	317.2 *2*	16	3760.50	8^+	M1[‡]	0.00406 *6*	α(K)=0.00363 *6*; α(L)=0.000377 *6*; α(M)=5.63×10^{-5} *8*; α(N)=3.69×10^{-6} *6*; α(N+..)=3.69×10^{-6} *6* B(M1)(W.u.)=0.12 *+11−12*
		1305.4 *2*	100	2772.03	6^+	E2[‡]	0.000224 *4*	α(K)=0.0001740 *25*; α(L)=1.772×10^{-5} *25*; α(M)=2.64×10^{-6} *4* α(N+..)=2.95×10^{-5} *5* B(E2)(W.u.)=9 *+8−9*
4090.4	$^+$	3256.0 *8*	75 *13*	834.011	2^+			
		3399.1 *7*	100 *15*	691.43	0^+			
4256.1	1	4256.0 *3*	100	0	0^+	D		
4291.85	$^+$	216.0 *5*		4077.57	8^+			
		1519.8 *2*		2772.03	6^+			
4358.7	1	4358.6 *3*	100	0	0^+	D		
4521.07?		1119.0[@] *2*	100	3402.06	(6^+)			
4741.34	9^-	843.0 *2*	25	3898.48	(7^-)			I_γ: from table 3 in 1979Mo01.
		957.0 *2*	100	3784.18	7^-	E2[‡]	0.000393 *6*	α(K)=0.000351 *5*; α(L)=3.60×10^{-5} *5*; α(M)=5.38×10^{-6} *8*; α(N)=3.51×10^{-7} *5* α(N+..)=3.51×10^{-7} *5* B(E2)(W.u.)=35 *+3−6*
4820.0	(10^+)	1059.5 *2*	100	3760.50	8^+	E2[‡]	0.000309 *5*	α(K)=0.000276 *4*; α(L)=2.83×10^{-5} *4*; α(M)=4.22×10^{-6} *6*; α(N)=2.76×10^{-7} *4* α(N+..)=2.76×10^{-7} *4* B(E2)(W.u.)=47 *+4−7*
4950.2		1166.0 *2*	100	3784.18	7^-			

$^{72}_{32}Ge_{40}$-12

Adopted Levels, Gammas (continued)

γ(^{72}Ge) (continued)

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.[†]	α	Comments
5082.5		1322.0 *2*	100	3760.50	8^+			
5164.8	1^+	5164.6 *3*	100	0	0^+	M1	0.001448 *21*	α(K)=1.572×10^{-5} *22*; α(L)=1.577×10^{-6} *22*; α(M)=2.35×10^{-7} *4*; α(N+..)=0.001431
5199.2	1	5199.0 *11*	100	0	0^+	D		
5280.4	1	5280.2 *6*	100	0	0^+	D		
5315.0	1	5314.8 *6*	100	0	0^+	D		
5395.5?		1497.0[@] *2*	100	3898.48	(7^-)			
5421.4?		1343.8[@] *2*	100	4077.57	8^+			
5435.8	1^+	5435.6 *5*	100	0	0^+	M1	0.001526 *22*	α(K)=1.460×10^{-5} *21*; α(L)=1.465×10^{-6} *21*; α(M)=2.19×10^{-7} *3*; α(N+..)=0.001510
5837.8	11^-	1096.5 *2*	100	4741.34	9^-	E2[‡]	0.000286 *4*	α(K)=0.000255 *4*; α(L)=2.61×10^{-5} *4*; α(M)=3.90×10^{-6} *6*; α(N)=2.55×10^{-7} *4* α(N+..)=2.55×10^{-7} *4* B(E2)(W.u.)=22 *+5−10*
5849.8	$1^{(-)}$	5849.5 *3*	100	0	0^+	(E1)	0.00226 *4*	α(K)=1.037×10^{-5} *15*; α(L)=1.038×10^{-6} *15*; α(M)=1.548×10^{-7} *22*; α(N)=1.024×10^{-8} *15* α(N+..)=0.00225 *4*
5919.8	1^-	5919.5 *4*	100	0	0^+	E1	0.00228 *4*	α(K)=1.022×10^{-5} *15*; α(L)=1.023×10^{-6} *15*; α(M)=1.526×10^{-7} *22*; α(N)=1.010×10^{-8} *15* α(N+..)=0.00227 *4*
5974.6	1	5974.3 *12*	100	0	0^+	D		
6115.0	(12^+)	1295.0 *2*	100	4820.0	(10^+)	E2[‡]	0.000225 *4*	α(K)=0.0001770 *25*; α(L)=1.80×10^{-5} *3*; α(M)=2.69×10^{-6} *4*; α(N+..)=2.71×10^{-5} *4* B(E2)(W.u.)=26 *+4−6*
6131.7	1	6131.4 *7*	100	0	0^+	D		
6146.0	1	6145.7 *11*	100	0	0^+	D		
6163.5	$1^{(-)}$	6163.2 *4*		0	0^+	(E1)		
6383.2	1	6382.9 *7*	100	0	0^+	D		
6470.0	1	6469.7 *7*	100	0	0^+	D		
6629.9	1	6629.6 *6*	100	0	0^+	D		
6736.8	1	6736.5 *6*	100	0	0^+	D		
6811.7	1^-	6811.4 *12*	100	0	0^+	E1		
7061.2	1	7060.8 *10*		0	0^+	D		
7450.4	1	7450.0 *11*	100	0	0^+	D		
7518.5	1	7518.1 *8*	100	0	0^+	D		
7673.7	1^-	7673.3 *4*	100	0	0^+	E1		
7805.0	$1^{(-)}$	7804.5 *13*		0	0^+	(E1)		
8441.7	$1^{(-)}$	8441.2 *8*	100	0	0^+	(E1)		
8486.9	$1^{(-)}$	8486.4 *10*		0	0^+	(E1)		
8867.9	1	8867.3 *5*	100	0	0^+	D		

$^{72}_{32}Ge_{40}$-13

Adopted Levels, Gammas (continued)

$\gamma(^{72}Ge)$ (continued)

† From $\gamma(\theta)$ and $\gamma\gamma(\theta)$ in ^{72}Ga β^- decay, except as noted.
‡ From $\gamma(\theta)$ and $\gamma\gamma(\theta)$ in $^{70}Zn(\alpha,2n\gamma)$.
# From Coul excitation.
@ Placement of transition in the level scheme is uncertain.

$^{72}_{32}Ge_{40}$-14

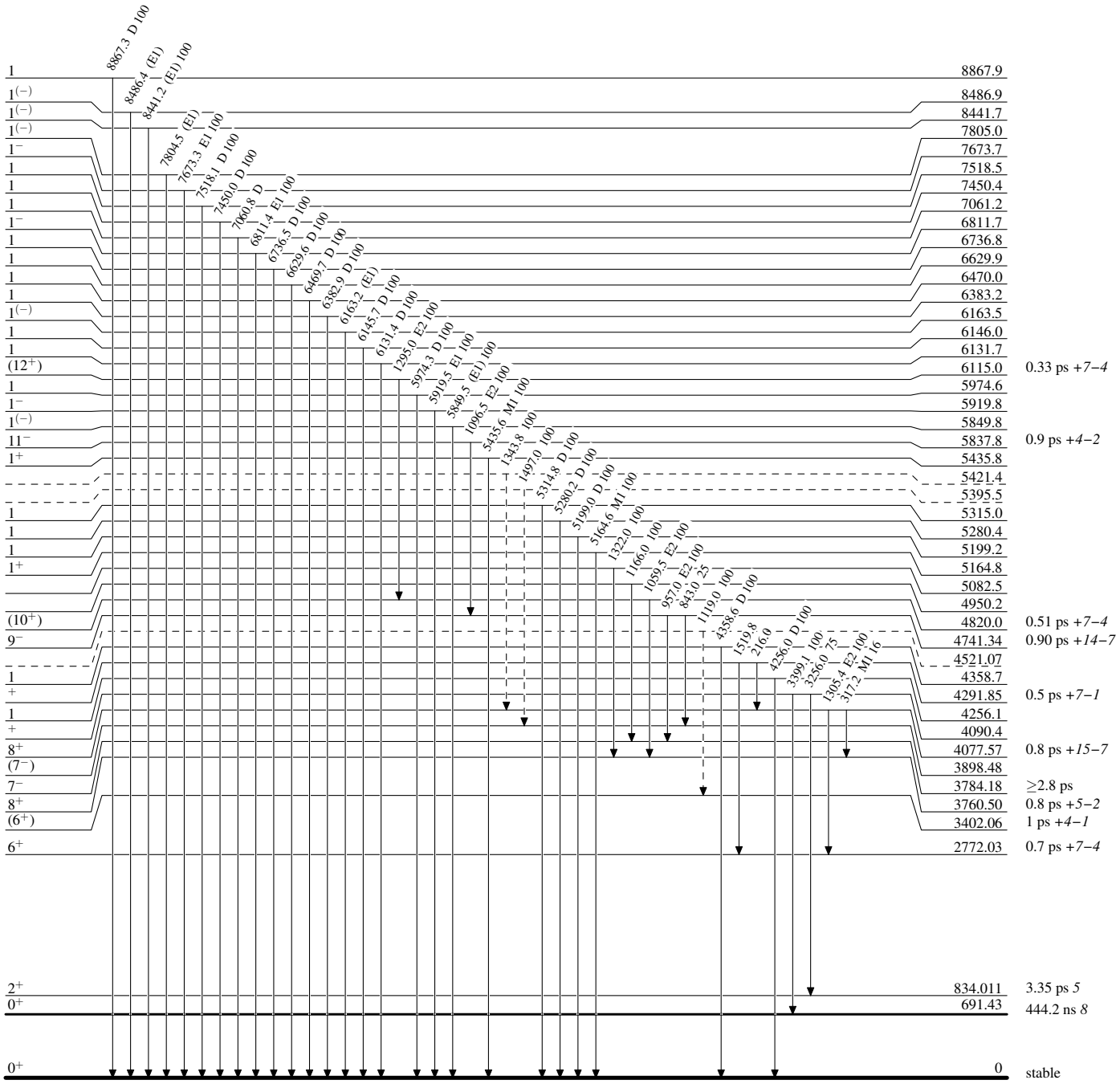
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

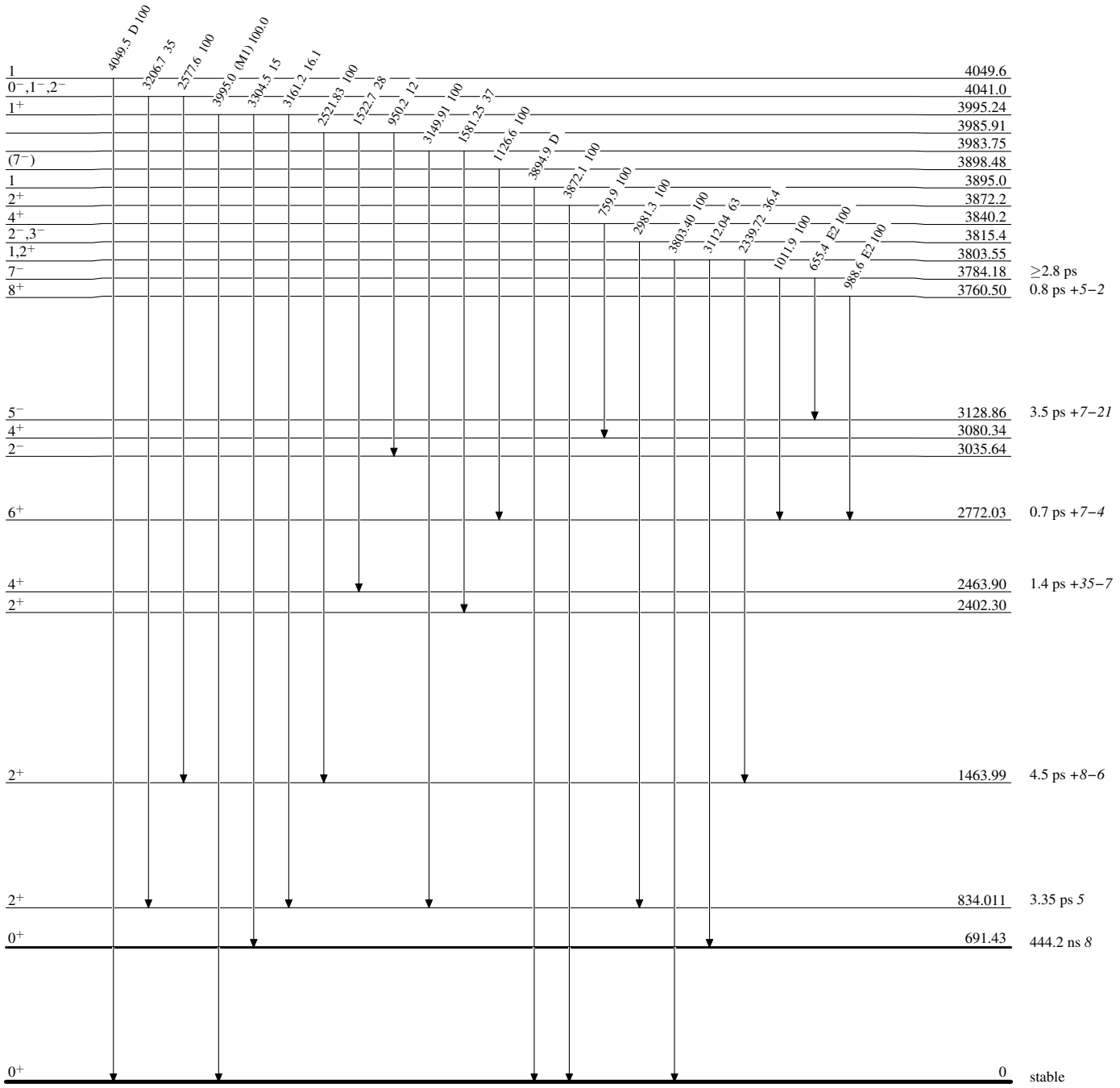


$^{72}_{32}Ge_{40}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

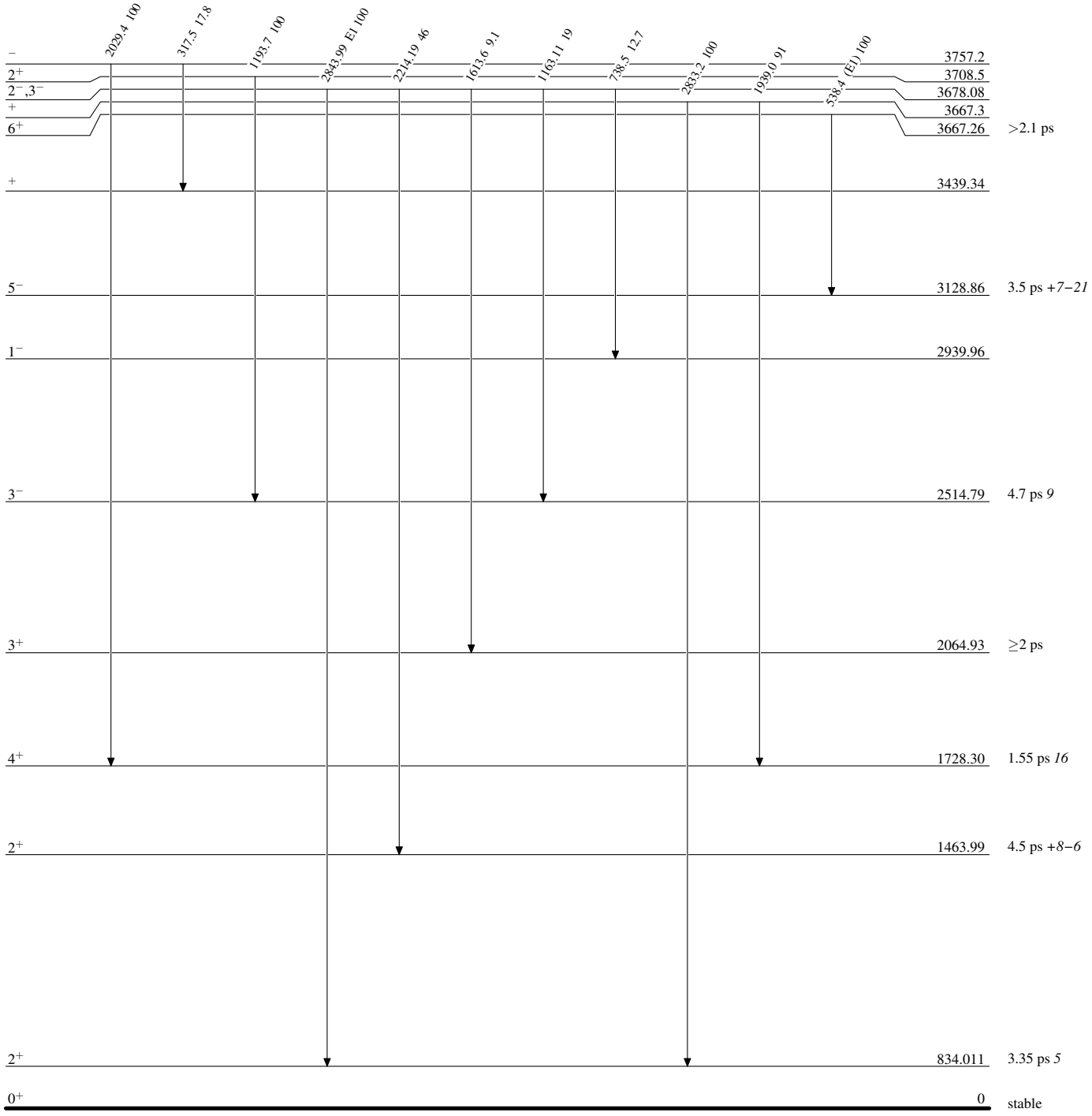


$^{72}_{32}Ge_{40}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{72}_{32}Ge_{40}$

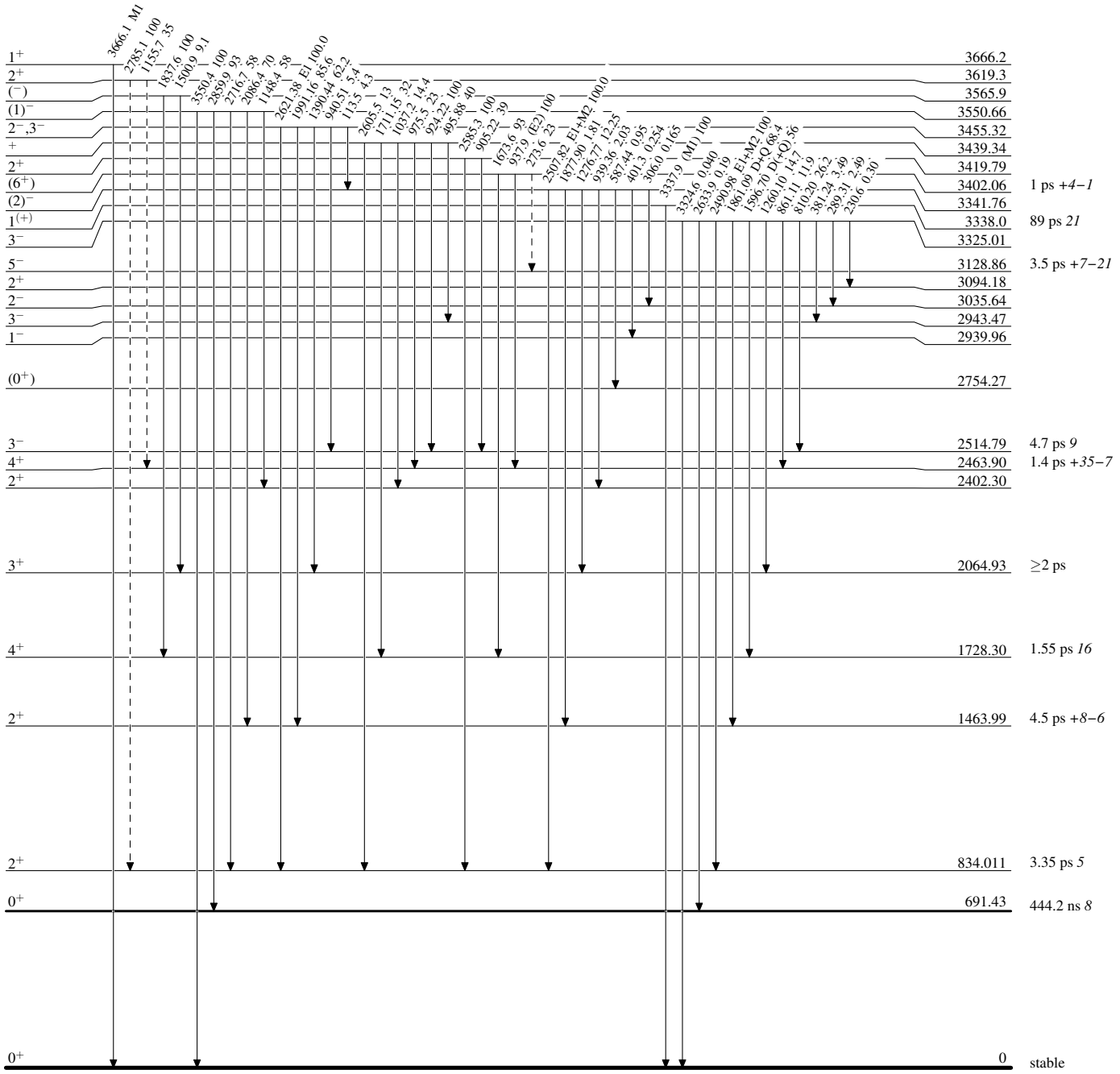
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{72}_{32}Ge_{40}$

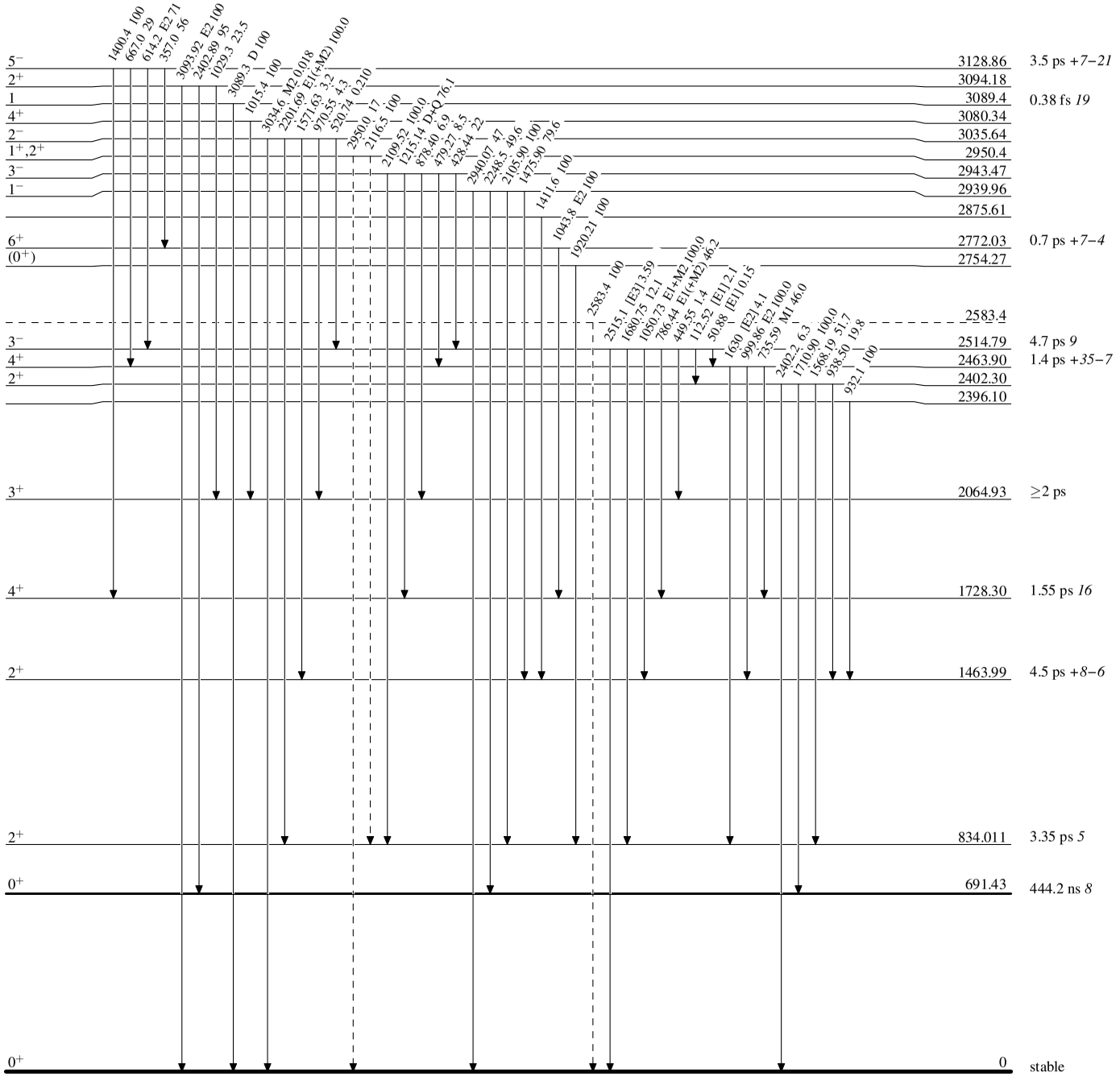
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

- - - - - - ► γ Decay (Uncertain)

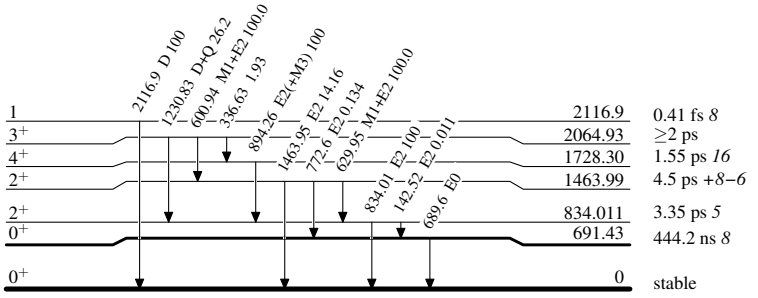


$^{72}_{32}Ge_{40}$

Adopted Levels, Gammas

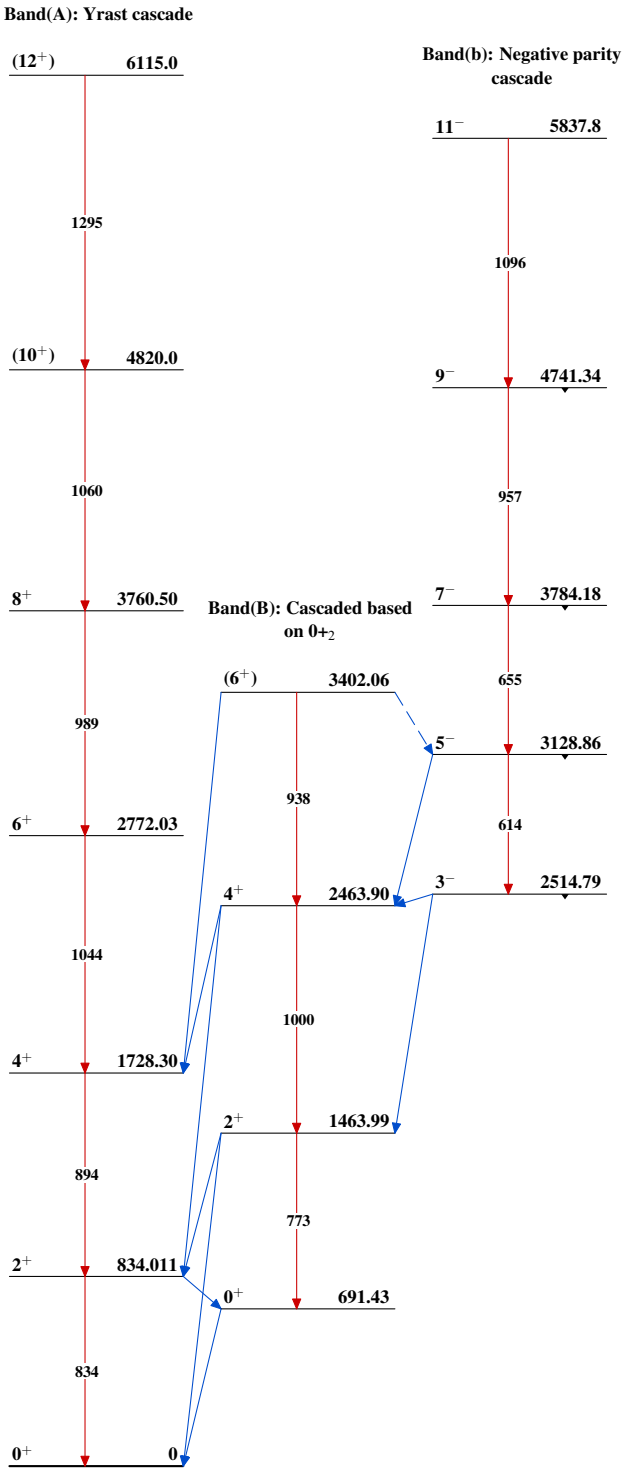
Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{72}_{32}Ge_{40}$

Adopted Levels, Gammas



$^{72}_{32}Ge_{40}$