Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	A. A. Sonzogni	NDS 93,599 (2001)	1-Dec-2000

Q(β^-)=−9.39×10^3 *4*; S(n)=1.160×10^4 *21*; S(p)=4.81×10^3 *3*; Q(α)=1.27×10^3 *3* 2012Wa38
Note: Current evaluation has used the following Q record −9074 syst 11750 syst 4958 syst 1113 syst 1995Au04.
ΔQ(β^-)=359 keV.
ΔS(n)=284 keV.
ΔS(p)=201 keV.
ΔQ(α)=201 keV.
Theory, shape, systematics, shell closure, spectra, etc.: 1999Kh05, 1998Af02, 1998Ka41,1998La12, 1994Sa35, 1993Mi10, 1987Ar05, 1985Ar16, 1986Ci03, 1985Ze01, 1985Du01, 1984Ab01.
Isotope shifts: 1988Ga17.
GDR studies: 1985Ba15, 1983Ha02.

^{144}Gd Levels

Cross Reference (XREF) Flags

A	^{144}Tb ε decay (1 s)	D	^{144}Sm(^{3}He,3nγ),(α,4nγ)
B	^{144}Tb ε decay (4.25 s)	E	^{108}Pd(^{40}Ar,4nγ)
C	^{144}Sm(α,4nγ)	F	(HI,xnγ):SD

E(level)[†]	J$^\pi$	T$_{1/2}$	XREF	Comments
0.0	0$^+$	4.47 min *6*	ABCDE	%ε+%β^+=100 T$_{1/2}$: from 1991Tu01; others: 4.5 min *1* (1968Ke14), 4.9 min *4* (1970Ar04), 4.4 min *3* (1973VaYZ).
743.00 *17*	2$^+$		ABCDE	J$^\pi$: E2 γ to 0$^+$ g.s.
1702.29 *24*	(3$^-$)		BCDE	J$^\pi$: from systematics of 3$^-$ states in neighboring nuclei.
1744.52 *24*	(4$^+$)		BCDE	J$^\pi$: Expected 2-phonon 4$^+$ from systematics of near-spherical even-even nuclei.
1876.41 *23*	(2$^+$)		A	
1886.9 *4*	(0$^+$)		A	
2226.51 *23*	(2$^+$)		A	
2302.6 *3*	(5$^-$)		BCDE	J$^\pi$: E1 γ to (4$^+$).
2330.5 *4*	(4$^-$,5$^-$)		B D	J$^\pi$: Because it feeds a 3$^-$ state with a 628 keV γ, 1984La29 assigned a (4$^-$) *J$^\pi$* to this level. However, this level is fed in β decay with a log *ft*=6.0 from a (6$^-$) parent. Both facts may be reconciled with a (5$^-$) assignment.
2354.3	(6$^+$)		B	
2442.3 *4*	(5$^-$)		B D	
2462.1 *4*	(0$^+$,1$^+$,2$^+$)		A	
2471.6 *4*	(7$^-$)	13 ns *2*	BCDE	T$_{1/2}$: from (α,4nγ) (1978Ma43), other T$_{1/2}$=13 ns (1984La29). J$^\pi$: E2 γ to (5$^-$).
2786.7 *4*	(7$^-$)		BCDE	J$^\pi$: M1 γ to (7$^-$).
2787.9 *4*			B	
2861.9 *4*	(6$^+$)		B D	
2912.5 *5*			B	
3015.4 *4*	(5$^-$,6$^-$,7$^-$)		B	
3018.0 *4*	(8$^-$)		CDE	J$^\pi$: M1 γ to (7$^-$).
3244.2 *7*	(8$^-$)		DE	
3345.7 *5*	(9$^-$)		CDE	
3433.1 *5*	(10$^+$)	145 ns *30*	CDE	μ=+12.76 *14* (1979Ha15); Q=−1.46 *6* (1982Ha22)

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Adopted Levels, Gammas (continued)

^{144}Gd Levels (continued)

E(level)[†]	J^π	XREF	Comments
			J^π: E1 γ to (9^-) and M2 γ to (8^-). μ,Q from $\gamma(\theta,H,t)$ in $^{120}Sn(^{28}Si,4n)$ (1979Ha15,1982Ha22). μ includes paramagnetic correction factor. Oblate shape for the isomer established by determining the deformation sign to be negative (1985Da20,1984Da21) (from $\gamma(\theta,t)$, polarized isomer). $T_{1/2}$: from 1978Ma43; other 131 ns (1984La29).
3697.0 *9*	(10^+)	D	
3910.0 *8*	(10^-)	D	
4144.5 *6*	(11^+)	CDE	J^π: M1+E2 γ to (10^+).
4267.0 *11*	(11^-)	D	
4450.9 *6*	(12^+)	CDE	J^π: E2 γ to (10^+).
4756.0 *10*	(12^+)	DE	J^π: M1+E2 γ to (11^+).
4954.0 *8*	(12^+)	E	J^π: M1+E2 γ to (11^+).
5086.4 *8*	(13^+)	E	J^π: M1+E2 γ to (12^+).
5133.9 *8*	(13^+)	DE	J^π: E2 γ to (11^+).
5179.5 *10*	(14^+)	DE	J^π: E2 γ to (12^+).
5227.9 *10*	(14^+)	E	
5369.9 *8*	(14^+)	DE	J^π: E2 γ to (12^+).
5455.0 *11*	(14^+)	E	
5486.8 *10*	(14^+)	E	
5497.1 *9*	(13^+)	DE	J^π: M1+E2 γ to (12^+).
5613.1 *10*	(14^+)	E	J^π: E2 γ to (12^+).
5626.4 *10*	(14^+)	DE	J^π: M1+E2 γ to (13^+).
5722.9 *10*	(15^+)	DE	J^π: M1+E2 γ to (14^+).
5835.2 *11*	(15^+)	DE	J^π: M1+E2 γ to (14^+).
6213.7 *11*	(16^+)	E	J^π: M1+E2 γ to (15^+).
6233.0 *15*	(16^+)	E	
6264.2 *13*	(17^+)	E	J^π: E2 γ to (15^+).
6325.0 *14*		E	
6380.6 *15*		E	
6382.1 *13*	(17^+)	E	
6432.4 *18*	(17^+)	E	
6443.1 *15*		E	
6618.4 *13*	(17^+)	E	J^π: M1+E2 γ to (17^+).
6669.9 *11*	(16^+)	E	J^π: E2 γ to (14^+).
6703.3 *11*	(16^+)	E	J^π: E2 γ to (14^+).
6747.8 *18*		E	
6824.6 *12*	(16^+)	E	
6927.7 *20*	(18^+)	E	
7014.1 *15*	(18^+)	E	J^π: M1+(E2) γ to (17^+).
7339.1 *22*		E	
7349.1 *16*	(19^+)	E	J^π: M1+E2 γ to (18^+).
7349.7[b] *10*	(18^+)	E	J^π: E2 γ to (16^+).
7351.5 *22*	(19^+)	E	
7418.6 *18*	(19^+)	E	J^π: M1+E2 γ to (18^+).
7569.4 *14*	(20^+)	E	
7606.6 *23*	(20^+)	E	
7756.4 *16*	(20^+)	E	J^π: M1+(E2) γ to (19^+).
7760.8 *24*		E	
7885.9 *25*		E	
7923.0 *21*	(20^+)	E	J^π: M1+E2 γ to (19^+).
8104.4[b] *15*	(20^+)	E	J^π: E2 γ to (18^+).
8189.5 *16*	(21^+)	E	
8221.2 *23*	(21^+)	E	
8476.1 *19*	(22^+)	E	
8539.9 *25*	(22^+)	E	

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Adopted Levels, Gammas (continued)

^{144}Gd Levels (continued)

E(level)[†]	Jπ	XREF	Comments
8595.3 *25*	(22+)	E	
8641.9 *20*	(24+)	E	
8993 *3*	(23+)	E	
9069.8[b] *18*	(22+)	E	
9079 *3*	(23+)	E	
9198.9 *20*	(24+)	E	
9603.0 *21*		E	
9862.4 *20*	(24+)	E	
9958.6[b] *20*	(24+)	E	
10066.1 *23*		E	
10424.1 *23*		E	
10441.4 *23*	(26+)	E	
10795.2[b] *23*	(26+)	E	
11178.3 *25*	(28+)	E	
11723.7[b] *25*	(28+)	E	
12843[b] *3*	(30+)	E	
13941[b] *3*	(32+)	E	
x[‡]	J≈(22)	F	Jπ: from 1997Lu03, π=+ from proposed configuration. Quadrupole moment measurements reported in 1999Ur02, Q_0=11.6 eb +14−10 below the backbending and Q_0=13.7 eb +11−9 above.
802.8+x[‡] *3*	J+2	F	
1649.0+x[‡] *4*	J+4	F	
2528.2+x[‡] *5*	J+6	F	
3430.7+x[‡] *5*	J+8	F	
4323.3+x[‡] *7*	J+10	F	
5257.5+x[‡] *7*	J+12	F	
6237.5+x[‡] *8*	J+14	F	
7268.8+x[‡] *9*	J+16	F	
8353.4+x[‡] *11*	J+18	F	
9492.9+x[‡] *11*	J+20	F	
10687.6+x[‡] *11*	J+22	F	
11937.4+x[‡] *11*	J+24	F	
13243.0+x[‡] *12*	J+26	F	
14605.0+x[‡] *13*	J+28	F	
16022.8+x[‡] *14*	J+30	F	
17497.3+x[‡] *15*	J+32	F	
19029.1+x[‡] *18*	J+34	F	
20617.1+x[‡] *24*	J+36	F	
22262+x[‡] *3*	J+38	F	
y[#]	J≈(25)[c]	F	
774.5+y[#]	J+2	F	
1609.3+y[#] *7*	J+4	F	
2503.5+y[#] *8*	J+6	F	
3456.9+y[#] *9*	J+8	F	
4468.5+y[#] *9*	J+10	F	
5538.1+y[#] *10*	J+12	F	

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Adopted Levels, Gammas (continued)

^{144}Gd Levels (continued)

E(level)[†]	J^π	XREF	E(level)[†]	J^π	XREF
6666.0+y[#] *11*	J+14	F	u[&]	J≈(29)[c]	F
7852.6+y[#] *13*	J+16	F	852.9+u[&] *4*	J+2	F
9098.1+y[#] *14*	J+18	F	1764.6+u[&] *6*	J+4	F
10402.0+y[#] *16*	J+20	F	2735.3+u[&] *8*	J+6	F
11764.6+y[#] *19*	J+22	F	3764.5+u[&] *10*	J+8	F
13186.6+y[#] *24*	J+24	F	4850.0+u[&] *12*	J+10	F
14668+y[#] *3*	J+26	F	5994.0+u[&] *14*	J+12	F
16208+y[#] *4*	J+28	F	7194.1+u[&] *15*	J+14	F
z[@]	J≈(24)[c]	F	8452.6+u[&] *16*	J+16	F
743.6+z[@] *8*	J+2	F	9769.1+u[&] *17*	J+18	F
1548.3+z[@] *11*	J+4	F	11144.6+u[&] *19*	J+20	F
2409.7+z[@] *12*	J+6	F	12581.6+u[&] *24*	J+22	F
3332.8+z[@] *13*	J+8	F	v[a]	J≈(32)[c]	F
4316.0+z[@] *14*	J+10	F	936.8+v[a] *5*	J+2	F
5357.4+z[@] *15*	J+12	F	1935.2+v[a] *10*	J+4	F
6457.6+z[@] *15*	J+14	F	2993.1+v[a] *11*	J+6	F
7617.6+z[@] *16*	J+16	F	4105.7+v[a] *13*	J+8	F
8833.6+z[@] *16*	J+18	F	5277.7+v[a] *16*	J+10	F
10110.7+z[@] *19*	J+20	F	6507.7+v[a] *19*	J+12	F
11443.7+z[@] *23*	J+22	F	7794.7+v[a] *24*	J+14	F
12837+z[@] *3*	J+24	F	9144+v[a] *4*	J+16	F
14289+z[@] *4*	J+26	F	10554+v[a] *4*	J+18	F

† From least square fit performed by evaluator assuming ΔEγ=1 keV in γ observed exclusively by 1994Rz01 and/or 1984La29.

‡ Band(A): SD-1 band (1994Lu03,1997Lu03). percent population=1.6 (1998Zh20) in ^{74}Ge(^{74}Ge,4nγ) E=318 MeV. Configuration=$\pi6^2$; (π,α)=(+,0) (1997Lu03). Percent feeding=1.2 *1* at E(^{48}Ti)=215 MeV, 0.7 *1* at E(^{48}Ti)=221 MeV (1997Lu03). Observed band crossing is interpreted (1995Li24) as due to alignment of $\pi6^2$.

Band(B): SD-2 band (1997Lu03). Configuration=$\pi6^1\pi9/2[404]$; (π,α)=(+,1) (1997Lu03). Percent feeding=0.31 *10* at E(^{48}Ti)=215 MeV (1997Lu03).

@ Band(C): SD-3 band (1997Lu03). Configuration=$\pi6^1\pi9/2[404]$; (π,α)=(+,0) (1997Lu03). Percent feeding=0.31 *10* (1997Lu03). SD-2 and SD-3 are possible signature partners.

& Band(D): SD-4 band (1997Lu03). Configuration=$\pi6^1\pi3/2[411]$; (π,α)=(+,1) (1997Lu03). Percent feeding=0.28 *10* (1997Lu03).

a Band(E): SD-5 band (1997Lu03). Configuration=$\pi6^1\pi3/2[411]$; (π,α)=(+,0) (1997Lu03). Percent feeding=0.18 *10* (1997Lu03). SD-4 and SD-5 are possible signature partners.

b Band(F): Band based on 18^+ state at 7350 keV.

c From 1997Lu03, π=+ from proposed configuration.

$\gamma(^{144}Gd)$

E_i(level)	J^π_i	E_γ	I_γ[†]	E_f	J^π_f	Mult.[‡]	δ	α[&]	Comments
743.00	2^+	743.0 *2*	100	0.0	0^+	E2		0.00531	α(K)=0.00440 *14*; α(L)=0.00068 *2* E_γ: weighted average of 1978Ma43 and 1986Re11 values.
1702.29	(3^-)	959.3 *2*	100	743.00	2^+	(E1+M2)	+0.12[#] *5*	0.00140 *17*	α(K)=0.00119 *14*; α(L)=0.00016 *2* E_γ: weighted average of 1978Ma43 and 1986Re11 values.
1744.52	(4^+)	1001.5 *2*	100	743.00	2^+				E_γ: weighted average of 1978Ma43 and 1986Re11 values.
1876.41	(2^+)	1133.4 *3*	75 *11*	743.00	2^+				
		1876.4 *3*	100	0.0	0^+				
1886.9	(0^+)	1143.9 *3*	100	743.00	2^+				
2226.51	(2^+)	1483.5 *3*	100	743.00	2^+				
		2226.5 *3*	80 *11*	0.0	0^+				
2302.6	(5^-)	558.0 *2*	100	1744.52	(4^+)	E1		0.00372	α(K)=0.00316 *10*; α(L)=0.00042 *1* E_γ: weighted average of 1978Ma43 and 1986Re11 values.
		600.3 *2*	68 *12*	1702.29	(3^-)				E_γ: weighted average of 1978Ma43 and 1986Re11 values, $I\gamma$; average of 1978Ma43 and 1986Re11 values.
2330.5	$(4^-,5^-)$	628.2 *3*	100	1702.29	(3^-)				
2354.3	(6^+)	609.7[a] *3*	100	1744.52	(4^+)				
2442.3	(5^-)	139.7 *3*	43 *6*	2302.6	(5^-)				E_γ,I_γ: from 1986Re11.
		697.9 *3*	100	1744.52	(4^+)				E_γ,I_γ: from 1986Re11.
2462.1	$(0^+,1^+,2^+)$	1719.1 *3*	100	743.00	2^+				
2471.6	(7^-)	169.0 *2*	100	2302.6	(5^-)	E2		0.396	α(K)=0.260 *8*; α(L)=0.105 *4*; α(M)=0.0243 *8*; α(N+..)=0.00677 *21* B(E2)(W.u.)=5.0 *8*
2786.7	(7^-)	315.1 *2*	100	2471.6	(7^-)	M1		0.085	α(K)=0.0724 *22*; α(L)=0.0102 *3*; α(M)=0.00220 *7*; α(N+..)=0.00062 *2* E_γ: average of 1978Ma43 and 1986Re11 values.
2787.9		485.3 *3*	100	2302.6	(5^-)				
2861.9	(6^+)	1117.4 *3*	100	1744.52	(4^+)				E_γ: from 1986Re11.
2912.5		470.2 *3*	100	2442.3	(5^-)				
3015.4	$(5^-,6^-,7^-)$	573.5[a] *3*	40 *6*	2442.3	(5^-)				
		712.8 *3*	100	2302.6	(5^-)				
3018.0	(8^-)	231.3 *2*	67	2786.7	(7^-)	M1		0.196	α(K)=0.166 *5*; α(L)=0.0236 *7*; α(M)=0.00509 *16*; α(N+..)=0.00146 *5* E_γ: from 1978Ma43.
		546.4 *2*	100	2471.6	(7^-)	M1+E2		0.016 *5*	α(K)=0.013 *5*; α(L)=0.0020 *5* E_γ: from 1978Ma43.
3244.2	(8^-)	226.3		3018.0	(8^-)				E_γ: average from 1984La29 and 1994Rz01 values.
		457.6		2786.7	(7^-)				E_γ: average from 1984La29 and 1994Rz01 values.
3345.7	(9^-)	101.7		3244.2	(8^-)				Seen by 1984La29 and 1994Rz01 only.
		327.7 *3*	100	3018.0	(8^-)	M1		0.0770	α(K)=0.0653 *20*; α(L)=0.0092 *3*; α(M)=0.00198 *6*; α(N+..)=0.00056 *2*
3433.1	(10^+)	87.4 *3*	100	3345.7	(9^-)	E1		0.423	α(K)=0.353 *11*; α(L)=0.0543 *17*; α(M)=0.0117 *4*;

$\gamma(^{144}Gd)$ (continued)

E_i(level)	J^π_i	E_γ	I_γ †	E_f	J^π_f	Mult. ‡	δ	α &	Comments
									α(N+..)=0.00328 *10* B(E1)(W.u.)=1.6×10^{-6} *4* E_γ,I_γ: from 1978Ma43.
3433.1	(10$^+$)	415.2 *3*	19	3018.0	(8$^-$)	M2		0.145	B(M2)(W.u.)=0.073 *16* α(K)=0.119 *4*; α(L)=0.0199 *6*; α(M)=0.00438 *14*; α(N+..)=0.00124 *4* E_γ,I_γ: from 1978Ma43.
3697.0	(10$^+$)	263.8		3433.1	(10$^+$)				
		351.3		3345.7	(9$^-$)				
3910.0	(10$^-$)	564.3		3345.7	(9$^-$)				
		892.0		3018.0	(8$^-$)				
4144.5	(11$^+$)	711.3 *3*	100	3433.1	(10$^+$)	M1+E2	−0.9 *2*	0.0086 *6*	α(K)=0.0072 *5*; α(L)=0.00103 *6* E_γ: from 1978Ma43. δ: from 1994Rz01 in (^{40}Ar,4nγ).
4267.0	(11$^-$)	921.3		3345.7	(9$^-$)				
4450.9	(12$^+$)	306.3	7	4144.5	(11$^+$)	M1+E2		0.074 *18*	α(K)=0.061 *18*; α(L)=0.0107 *4*; α(M)=0.00235 *3*; α(N+..)=0.00066 *2* observed by 1994Rz01 only.
		1017.8 *3*	100	3433.1	(10$^+$)	E2		0.00267	α(K)=0.00224 *7*; α(L)=0.00032 *1*
4756.0	(12$^+$)	611.5	100	4144.5	(11$^+$)	M1+E2		0.012 *4*	α(K)=0.010 *4*; α(L)=0.0015 *4*
4954.0	(12$^+$)	809.5	100	4144.5	(11$^+$)	M1+E2		0.0061 *18*	α(K)=0.0051 *15*; α(L)=0.00073 *18*
		1521.0	90	3433.1	(10$^+$)	E2		0.00102	α(K)=0.00102 *3*
5086.4	(13$^+$)	132.5	100	4954.0	(12$^+$)	M1+(E2)		0.92	α(K)=0.66 *13*; α(L)=0.21 *10*; α(M)=0.047 *23*; α(N+..)=0.013 *7*
		635.3	82	4450.9	(12$^+$)	M1+E2		0.011 *4*	α(K)=0.009 *3*; α(L)=0.0013 *3*
		941.8	100	4144.5	(11$^+$)	E2		0.00314	α(K)=0.00263 *8*; α(L)=0.00039 *1*
5133.9	(13$^+$)	377.9	52	4756.0	(12$^+$)	M1+E2		0.042 *12*	α(K)=0.034 *11*; α(L)=0.0056 *7*; α(M)=0.00124 *13*; α(N+..)=0.00034 *4* E_γ: average from 1984La29 and 1994Rz01 values.
		989.4	100	4144.5	(11$^+$)	E2		0.00283	α(K)=0.00237 *8*; α(L)=0.00034 *1* E_γ: average from 1984La29 and 1994Rz01 values.
5179.5	(14$^+$)	728.6	100	4450.9	(12$^+$)	E2		0.00556	α(K)=0.00460 *14*; α(L)=0.00072 *2* E_γ: average from 1984La29 and 1994Rz01 values.
5227.9	(14$^+$)	141.6	100	5086.4	(13$^+$)				
5369.9	(14$^+$)	142.1	11	5227.9	(14$^+$)				Seen only by 1994Rz01.
		236.0	53	5133.9	(13$^+$)	M1+(E2)		0.16 *3*	α(K)=0.13 *4*; α(L)=0.025 *3*; α(M)=0.0055 *7*; α(N+..)=0.00155 *17* E_γ: average of 1984La29 and 1994Rz01 values.
		283.4	21	5086.4	(13$^+$)	M1+E2		0.093 *21*	α(K)=0.075 *21*; α(L)=0.0136 *1*; α(M)=0.00301 *9*; α(N+..)=0.00084 *1* Seen only by 1994Rz01.
		919.0	100	4450.9	(12$^+$)	E2		0.00331	α(K)=0.00277 *9*; α(L)=0.00041 *1* Seen only by 1994Rz01.
5455.0	(14$^+$)	227.1	100	5227.9	(14$^+$)				
5486.8	(14$^+$)	1036.0	100	4450.9	(12$^+$)				
5497.1	(13$^+$)	317.7	50	5179.5	(14$^+$)				Seen only by 1994Rz01.
		1046.2	100	4450.9	(12$^+$)	M1+E2		0.0034 *9*	α(K)=0.0028 *8*; α(L)=0.00039 *9* E_γ: average of 1984La29 and 1994Rz01 values.

$^{144}_{64}Gd_{80}$-6

γ(^{144}Gd) (continued)

E_i(level)	J_i^π	E_γ	I_γ[†]	E_f	J_f^π	Mult.[‡]	α[&]	Comments
5613.1	(14+)	1162.2	100	4450.9	(12+)	E2	0.00204	α(K)=0.00172 *6*; α(L)=0.00024 *1*
5626.4	(14+)	129.3	100	5497.1	(13+)	M1+(E2)	1.00 *1*	α(K)=0.70 *13*; α(L)=0.23 *11*; α(M)=0.05 *3*; α(N+..)=0.015 *7* E_γ: average of 1984La29 and 1994Rz01 values, Iγ; from 1994Rz01.
		492.4	92	5133.9	(13+)	M1+E2	0.021 *6*	α(K)=0.017 *6*; α(L)=0.0026 *5*; α(M)=0.00058 *11*; α(N+..)=0.00016 *3* E_γ: average of 1984La29 and 1994Rz01 values, Iγ; from 1994Rz01.
5722.9	(15+)	267.9	22	5455.0	(14+)			Seen only by 1994Rz01.
		352.9	100	5369.9	(14+)	M1+E2	0.050 *14*	α(K)=0.041 *13*; α(L)=0.0069 *7*; α(M)=0.00152 *11*; α(N+..)=0.00042 *4* E_γ: average of 1984La29 and 1994Rz01 values, Iγ; from 1994Rz01.
5835.2	(15+)	208.7	100	5626.4	(14+)	M1+(E2)	0.23 *4*	α(K)=0.18 *5*; α(L)=0.038 *7*; α(M)=0.0085 *17*; α(N+..)=0.0024 *5* E_γ: average of 1984La29 and 1994Rz01 values, Iγ; from 1994Rz01.
		465.3[@@]	50	5369.9	(14+)	M1+E2	0.024 *7*	α(K)=0.020 *7*; α(L)=0.0031 *6*; α(M)=0.00068 *12*; α(N+..)=0.00019 *4*
6213.7	(16+)	490.6	100	5722.9	(15+)	M1+E2	0.021 *7*	α(K)=0.017 *6*; α(L)=0.0027 *6*; α(M)=0.00058 *11*; α(N+..)=0.00016 *3*
6233.0	(16+)	397.8	100	5835.2	(15+)			
6264.2	(17+)	541.4	100	5722.9	(15+)	E2	0.0115	α(K)=0.0093 *3*; α(L)=0.00162 *5*
6325.0		711.9		5613.1	(14+)			
6380.6		545.4	100	5835.2	(15+)			
6382.1	(17+)	118.0	46	6264.2	(17+)			
		168.0	100	6213.7	(16+)			
6432.4	(17+)	199.4	100	6233.0	(16+)			
6443.1		607.9	100	5835.2	(15+)			
6618.4	(17+)	236.0	75	6382.1	(17+)			
		404.8	100	6213.7	(16+)	M1+E2	0.035 *10*	α(K)=0.029 *9*; α(L)=0.0046 *7*; α(M)=0.00101 *13*; α(N+..)=0.00028 *4*
6669.9	(16+)	1056.8	100	5613.1	(14+)	E2	0.00247	α(K)=0.00207 *7*; α(L)=0.00030 *1*
		1183.2	86	5486.8	(14+)	E2	0.00197	α(K)=0.00166 *5*; α(L)=0.00023 *1*
6703.3	(16+)	1090.2	100	5613.1	(14+)	E2	0.00232	α(K)=0.00195 *6*; α(L)=0.00028 *1*
		1216.6	100	5486.8	(14+)	E2	0.00186	α(K)=0.00157 *5*; α(L)=0.00022 *1*
6747.8		514.8		6233.0	(16+)			
6824.6	(16+)	1337.6	100	5486.8	(14+)	(E2)	0.00154	α(K)=0.00131 *4*; α(L)=0.00018 *1*
6927.7	(18+)	495.3	100	6432.4	(17+)			
7014.1	(18+)	395.6	100	6618.4	(17+)	M1+(E2)	0.037 *11*	α(K)=0.031 *10*; α(L)=0.0049 *7*; α(M)=0.00108 *13*; α(N+..)=0.00030 *4*
7339.1		411.4	100	6927.7	(18+)			
7349.1	(19+)	334.9	100	7014.1	(18+)	M1+E2	0.058 *15*	α(K)=0.048 *14*; α(L)=0.0081 *6*; α(M)=0.00178 *9*; α(N+..)=0.00050 *4*
7349.7	(18+)	525.0	8	6824.6	(16+)	E2	0.0124	α(K)=0.0101 *3*; α(L)=0.00177 *6*
		646.4	100	6703.3	(16+)	E2	0.00737	α(K)=0.00606 *19*; α(L)=0.00098 *3*
		679.8	64	6669.9	(16+)	E2	0.00654	α(K)=0.00539 *17*; α(L)=0.00086 *3*
		1136.0	20	6213.7	(16+)			
7351.5	(19+)	423.8	100	6927.7	(18+)			
7418.6	(19+)	404.5	100	7014.1	(18+)	M1+E2	0.035 *10*	α(K)=0.029 *9*; α(L)=0.0046 *7*; α(M)=0.00101 *13*; α(N+..)=0.00028 *4*
7569.4	(20+)	219.9	100	7349.7	(18+)			
7606.6	(20+)	255.1	100	7351.5	(19+)			
		267.5	39	7339.1				

From ENSDF

$^{144}_{64}Gd_{80}$-7

$\gamma(^{144}Gd)$ (continued)

E_i(level)	J_i^π	E_γ	I_γ[†]	E_f	J_f^π	Mult.[‡]	α[&]	Comments
7756.4	(20+)	407.2	100	7349.1	(19+)	M1+(E2)	0.034 10	α(K)=0.028 9; α(L)=0.0045 7; α(M)=0.00099 13; α(N+..)=0.00027 4
7760.8		421.7		7339.1				
7885.9		279.3	100	7606.6	(20+)			
7923.0	(20+)	504.4	100	7418.6	(19+)	M1+E2	0.020 6	α(K)=0.016 6; α(L)=0.0025 5
8104.4	(20+)	754.7	100	7349.7	(18+)	E2	0.00513	α(K)=0.00425 13; α(L)=0.00066 2
8189.5	(21+)	432.9	100	7756.4	(20+)	M1+(E2)	0.029 9	α(K)=0.024 8; α(L)=0.0038 7; α(M)=0.00083 12; α(N+..)=0.00023 4
		620.2	23	7569.4	(20+)			
8221.2	(21+)	298.2	100	7923.0	(20+)	M1+(E2)	0.080 19	α(K)=0.065 19; α(L)=0.0116 2; α(M)=0.00256 1; α(N+..)=0.00072 1
8476.1	(22+)	286.6	100	8189.5	(21+)			
8539.9	(22+)	318.7	100	8221.2	(21+)	M1+E2	0.067 17	α(K)=0.055 16; α(L)=0.0094 5; α(M)=0.00208 6; α(N+..)=0.00058 3
8595.3	(22+)	374.1	100	8221.2	(21+)			
8641.9	(24+)	165.8	100	8476.1	(22+)			
8993	(23+)	453.4	100	8539.9	(22+)	M1+(E2)	0.026 8	α(K)=0.021 7; α(L)=0.0033 6; α(M)=0.00073 12; α(N+..)=0.00020 4
9069.8	(22+)	965.4	100	8104.4	(20+)			
9079	(23+)	483.8	100	8595.3	(22+)			
9198.9	(24+)	722.8	100	8476.1	(22+)			
9603.0		404.2	100	9198.9	(24+)			
		961.1	31	8641.9	(24+)			
9862.4	(24+)	792.6	100	9069.8	(22+)	E2	0.00459	α(K)=0.00381 12; α(L)=0.00058 2
9958.6	(24+)	888.8	100	9069.8	(22+)	E2	0.00356	α(K)=0.00297 9; α(L)=0.00044 1
10066.1		463.1	100	9603.0				
10424.1		561.7	100	9862.4	(24+)			
10441.4	(26+)	579.0	100	9862.4	(24+)	E2	0.0097	α(K)=0.00789 24; α(L)=0.00133 4
10795.2	(26+)	836.6	100	9958.6	(24+)	E2	0.00407	α(K)=0.00339 11; α(L)=0.00051 2
11178.3	(28+)	736.9	100	10441.4	(26+)			
11723.7	(28+)	928.5	100	10795.2	(26+)	(E2)	0.00324	α(K)=0.00271 9; α(L)=0.00040 1
12843	(30+)	1119.5		11723.7	(28+)	(E2)	0.00220	α(K)=0.00185 6; α(L)=0.00026 1
13941	(32+)	1098		12843	(30+)	(E2)	0.00228	α(K)=0.00192 6; α(L)=0.00027 1
802.8+x	J+2	802.8 3	0.22 4	x	J≈(22)			
1649.0+x	J+4	846.2 2	0.43 5	802.8+x	J+2			
2528.2+x	J+6	879.2 2	0.55 5	1649.0+x	J+4	(E2)		
3430.7+x	J+8	902.5 2	0.87 4	2528.2+x	J+6	(E2)		
4323.3+x	J+10	892.6 5	1.00 3	3430.7+x	J+8	(E2)		
5257.5+x	J+12	934.2 2	1.00 3	4323.3+x	J+10	(E2)		
6237.5+x	J+14	980.0 2	0.99 3	5257.5+x	J+12	(E2)		
7268.8+x	J+16	1031.3 5	1.01 5	6237.5+x	J+14	(E2)		
8353.4+x	J+18	1084.6 5	0.92 4	7268.8+x	J+16	(E2)		
9492.9+x	J+20	1139.5 2	0.87 5	8353.4+x	J+18	(E2)		
10687.6+x	J+22	1194.7 2	0.83 7	9492.9+x	J+20	(E2)		
11937.4+x	J+24	1249.8 2	0.74 7	10687.6+x	J+22			
13243.0+x	J+26	1305.6 5	0.65 7	11937.4+x	J+24	(E2)		
14605.0+x	J+28	1362.0 5	0.55 5	13243.0+x	J+26			

Adopted Levels, Gammas (continued)

$\gamma(^{144}Gd)$ (continued)

E_i(level)	J^π_i	E_γ	I_γ†	E_f	J^π_f	E_i(level)	J^π_i	E_γ	I_γ†	E_f	J^π_f
16022.8+x	J+30	1417.8 *5*	0.43 *4*	14605.0+x	J+28	7617.6+z	J+16	1160.0 *5*	1.09 *10*	6457.6+z	J+14
17497.3+x	J+32	1474.5 *6*	0.34 *5*	16022.8+x	J+30	8833.6+z	J+18	1216.0 *4*	0.85 *13*	7617.6+z	J+16
19029.1+x	J+34	1531.8 *10*	0.24 *4*	17497.3+x	J+32	10110.7+z	J+20	1277.1 *9*	0.68 *10*	8833.6+z	J+18
20617.1+x	J+36	1588.0 *15*	0.16 *3*	19029.1+x	J+34	11443.7+z	J+22	1333.0 *13*	0.43 *14*	10110.7+z	J+20
22262+x	J+38	1645 *2*	0.09 *2*	20617.1+x	J+36	12837+z	J+24	1393.0 *15*	0.37 *18*	11443.7+z	J+22
774.5+y	J+2	774.5 *5*	0.39 *8*	y	J≈(25)	14289+z	J+26	1452.0 *25*	0.26 *14*	12837+z	J+24
1609.3+y	J+4	834.8 *4*	0.48 *8*	774.5+y	J+2	852.9+u	J+2	852.9 *4*	0.62 *9*	u	J≈(29)
2503.5+y	J+6	894.2 *4*	0.56 *7*	1609.3+y	J+4	1764.6+u	J+4	911.7 *4*	0.83 *13*	852.9+u	J+2
3456.9+y	J+8	953.4 *3*	0.77 *9*	2503.5+y	J+6	2735.3+u	J+6	970.7 *5*	0.95 *10*	1764.6+u	J+4
4468.5+y	J+10	1011.6 *4*	1.00 *3*	3456.9+y	J+8	3764.5+u	J+8	1029.2 *6*	1.03 *14*	2735.3+u	J+6
5538.1+y	J+12	1069.6 *4*	0.84 *6*	4468.5+y	J+10	4850.0+u	J+10	1085.5 *6*	1.00 *6*	3764.5+u	J+8
6666.0+y	J+14	1127.9 *5*	1.00 *8*	5538.1+y	J+12	5994.0+u	J+12	1144.0 *7*	0.63 *15*	4850.0+u	J+10
7852.6+y	J+16	1186.6 *5*	1.03 *9*	6666.0+y	J+14	7194.1+u	J+14	1200.1 *5*	0.52 *11*	5994.0+u	J+12
9098.1+y	J+18	1245.5 *6*	0.79 *14*	7852.6+y	J+16	8452.6+u	J+16	1258.5 *6*	0.45 *11*	7194.1+u	J+14
10402.0+y	J+20	1303.9 *7*	0.65 *11*	9098.1+y	J+18	9769.1+u	J+18	1316.5 *5*	0.38 *9*	8452.6+u	J+16
11764.6+y	J+22	1362.6 *10*	0.48 *10*	10402.0+y	J+20	11144.6+u	J+20	1375.5 *8*	0.28 *10*	9769.1+u	J+18
13186.6+y	J+24	1422.0 *15*	0.36 *7*	11764.6+y	J+22	12581.6+u	J+22	1437.0 *15*	0.19 *9*	11144.6+u	J+20
14668+y	J+26	1481.0 *15*	0.22 *6*	13186.6+y	J+24	936.8+v	J+2	936.8 *5*	0.89 *11*	v	J≈(32)
16208+y	J+28	1540 *2*	0.16 *5*	14668+y	J+26	1935.2+v	J+4	998.4 *8*	0.80 *11*	936.8+v	J+2
743.6+z	J+2	743.6 *8*	0.44 *8*	z	J≈(24)	2993.1+v	J+6	1057.9 *5*	1.01 *8*	1935.2+v	J+4
1548.3+z	J+4	804.7 *7*	0.52 *8*	743.6+z	J+2	4105.7+v	J+8	1112.6 *6*	0.97 *12*	2993.1+v	J+6
2409.7+z	J+6	861.4 *5*	0.59 *13*	1548.3+z	J+4	5277.7+v	J+10	1172 *1*	1.00 *8*	4105.7+v	J+8
3332.8+z	J+8	923.1 *5*	1.11 *15*	2409.7+z	J+6	6507.7+v	J+12	1230 *1*	0.90 *11*	5277.7+v	J+10
4316.0+z	J+10	983.2 *4*	1.03 *10*	3332.8+z	J+8	7794.7+v	J+14	1287.0 *15*	0.57 *11*	6507.7+v	J+12
5357.4+z	J+12	1041.4 *5*	1.00 *7*	4316.0+z	J+10	9144+v	J+16	1349 *2*	0.50 *13*	7794.7+v	J+14
6457.6+z	J+14	1100.2 *3*	0.96 *12*	5357.4+z	J+12	10554+v	J+18	1410 *2*	0.44 *8*	9144+v	J+16

† For SD bands, intensities are relative within each band.
‡ For SD-1 band, assignments are from R(DCO) values.
# From $\gamma\gamma(\theta)$ in ^{144}Tb ε decay (1986Re11).
@ Seen only by 1994Rz01.
& 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.
a Placement of transition in the level scheme is uncertain.

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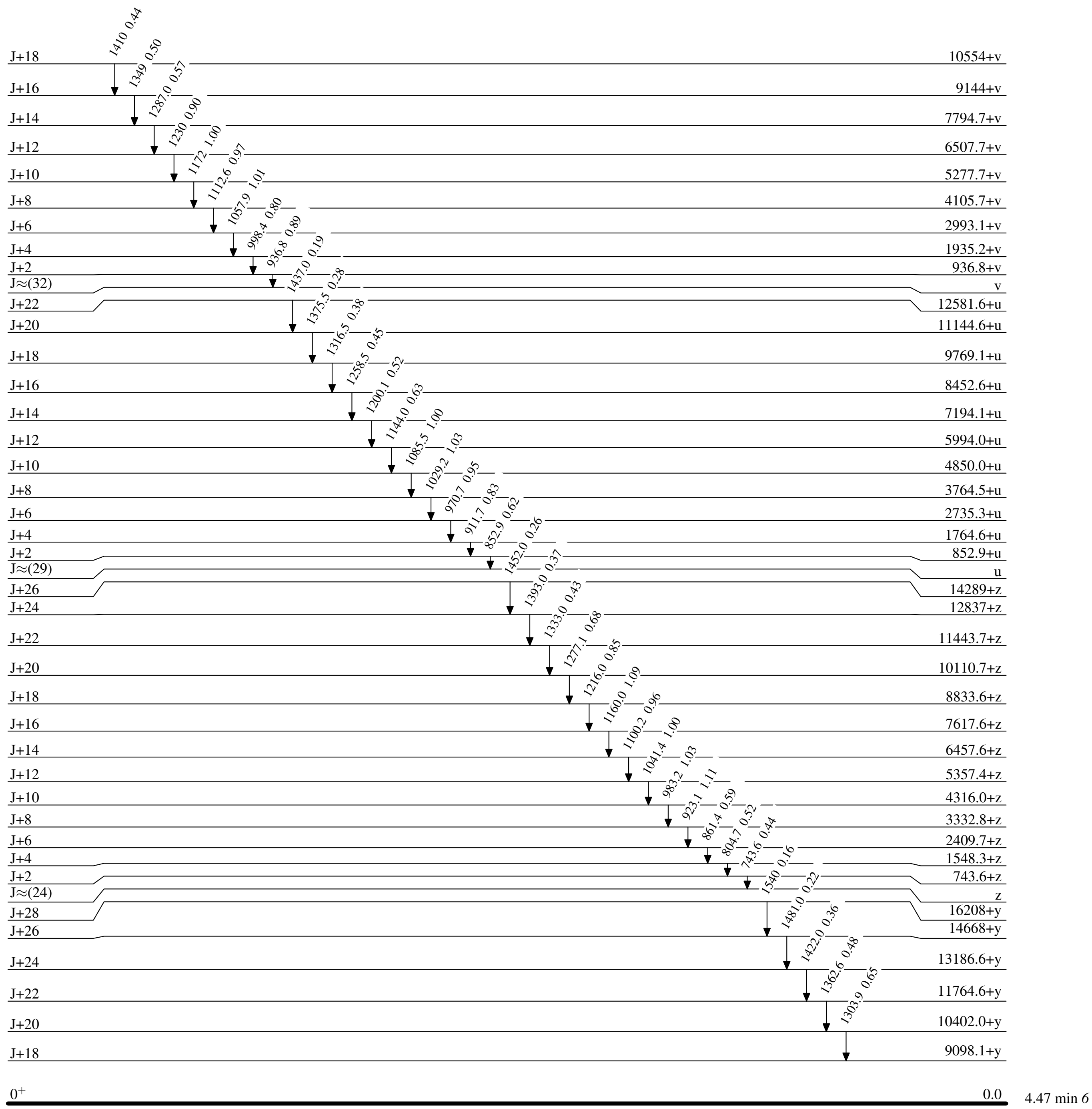
Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level

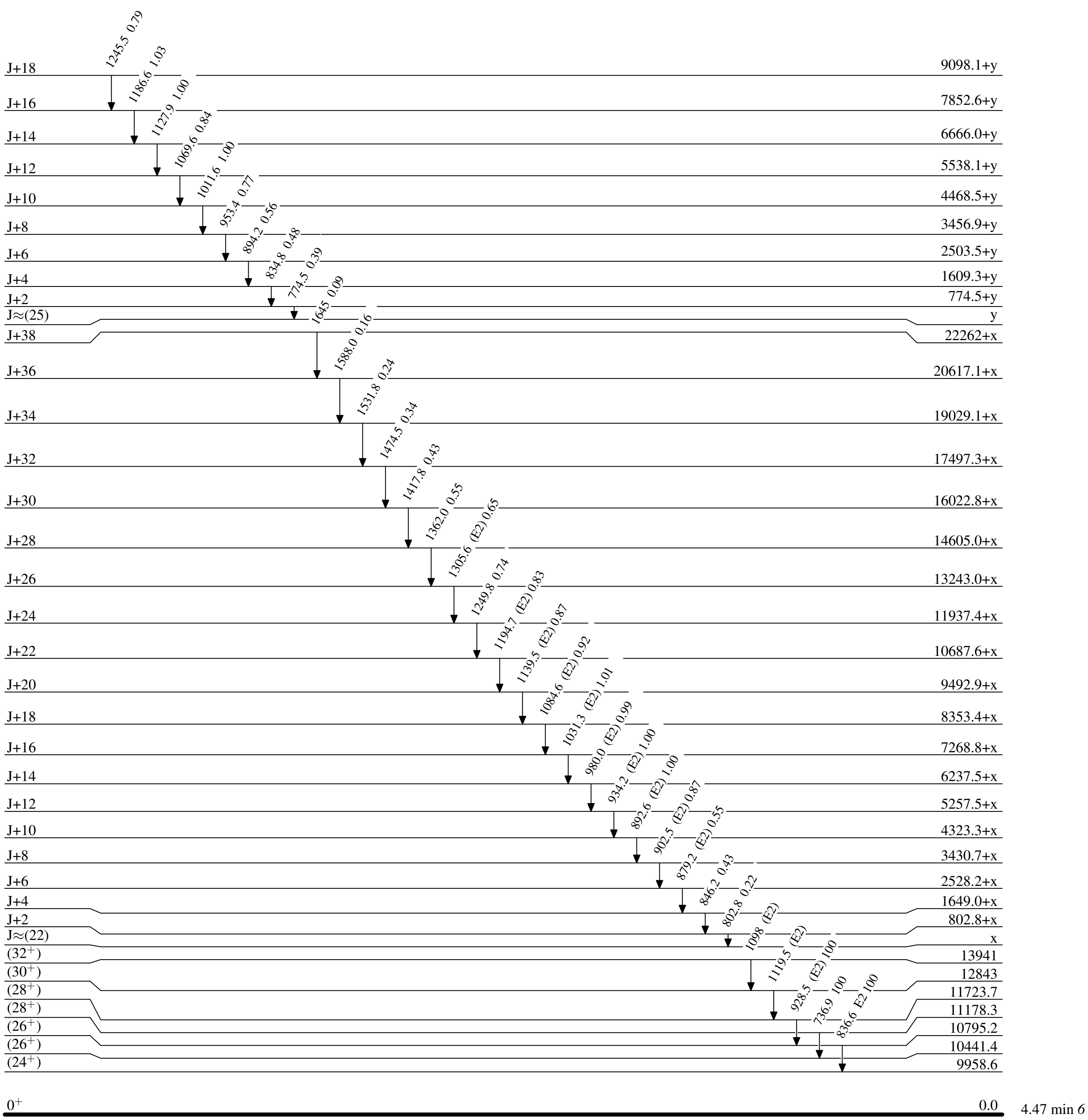


$^{144}_{64}Gd_{80}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

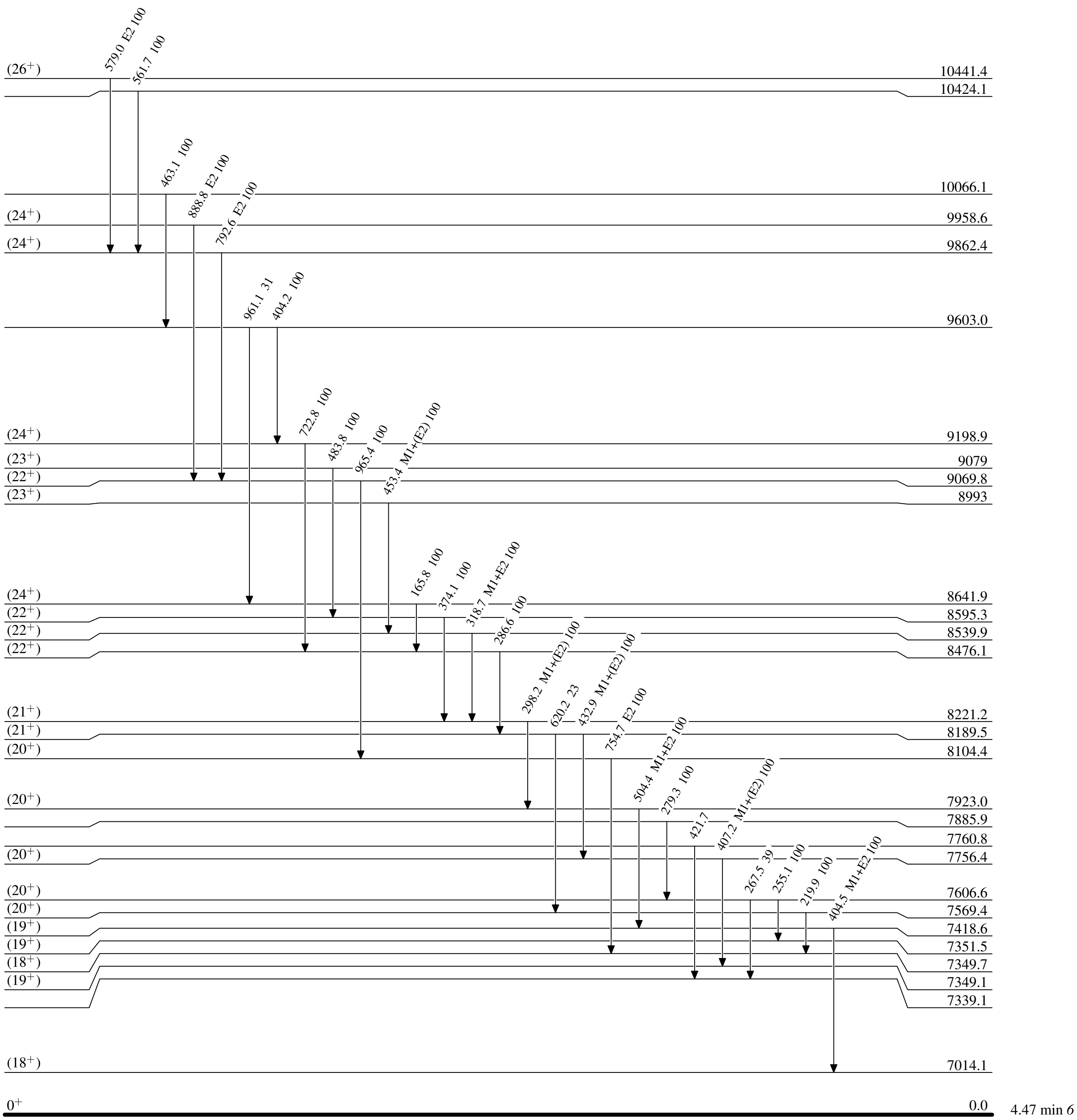


$^{144}_{64}Gd_{80}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

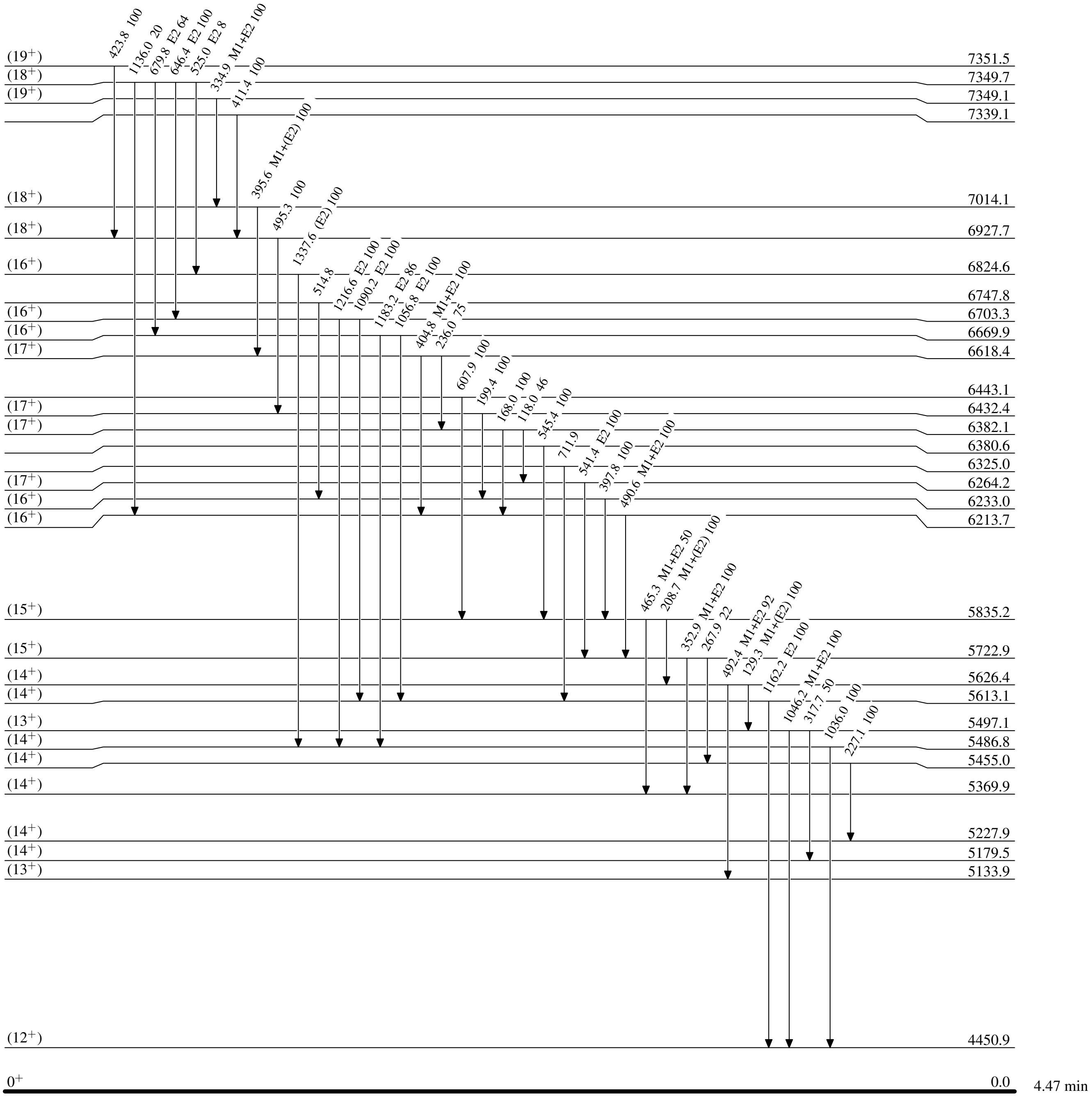


$^{144}_{64}Gd_{80}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

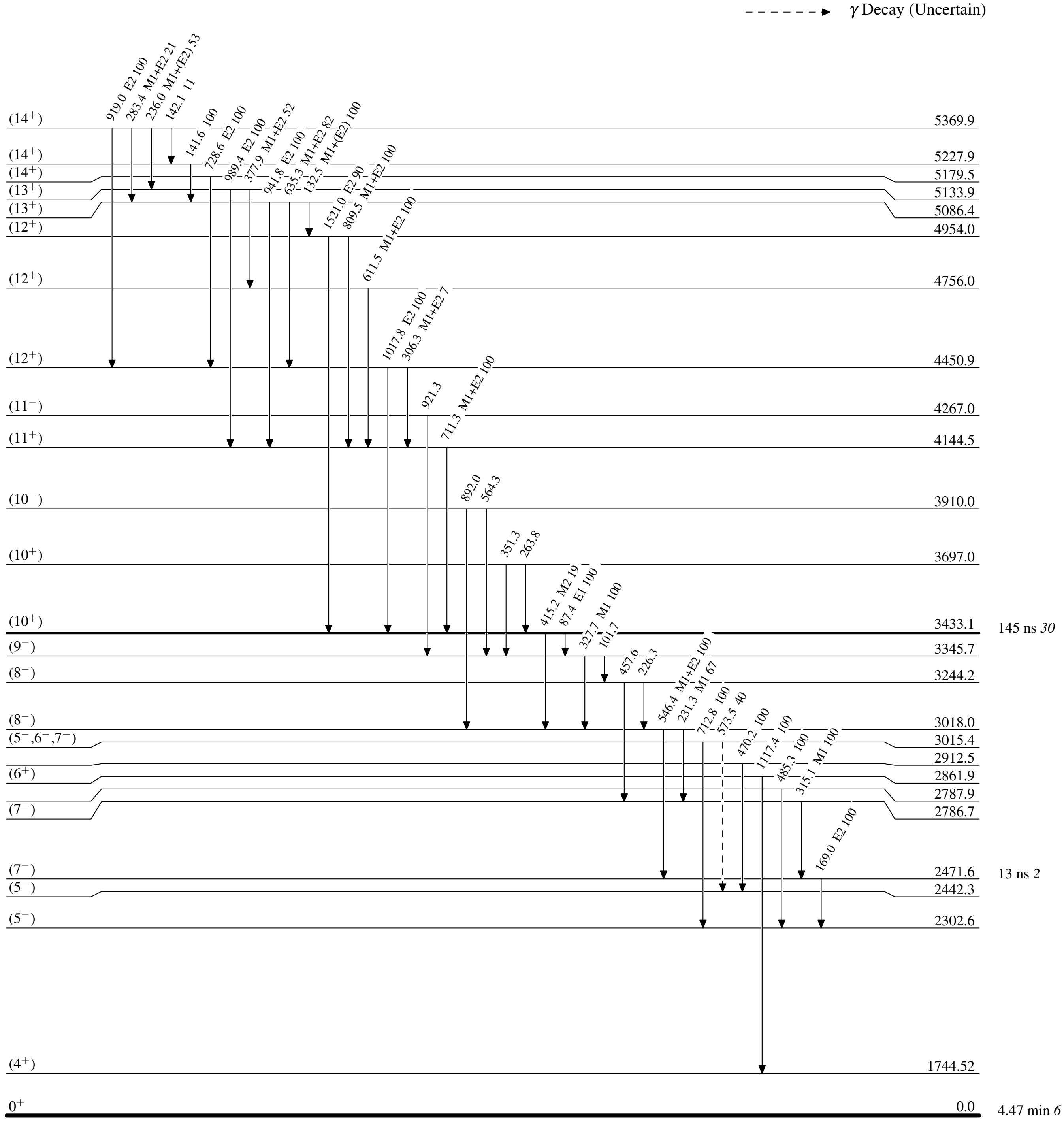


$^{144}_{64}Gd_{80}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



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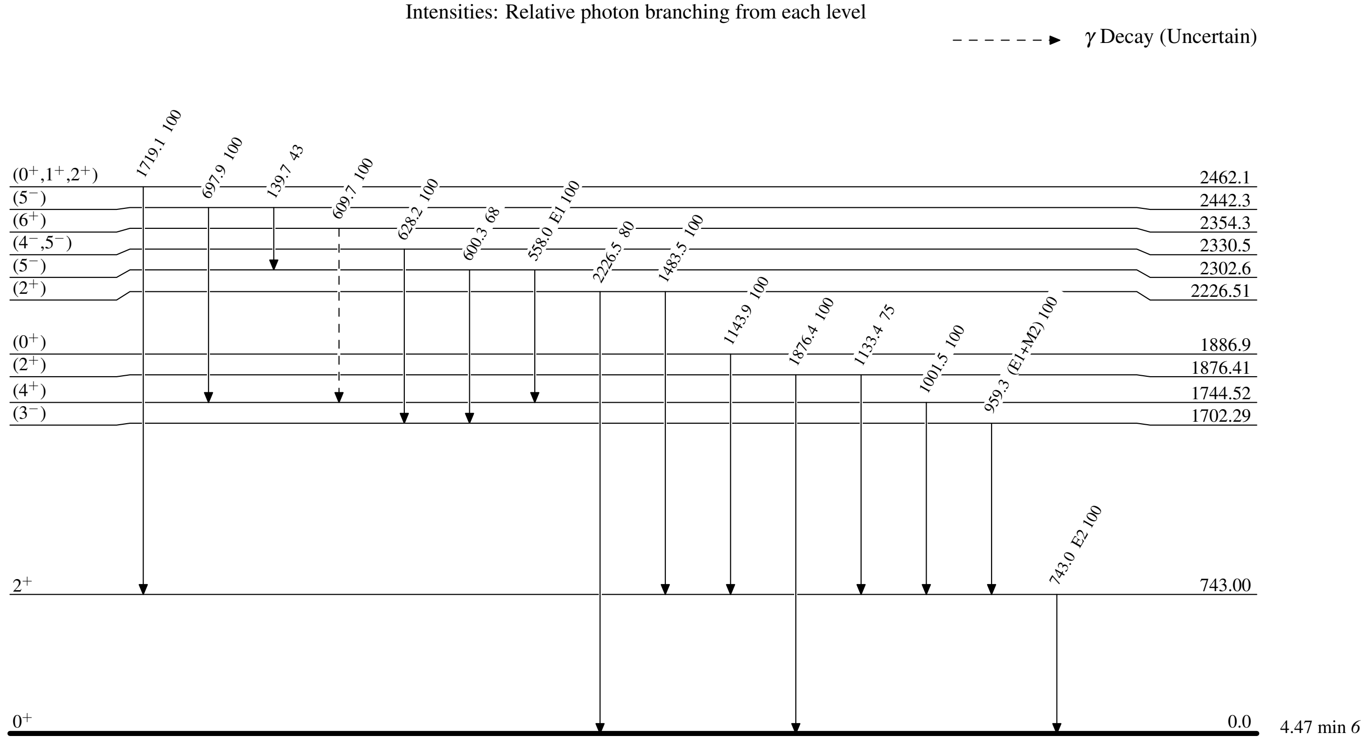
Adopted Levels, Gammas

Legend

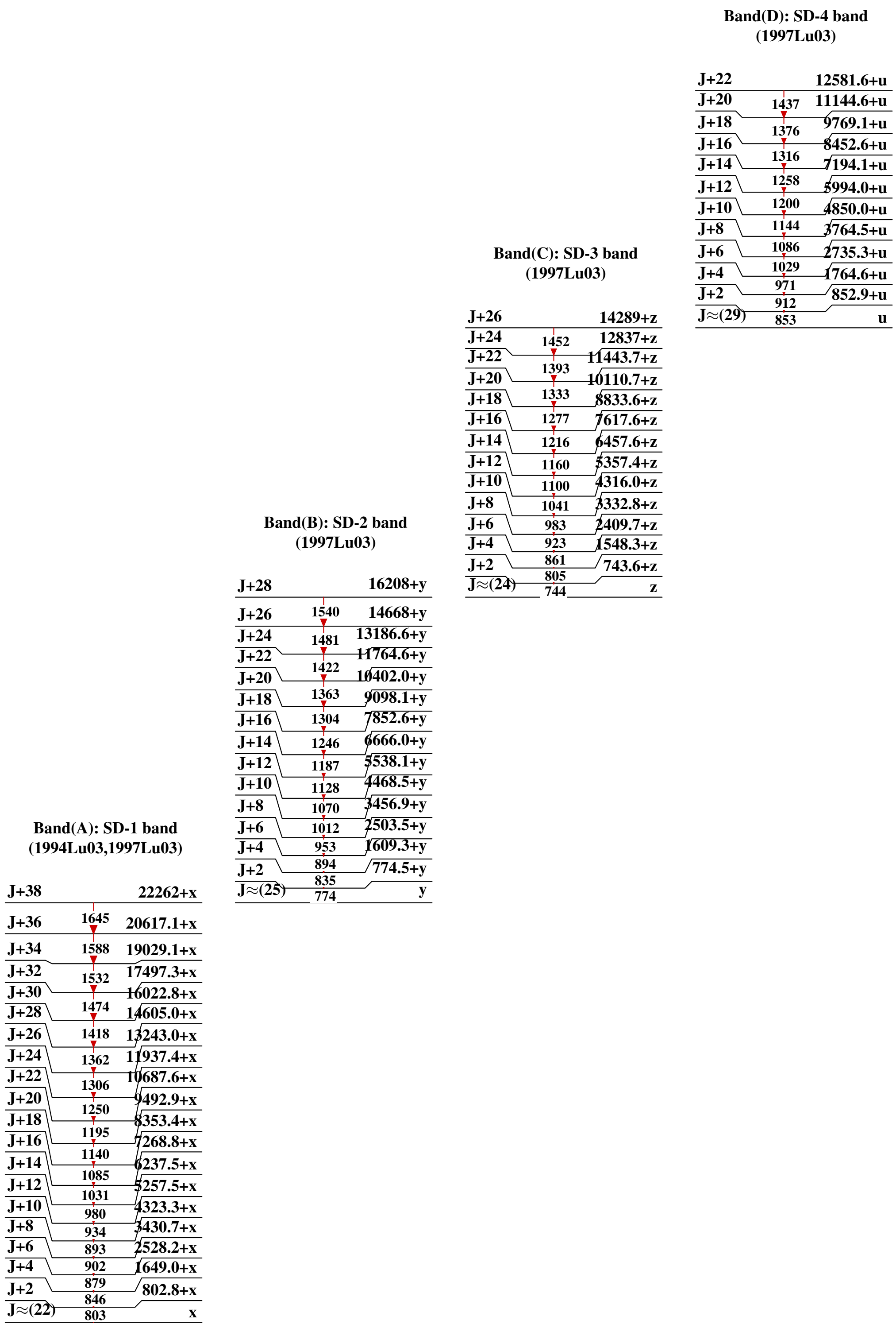
Level Scheme (continued)

Intensities: Relative photon branching from each level



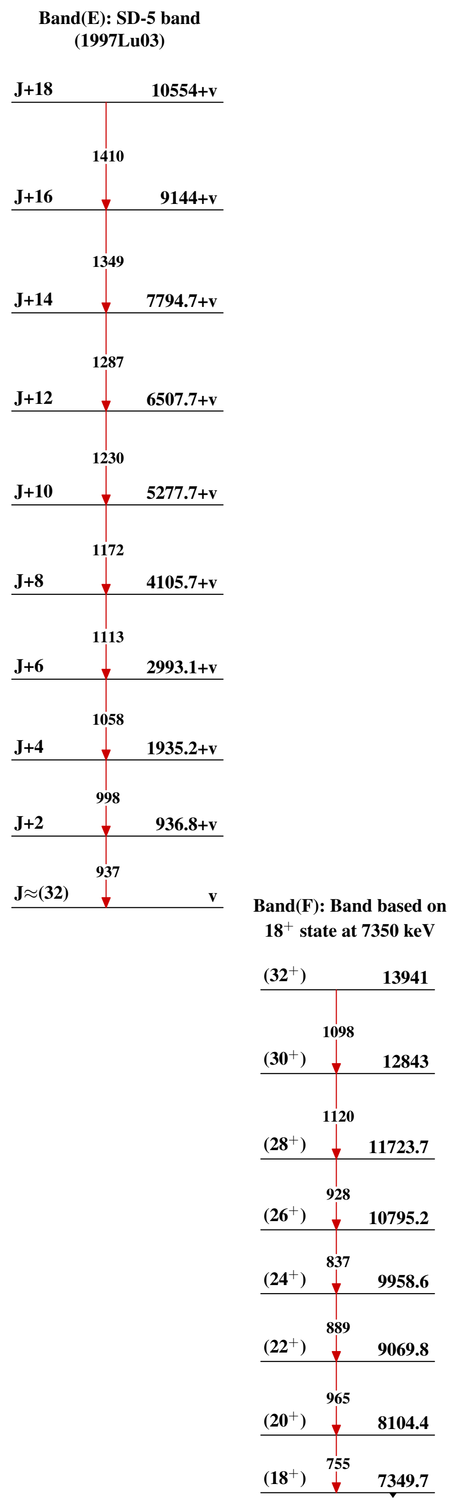
$^{144}_{64}Gd_{80}$

Adopted Levels, Gammas



$^{144}_{64}$Gd$_{80}$

Adopted Levels, Gammas (continued)



$^{144}_{64}Gd_{80}$

Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Yu. Khazov, A. Rodionov and G. Shulyak	NDS 136, 163 (2016)	14-Jul-2016

Q(β^-)=−8320 *40*; S(n)=11233 *20*; S(p)=5383 *5*; Q(α)=476 *5* 2012Wa38

Produced and identified by 1957Go78, 1957Go72. Spallation of Ta under bombardment with 660 MeV protons.

The even-even ^{146}Gd nucleus has closed shell with 82 neutrons. The level scheme was built on the basis of measurements of ^{146}Tb ε decays and of different reactions. The scheme contains about 160 excited states with assigned J_{max}=29$^+$ and also two SD bands with J≈32/62. Detailed shell-model configurations for many levels are given in 1986Ya06.

^{146}Gd Levels

Cross Reference (XREF) Flags

A	^{146}Tb ε decay (24.1 s)	E	^{144}Sm(α,2nγ)	I	^{144}Sm(^{12}C,^{10}Be)
B	^{146}Tb ε decay (8 s)	F	^{148}Sm(α,6nγ)	J	^{144}Sm(^{16}O,^{14}C)
C	^{150}Dy α decay	G	^{144}Sm(^{3}He,nγ)	K	(HI,xnγ)
D	^{148}Gd(p,t)	H	Sm(^{3}He,xnγ)	L	(HI,xnγ):SD

E(level)[†]	J$^\pi$	T$_{1/2}$	XREF	Comments
0.0	0$^+$	48.27 d *9*	ABCDEFGHIJK	%ε+%β^+=100 T$_{1/2}$: from weighted average of 48.27 d *10* (γ(t), (X-ray)(Sm$_K$+Eu$_K$)(t) (1970Ch09)), 48.24 d *26* (weighted average of 47.34 d *67*, 48.30 d *31*, 48.94 d *64*, 45.83 d *560*, 45.12 d *916*, 53.47 d *915*, 42.46 d *999*, 40.67 d *630*, 45.12 d *916*, 64.97 d *2994* for several γ-rays(t) (2013Bh07)).
1579.40[‡] *5*	3$^-$	1.06 ns *12*	AB DEFGHIJK	μ: +2.1 *9* (1979Ke03, TDPAD method. 2014StZZ). Other: +4.4 *7* (1998FuZO, TIPAD method), g=0.62 *12*, derived by 1982Ha22 from shell-model calculations. J$^\pi$: 1579.4γ E3 to J=0$^+$. T$_{1/2}$: weighted average from $\gamma\gamma$(t) and e$^-\gamma$(t) in (α,2nγ) and (α,6n) reactions (1978Kl04). Other: 1.1 ns from ^{146}Tb ε decay (1981StZO).
1972.02 *7*	2$^+$	<0.7 ps	AB DE G IJ	XREF: J(1950). J$^\pi$: 1972.0γ E2 to J=0$^+$, L=2 in (p,t). T$_{1/2}$: Doppler-shift effect, (1978Og03).
2164.72 *12*	0$^+$	375 ps *40*	B DE G	T$_{1/2}$: from ce(t) (1980Ju04). J$^\pi$: 2164.7 E0 transition to J=0$^+$, 192.7γ E2 to 2$^+$.
2611.57 *7*	4$^+$		A DE	J$^\pi$: 1032.1γ E1 to 3$^-$, 639.6γ E2 to 2$^+$; direct population in ^{146}Tb ε decay (24 s) from J^π=5$^-$. However, L=2,(4) in (p,t).
2658.04[‡] *8*	5$^-$		A DEF HIJK	XREF: J(2690). J$^\pi$: 1078.66γ E2 (ΔJ=2) to 3$^-$; L=(5) in (p,t).
2967.52 *24*	4$^+$		A E	J$^\pi$: 1388.11γ E1 to 3$^-$; log *ft*=6.7 in ^{146}Tb ε decay (24 s) from J^π=5$^-$.
2982.15[‡] *9*	7$^-$	6.73 ns *10*	A EF HI K	μ=8.76 *26* μ: weighted average from g=+1.283 *27* (1979Ha15), +1.13 *9* (1979Fa01), +1.18 *5* (1979Ke03), all measured by TDPAD method. J$^\pi$: 324.09γ E2, ΔJ=2 to 5$^-$ state; no γ to J<5. T$_{1/2}$: weighted average of 7.2 ns *4* (γ(t), ce(t) in (α,6nγ) (1979Kl04)), 6.7 ns *1* (γ(t) in (α,2nγ) (1979Ha15)). Others: 6.7 ns *2* (1978Kl04), 13.5 ns *35* (1972Ko42), 9.1 ns *20* (1973Kr10).
2986.4 *2*	2$^+$		B DE	J$^\pi$: from L(p,t)=(2).
2996.58 *8*	4$^-$		A E	J$^\pi$: 338.2γ M1 to 5$^-$, 1417.1γ M1 to 3$^-$.
3019.83 *21*	0$^+$		DE	J$^\pi$: E0 transition to 0$^+$, 1047.8γ E2 to 2$^+$; L=0 in (p,t).
3031.16 *9*	3$^+$		A E	J$^\pi$: 1059.13γ M1 (ΔJ=1) to 2$^+$, 1451.8γ D+Q to 3$^-$.
3099.03[‡] *9*	6$^-$		A E	J$^\pi$: 116.77γ M1 to 7$^-$, 441.0γ M1 to 5$^-$.
3182.58[‡] *10*	8$^-$		EF H K	J$^\pi$: 200.43γ M1+E2 (ΔJ=1) to 7$^-$, 245.8γ M1+E2 from 9$^-$.
3185.95 *10*	2$^+$		B DE	J$^\pi$: L=2 in (p,t); 1606.5γ E1 to 3$^-$.

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Adopted Levels, Gammas (continued)

^{146}Gd Levels (continued)

E(level)†	J^π	$T_{1/2}$	XREF	Comments
3232.5 *4*	2^+		B DE	J^π: L(p,t)=2; 3233γ to 0^+.
3287.29 *11*	3^+		A E	J^π: 675.71γ M1 (ΔJ=1) to 4^+, 1315.2γ (D+Q) (ΔJ=1) to 2^+.
3290.46# *19*	7^-		E	J^π: 308.29γ M1 (ΔJ=0) to 7^-.
3293.74# *11*	8^-	<300 ps	EF H K	J^π: 111.2γ M1+E2 (ΔJ=0) to 8^-, 311.6γ M1+E2 (ΔJ=1) to 7^-. $T_{1/2}$: from ce(t),γ(t) in (α,2nγ) (1979Kl04).
3313.16# *8*	5^-		A E	J^π: 655.1γ M1 (ΔJ=0) to 5^-, 701.6γ E1 to 4^+.
3320 *3*			D	
3356.7 *5*	2^+		DE	J^π: from L=2 in (p,t).
3363.85 *10*	4		E	J^π: 706.0γ D to 5^-, 1784.4γ D to 3^-.
3380.81 *19*	2^+		DE	J^π: from L=2 in (p,t).
3383 *3*			D	
3384.19# *13*	6^-		A E	J^π: 402.0γ M1 to 7^-, 726.2γ M1 to 5^-.
3388.73# *12*	$(2,1,4^+)$		E	E(level): two levels of 3388.70 *13*, J^π=3,(1) and 3388.7 *4*, J^π=2,4 stated in 2010CaZZ. J^π: 1416.7γ D (ΔJ=1, not excluded ΔJ=2 or 0) to 2^+, 357.6γ D (ΔJ=1) to 3^+, assignment to $\pi h_{11/2}g_{7/2}^{-1}$ multiplet.
3411.84# *10*	4^+		A E	J^π: 380.9γ M1 (ΔJ=1) to 3^+, 415.3γ E1 (ΔJ=0) to 4^-.
3416.57 *13*	4^+		E	J^π: 804.9γ M1 (ΔJ=0) to 4^+, 1444.6γ E2 to 2^+.
3423.28 *13*	3^-		A DE	J^π: from L=3 in (p,t).
3428.42# *12*	9^-	<300 ps	EF HI K	J^π: 134.7γ M1+E2 (ΔJ=1) to 8^-, 446.3γ E2 to 7^-. $T_{1/2}$: from ce(t),γ(t) in (α,2nγ) (1979Kl04).
3436.21 *15*	4^+		A DE	J^π: 1857.0γ (E1) to 3^-, 1464.1γ E2 to 2^+, 824.6γ ΔJ=0 to 4^+.
3456.60 *15*	4^+		E	J^π: 798.69γ E1 (ΔJ=1) to 5^-, 1877.0γ to 3^-.
3461.1 *3*	(5^-)		dE	J^π: 1881.7γ Q (E2, ΔJ=2) to 3^-; no γ to J<3; however, L=(2) in (p,t).
3464.03 *17*	5^-		dE	J^π: 1884.6γ (E2) (ΔJ=2) to 3^-; no γ to J<3; however, L=(2) in (p,t).
3469.1 *3*			A	
3478.4 *10*			E	
3481.8 *6*	3^+		E	J^π: 1902.4γ E1 (ΔJ=0) to 3^-.
3484.76 *11*	6^+		DE	J^π: 502.6γ E1 to 7^-, 826.7γ E1 to 5^-, 1905.8γ E3 to 3^-. L=0+6 in (p,t) including contribution from 3484.9 level.
3484.93 *21*	0^+		B DE	J^π: 3485 E0 transition to 0^+. L=0+6 in (p,t) including contribution from 3484.8 level.
3547.5 *8*	2^+		DE	J^π: from L=2 in (p,t).
3563.01 *16*	$(4^+,2^+)$		E	J^π: 1983.1γ (ΔJ=1) to 3^-, 1591.1γ (ΔJ=0 or 2) to 2^+, 951.6γ (ΔJ=0 or 2) to 4^+.
3585.3 *3*	4		A E	J^π: 2005.9γ D (ΔJ=1) to 3^-; direct population in ^{146}Tb ε decay (24 s) from $J^\pi=5^-$.
3640.8 *6*	0^+		DE G	J^π: 3639 E0 transition to 0^+.
3656.31 *12*	3		E	J^π: 1684.3γ D (ΔJ=1) to 2^+, 1044.6γ to 4^+.
3660.05 *13*	(6^+)		E I	J^π: 1002.0γ E1 (ΔJ=1) to 5^-; no γ to J<5.
3686.6 *8*	5^-		DE	J^π: from L=(5) in (p,t), 2107.2γ E2 to 3^-.
3730.0 *20*			E	
3744.2 *7*	$(2^+,3^-)$		DE	J^π: from L=(2,3) in (p,t).
3761.5 *6*	(4^+)		DE	J^π: 1789.5γ (E2) to 2^+; L=(5) from (p,t) (1989Ma28), however, the inspection of σ(θ) by 2010CaZZ shows that it could be L=4.
3779.33 *14*	(8^+)		E	J^π: 797.18γ E1 (ΔJ=1) to 7^-; no γ to J<7.
3783.78 *13*	$(3,5)^+$		E	J^π: 1172.2γ M1 (ΔJ=1) to 4^+.
3789 *3*	$(2^-,3^-,4^-)$		E	J^π: 2210γ (M1) to 3^-.
3853.61 *16*	(3^-)		dE	J^π: 1244γ (E1) (ΔJ=1) to 4^+, 2274γ (ΔJ=0 or 2) to 3^-.
3854.24 *12*	7^-		dE	J^π: 671.7γ M1 (ΔJ=1) to 8^-, 872.0γ M1 (ΔJ=0) to 7^-.
3864.83 *13*	10^+	<300 ps	EF HIJK	Q=−0.70 *9* Q: estimated by 1982Ha22, (systematics, model calculations). J^π: 436.4γ E1 (ΔJ=1) to 9^-, 1229.8γ M1+E2 from 11^+, 1583.0γ E2 from 12^+, 1485.7γ E2 from 12^+.

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Adopted Levels, Gammas (continued)

^{146}Gd Levels (continued)

E(level)†	J^π	XREF	Comments
			$T_{1/2}$: from ce(t),γ(t) in (α,2nγ), (α,6nγ) (1979Kl04).
3866.68 *18*	5^-	E	J^π: 381.7γ E1 (ΔJ=1) to 6^+, 1255.2γ (ΔJ=1) to 4^+.
3908.16 *22*	(3^+)	A DE	J^π: 876.7γ (ΔJ=0 or 2) to 3^+, 1297γ (ΔJ=1) to 4^+; direct population in ^{146}Tb ε decay (24 s) from J^π=5^-; observed in (p,t). J^π=(3^-) deduced in (α,2nγ) data set (2010CaZZ).
3947.14 *17*	$(6)^+$	E	J^π: 483.1γ E1 to 5^-, 848.1γ (ΔJ=0) to 6^-.
3973.4 *10*	(3^-)	DE	J^π: from L=(3) in (p,t); 2394γ (ΔJ=0 or 2) to 3^-.
3987.4 *10*		E	
4006.7 *5*	(4^+)	DE	J^π: from L=(4,5) in (p,t); 2034.7γ to 2^+.
4026.71 *21*	(6,8)	E	J^π: 736.0γ (ΔJ=1) to 7^-.
4076.8 *5*		E	
4107.51 *14*	8^+	E	J^π: 924.9γ E1 to 8^-, 1125.7γ (ΔJ=1) to 7^-.
4113.4 *10*		E	
4118.3 *4*		E	
4122.6 *10*	(5^-)	DE	J^π: from L=(4,5) in (p,t); 1511γ (ΔJ=1) to 4^+.
4131.2 *10*	(3,5)	E	J^π: 1100γ (ΔJ=0 or 2) to 3^+, from measurements of asymmetry and pol (2010CaZZ).
4152.4 *10*	(2,4)	E	J^π: 2573γ (ΔJ=1) to 3^-.
4166.6 *3*	(4,6)	E	J^π: 1508.5γ (ΔJ=1) to 5^-.
4179.49 *20*	(6)	E	J^π: 1521.6γ (ΔJ=1) to 5^-, 1197.3γ D to 7^-.
4216.4 *5*	(2,4)	DE	J^π: 1185.2γ (ΔJ=1) to 3^+; observed in (p,t).
4230.4 *20*	(5^-)	DE	J^π: from L=(5) in (p,t), 2651γ to 3^-.
4248.4 *5*	(7,9)	E	J^π: 1065.8γ (ΔJ=1) to 8^-.
4259.8 *5*		E	
4286.4 *20*		E	
4299.8 *3*	(2^+)	DE	J^π: L=(2) in (p,t); 1688.2γ (ΔJ=0 or 2) to 4^+.
4318.95 *22*	$(6^-,7^+,8^-)$	E	J^π: 1336.8γ (E1, ΔJ=0; M1, ΔJ=1) to 7^-.
4326.6 *20*	(3,5)	E	J^π: 1715γ (ΔJ=1) to 4^+.
4341.4 *20*	(4^-)	DE	J^π: from L=(4) in (p,t); 2762γ (possible M1) to 3^-.
4355.03 *14*	(5)	E	J^π: 1256.0γ (ΔJ=1) to 6^-, 1742γ to 4^+.
4372.4 *20*	(4^+)	DE	J^π: from L=(4) in (p,t).
4376.1 *10*	(4^+)	E	
4389.6 *6*	(5,7)	E	J^π: 1290.6γ (ΔJ=1) to 6^-.
4399.5 *3*	$(5^-,7^-)$	DE	XREF: D(4394). J^π: 1300.5γ (ΔJ=1) to 6^-, 1741γ to 5^-; observed in (p,t).
4409 *6*		D	
4416.9 *4*	$(10^-,8^-)$	E	J^π: 1123.2γ (M1, ΔJ=0 or E2, ΔJ=2) to 8^-, see comment for the level in the ^{144}Sm(α,2nγ) dataset.
4459.09 *20*	$(7^-,9)$	E	J^π: 1276.5γ (ΔJ=1) to 8^-, 1030.7γ to 9^-.
4484.2 *10*	(4^+)	DE	J^π: from L=(4) in (p,t); 1826γ (ΔJ=1) to 5^-.
4484.9 *4*	(11^-)	E	J^π: 1056.5γ (ΔJ=0 or 2) to 9^-. No γ to J<9.
4501.97 *20*	10^+	EF K	J^π: 1073.6γ E1 (ΔJ=1) to 9^-, 592.8γ M1 from 11^+. J^π=10^- from (α,6nγ).
4520.6 *10*		E	
4529.25 *22*		E	
4532.6 *20*	(3,5)	E	J^π: 1921γ (ΔJ=1) to 4^+.
4534 *6*	0^+	D	J^π: from L=0 in (p,t).
4541.23 *14*	10^+	EF K	J^π: 1112.9γ E1 (ΔJ=1) to 9^-, 676.3γ (ΔJ=0 or 2) to 10^+; no γ to J<9.
4580.3 *8*	7	E	J^π: 1399γ (ΔJ=1) to 8^-, 1480γ (ΔJ=1) to 6^-.
4596 *6*	$(2^+,3^-)$	D	J^π: from L=(2,3) in (p,t).
4608.4 *6*	$8,10^-$	E	J^π: 1314.7γ (ΔJ=0 or 2) to 8^-; no γ to J<8.
4638 *6*	$(5^-,6^+)$	D	J^π: from L=(5,6) in (p,t).
4645.79 *18*	(11^-)	EF K	J^π: 780.96γ (E1) (ΔJ=1) to 10^+, 802.1γ (E1) from 12^+.
4656 *6*		D	
4666.89 *16*	(12^+)	E	J^π: 802.0γ (ΔJ=0 or 2) to 10^+. No γ to J<10.
4686 *6*	$(2^+,3^-)$	D	J^π: from L=(2,3) in (p,t).
4719.24 *9*	4^-	A E	J^π: 1431.7γ to 3^+, 2061.0γ to 5^-, 3139.9γ to 3^-; population in ^{146}Tb ε decay (24 s) from J^π=5^-, log *ft*=4.58.

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Adopted Levels, Gammas (continued)

^{146}Gd Levels (continued)

E(level)[†]	J^π	XREF	Comments
4726 *6*	$(2^+,3^-)$	D i	J^π: from L=(2,3) in (p,t).
4729.64 *23*	$(9^+,7^+)$	E	J^π: 1435.9γ E1 (ΔJ=1) to 8^-.
4747 *6*	$(2^+,3^-)$	D i	J^π: from L=(2,3) in (p,t).
4780.54 *23*		E	
4782.2 *10*	8,6	E	J^π: 1800γ D (ΔJ=1) to 7^-.
4793 *6*	$(2^+,3^-)$	D	J^π: from L=(2,3) in (p,t).
4802.0 *10*		E	
4825 *6*	$(2^+,3^-)$	D	J^π: from L=(2,3) in (p,t).
4828.64 *13*	$(4,5)^-$	A	J^π: log *ft*=5.56 in ^{146}Tb ε decay (24 s) from $J^\pi=5^-$.
4847.7 *20*	(9,7)	E	J^π: 1554γ D (ΔJ=1) to 8^-.
4880 *6*	$(2^+,3^-)$	D	J^π: from L=(2,3) in (p,t).
4880.2 *4*	(10,8)	E	J^π: 1451.8γ D (ΔJ=1) to 9^-.
4898.3 *3*	(9,7)	E	J^π: 1604.7γ D (ΔJ=1) to 8^-.
4905 *6*		D	
4941 *6*	(2^+)	D	J^π: from L=(2) in (p,t).
4942.6 *10*		E	
4976 *6*	$(2^+,3^-)$	D	J^π: from L=(2,3) in (p,t).
5044 *6*	(2^+)	D	J^π: from L=(2) in (p,t).
5056.3 *5*		E	
5086 *6*	$(2^+,3^-)$	D	J^π: from L=(2,3) in (p,t).
5094.70 *19*	11^+	EF K	J^π: 592.8γ M1 (ΔJ=1) to 10^+, 697.0γ E2 from 13^+.
5115 *6*		D	
5151 *6*		D	
5164.54 *24*	(11,9)	E	J^π: 1299.7γ D (ΔJ=1) to 10^+.
5177 *6*		D	
5217 *6*		D	
5258 *6*	(2^+)	D	J^π: from L=(2) in (p,t).
5277.54 *21*	11^+	EF K	J^π: 1412.5γ M1+E2 (ΔJ=1) to 10^+, 514.2γ E2 from 13^+.
5289 *6*		D	
5320.7? *4*		E	E(level): observed in (α,2nγ) by 1972Ko42, marked as tentative level.
5342 *6*	$(4^+,5^-)$	D	J^π: from L=(4,5) in (p,t).
5350.67 *22*	12^+	EF K	J^π: 1485.7γ E2 (ΔJ=2) to 10^+, 543.6γ E2 from 14^+.
5388 *6*		D	
5443 *6*		D	
5447.88 *18*	12^+	EF K	J^π: 1583.0γ E2 (ΔJ=2) to 10^+, 446.4γ E2 from 14^+.
5482 *6*		D	
5528 *6*		D	
5529.0 *3*	(12^+)	K	J^π: 434.3γ (ΔJ=1, M1+E2) to 11^+.
5549 *6*		D	
5700.55 *24*	$(12)^+$	K	J^π: 1835.7γ (E2) (ΔJ=2) to 10^+.
5730.05 *24*	$(12)^+$	K	J^π: 1865.2γ (E2) (ΔJ=2) to 10^+.
5791.67 *20*	13^+	EF K	J^π: 697.0γ E2 (ΔJ=2) to 11^+, 440.9γ M1+E2 (ΔJ=1) to 12^+.
5894.16 *22*	14^+	EF K	J^π: 446.4γ E2 (ΔJ=2) to 12^+, 102.4γ D (ΔJ=1) to 13^+.
5996.1 *3*	14^+	F K	J^π: 645.3γ E2 (ΔJ=2) to 12^+, 124.0γ from 15^+, 402.9γ E2 from 16^+.
6120.1 *3*	15^+	EF K	J^π: 225.9γ D+Q (ΔJ=1) to 14^+, 278.8γ D from 16^+, π from 913.9γ E1 (ΔJ=1) from 16^-.
6399.0 *3*	16^+	F K	J^π: 402.9γ E2 (ΔJ=2) to 14^+, 1631.0γ E2 from 18^+, 1167.2γ E1 from 17^-, 765.9γ E1 from 17^-.
6470 *30*		I	
6820.3 *3*	$17^{(+)}$	K	J^π: 421.3γ (M1+E2) (ΔJ=1) to 16^+; no γ to J<16.
7034.0 *3*	16^-	F K	J^π: 913.9γ E1 (ΔJ=1) to 15^+, 130.7γ M1+E2 (ΔJ=1) from 17^-.
7164.8 *3*	17^-	F K	J^π: 765.9γ E1 (ΔJ=1) to 16^+, 865.2γ E1 from 18^+; no γ to J<16.
7202.0 *11*		K	
7513.3 *3*	16^+	F K	J^π: 1114.3γ M1+E2 (ΔJ=0) to 16^+, 516.8γ E2 from 18^+.
7566.2 *3*	17^-	K	J^π: ΔJ=1, E1 γ to 16^+, 463.9γ E1 from 18^+.
7659.1 *4*		K	

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Adopted Levels, Gammas (continued)

^{146}Gd Levels (continued)

E(level)†	J^π	$T_{1/2}$	XREF	Comments
7738.8 *4*	17^+		F K	J^π: 291.3γ M1+E2 (ΔJ=1) from 18^+, 226γ to 16^+.
7999.7 *4*	(18^+)		K	J^π: 260.9γ M1+E2 to 17^+, no γ to J<17.
8030.1 *3*	18^+	1.5 ns *6*	F K	J^π: 516.8γ E2 (ΔJ=2) to 16^+, 865.2γ E1 (ΔJ=1) to 17^-. $T_{1/2}$: from γ(t) in (α,6nγ) (1980BrZQ).
8077.0 *15*			K	
8368.2 *4*	(18^+)		K	J^π: 629.4γ M1+E2 (ΔJ=1) to 17^+; no γ to J<17.
8649.6 *4*	(19^-)		K	J^π: 649.9γ (E1) (ΔJ=1) to (18^+); no γ to J<18.
8665.8 *4*	(19^+)		K	J^π: 297.6γ M1+E2 (ΔJ=1) to (18^+); no γ to J<18.
8804.0 *18*			K	
8915.7 *4*	20^-	4.3 ns *3*	F K	μ=+12.7 *18* μ: from weighted average of g=+0.63 *9* (TDPAD method, 1979Ha15) and g=+0.7 *4* (TDPAD method, 1979Ke03). μ: +12 *2* for J=(19^+) (2014StZZ). J^π: 885.6γ M2+E3 (ΔJ=2) to 18^+; no γ to J<18. $T_{1/2}$: from γ(t) in (α,6nγ) (1980BrZQ).
9083.5 *4*	(20^+)		K	J^π: 417.8γ M1+E2 (ΔJ=1) to (19^+); no γ to J<18.
9225.5 *4*	(21^-)		K	J^π: 309.8γ M1+E2 (ΔJ=1) to 20^-; no γ's to J<20.
9254.0 *5*			K	
9257.0 *5*	(21^-)		K	J^π: 173.5γ E1 (ΔJ=1) to (20^+); no γ to J<20.
9482.3 *5*	(22^-)		K	J^π: 1288.1γ E2 (ΔJ=2) from (24^-); no γ to J<20.
9495.0 *20*			K	
9526.8 *5*	(22^-)		K	J^π: 269.8γ M1+E2 (ΔJ=1) to (21^-); no γ to J<21.
9745.0 *20*			K	
9962.7 *4*	(22^-)		K	J^π: 1047.1γ E2 (ΔJ=2) to 20^-; no γ to J<21.
10006.2 *6*	(23^-)		K	J^π: 479.4γ M1+E2 (ΔJ=1) to (22^-); no γ to J<22.
10087.0 *4*	(23^-)		K	J^π: 861.5γ E2 (ΔJ=2) to (21^-); no γ to J<21.
10266.5 *4*	(23^-)		K	J^π: 1041.0γ E2 (ΔJ=2) to (21^-); no γ to J<21.
10440.0 *21*			K	
10770.4 *4*	(24^-)		K	J^π: 807.7γ E2 (ΔJ=2) to (22^-), 669.9 E1 from 25^+; no γ's to J<22.
11023.8 *4*	(24^+)		K	J^π: 936.7γ E1 (ΔJ=1) to (23^-), 505.6γ E1 from 25^-.
11099.0 *23*			K	
11244.1 *5*	25^-		K	J^π: 977.6γ E2 (ΔJ=2) to (23^-), 393.8γ E1 from 26^+.
11440.2 *5*	25^+		K	J^π: 669.9γ E1 (ΔJ=1) to (24^-), 197.8γ M1+E2 from 26^+.
11450.0 *25*			K	
11497.5 *5*	(25)		K	J^π: 727.1γ (D+Q) to (24^-), 140.2γ (D+Q) from 26^+.
11529.7 *5*	25^-		K	J^π: 505.6γ E1 to 24^+, 107.8γ E1 from 26^+.
11637.8 *5*	26^+		K	J^π: 197.8γ M1+E2 (ΔJ=1) to 25^+, 393.8γ E1 ΔJ=1 to 25^-.
11932.8 *5*	(27^+)		K	J^π: 295.0γ M1+E2 to 26^+; no γ's to J<26.
12891.0 *5*	(29^+)		K	J^π: 958.2γ E2 (ΔJ=2) to (27^+); no γ's to J<27.
13696.0 *6*			K	
14013.6 *10*			K	
14176.3 *10*			K	
14197.0 *12*			K	
14444.0 *15*			K	
14595.0 *9*			K	
15069.0 *14*			K	
15443.0 *17*			K	
15758.0 *20*			K	
16313.0 *22*			K	
0.0+x@	J1		L	Additional information 1. J^π: $J_1\pi=33^-$. J^π: 1993Ha19: all J's could be shifted jointly units of 2. From theoretical analysis, 1993Ra07 suggest J=31 or 33. Population of normal states of J=29, 27 and 26 by the band (1995Sc31) suggests J>31.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{146}Gd Levels (continued)

E(level)[†]	J^π	XREF	Comments
			Percent population=0.65 *19* (1993Ha19) in $^{122}Sn(^{29}Si,5n\gamma)$, ≈1 (1990He14) in $^{110}Pd(^{40}Ar,4n\gamma)$. Q(intrinsic)=13.9 *4* (2001Cl05), 12 *2* (1990He14).
826.3+x[@] *3*	J1+2	L	
1704.3+x[@] *5*	J1+4	L	
2634.8+x[@] *5*	J1+6	L	
3618.0+x[@] *5*	J1+8	L	
4656.6+x[@] *6*	J1+10	L	
5750.0+x[@] *7*	J1+12	L	
6898.8+x[@] *7*	J1+14	L	
8100.0+x[@] *8*	J1+16	L	
9350.3+x[@] *9*	J1+18	L	
10648.1+x[@] *9*	J1+20	L	
11993.2+x[@] *10*	J1+22	L	
13387.0+x[@] *11*	J1+24	L	
14833.2+x[@] *12*	J1+26	L	
16331.7+x[@] *14*	J1+28	L	
17885.3+x[@] *17*	J1+30	L	
0.0+y[&]	J2	L	Additional information 2. J^π: $J_2\pi=32^-$. J^π: 1993Ha19: all J's could be shifted jointly units of 2. From theoretical analysis, 1993Ra07 suggest J=30 or 32. 1995Sc31 suggest J>31, presumably from population of normal states by the SD band. Percent population=0.39 *12* (1993Ha19) in $^{122}Sn(^{29}Si,5n\gamma)$, ≈0.7 (1991Rz01) in $^{110}Pd(^{40}Ar,4n\gamma)$. Q(intrinsic)=13.9 *3* (2001Cl05), 8 *2* (1992StZU).
806.2+y[&] *3*	J2+2	L	
1663.2+y[&] *5*	J2+4	L	
2571.7+y[&] *6*	J2+6	L	
3532.8+y[&] *6*	J2+8	L	
4549.0+y[&] *6*	J1+10	L	
5621.2+y[&] *7*	J2+12	L	
6749.0+y[&] *7*	J2+14	L	
7933.8+y[&] *8*	J2+16	L	
9176.4+y[&] *9*	J1+18	L	
10475.7+y[&] *9*	J1+20	L	
11832.6+y[&] *10*	J1+22	L	
13246.1+y[&] *11*	J2+24	L	
14718.8+y[&] *13*	J2+26	L	
16248.7+y[&] *15*	J1+28	L	
17830.7+y[&] *19*	J1+30	L	
0.0+z?[a]	J3	L	Additional information 3. E(level): this band belongs to ^{147}Gd or ^{146}Gd (1995Sc31).
958.5+z?[a] *5*	J3+2	L	
1964.6+z?[a] *8*	J3+4	L	
3029.5+z?[a] *10*	J3+6	L	
4153.0+z?[a] *13*	J3+8	L	
5328.7+z?[a] *15*	J3+10	L	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{146}Gd Levels (continued)

E(level)[†]	J$^{\pi}$	XREF
6554.3+z?[a] *18*	J3+12	L
7832.3+z?[a] *23*	J3+14	L
9155+z?[a] *3*	J3+16	L
10524+z?[a] *4*	J3+18	L

[†] From a least-squares fit to Eγ, normalized χ^2=0.62.

[‡] Sequence of the levels with probable configuration $\pi h_{11/2} d^{-1}_{5/2}$ (1986Ya06).

[#] Sequence of the levels with probable configuration $\pi h_{11/2} g^{-1}_{7/2}$. The configuration assignments to 3389 keV, and 3412 keV are ambiguous (1986Ya06).

[@] Band(A): SD-1 BAND (1995Sc31,1990He14,1993Ha19,2001Cl05). Q_0=13.9 *4* (2001Cl05). Percent population=0.65 *19* (1993Ha19).

[&] Band(B): SD-2 BAND (1995Sc31,1991Rz01,1993Ha19,2001Cl05). Q_0=13.9 *3* (2001Cl05). Percent population=0.39 *12* (1993Ha19).

[a] Band(C): SD-3 BAND (?) (1995Sc31). this band belongs to ^{147}Gd or ^{146}Gd (1995Sc31). Population=1/8 of SD-1 (1995Sc31).

Adopted Levels, Gammas (continued)

$\gamma(^{146}Gd)$

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[#]	δ[#d]	α[c]	Comments
1579.40	3^-	1579.38 *5*	100	0.0	0^+	E3		0.00216	B(E3)(W.u.)=37 *5*
1972.02	2^+	392.6 *2*	1.05[@] *11*	1579.40	3^-				
		1972.00 *11*	100[@] *11*	0.0	0^+	E2		1.01×10^{-3}	B(E2)(W.u.)>0.59
2164.72	0^+	192.7 *1*		1972.02	2^+	E2		0.252	
		2164.7 *3*		0.0	0^+	E0			
2611.57	4^+	639.6 *1*	1.8 *8*	1972.02	2^+	E2		0.00750	
		1032.10 *11*	100 *10*	1579.40	3^-	E1		1.07×10^{-3}	
2658.04	5^-	1078.66 *9*	100	1579.40	3^-	E2		0.00235	
2967.52	4^+	1388.11 *23*	100	1579.40	3^-	E1		7.56×10^{-4}	
2982.15	7^-	324.09 *5*	100	2658.04	5^-	E2		0.0476	B(E2)(W.u.)=0.52 *7*
2986.4	2^+	1014 *1*	<0.48	1972.02	2^+	D			
		1407 *1*		1579.40	3^-				
		2986.4 *2*	100 *20*	0.0	0^+	E2		1.09×10^{-3}	
2996.58	4^-	338.2 *4*	1.1 *4*	2658.04	5^-	M1		0.0696	
		1417.14 *8*	100 *6*	1579.40	3^-	M1		0.00206	
3019.83	0^+	1047.8 *2*		1972.02	2^+	E2		0.00250	
		3020 *2*		0.0	0^+	E0			
3031.16	3^+	1059.13 *9*	100 *10*	1972.02	2^+	M1		0.00399	
		1451.80 *15*	7.3 *7*	1579.40	3^-	D+Q			
3099.03	6^-	116.77 *17*	3.4 *4*	2982.15	7^-	M1		1.292	
		440.99 *5*	100 *10*	2658.04	5^-	M1		0.0349	
3182.58	8^-	200.43 *6*	100	2982.15	7^-	M1+E2	+0.151 *+4−3*	0.283	
3185.95	2^+	1213.9 *1*	22.2[@] *22*	1972.02	2^+	(D+Q)			
		1606.1 *4*	100[@] *10*	1579.40	3^-	E1		7.76×10^{-4}	
		3186.1 *2*	11.1[@] *11*	0.0	0^+				
3232.5	2^+	1260.2 *8*	20[@] *2*	1972.02	2^+	[M1]		0.00266	
		1653.0 *4*	100[@] *10*	1579.40	3^-	D			
		3233 *1*	20[@] *2*	0.0	0^+				
3287.29	3^+	675.71 *9*	100 *11*	2611.57	4^+	M1		0.01188	
		1315.2 *2*	19.6 *2*	1972.02	2^+	(D+Q)		0.00242	
3290.46	7^-	308.29 *17*	100	2982.15	7^-	M1		0.0890	
3293.74	8^-	111.2 *1*	15.0[a] *2*	3182.58	8^-	M1+E2	<0.5	1.51 *3*	
		311.6 *1*	100.0[a] *2*	2982.15	7^-	M1+E2	−0.032 *+12−13*	0.0864 *13*	
3313.16	5^-	655.12 *1*	100 *10*	2658.04	5^-	M1		0.01282	
		701.6 *2*	7.4 *15*	2611.57	4^+	E1		0.00227	
		1733.7 *3*	9.6 *22*	1579.40	3^-	(Q)			
3356.7	2^+	3356.7 *5*	100	0.0	0^+	E2		1.18×10^{-3}	
3363.85	4	706.0 *2*	21 *4*	2658.04	5^-	D			
		752.2 *2*	11 *2*	2611.57	4^+				
		1784.4 *1*	100 *13*	1579.40	3^-	D			

From ENSDF

γ(^{146}Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[#]	δ[#d]	α[c]	Comments
3380.81	2^+	1408.8 *2*	28 *3*	1972.02	2^+	M1		0.00209	
		1801.0 *5*	100 *24*	1579.40	3^-	D			
		3381.5 *8*	79 *30*	0.0	0^+	E2		1.19×10^{-3}	
3384.19	6^-	285.2 *2*	24 *6*	3099.03	6^-	M1		0.1094	
		402.0 *2*	29 *12*	2982.15	7^-	M1		0.0443	
		726.15 *14*	100 *12*	2658.04	5^-	M1		0.00994	
3388.73	$(2,1,4^+)$	357.6 *3*	70 *13*	3031.16	3^+	D			
		1416.7 *1*	100 *5*	1972.02	2^+	D			
3411.84	4^+	380.9 *3*	85 *15*	3031.16	3^+	M1		0.0510	
		415.3 *1*	100 *30*	2996.58	4^-	E1		0.00722	
		800.2 *1*	42 *6*	2611.57	4^+				Mult.: ΔJ=0.
3416.57	4^+	804.9 *2*	8 *3*	2611.57	4^+	M1		0.00773	
		1444.6 *2*	14 *4*	1972.02	2^+	E2		1.37×10^{-3}	
		1837.2 *2*	100 *8*	1579.40	3^-	(E1)		8.50×10^{-4}	
3423.28	3^-	1843.90 *12*	100	1579.40	3^-	D+Q			
3428.42	9^-	134.70 *7*	100 *9*	3293.74	8^-	M1+E2	−0.15 *+4−6*	0.863 *13*	
		245.77 *15*	3.9 *6*	3182.58	8^-	M1+E2	0.9	0.1408	
		446.25 *12*	8.7 *9*	2982.15	7^-	E2		0.0189	
3436.21	4^+	824.6 *2*	18 *2*	2611.57	4^+				
		1464.09 *25*	100 *15*	1972.02	2^+	E2		1.35×10^{-3}	
		1857.0 *3*	61 *12*	1579.40	3^-	(E1)		8.58×10^{-4}	
3456.60	4^+	798.69 *17*	100 *9*	2658.04	5^-	E1		1.75×10^{-3}	
		1877.0 *2*	13 *4*	1579.40	3^-				
3461.1	(5^-)	1881.7 *3*	100	1579.40	3^-	Q			
3464.03	5^-	1884.6 *2*	100	1579.40	3^-	(E2)		1.03×10^{-3}	
3469.1		811.1 *3*	100	2658.04	5^-				
3478.4		1899 *1*	100	1579.40	3^-				
3481.8	3^+	1902.4 *6*	100	1579.40	3^-	E1		8.76×10^{-4}	
3484.76	6^+	502.6 *1*	7 *3*	2982.15	7^-	E1		0.00466	
		826.7 *1*	100 *7*	2658.04	5^-	E1		1.64×10^{-3}	
		1905.8 *6*	6 *3*	1579.40	3^-	E3		1.56×10^{-3}	
3484.93	0^+	1512.9 *2*		1972.02	2^+	(E2)		1.28×10^{-3}	
		3485 *2*		0.0	0^+	E0			
3547.5	2^+	3547.5 *8*	100	0.0	0^+	E2		1.23×10^{-3}	
3563.01	$(4^+,2^+)$	951.6 *2*	11 *3*	2611.57	4^+				
		1591.1 *3*	27 *8*	1972.02	2^+				
		1983.1 *3*	100 *30*	1579.40	3^-	D			
3585.3	4	2005.9 *3*	100	1579.40	3^-	D			
3640.8	0^+	654.6 *6*		2986.4	2^+	E2		0.00709	
		3639 *2*		0.0	0^+	E0			
3656.31	3	1044.6 *3*	58 *17*	2611.57	4^+				
		1684.3 *1*	100 *17*	1972.02	2^+	D			
		2076 *2*	42 *17*	1579.40	3^-				

γ(^{146}Gd) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	α[c]	Comments
3660.05	(6+)	1002.0 1	100	2658.04	5−	E1	1.13×10^{-3}	
3686.6	5−	2107.2 8	100	1579.40	3−	E2	9.89×10^{-4}	
3730.0		1758 2	100	1972.02	2+			
3744.2	(2+,3−)	1772 1	62 30	1972.02	2+			
		2165 1	100 30	1579.40	3−			
3761.5	(4+)	1789.5 6	100	1972.02	2+	(E2)	1.07×10^{-3}	
3779.33	(8+)	797.18 10	100	2982.15	7−	E1	1.76×10^{-3}	
3783.78	(3,5)+	1172.2 1	100	2611.57	4+	M1	0.0026 6	
3789	(2−,3−,4−)	2210 3	100	1579.40	3−	(M1)	1.18×10^{-3}	
3853.61	(3−)	822.6 2	33 8	3031.16	3+			
		1244 2	79 17	2611.57	4+	(E1)	8.08×10^{-4}	
		1881.4 2	58 13	1972.02	2+			
		2274 1	100 21	1579.40	3−			
3854.24	7−	671.7 1	63 30	3182.58	8−	M1	0.01205	
		755.17 19	63 30	3099.03	6−	D		
		872.0 2	100 40	2982.15	7−	M1	0.00636	
3864.83	10+	436.35 7	100	3428.42	9−	E1	0.00643	B(E1)(W.u.)>9.8×10^{-6}
3866.68	5−	381.7 3	100 40	3484.76	6+	E1	0.00882	
		1255.2 2	20 7	2611.57	4+	D		
3908.16	(3+)	876.7 3	100[&] 11	3031.16	3+			
		1297 1	53[&] 5	2611.57	4+			
		2329.0 3	100[&] 11	1579.40	3−			
3947.14	(6)+	483.1 2	59 14	3464.03	5−	E1	0.00509	
		848.1 2	100 11	3099.03	6−			
		1289.2 5	51 14	2658.04	5−	D		
3973.4	(3−)	2394 1	100	1579.40	3−			
3987.4		2408 1	100	1579.40	3−			
4006.7	(4+)	2034.7 5	100 70	1972.02	2+			
		2427 1	67 30	1579.40	3−			
4026.71	(6,8)	736.0 5	11 6	3290.46	7−	D		
		1044.6 2	100 13	2982.15	7−	D		
4076.8		977.8 5	100	3099.03	6−			
4107.51	8+	924.87 10	85 15	3182.58	8−	E1	1.32×10^{-3}	
		1125.60 21	100 18	2982.15	7−	D		
4113.4		2534 1	100	1579.40	3−			
4118.3		1460.2 4	100	2658.04	5−			
4122.6	(5−)	1511 1	100	2611.57	4+	D		
4131.2	(3,5)	1100 1	100	3031.16	3+			
4152.4	(2,4)	2573 1	100	1579.40	3−	D		
4166.6	(4,6)	1508.5 3	100	2658.04	5−	D		
4179.49	(6)	1197.3 2	100 17	2982.15	7−	D		
		1521.6 4	93 17	2658.04	5−	D		

$^{146}_{64}Gd_{82}$-10

$\gamma(^{146}Gd)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	α[c]	Comments
4216.4	(2,4)	1185.2 *5*	100	3031.16	3^+	D		
4230.4	(5^-)	2651 *2*	100	1579.40	3^-			
4248.4	(7,9)	1065.8 *5*	100	3182.58	8^-	D		
4259.8		1277.6 *5*	100	2982.15	7^-			
4286.4		2707 *2*	100	1579.40	3^-			
4299.8	(2^+)	1688.2 *3*	100	2611.57	4^+			
4318.95	(6^-,7^+,8^-)	1336.8 *2*	100	2982.15	7^-			Mult.: E1, ΔJ=0 or M1, ΔJ=1 from anisotropy and pol. (2010CaZZ).
4326.6	(3,5)	1715 *2*	100	2611.57	4^+	D		
4341.4	(4^-)	2762 *2*	100	1579.40	3^-			
4355.03	(5)	1256.0 *1*	100 *21*	3099.03	6^-	D		
		1372.8 *6*	22 *5*	2982.15	7^-			
		1742 *2*	18 *5*	2611.57	4^+			
4372.4	(4^+)	2793 *2*	100	1579.40	3^-			
4376.1	(4^+)	1718 *1*	100	2658.04	5^-			
4389.6	(5,7)	1290.6 *6*	100	3099.03	6^-	D		
4399.5	(5^-,7^-)	1300.5 *3*	100 *18*	3099.03	6^-	D		
		1741 *1*	12 *5*	2658.04	5^-			
4416.9	(10^-,8^-)	1123.2 *3*	100	3293.74	8^-			
4459.09	(7^-,9)	1030.7 *5*	38 *24*	3428.42	9^-			
		1165.4 *5*	100 *40*	3293.74	8^-			
		1276.5 *2*	75 *13*	3182.58	8^-	D		
4484.2	(4^+)	1826 *1*	100 *25*	2658.04	5^-	D		
		2906 *3*	21 *17*	1579.40	3^-			
4484.9	(11^-)	1056.5 *3*	100	3428.42	9^-			
4501.97	10^+	1073.6 *2*	100	3428.42	9^-	E1	9.96×10^{-4}	
4520.6		1909 *1*	100	2611.57	4^+			
4529.25		1547.1 *2*	100	2982.15	7^-			
4532.6	(3,5)	1921 *2*	100	2611.57	4^+			
4541.23	10^+	676.3 *2*	0.10 *5*	3864.83	10^+			
		1112.93 *10*	100	3428.42	9^-	E1	9.35×10^{-4}	
4580.3	7	1399 *1*	71 *21*	3182.58	8^-	D		
		1480 *1*	100 *25*	3099.03	6^-	D		
4608.4	8,10^-	1314.7 *6*	100	3293.74	8^-			
4645.79	(11^-)	780.96 *15*	100	3864.83	10^+	(E1)	0.00183	
4666.89	(12^+)	125.9 *2*	10 *3*	4541.23	10^+			
		802.0 *1*	100 *23*	3864.83	10^+			
4719.24	4^-	1296.4 *4*	23[&] *2*	3423.28	3^-			
		1431.7 *3*	3.9[&] *4*	3287.29	3^+			
		1688.0 *2*	2.7[&] *3*	3031.16	3^+			
		2061.00 *14*	9[&] *1*	2658.04	5^-			
		2107.9 *2*	2.4[&] *3*	2611.57	4^+			
		3139.87 *13*	100[&] *1*	1579.40	3^-			

From ENSDF

γ(^{146}Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[#]	δ[#d]	α[c]
4729.64	(9$^+$,7$^+$)	1435.9 2	100 17	3293.74	8$^-$	E1		7.53×10^{-4}
		1547 1	42 8	3182.58	8$^-$			
4780.54		1391.8 2	100	3388.73	(2,1,4$^+$)	D		
4782.2	8,6	1800 1	100	2982.15	7$^-$	D		
4802.0		1703 1	100	3099.03	6$^-$			
4828.64	(4,5)$^-$	1831.85 14	100[&] 10	2996.58	4$^-$			
		2170.9 2	49[&] 4	2658.04	5$^-$			
		3249.4 3	57[&] 6	1579.40	3$^-$			
4847.7	(9,7)	1554 2	100	3293.74	8$^-$	D		
4880.2	(10,8)	1451.8 3	100	3428.42	9$^-$	D		
4898.3	(9,7)	1604.7 6	100 30	3293.74	8$^-$	D		
		1715.7 3	44 11	3182.58	8$^-$			
4942.6		1760 1	100	3182.58	8$^-$			
5056.3		1191.5 4	100	3864.83	10$^+$			
5094.70	11$^+$	592.8 2	33.6[a] 4	4501.97	10$^+$	M1		0.01646
		1229.8 2	100.0[a] 4	3864.83	10$^+$	M1+E2	−1.67 7	0.00208 4
5164.54	(11,9)	1299.7 2	100	3864.83	10$^+$	D		
5277.54	11$^+$	736.7 3		4541.23	10$^+$			
		775 1		4501.97	10$^+$			
		1412.5 3		3864.83	10$^+$	M1+E2		0.0018 4
5320.7?		1412.5 3	100	3908.16	(3$^+$)			
5350.67	12$^+$	1485.7 3	100	3864.83	10$^+$	E2		1.32×10^{-3}
5447.88	12$^+$	802.10 18	100.0[a] 14	4645.79	(11$^-$)	(E1)		1.74×10^{-3}
		1583.0 2	95.4[a] 15	3864.83	10$^+$	E2		1.21×10^{-3}
5529.0	(12$^+$)	434.3 2	100	5094.70	11$^+$	M1+E2	+0.07 +3−4	0.0362 6
5700.55	(12)$^+$	1835.7 2	100	3864.83	10$^+$	(E2)		1.05×10^{-3}
5730.05	(12)$^+$	1865.2 2	100	3864.83	10$^+$	(E2)		1.04×10^{-3}
5791.67	13$^+$	343.7 2	10.4[a] 3	5447.88	12$^+$	M1+E2		0.053 14
		440.9 3	21.3[a] 3	5350.67	12$^+$	M1+E2		0.027 8
		514.2 2	41.5[a] 3	5277.54	11$^+$	E2		0.01295
		697.0 3	100.0[a] 3	5094.70	11$^+$	E2		0.00611
5894.16	14$^+$	102.4 3	83.3[a] 12	5791.67	13$^+$	D		
		446.35 20	100.0[a] 12	5447.88	12$^+$	E2		0.0189
		543.6 2	86.9[a] 12	5350.67	12$^+$	E2		0.01123
5996.1	14$^+$	645.30 21	100	5350.67	12$^+$	E2		0.00734
6120.1	15$^+$	124 1		5996.1	14$^+$			
		225.9 2		5894.16	14$^+$	D+Q		
		328 1		5791.67	13$^+$			
6399.0	16$^+$	278.8 3		6120.1	15$^+$	D		
		402.9 2		5996.1	14$^+$	E2		0.0252
		505.0 2		5894.16	14$^+$	Q		
6820.3	17$^{(+)}$	421.3 2	100	6399.0	16$^+$	(M1+E2)	−0.13 +8−15	0.0390 11

$^{146}_{64}Gd_{82}$-12

$\gamma(^{146}Gd)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[#]	δ[#d]	α[c]	Comments
7034.0	16^-	913.9 2	100	6120.1	15^+	E1		1.35×10^{-3}	
7164.8	17^-	130.7 2	17.7[a] 4	7034.0	16^-	M1+E2	+0.28 +21−5	0.939	
		765.9 2	100[a] 4	6399.0	16^+	E1		0.00190	
		1046 1	[a]	6120.1	15^+				
		1166 1	[a]	5996.1	14^+				
7202.0		803 1		6399.0	16^+				
7513.3	16^+	479.3 3		7034.0	16^-				
		1114.3 2		6399.0	16^+	M1+E2	+0.2 2	0.00348 15	
7566.2	17^-	1167.2 2	100	6399.0	16^+	E1		8.69×10^{-4}	
7659.1		838.8 2		6820.3	$17^{(+)}$				
		1260 1		6399.0	16^+				
7738.8	17^+	226 1		7513.3	16^+				
7999.7	(18^+)	260.9 2	100	7738.8	17^+	M1+E2	−0.07 +5−8	0.1387 22	
8030.1	18^+	291.3 2	35.8[a] 4	7738.8	17^+	M1+E2	−0.021 +20−24	0.1034	B(M1)(W.u.)=0.00012 5; B(E2)(W.u.)=0.0004 +7−4
		463.9 2	3.9[a] 4	7566.2	17^-	E1		0.00559	B(E1)(W.u.)=3.6×10^{-8} 15
		516.8 2	22.4[a] 4	7513.3	16^+	E2		0.01280	B(E2)(W.u.)=0.028 12
		865.2 2	100.0[a] 4	7164.8	17^-	E1		1.50×10^{-3}	B(E1)(W.u.)=1.4×10^{-7} 6
		1631.0 2	14.7[a] 4	6399.0	16^+	E2		1.17×10^{-3}	B(E2)(W.u.)=6.0×10^{-5} 24
8077.0		875 1	100	7202.0					
8368.2	(18^+)	629.4 2	10.6[a] 5	7738.8	17^+	M1+E2	+4.5 +31−42	0.008 6	
		709.1 2	100.0[a] 5	7659.1					
8649.6	(19^-)	649.9 2	100	7999.7	(18^+)	(E1)		0.00267	
8665.8	(19^+)	297.6 2	100	8368.2	(18^+)	M1+E2	−0.086 +23−28	0.0974	
8804.0		727 1	100	8077.0					
8915.7	20^-	885.6 2	100	8030.1	18^+	M2+E3	−0.13 +6−4	0.01570 24	B(M2)(W.u.)=0.47 4; B(E3)(W.u.)=9 8
9083.5	(20^+)	417.8 2		8665.8	(19^+)	M1+E2	−0.27 +4−6	0.0389 8	
		433.9 2		8649.6	(19^-)	(E1)		0.00652	
9225.5	(21^-)	309.8 2	100	8915.7	20^-	M1+E2	−0.058 +15−17	0.0876	
9254.0		170.5 2	100	9083.5	(20^+)	(D)			
9257.0	(21^-)	173.5 2	100	9083.5	(20^+)	E1		0.0662	
9482.3	(22^-)	257 1	100	9225.5	(21^-)				
9495.0		691 1	100	8804.0					
9526.8	(22^-)	269.8 2	100	9257.0	(21^-)	M1+E2		0.105 22	
9745.0		941 1	100	8804.0					
9962.7	(22^-)	1047.1 2	100	8915.7	20^-	E2		0.00250	
10006.2	(23^-)	479.4 2	100	9526.8	(22^-)	M1+E2	−0.47 +10−17	0.0259 15	
10087.0	(23^-)	861.5 2	100	9225.5	(21^-)	E2		0.00379	
10266.5	(23^-)	1041.0 2	100	9225.5	(21^-)	E2		0.00253	
10440.0		695 1		9745.0					
		945 1		9495.0					
10770.4	(24^-)	807.7 2	63.2[a] 18	9962.7	(22^-)	E2		0.00436	
		1288.1 2	100.0[a] 18	9482.3	(22^-)	E2		1.67×10^{-3}	

$^{146}_{64}Gd_{82}$-13

$\gamma(^{146}Gd)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[#]	δ[#d]	α[c]
11023.8	(24$^+$)	757.1 2	24.6[a] 15	10266.5	(23$^-$)	E1		0.00195
		936.7 2	100.0[a] 15	10087.0	(23$^-$)	E1		1.28×10^{-3}
11099.0		659 1	100	10440.0				
11244.1	25$^-$	474	100[a]	10770.4	(24$^-$)			
		977.6 2	33[a] 1	10266.5	(23$^-$)	E2		0.00289
11440.2	25$^+$	416.6 2	30[a] 2	11023.8	(24$^+$)	M1+E2	−0.25 +6−8	0.0394 9
		669.9 2	100[a] 2	10770.4	(24$^-$)	E1		0.00250
11450.0		351 1	100	11099.0				
11497.5	(25)	727.1 2	100	10770.4	(24$^-$)	(D+Q)		
11529.7	25$^-$	505.6 2	100	11023.8	(24$^+$)	E1		0.00460
11637.8	26$^+$	107.8 2	18[a] 2	11529.7	25$^-$	E1		0.239
		140.2 2	36[a] 2	11497.5	(25)	(D+Q)		
		197.8 2	36[a] 2	11440.2	25$^+$	M1+E2		0.26 4
		393.8 2	100[a] 2	11244.1	25$^-$	E1		0.00819
11932.8	(27$^+$)	295.0 2	100	11637.8	26$^+$	M1+E2	+0.042 +12−13	0.0999 15
12891.0	(29$^+$)	958.2 2	100	11932.8	(27$^+$)	E2		0.00301
13696.0		805.0 2	100	12891.0	(29$^+$)			
14013.6		1123 1	100	12891.0	(29$^+$)			
14176.3		163 1		14013.6				
		480 1		13696.0				
14197.0		1306 1	100	12891.0	(29$^+$)			
14444.0		247 1	100	14197.0				
14595.0		899 1		13696.0				
		1704 1		12891.0	(29$^+$)			
15069.0		474 1	100	14595.0				
15443.0		374 1	100	15069.0				
15758.0		315 1	100	15443.0				
16313.0		555 1	100	15758.0				
826.3+x	J1+2	826.3 3	100	0.0+x	J1			
1704.3+x	J1+4	878.0 3	100	826.3+x	J1+2			
2634.8+x	J1+6	930.5 2	100	1704.3+x	J1+4			
3618.0+x	J1+8	983.2 2	100	2634.8+x	J1+6			
4656.6+x	J1+10	1038.6 3	100	3618.0+x	J1+8	E2[b]		
5750.0+x	J1+12	1093.4 3	100	4656.6+x	J1+10	E2[b]		
6898.8+x	J1+14	1148.8 2	100	5750.0+x	J1+12	E2[b]		
8100.0+x	J1+16	1201.2 3	100	6898.8+x	J1+14	E2[b]		
9350.3+x	J1+18	1250.3 4	100	8100.0+x	J1+16	E2[b]		
10648.1+x	J1+20	1297.8 3	100	9350.3+x	J1+18	E2[b]		
11993.2+x	J1+22	1345.1 3	100	10648.1+x	J1+20	E2[b]		
13387.0+x	J1+24	1393.7 4	100	11993.2+x	J1+22			
14833.2+x	J1+26	1446.2 5	100	13387.0+x	J1+24			

$^{146}_{64}Gd_{82}$-14

Adopted Levels, Gammas (continued)

γ(^{146}Gd) (continued)

E_i(level)	J^π_i	E_γ [†]	I_γ [‡]	E_f	J^π_f	E_i(level)	J^π_i	E_γ [†]	I_γ [‡]	E_f	J^π_f
16331.7+x	J1+28	1498.5 *7*	100	14833.2+x	J1+26	13246.1+y	J2+24	1413.4 *4*	100	11832.6+y	J1+22
17885.3+x	J1+30	1553.6 *9*	100	16331.7+x	J1+28	14718.8+y	J2+26	1472.7 *6*	100	13246.1+y	J2+24
806.2+y	J2+2	806.2 *3*	100	0.0+y	J2	16248.7+y	J1+28	1529.9 *8*	100	14718.8+y	J2+26
1663.2+y	J2+4	857.0 *3*	100	806.2+y	J2+2	17830.7+y	J1+30	1582.0 *11*	100	16248.7+y	J1+28
2571.7+y	J2+6	908.5 *3*	100	1663.2+y	J2+4	958.5+z?	J3+2	958.5 *5*	100	0.0+z?	J3
3532.8+y	J2+8	961.1 *2*	100	2571.7+y	J2+6	1964.6+z?	J3+4	1006.1 *6*	100	958.5+z?	J3+2
4549.0+y	J1+10	1016.2 *2*	100	3532.8+y	J2+8	3029.5+z?	J3+6	1064.9 *6*	100	1964.6+z?	J3+4
5621.2+y	J2+12	1072.2 *2*	100	4549.0+y	J1+10	4153.0+z?	J3+8	1123.5 *8*	100	3029.5+z?	J3+6
6749.0+y	J2+14	1127.8 *3*	100	5621.2+y	J2+12	5328.7+z?	J3+10	1175.7 *8*	100	4153.0+z?	J3+8
7933.8+y	J2+16	1184.8 *3*	100	6749.0+y	J2+14	6554.3+z?	J3+12	1225.6 *10*	100	5328.7+z?	J3+10
9176.4+y	J1+18	1242.6 *3*	100	7933.8+y	J2+16	7832.3+z?	J3+14	1278.0 *14*	100	6554.3+z?	J3+12
10475.7+y	J1+20	1299.3 *4*	100	9176.4+y	J1+18	9155+z?	J3+16	1322.4 *11*	100	7832.3+z?	J3+14
11832.6+y	J1+22	1356.9 *4*	100	10475.7+y	J1+20	10524+z?	J3+18	1368.9 *19*	100	9155+z?	J3+16

[†] Weighted average of ^{146}Tb ε decays (23 s and 8 s), (α,2nγ), (α,6nγ) and (HI,xnγ) reactions data when it is available.

[‡] % photon branching from each level from (α,2nγ) data set, except as noted. In the cases of the stated I(γ+ce) in papers, the evaluators calculated Iγ using measured α, when they were known, or theoretical α for the transitions, the multipolarities which were evident from the scheme. Iγ's of SD-bands are relative within each band.

[#] From α(exp), $\gamma(\theta)$ and lin pol, also from shell model treatments.

[@] From ^{146}Tb ε decay (8 s).

[&] From ^{146}Tb ε decay (23 s).

[a] From (HI,xnγ).

[b] Stretched quadrupole from Iγ(34°/146°)/Iγ($\sum$0°) ratios (1987He16).

[c] Additional information 4.

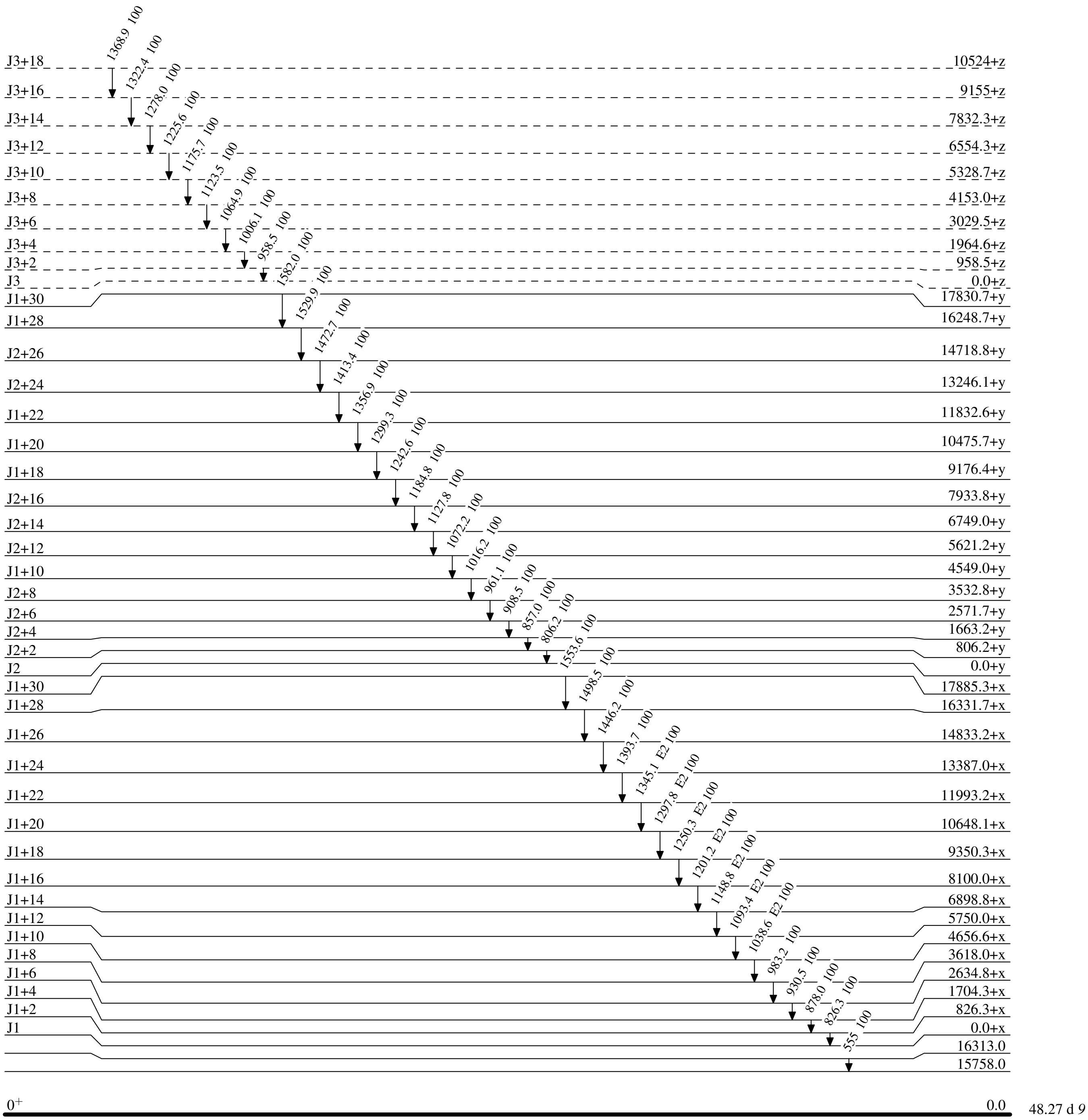
[d] If No value given it was assumed δ=1.00 for E2/M1.

$^{146}_{64}Gd_{82}$-15

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level

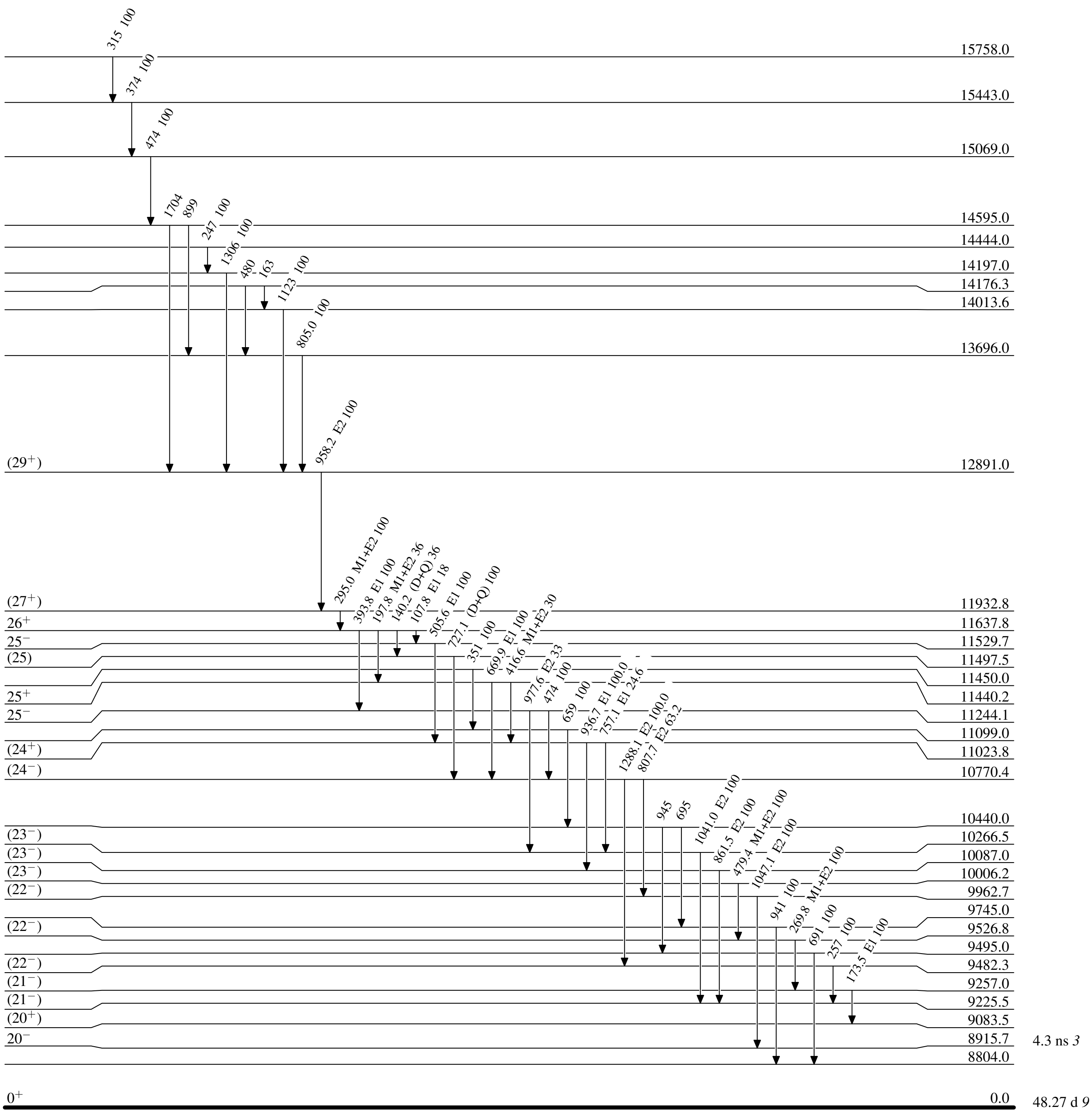


$^{146}_{64}Gd_{82}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

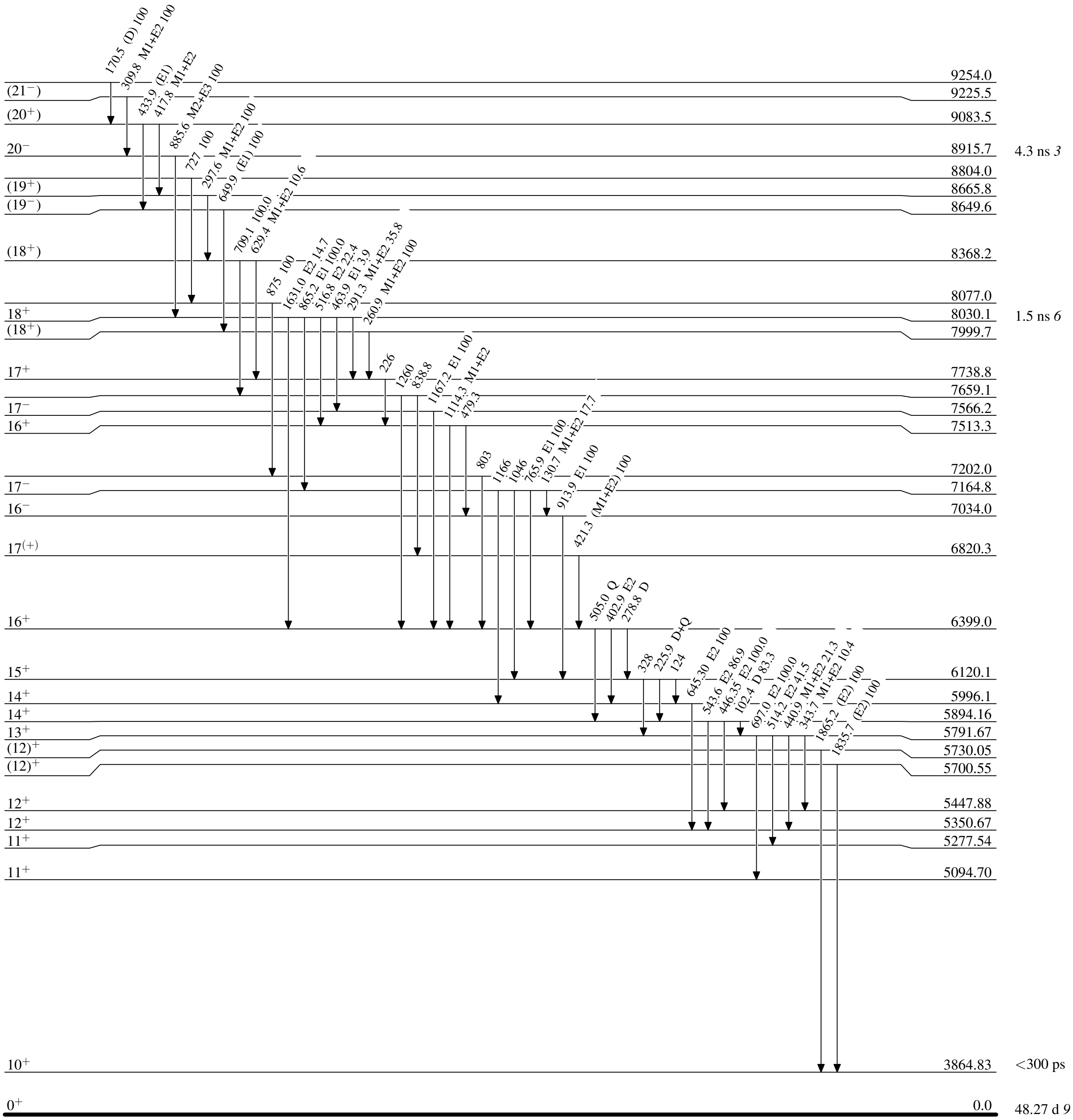


$^{146}_{64}Gd_{82}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

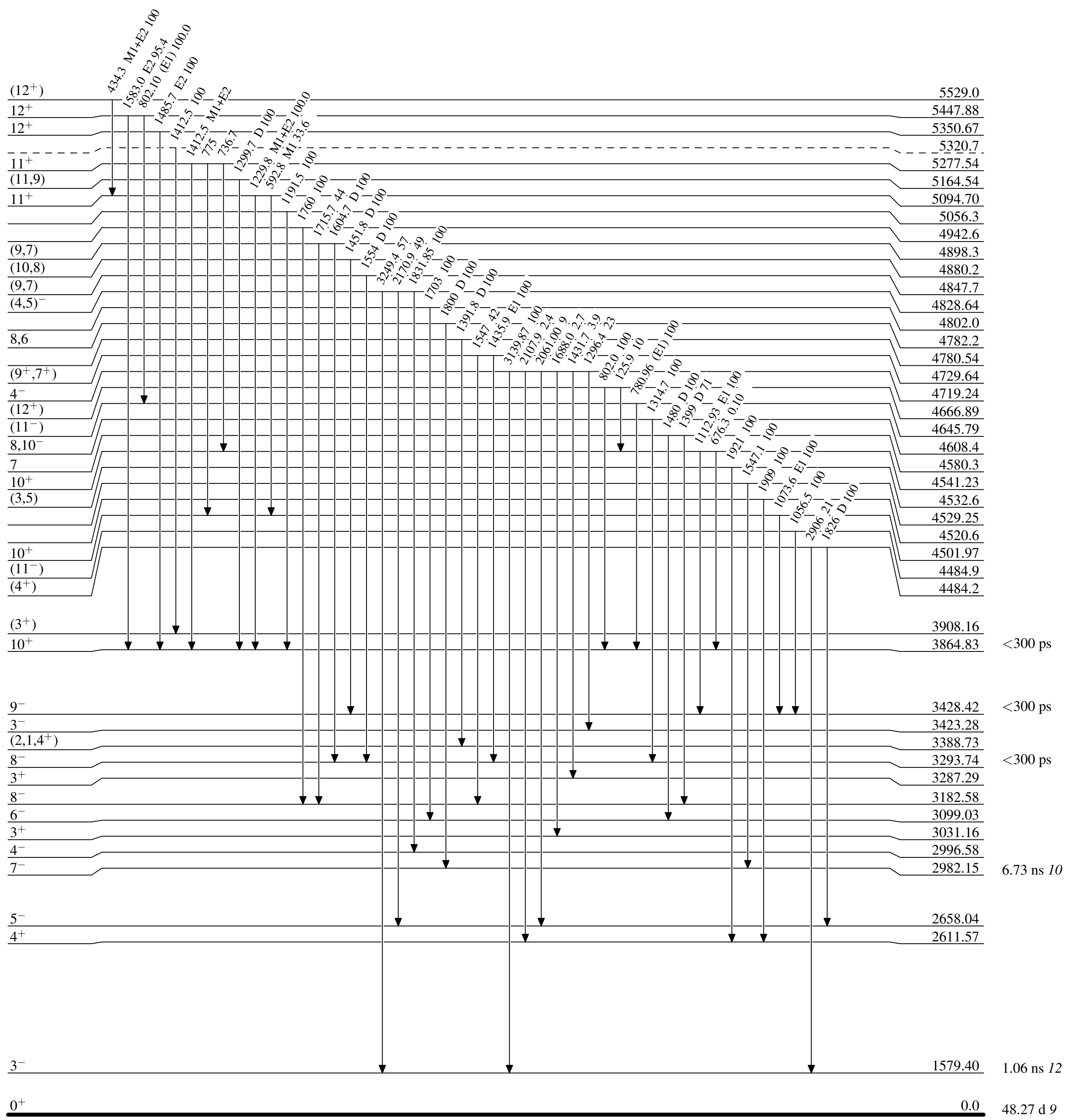


$^{146}_{64}Gd_{82}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

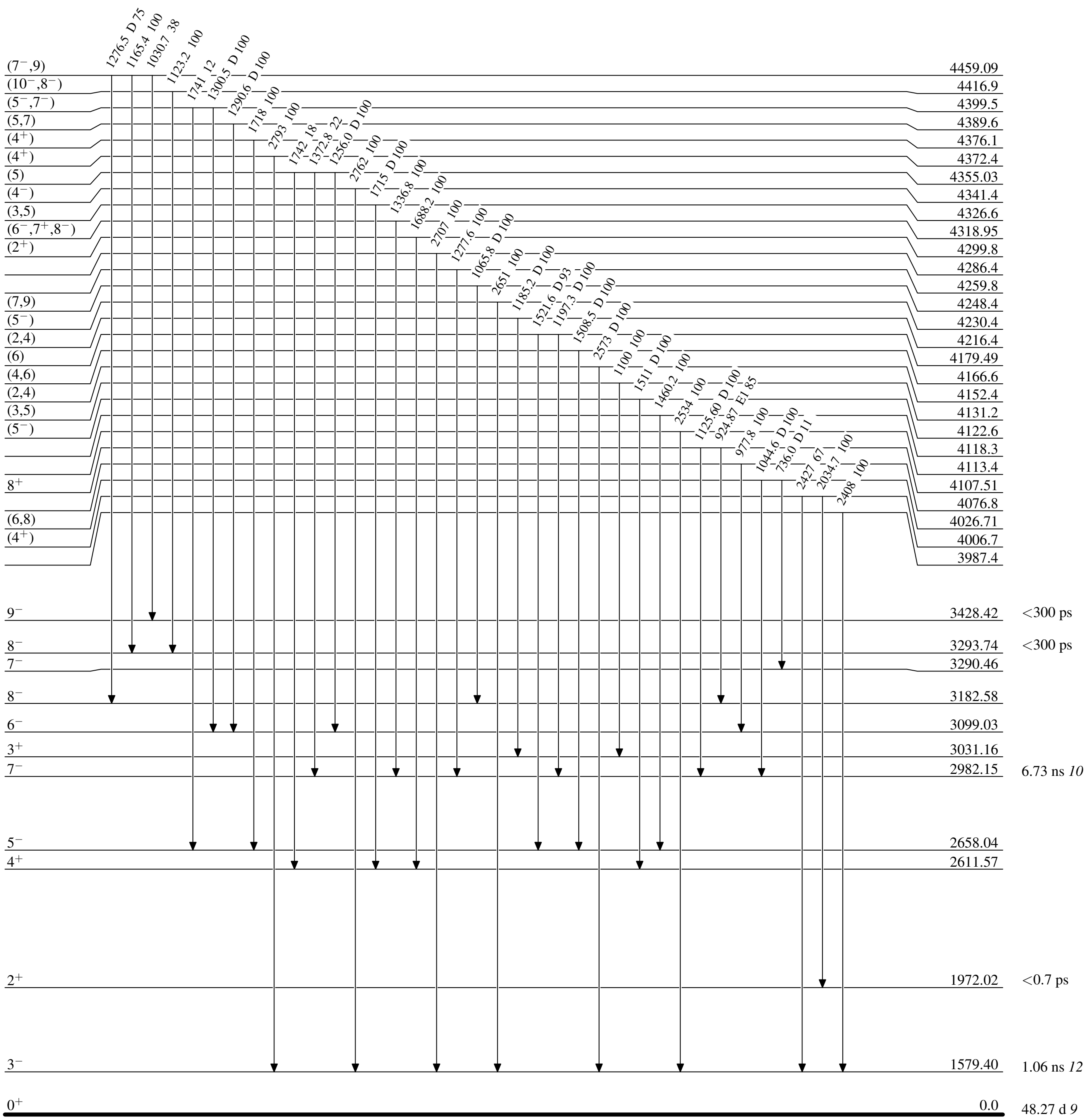


$^{146}_{64}Gd_{82}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

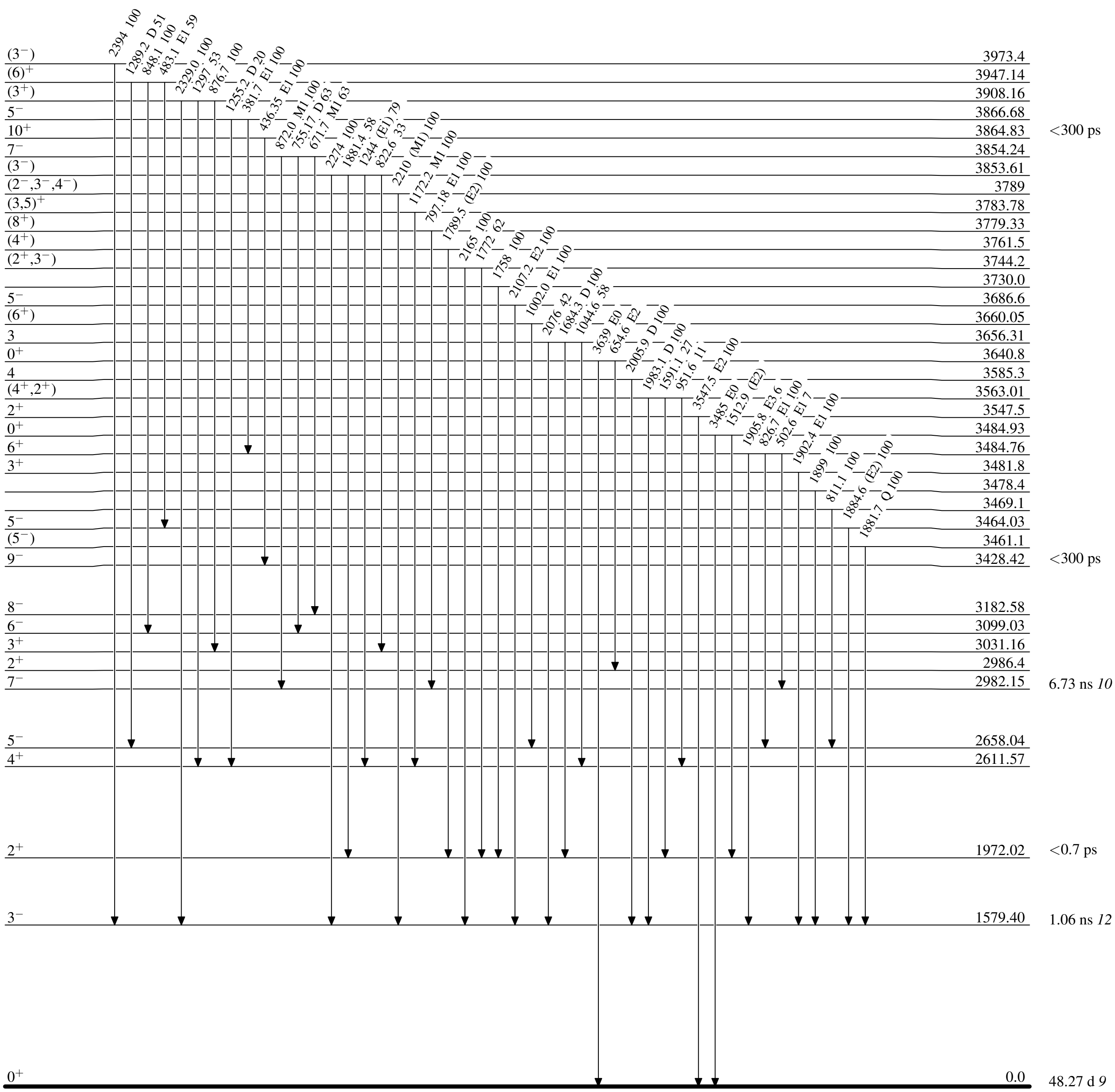


$^{146}_{64}Gd_{82}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

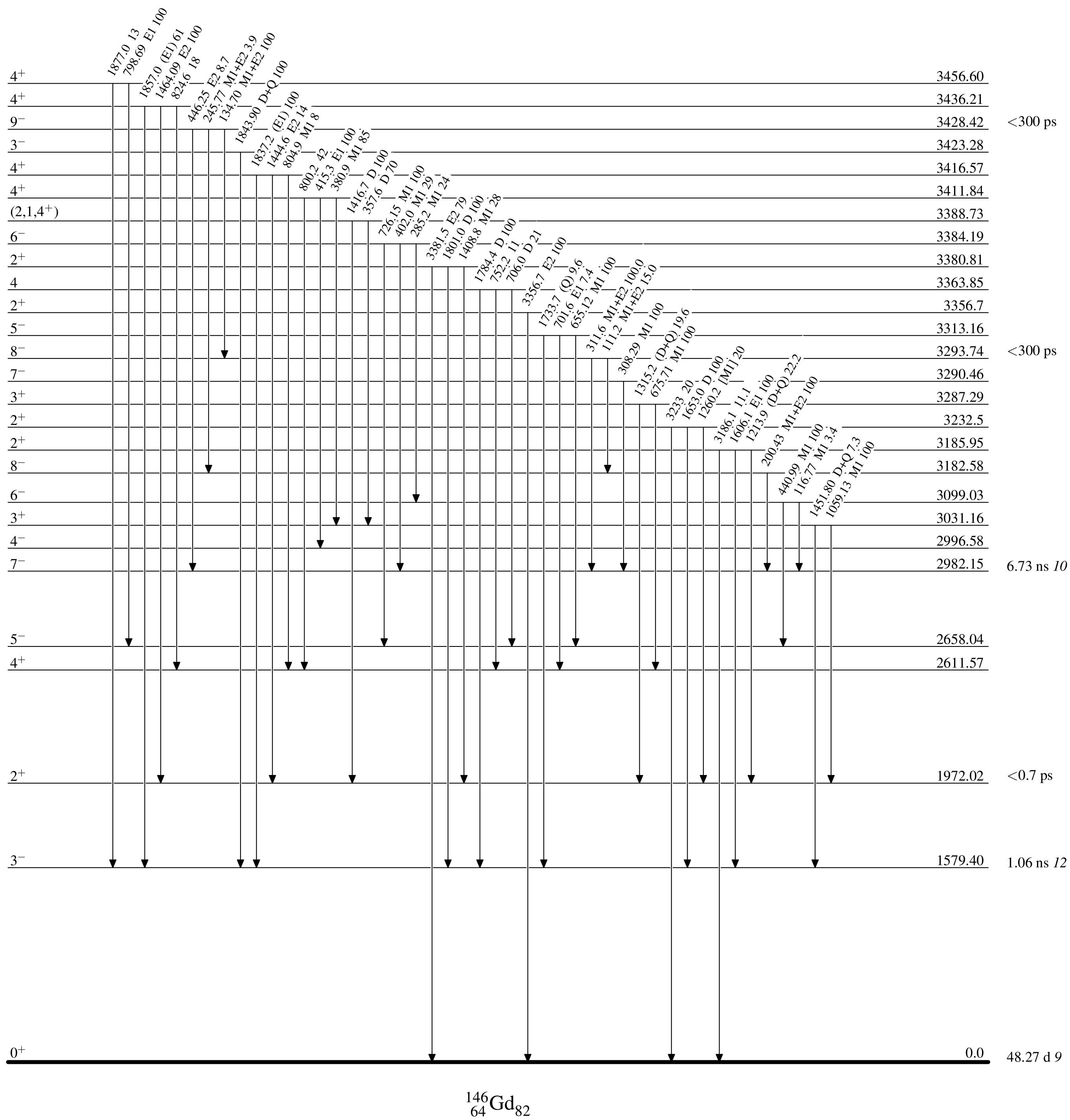


$^{146}_{64}Gd_{82}$

Adopted Levels, Gammas

Level Scheme (continued)

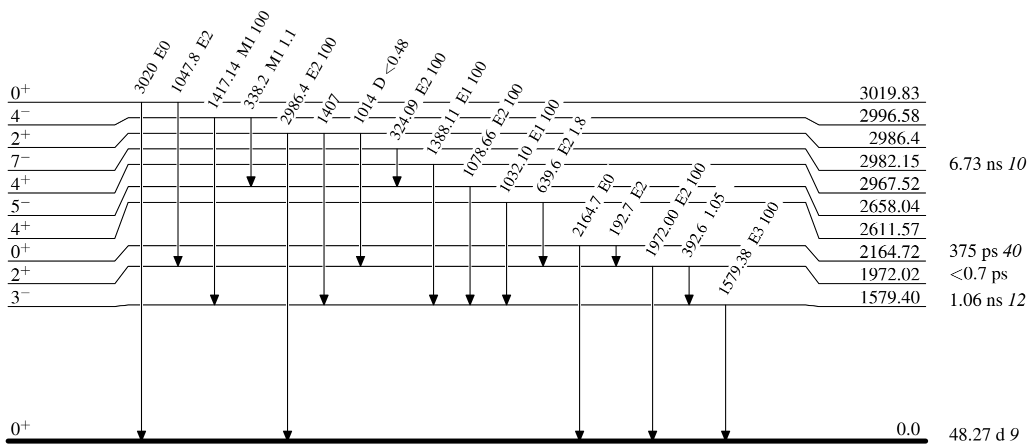
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

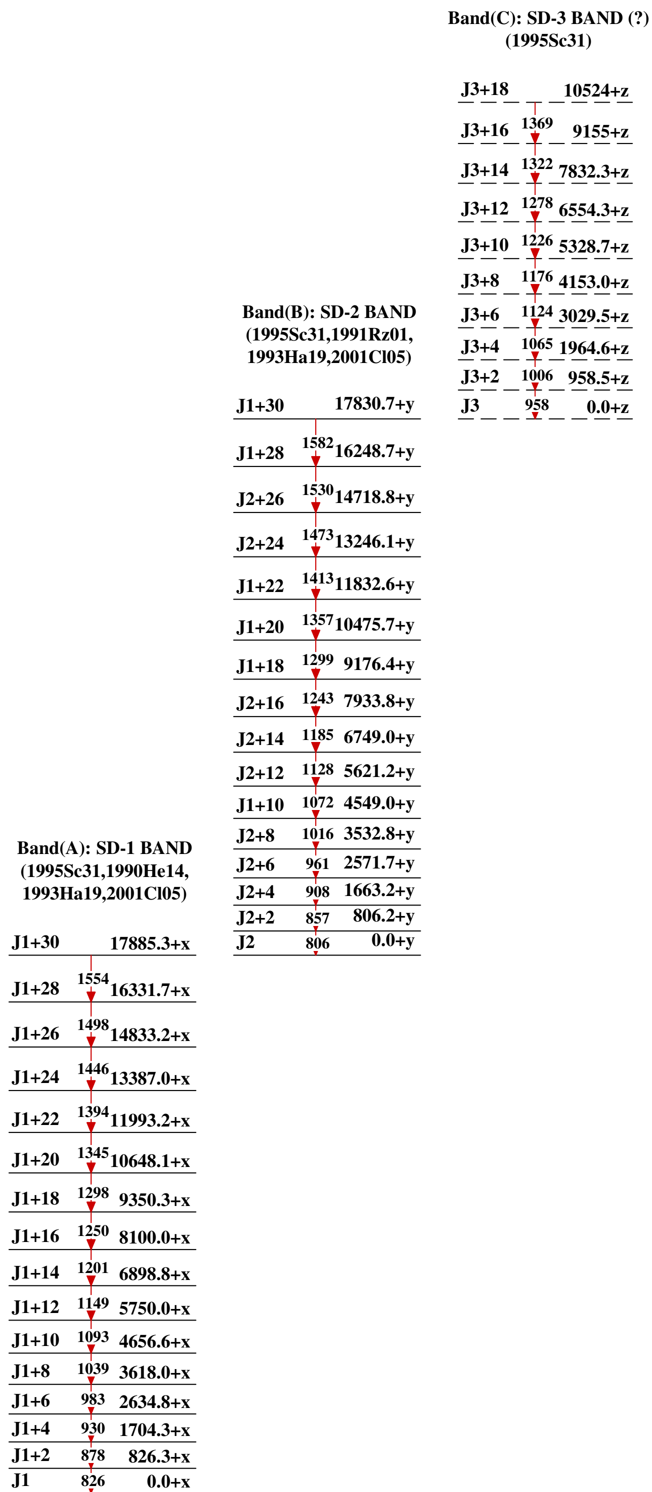
Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{146}_{64}Gd_{82}$

Adopted Levels, Gammas



$^{146}_{64}Gd_{82}$

Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 117, 1 (2014)	1-Oct-2013

Q(β^-)=−5738 *13*; S(n)=8984.1 *12*; S(p)=6013.9 *24*; Q(α)=3271.21 *3* 2012Wa38
Additional information 1.
Other reactions: 1991Fl03: spin dependence of GDR in Gd isotopes.
There are problems in reconciling log *ft* values from ^{148}Tb ε decay (2.20 min) with ΔJ^{π} of the transitions. More data are needed to clarify these problems.

^{148}Gd Levels

Cross Reference (XREF) Flags

A	^{148}Tb ε decay (60 min)	D	^{148}Gd(p,p′)
B	^{148}Tb ε decay (2.20 min)	E	(HI,xnγ)
C	^{152}Dy α decay	F	(HI,xnγ):SD

E(level)[†]	J^{π}[‡]	$T_{1/2}$[#]	XREF	Comments
0.0[@]	0^+	71.1 y *12*	ABCDE	%α=100 $T_{1/2}$: weighted average of values (In Y): 74.6 *30* (1981Pr06), and 70.9 *10* (2003Fu10, preliminary result after two year measurement). Others: 97.5 y *65* (1966Fr11), 84 y *9* (1962Si14), see also 1953Ra02.
784.433[@] *15*	2^+	4.2 ps *12*	AB DE	J^{π}: L(p,p′)=2.
1273.492[&] *18*	3^-	34.7 ps *21*	AB DE	J^{π}: L(p,p′)=3.
1416.378[@] *20*	4^+	8.1 ps *24*	AB DE	J^{π}: L(p,p′)=4.
1810.98[@] *7*	6^+	178 ps *20*	B DE	J^{π}: L(p,p′)=6. log *ft*=6.3 from $(9)^+$ to this level is very low.
1834.59 *5*	$2^+,3^+$		A	J^{π}: from $\gamma(\theta)$ of oriented nuclei in ε decay (60 min).
1863.445 *24*	2^+		A D	J^{π}: L(p,p′)=2.
1912.97[&] *6*	4^-		AB E	J^{π}: γ to 3^- is M1, no γ to 2^+.
2082.11[&] *6*	5^-	2.6 ps *13*	AB DE	J^{π}: L(p,p′)=5.
2188.67 *4*	2^+		A D	J^{π}: L(p,p′)=2.
2233.60 *4*	3^-		A D	J^{π}: L(p,p′)=3.
2310.97 *5*	2^+		A D	J^{π}: L(p,p′)=2.
2424.10 *9*	$3^+,4^+$		A	J^{π}: from $\gamma(\theta)$ of oriented nuclei in ε decay (60 min); π from M1+E2 γ to 4^+, 1416.
2503.70 *6*	$(1,2,3)^-$		A	J^{π}: γ to 3^- is E2,M1 and γ to 2^+.
2505.80 *4*	3^-		A D	J^{π}: γ to 4^+ is E1; γ to 2^+; seen in (p,p′).
2522.04 *11*	4^+		A D	J^{π}: L(p,p′)=4.
2563.81[&] *9*	7^-	21.3 ps *30*	B E	J^{π}: γ to 5^- ΔJ=2, E2; γ to 6^+ is E1.
2566.82[&] *18*	6^-		E	
2614.59 *5*	2^+		A D	J^{π}: L(p,p′)=2.
2632.65[a] *8*	5^-		A DE	J^{π}: L(p,p′)=5.
2693.35[@] *10*	8^+	13.2 ps *28*	B DE	J^{π}: γ to 6^+ is ΔJ=2, E2; no γ to J<6.
2694.67[&] *13*	9^-	16.6 ns *3*	B E	μ=−0.162 *18* (2005St24,1987Da27) Q=1.01 *5* (2005St24,1982Ha22) J^{π}: γ to 7^- is E2, γ to 6^+ is E3 (from $\gamma(\theta)$ and RUL). $T_{1/2}$: weighted average of 17.5 ns *10* (1990Pi17), 17.5 ns *10* (1984Lu09), 16.5 *3* (1979Ha15), 17.3 ns *20* (1973Kr10), 16.3 ns *9* (1972HaXQ), and 16.7 ns *9* (1971HaXD). μ: Other: −0.252 *81* (1979Ha15); both 1987Da27 and 1979Ha15 used the time

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{148}Gd Levels (continued)

E(level)†	Jπ‡	T1/2#	XREF	Comments
				dependent perturbed angular distribution method. Q: measured by the time dependent perturbed angular distribution method (1982Ha22).
2700.06 *7*	(1^-,2^+)		A	Jπ: γ to 0^+ and 3^-.
2763 *3*	4^+		D	Jπ: L(p,p′)=4.
2782.60@ *17*			B E	Jπ=(4^+,5,6^+) from gammas to 4^+ and 6^+; not consistent with log *ft*=7.1 or log $f^{1u}t$=8.6 from ^{148}Tb ε decay (2.20 min).
2868.74@ *20*	$(5)^+$		B DE	
2872.89 *7*	(2^-,3,4^+)		A	Jπ: gammas to 2^+ and 4^-.
2886.31 *10*	(2^+,3,4^+)		A	Jπ: gammas to 2^+ and 4^+.
2915.50 *8*	3^-		A D	Jπ: L(p,p′)=3.
2934.9@ *5*	$(7)^+$		E	
2936.61a *24*	7^-	3.8 ps *26*	B DE	
3029.59& *13*	8^-	52 ps *13*	B E	
3045.7 *3*			B	
3065			A	
3076.12 *24*			A	
3089.70 *8*	(1^-,2^+)		A	Jπ: gammas to 0^+ and 3^-.
3128.8 *3*			B	
3130.87 *16*	(1,2^+)		A	Jπ: γ to 0^+.
3152.48a *14*	8^-		B E	
3157.0 *3*			B	
3179.7a *6*	7^-		E	
3295.03 *15*	(1,2^+)		A	Jπ: γ to 0^+.
3310.4a *4*	8^-		E	
3357.80 *24*			B	
3367.26a *15*	9^-	19.1 ps *21*	E	
3478.0 *3*	(8,9)		B	Jπ: log $f^{1u}t$=7.4 in ε decay from $(9)^+$ and γ to 6^+.
3502.1 *4*			B	
3574.94 *21*	(1^-,2^+)		A	Jπ: gammas to 0^+ and 3^-.
3645.92 *23*	(8^+)		B	Jπ: gammas to 6^+ and 8^+; and log $f^{1u}t$=7.3 in ε decay from $(9)^+$.
3666.6@ *4*	10^-		B E	
3701.48& *20*	11^-	<5 ps	E	$T_{1/2}$: adopted by evaluator from 1 ps *+4−1* In (HI,xnγ).
3758.24b *19*	10^+	7.6 ps *10*	B E	
3768.35 *24*			B	
3808.34 *19*	(8^+)		B	Jπ: gammas to 6^+ and 9^-; and log $f^{1u}t$=7.3 in ε decay from $(9)^+$.
3822.4& *4*	10^+		E	
3868.66 *18*			B	
3918.22a *19*	10^-	8.9 ps *15*	E	
3980.42& *20*	12^+	60 ps *5*	E	
3990.51 *20*	$(8,9,10)^+$		B	Jπ: log *ft*=5.9 in ε decay from $(9)^+$.
4051.0 *6*	(2^+,3,4^+)		A	Jπ: gammas to 2^+ and 4^+.
4068.22 *25*	(2)		A	Jπ: gammas to 0^+ and 4^-.
4119.24 *14*	$(8)^+$		B	Jπ: log *ft*=5.2 for ε decay from $(9)^+$; γ to 6^+.
4121.47a *21*	11^-	4.6 ps *34*	E	
4170.25 *20*	(8,9^-)		B	Jπ: gammas to 7^- and 9^-; and log $f^{1u}t$=7.0 in ε decay from $(9)^+$.
4271.4 *4*			B	
4312.01 *17*	$(8,9,10)^+$		B	Jπ: log *ft*=5.1 for ε decay from $(9)^+$.
4408.90 *16*	$(8)^+$		B	Jπ: log *ft*=5.3 for ε decay from $(9)^+$; and γ to $(5)^+$.
4429.74a *23*	12^-	12 ps *9*	E	
4500.33b *19*	12^+	3.9 ps *21*	E	
4542.27 *22*			A	
4551.04a *23*	13^-	38 ps *6*	E	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{148}Gd Levels (continued)

E(level)[†]	J^{π}[‡]	$T_{1/2}$[#]	XREF	Comments
4740.6[a] *4*	$13^{(-)}$		E	J^{π}: from (HI,xnγ) (1990Pi17); 13^- from (HI,xnγ) (1990Dr06).
4906.0[a] *3*	14^-	<12 ps	E	$T_{1/2}$: adopted by evaluator from 3 ps *+9−3* In (HI,xnγ).
5025.83[b] *21*	14^+	25 ps *14*	E	
5117.51[a] *25*	15^-	16 ps *8*	E	
5167.8[&] *4*	14^+		E	
5355.57[b] *25*	16^+	184 ps *26*	E	
5438.6 *4*	16		E	
5578.6 *9*			E	
5800.3 *9*			E	
5832.7[b] *3*	18^+		E	
5882.8 *8*	17		E	
5933.7[a] *5*	17		E	
6210.9[c] *4*	17		E	
6268.4 *8*	18		E	
6381.4 *6*	18		E	
6545.6[c] *4*	18^-		E	
6574.9 *6*	19^+		E	
6640.8[c] *3*	19^-		E	
6834.5[b] *4*	20^-	1.5 ns *3*	E	
7051.3 *7*	19^+		E	
7110.3 *8*	20^+		E	
7155.7 *5*	21^-		E	
7274.2 *8*	20^+		E	
7333.6 *9*			E	
7530.8 *7*	21^+		E	
7790.8 *7*	22^+		E	
8004.9 *7*	22^-		E	
8242.9 *9*	22^-		E	
8304.5 *8*	23^-		E	
8309.1 *9*	23^+		E	
8364.0 *7*	23^-		E	
8455.5 *7*	23^-		E	
8609.1 *10*	23		E	
8639.1 *8*	24^-		E	
8832.1 *8*	24		E	
8987.1 *9*	25^-		E	
9243.7 *10*	25^-		E	
9258.8 *9*			E	
9652.7 *11*	26^-		E	
9757.6 *10*	26		E	
9934.3 *13*			E	
9957.3 *12*	26^-		E	
10046.5 *9*	25^-		E	
10063.0 *12*	27		E	
10317.9 *9*	27^-		E	
10474.3 *12*	27		E	
10694.0 *11*	27^-		E	
10760.1 *14*	28		E	
10869.8 *14*	28		E	
11158.4 *11*	28		E	
11185.7 *12*	29		E	
11456.9 *12*	29		E	
11477.9 *12*	29^-		E	
11545.9 *11*	29^-		E	

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Adopted Levels, Gammas (continued)

^{148}Gd Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$[#]	XREF	Comments
11587.0 *12*	30		E	
11727.6 *13*	30		E	
12012.8 *16*			E	
12064.1 *13*	30		E	
12138.6 *11*	31^-		E	
12284.9 *12*	30		E	
12381.9 *13*	31		E	
12529.5 *12*	32		E	
12683.2 *13*	33		E	
13039.1 *13*	33		E	
13125.9 *15*	33^-		E	
13147.7 *13*	32		E	
13244.0 *15*			E	
13354.3? *16*			E	
13555.0 *14*	33		E	
13736.0 *13*	34		E	
13869.9 *14*	35	1.5 ns *3*	E	μ=+21 *6* (1989Ha15)
13888.3 *16*	33		E	
13911.5 *17*			E	
14011.3 *17*	34		E	
14145.8 *16*	35		E	
14206.6 *17*	36		E	
14924.4 *17*	36		E	
15165.7? *19*	38		E	
15727.8 *19*	37		E	
16077.6 *22*			E	
16112.1 *19*	38		E	
16204.2? *22*	40	<0.17 ps	E	
16257.4? *22*	40		E	
16406.8 *22*	40		E	
16473.7 *22*	39		E	
17241.0? *24*	40		E	
17320.2? *24*			E	
17370.8 *24*	42		E	
18482 *3*	44	<0.17 ps	E	
19149?	(46)		E	
x[d]	J≈(29)		F	Additional information 2. Jπ: ≈(29) from 699.9γ as a possible J=31 to J=29 transition based on the assignment (1993Ha19) of 652.3γ as a J=29 to J=27 transition. A tentative 652.3γ was reported by 1993Ha19 but is removed by 1995DeZZ. Theoretical analysis by 1993Ra07 suggests J=27, 29; J=25, 27 was proposed (1993Ra07) with the 652.3γ as the lowest energy transition.
699.90+x[d] *10*	J+2		F	
1447.80+x[d] *15*	J+4		F	
2243.61+x[d] *18*	J+6		F	
3090.31+x[d] *20*	J+8		F	
3988.21+x[d] *23*	J+10		F	
4938.51+x[d] *25*	J+12		F	
5942.4+x[d] *3*	J+14		F	
7001.1+x[d] *3*	J+16		F	
8115.3+x[d] *3*	J+18		F	
9285.9+x[d] *4*	J+20		F	
10513.7+x[d] *4*	J+22		F	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{148}Gd Levels (continued)

E(level)[†]	J^π[‡]	XREF	Comments
11799.3+x[d] 4	J+24	F	
13143.4+x[d] 4	J+26	F	
14545.9+x[d] 5	J+28	F	
16007.3+x[d] 5	J+30	F	
17527.8+x[d] 6	J+32	F	
19108.3+x[d] 9	J+34	F	
20748.3+x[d] 13	J+36	F	
22448.6+x[d] 15	J+38	F	
y[e]	J1≈(30)	F	Additional information 3. J^π: ≈(30) from assignment of 789γ as J=34 to 32 transition. Negative parity is suggested by 1993Ha19. 1993Ra07 suggest J=30, 32 (assuming 789γ as the lowest transition).
741.8+y[e] 3	J1+2	F	
1530.7+y[e] 4	J1+4	F	
2369.5+y[e] 5	J1+6	F	
3258.6+y[e] 5	J1+8	F	
4198.4+y[e] 5	J1+10	F	
5188.8+y[e] 6	J1+12	F	
6228.5+y[e] 7	J1+14	F	
7316.3+y[e] 7	J1+16	F	
8451.5+y[e] 7	J1+18	F	
9634.2+y[e] 7	J1+20	F	
10865.4+y[e] 8	J1+22	F	
12146.3+y[e] 8	J1+24	F	
13478.6+y[e] 8	J1+26	F	
14861.9+y[e] 9	J1+28	F	
16299.4+y[e] 10	J1+30	F	
17790.5+y[e] 13	J1+32	F	
19336.7+y[e] 17	J1+34	F	
z[f]	J2	F	Additional information 4.
830.3+z[f] 6	J2+2	F	
1706.0+z[f] 7	J2+4	F	
2631.0+z[f] 7	J2+6	F	
3606.7+z[f] 8	J2+8	F	
4634.2+z[f] 8	J2+10	F	
5713.8+z[f] 9	J2+12	F	
6846.5+z[f] 9	J2+14	F	
8032.4+z[f] 10	J2+16	F	
9271.7+z[f] 10	J2+18	F	
10564.6+z[f] 10	J2+20	F	
11909.1+z[f] 11	J2+22	F	
13304.4+z[f] 12	J2+24	F	
14739.6+z[f] 13	J2+26	F	
16182.2+z[f] 16	J2+28	F	E(level): the ordering of the 1447.7γ-1442.6γ cascade is adopted from 1996De04, based on relative Iγ's. A reverse ordering is proposed by 1995DeZZ.
17629.9+z[f] 17	J2+30	F	
19101.9+z[f] 20	J2+32	F	
u[g]	J3	F	Additional information 5.

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Adopted Levels, Gammas (continued)

^{148}Gd Levels (continued)

E(level)[†]	Jπ[‡]	XREF	Comments
849.7+u[g] 3	J3+2	F	
1739.7+u[g] 4	J3+4	F	
2678.4+u[g] 5	J3+6	F	
3666.8+u[g] 5	J3+8	F	
4706.4+u[g] 6	J3+10	F	
5797.5+u[g] 7	J3+12	F	
6941.7+u[g] 8	J3+14	F	
8139.7+u[g] 8	J3+16	F	
9392.5+u[g] 9	J3+18	F	
10700.6+u[g] 9	J3+20	F	
12065.0+u[g] 10	J3+22	F	
13486.4+u[g] 11	J3+24	F	
14964.9+u[g] 11	J3+26	F	
16501.8+u[g] 15	J3+28	F	
v[h]	J4	F	Additional information 6.
853.7+v[h] 3	J4+2	F	
1753.6+v[h] 4	J4+4	F	
2698.5+v[h] 5	J+6	F	
3689.9+v[h] 5	J4+8	F	
4727.8+v[h] 6	J4+10	F	
5812.4+v[h] 6	J4+12	F	
6944.3+v[h] 7	J4+14	F	
8123.8+v[h] 7	J4+16	F	
9350.3+v[h] 7	J4+18	F	
10624.1+v[h] 7	J4+20	F	
11946.2+v[h] 8	J4+22	F	
13315.9+v[h] 8	J4+24	F	
14733.0+v[h] 9	J4+26	F	
16197.9+v[h] 10	J4+28	F	
17711.0+v[h] 14	J4+30	F	
19273.0+v[h] 17	J4+32	F	
w[i]	J5	F	Additional information 7.
802.2+w[i] 3	J5+2	F	
1651.6+w[i] 4	J5+4	F	
2549.0+w[i] 4	J5+6	F	
3494.9+w[i] 5	J5+8	F	
4491.0+w[i] 5	J5+10	F	
5537.8+w[i] 5	J5+12	F	
6637.2+w[i] 6	J5+14	F	
7789.4+w[i] 6	J5+16	F	
8996.2+w[i] 6	J5+18	F	
10257.2+w[i] 7	J5+20	F	
11573.8+w[i] 7	J5+22	F	
12945.9+w[i] 7	J5+24	F	
14374.4+w[i] 7	J5+26	F	
15859.6+w[i] 8	J5+28	F	
17402.0+w[i] 9	J5+30	F	
r[j]	J6	F	Additional information 8.

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Adopted Levels, Gammas (continued)

^{148}Gd Levels (continued)

E(level)[†]	Jπ[‡]	XREF	Comments
911.8+r[j] *4*	J6+2	F	
1873.7+r[j] *5*	J6+4	F	
2892.1+r[j] *6*	J6+6	F	
3969.0+r[j] *7*	J6+8	F	
5101.0+r[j] *8*	J6+10	F	
6287.7+r[j] *9*	J6+12	F	
7527.4+r[j] *10*	J6+14	F	
8817.6+r[j] *10*	J6+16	F	
10152.6+r[j] *10*	J6+18	F	
11530.7+r[j] *11*	J6+20	F	
12956.2+r[j] *12*	J6+22	F	
14431.4+r[j] *13*	J6+24	F	
15960.3+r[j] *14*	J6+26	F	
s[k]	J7	F	Additional information 9.
887.0+s[k] *3*	J7+2	F	
1822.4+s[k] *5*	J7+4	F	
2812.3+s[k] *7*	J7+6	F	
3858.2+s[k] *7*	J7+8	F	
4961.4+s[k] *13*	J7+10	F	
6120.6+s[k] *13*	J7+12	F	
7332.7+s[k] *13*	J7+14	F	
8596.7+s[k] *14*	J7+16	F	
9908.0+s[k] *14*	J7+18	F	
11263.4+s[k] *15*	J7+20	F	
12664.9+s[k] *15*	J7+22	F	
14115.5+s[k] *16*	J7+24	F	
15618.5+s[k] *16*	J7+26	F	
t[l]	J8	F	Additional information 10.
868.4+t[l] *3*	J8+2	F	
1783.4+t[l] *5*	J8+4	F	
2745.6+t[l] *6*	J8+6	F	
3755.3+t[l] *6*	J8+8	F	
4811.6+t[l] *6*	J8+10	F	
5916.5+t[l] *7*	J8+12	F	
7069.9+t[l] *7*	J8+14	F	
8271.5+t[l] *8*	J8+16	F	
9521.3+t[l] *8*	J8+18	F	
10818.5+t[l] *8*	J8+20	F	
12157.8+t[l] *10*	J8+22	F	
13509.8+t[l] *13*	J8+24	F	

† From a least-squares fit to Eγ data with ΔEγ=1 keV for Eγ′s with No assigned uncertainty.

‡ Except where noted otherwise, J^{π} assignments are based on conversion electron and $\gamma(\theta)$ of oriented nuclei from ε decay (60 min), conversion electron data from ε decay (2.20 min), $\gamma\gamma(\theta)$, excitation function, conversion electron and $\gamma\gamma(\theta)$ data from (HI,xnγ). Band designations for normal deformed states are from (HI,xnγ) (1990Pi17).

\# From (HI,xnγ), unless indicated otherwise.

@ Band(A): ν^2 states.

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Adopted Levels, Gammas (continued)

^{148}Gd Levels (continued)

& Band(B): ν^2 x octupole states.
a Band(C): ν^2 x $\pi^{+1}\pi^{-1}$ states.
b Band(D): ν^2 x π^2 states.
c Band(E): $\nu^2\pi^2$ x octupole states.
d Band(F): SD-1 band (1995DeZZ,1993Ha19,1988De10). configuration=$\pi6^2$ $\nu(7^1$ 1/2[651],α=−1/2) (1998By02). Q(intrinsic)=14.6 *2* (1996Sa15). Percent population=1.6 *1* (1996De04), 1.30 *15* (1993Ha19), 0.72 *25* (1997Zh03) in ^{124}Sn(^{29}Si,5nγ) E=157 MeV (1996De04,1997Zh03), E=155 MeV (1993Ha19). Other values from 1992Fl02: 1.9 *5* in ^{76}Ge(^{76}Ge,4nγ); 0.8 *2* in ^{124}Sn(^{29}Si,5nγ) and 0.5 *2* in ^{122}Sn(^{30}Si,4nγ).
e Band(G): SD-2 band (1995DeZZ,1993Ha19,1996De04). configuration=$\pi6^2$ $\nu(7^1$ 1/2[651],α=+1/2) (1998By02). Promotion of neutron from 1/2[651],α=−1/2 to 1/2[651],α=+1/2. Q(intrinsic)=14.8 *3* (1996Sa15). Percent population=0.7 *2* (1996De04), 0.62 *20* (1993Ha19).
f Band(H): SD-3 band (1995DeZZ,1996De04). This band reveals a backbend at a rotational frequency of≈0.72 MeV. configuration=$\pi6^2$ ν((1/2[651],α=−1/2)(1/2[651],α=+1/2)) (1998By02). Promotion of neutron from 1/2[770],α=−1/2 to 1/2[651],α=+1/2. Q(intrinsic)=17.8 *13* (1996Sa15). Percent population=0.4 *2* (1996De04), 18% 3 of SD-1 (1995DeZZ).
g Band(I): SD-4 band (1995DeZZ,1996De04). configuration=$\pi6^2$ $\nu(7^1$(1/2[651],α=−1/2)(1/2[651],α=+1/2)) (1998By02). Promotion of neutron from 5/2[642],α=+1/2 to 1/2[651],α=+1/2. Percent population=0.5 *2* (1996De04), 12% 4 of SD-1 band (1995DeZZ).
h Band(J): SD-5 band (1995DeZZ,1996De04). configuration=$\pi(6^4$ 1/2[301]$^{-2}$) $\nu(7^2$(1/2[651],α=−1/2) (1/2[651],α=+1/2)) (1998By02). This involves promotion of two neutrons from 1/2[411] to 7^1 and 1/2[651],α=+1/2 orbitals. Or configuration=$\pi(6^2$(1/2[301],α=−1/2)$^{-1}$(3/2[651],α=+1/2)) $\nu(7^1$ 1/2[651],α=−1/2) (1998By02). This band is identical (in transition energies) to ^{152}Dy SD-1 band. Percent population=0.5 *1* (1996De04), 23% 4 of SD-1 band (1995DeZZ).
i Band(K): SD-6 band (1995DeZZ,1996De04,1997Ha19). configuration=$\pi6^2$ $\nu(7^1$(1/2[651],α=−1/2)(1/2[651],α=+1/2)) (1998By02). Promotion of neutron from 1/2[411],α=+1/2 to 1/2[651],α=+1/2. 1997Ha19 provide evidence for ΔJ=2 staggering of 0.37 keV *12*, and propose that this band is identical to ^{149}Gd SD-1, yrast band. Percent population=0.4 *1* (1996De04), 16% 3 of SD-1 band (1995DeZZ).
j Band(L): SD-7 band (1998By02). configuration=$\pi6^2$ $\nu(7^1$(5/2[402] or 9/2[514])) (1998By02). Promotion of neutron from 1/2[651],α=−1/2 to 5/2[402] or 9/2[514]. Bands SD-7 and SD-8 are probably signature partners. Percent population=5-10% of SD-1 band (1998By02).
k Band(M): SD-8 band (1998By02). configuration=$\pi6^2$ $\nu(7^1$(5/2[402] or 9/2[514])) (1998By02). Promotion of neutron from 1/2[651],α=−1/2 to 5/2[402] or 9/2[514]. Bands SD-7 and SD-8 are probably signature partners. Percent population=5-10% of SD-1 band (1998By02).
l Band(N): SD-9 band (1998By02). Percent population=5-10% of SD-1 band (1998By02).

Adopted Levels, Gammas (continued)

γ(^{148}Gd)

E_i(level)	J^π_i	E_γ[†]	I_γ[#]	E_f	J^π_f	Mult.[‡]	δ	α[d]	Comments
784.433	2^+	784.430 *16*	100	0.0	0^+	E2		0.00466	B(E2)(W.u.)=10 *3* α(K)=0.00390 *6*; α(L)=0.000597 *9*; α(M)=0.0001305 *19* α(N)=2.99×10^{-5} *5*; α(O)=4.53×10^{-6} *7*; α(P)=2.69×10^{-7} *4*
1273.492	3^-	489.049 *12*	100[@] *2*	784.433	2^+	E1+M2	+0.18 *9*	0.008 *3*	B(E1)(W.u.)=5.7×10^{-5} *4*; B(M2)(W.u.)=4.E+1 *4* α(K)=0.0063 *25*; α(L)=0.0009 *4*; α(M)=0.00020 *9* α(N)=4.6×10^{-5} *21*; α(O)=7.E−6 *4*; α(P)=4.5×10^{-7} *21*
		1273.5	0.87[@] *7*	0.0	0^+	[E3]		0.00338	B(E3)(W.u.)=42 *5* α(K)=0.00281 *4*; α(L)=0.000440 *7*; α(M)=9.64×10^{-5} *14* α(N)=2.21×10^{-5} *3*; α(O)=3.37×10^{-6} *5*; α(P)=2.04×10^{-7} *3*; α(IPF)=4.74×10^{-6} *7* E_γ: from (HI,xnγ).
1416.378	4^+	142.878 *14*	2.90 *13*	1273.492	3^-	E1		0.1116	B(E1)(W.u.)=0.00029 *9* α(K)=0.0941 *14*; α(L)=0.01368 *20*; α(M)=0.00296 *5* α(N)=0.000672 *10*; α(O)=9.98×10^{-5} *14*; α(P)=5.53×10^{-6} *8*
		631.947 *17*	100 *2*	784.433	2^+	E2		0.00772	B(E2)(W.u.)=14 *5* α(K)=0.00638 *9*; α(L)=0.001044 *15*; α(M)=0.000230 *4* α(N)=5.25×10^{-5} *8*; α(O)=7.88×10^{-6} *11*; α(P)=4.36×10^{-7} *6*
1810.98	6^+	394.55 *8*	100	1416.378	4^+	E2		0.0267	B(E2)(W.u.)=7.0 *8* α(K)=0.0212 *3*; α(L)=0.00428 *6*; α(M)=0.000959 *14* α(N)=0.000218 *3*; α(O)=3.16×10^{-5} *5*; α(P)=1.386×10^{-6} *20*
1834.59	$2^+,3^+$	1050.15 *4*	100	784.433	2^+	E2+M3		0.00266 *18*	α(K)=0.00225 *15*; α(L)=0.000325 *24*; α(M)=7.1×10^{-5} *6* α(N)=1.62×10^{-5} *12*; α(O)=2.49×10^{-6} *19*; α(P)=1.58×10^{-7} *13* δ: +3 *+4−1* or −0.12 *19* if J^π=2^+; or +0.31 *12* if J^π=3^+ from $\gamma(\theta)$ of oriented nuclei in ε decay (60 min). Additional information 11.
1863.445	2^+	589.9 *7*	5.2 *3*	1273.492	3^-				
		1079.025 *25*	100.0 *22*	784.433	2^+	M1+E2	+4.6 *+35−14*	0.00242 *8*	α(K)=0.00205 *7*; α(L)=0.000291 *8*; α(M)=6.31×10^{-5} *17* α(N)=1.45×10^{-5} *4*; α(O)=2.23×10^{-6} *7*; α(P)=1.42×10^{-7} *5*
		1863.39 *4*	49.2 *10*	0.0	0^+				
1912.97	4^-	639.47 *7*	100	1273.492	3^-	M1		0.01362	α(K)=0.01159 *17*; α(L)=0.001595 *23*; α(M)=0.000345 *5* α(N)=7.94×10^{-5} *12*; α(O)=1.236×10^{-5} *18*; α(P)=8.44×10^{-7} *12*
2082.11	5^-	169.2 *1*	4.3	1912.97	4^-				
		271.1 *2*	8.8	1810.98	6^+	E1(+M2)	≤0.23	0.034 *14*	B(E1)(W.u.)>0.00016 α(K)=0.029 *11*; α(L)=0.0045 *21*; α(M)=0.0010 *5* α(N)=0.00022 *11*; α(O)=3.4×10^{-5} *16*; α(P)=2.1×10^{-6} *10*
		666.0 *4*	7.2	1416.378	4^+	E1(+M2)	≤0.34	0.0042 *17*	B(E1)(W.u.)>8.4×10^{-6}

$^{148}_{64}$Gd$_{84}$-9

Adopted Levels, Gammas (continued)

$\gamma(^{148}Gd)$ (continued)

E_i(level)	J^π_i	E_γ†	I_γ#	E_f	J^π_f	Mult.‡	δ	α[d]	Comments
									α(K)=0.0036 *14*; α(L)=0.00051 *22*; α(M)=0.00011 *5* α(N)=2.5×10^{-5} *11*; α(O)=3.9×10^{-6} *17*; α(P)=2.6×10^{-7} *12*
2082.11	5^-	808.7 *1*	100	1273.492	3^-	E2		0.00435	B(E2)(W.u.)=11 *6* α(K)=0.00365 *6*; α(L)=0.000554 *8*; α(M)=0.0001210 *17* α(N)=2.77×10^{-5} *4*; α(O)=4.21×10^{-6} *6*; α(P)=2.51×10^{-7} *4*
2188.67	2^+	915.30 *12*	14.2 *16*	1273.492	3^-				
		1404.22 *4*	100.0 *24*	784.433	2^+	M1+E2		0.0018 *4*	α(K)=0.0015 *3*; α(L)=0.00020 *4*; α(M)=4.3×10^{-5} *8* α(N)=9.9×10^{-6} *18*; α(O)=1.5×10^{-6} *3*; α(P)=1.04×10^{-7} *22*; α(IPF)=4.7×10^{-5} *3* δ: +2.0 *+10−7* or +0.04 *+19−14* from $\gamma(\theta)$ of oriented nuclei in ε decay (60 min).
		2188.65 *7*	80 *3*	0.0	0^+				
2233.60	3^-	960.09 *7*	100 *9*	1273.492	3^-	M1+E2		0.0040 *11*	α(K)=0.0034 *9*; α(L)=0.00048 *11*; α(M)=0.000103 *23* α(N)=2.4×10^{-5} *6*; α(O)=3.7×10^{-6} *9*; α(P)=2.4×10^{-7} *7* δ: +0.02 *+21−14* or +1.3 *+4−5* from $\gamma(\theta)$ of oriented nuclei in ε decay (60 min).
		1449.16 *4*	84 *3*	784.433	2^+	E1(+M2)	+0.09 *10*	0.00078 *10*	α(K)=0.00053 *9*; α(L)=6.8×10^{-5} *13*; α(M)=1.5×10^{-5} *3* α(N)=3.4×10^{-6} *7*; α(O)=5.2×10^{-7} *10*; α(P)=3.6×10^{-8} *7*; α(IPF)=0.000167 *5* δ: from $\gamma(\theta)$ of oriented nuclei in ε decay (60 min).
2310.97	2^+	1526.45 *7*	55.0 *22*	784.433	2^+	M1+E2		0.0015 *3*	α(K)=0.00123 *22*; α(L)=0.00017 *3*; α(M)=3.6×10^{-5} *6* α(N)=8.2×10^{-6} *14*; α(O)=1.28×10^{-6} *23*; α(P)=8.7×10^{-8} *17*; α(IPF)=8.9×10^{-5} *6* δ: +2.4 *+22−10* or −0.0 *2* from $\gamma(\theta)$ of oriented nuclei in ε decay (60 min).
		2311.03 *7*	100 *3*	0.0	0^+				
2424.10	$3^+,4^+$	1007.72 *9*	100 *9*	1416.378	4^+	M1+E2		0.0036 *9*	α(K)=0.0031 *8*; α(L)=0.00042 *10*; α(M)=9.2×10^{-5} *21* α(N)=2.1×10^{-5} *5*; α(O)=3.3×10^{-6} *8*; α(P)=2.2×10^{-7} *6* δ: −1.2 *8* if $J^\pi=3^+$; +0.6 *8* if $J^\pi=4^+$ from $\gamma(\theta)$ of oriented nuclei in ε decay (60 min).
		1639.66 *22*	65 *9*	784.433	2^+				
2503.70	$(1,2,3)^-$	1230.18 *5*	56.6 *23*	1273.492	3^-	E2,M1		0.0023 *5*	α(K)=0.0020 *5*; α(L)=0.00027 *6*; α(M)=5.8×10^{-5} *12* α(N)=1.3×10^{-5} *3*; α(O)=2.1×10^{-6} *5*; α(P)=1.4×10^{-7} *4*; α(IPF)=9.6×10^{-6} *6* Mult.: from internal conversion and $\gamma(\theta)$ data in ε decay (60 min).
		1719.63 *20*	100 *6*	784.433	2^+				
2505.80	3^-	1089.41 *3*	100.0 *22*	1416.378	4^+	E1		9.69×10^{-4}	α(K)=0.000832 *12*; α(L)=0.0001082 *16*; α(M)=2.32×10^{-5} *4*

$^{148}_{64}Gd_{84}$-10

$\gamma(^{148}Gd)$ (continued)

E_i(level)	J^{π}_i	E_{γ}†	I_{γ}#	E_f	J^{π}_f	Mult.‡	δ	α[d]	Comments
									α(N)=5.33×10^{-6} *8*; α(O)=8.27×10^{-7} *12*; α(P)=5.60×10^{-8} *8* Mult.: from internal conversion and $\gamma(\theta)$ data in ε decay (60 min).
2505.80	3$^-$	1722.5 *3*	15 *4*	784.433	2$^+$				
2522.04	4$^+$	1105.65 *11*	100 *5*	1416.378	4$^+$	M1+E2		0.0029 *7*	α(K)=0.0025 *6*; α(L)=0.00034 *8*; α(M)=7.4×10^{-5} *16* α(N)=1.7×10^{-5} *4*; α(O)=2.6×10^{-6} *6*; α(P)=1.8×10^{-7} *5*; α(IPF)=3.89×10^{-7} *22* δ: −0.18 *20* or +1.5 *+10−6* from $\gamma(\theta)$ of oriented nuclei in ε decay (60 min).
		1248.2 *8*	33 *8*	1273.492	3$^-$				
		1737.9 *6*	27 *5*	784.433	2$^+$				
2563.81	7$^-$	481.65 *10*	100	2082.11	5$^-$	E2		0.01541	B(E2)(W.u.)=13.0 *19* α(K)=0.01249 *18*; α(L)=0.00228 *4*; α(M)=0.000506 *7* α(N)=0.0001152 *17*; α(O)=1.699×10^{-5} *24*; α(P)=8.34×10^{-7} *12*
		752.8 *2*	68	1810.98	6$^+$	E1		0.00197	B(E1)(W.u.)=1.07×10^{-5} *15* α(K)=0.001687 *24*; α(L)=0.000223 *4*; α(M)=4.80×10^{-5} *7* α(N)=1.100×10^{-5} *16*; α(O)=1.699×10^{-6} *24*; α(P)=1.127×10^{-7} *16* I_{γ}: from (HI,xnγ).
2566.82	6$^-$	484.8 *2*		2082.11	5$^-$	M1		0.0274	α(K)=0.0232 *4*; α(L)=0.00323 *5*; α(M)=0.000699 *10* α(N)=0.0001610 *23*; α(O)=2.51×10^{-5} *4*; α(P)=1.702×10^{-6} *24*
		653.6 *5*		1912.97	4$^-$	E2		0.00712	α(K)=0.00590 *9*; α(L)=0.000954 *14*; α(M)=0.000210 *3* α(N)=4.79×10^{-5} *7*; α(O)=7.20×10^{-6} *11*; α(P)=4.03×10^{-7} *6*
		755.6 *4*		1810.98	6$^+$				
2614.59	2$^+$	1342.2 *6*	9 *4*	1273.492	3$^-$				
		1830.14 *4*	100 *6*	784.433	2$^+$	M1+E2		0.00120 *16*	α(K)=0.00084 *12*; α(L)=0.000112 *16*; α(M)=2.4×10^{-5} *4* α(N)=5.5×10^{-6} *8*; α(O)=8.6×10^{-7} *13*; α(P)=5.9×10^{-8} *10*; α(IPF)=0.000223 *16* δ: +2.5 *+14−8* or −0.03 *5* from $\gamma(\theta)$ of oriented nuclei in ε decay (60 min).
		2614.3 *6*	38 *3*	0.0	0$^+$				
2632.65	5$^-$	820.3 *4*		1810.98	6$^+$	E1(+M2)	≤0.34	0.0026 *10*	α(K)=0.0022 *8*; α(L)=0.00030 *12*; α(M)=7.E−5 *3* α(N)=1.5×10^{-5} *6*; α(O)=2.3×10^{-6} *10*; α(P)=1.6×10^{-7} *6*
		1215.2 *4*		1416.378	4$^+$	E1(+M2)	≤0.37	0.0012 *4*	α(K)=0.0010 *3*; α(L)=0.00013 *5*; α(M)=2.9×10^{-5} *10* α(N)=6.6×10^{-6} *23*; α(O)=1.0×10^{-6} *4*; α(P)=7.0×10^{-8} *24*; α(IPF)=2.95×10^{-5} *19*
		1357.8 *4*		1273.492	3$^-$				
		1848.36 *8*		784.433	2$^+$				
2693.35	8$^+$	129.5 *2*	3.4	2563.81	7$^-$	E1		0.1454	B(E1)(W.u.)=0.00028 *6* α(K)=0.1225 *18*; α(L)=0.0180 *3*; α(M)=0.00389 *6* α(N)=0.000882 *13*; α(O)=0.0001305 *19*; α(P)=7.10×10^{-6} *11*
		882.41 *8*	100	1810.98	6$^+$	E2		0.00359	B(E2)(W.u.)=1.7 *4* α(K)=0.00302 *5*; α(L)=0.000449 *7*; α(M)=9.79×10^{-5} *14* α(N)=2.24×10^{-5} *4*; α(O)=3.42×10^{-6} *5*; α(P)=2.09×10^{-7} *3*

$\gamma(^{148}Gd)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[#]	E_f	J^π_f	Mult.[‡]	δ	α[d]	Comments
2694.67	9^-	130.8 *3*	100.0[@] *16*	2563.81	7^-	E2		0.956 *16*	B(E2)(W.u.)=7.31 *25* α(K)=0.550 *9*; α(L)=0.314 *6*; α(M)=0.0735 *13* α(N)=0.0164 *3*; α(O)=0.00219 *4*; α(P)=2.86×10^{-5} *5* I_γ: other: I(130.8γ)/I(883.6γ)=0.67 *8* from comparison of measured $T_{1/2}$ and presented B(E3)(W.u.)(883.6γ) (1984Lu09).
		883.6 *3*	66.0[@] *16*	1810.98	6^+	E3		0.00802	B(E3)(W.u.)=33.6 *12* α(K)=0.00650 *10*; α(L)=0.001186 *17*; α(M)=0.000264 *4* α(N)=6.04×10^{-5} *9*; α(O)=9.02×10^{-6} *13*; α(P)=4.76×10^{-7} *7* Additional information 12.
2700.06	$(1^-,2^+)$	1426.49 *8*	43 *3*	1273.492	3^-				
		1915.54 *19*	63 *4*	784.433	2^+	M1+E2	+0.8 *6*	0.00119 *10*	α(K)=0.00078 *8*; α(L)=0.000104 *10*; α(M)=2.25×10^{-5} *21* α(N)=5.2×10^{-6} *5*; α(O)=8.1×10^{-7} *8*; α(P)=5.6×10^{-8} *6*; α(IPF)=0.000269 *13* δ: from γ(θ) in ε decay (60 min).
		2700.57 *20*	100 *4*	0.0	0^+				
2782.60		971.7 *3*	68	1810.98	6^+				
		1366.4 *3*	100	1416.378	4^+				
2868.74	$(5)^+$	1057.7 *3*	100	1810.98	6^+	M1,E2		0.0032 *8*	α(K)=0.0027 *7*; α(L)=0.00038 *9*; α(M)=8.2×10^{-5} *18* α(N)=1.9×10^{-5} *4*; α(O)=2.9×10^{-6} *7*; α(P)=1.9×10^{-7} *6*
2872.89	$(2^-,3,4^+)$	960.09[e] *7*	100 *9*	1912.97	4^-				
		1599.39 *6*	100 *3*	1273.492	3^-				
		2089 *1*	41 *6*	784.433	2^+				
2886.31	$(2^+,3,4^+)$	382.0 *8*	24 *12*	2503.70	$(1,2,3)^-$				
		1470.1 *8*	20 *8*	1416.378	4^+				
		2101.87 *10*	100 *8*	784.433	2^+				
2915.50	3^-	1002.48 *9*	27.7 *17*	1912.97	4^-	M1,E2		0.0036 *9*	α(K)=0.0031 *8*; α(L)=0.00043 *10*; α(M)=9.3×10^{-5} *21* α(N)=2.1×10^{-5} *5*; α(O)=3.3×10^{-6} *8*; α(P)=2.2×10^{-7} *6*
		1641.98 *21*	37 *5*	1273.492	3^-				
		2131.14 *11*	100 *3*	784.433	2^+	E1+M2	−0.19 *7*	0.00101 *3*	α(K)=0.00031 *4*; α(L)=4.0×10^{-5} *5*; α(M)=8.6×10^{-6} *11* α(N)=1.97×10^{-6} *24*; α(O)=3.1×10^{-7} *4*; α(P)=2.1×10^{-8} *3*; α(IPF)=0.000650 *16*
2934.9	$(7)^+$	241.5 *5*	100	2693.35	8^+	M1		0.171	α(K)=0.1449 *22*; α(L)=0.0206 *4*; α(M)=0.00447 *7* α(N)=0.001028 *16*; α(O)=0.0001597 *25*; α(P)=1.073×10^{-5} *17*
2936.61	7^-	1125.6 *3*	100	1810.98	6^+	E1(+M2)	≤0.14	0.00099 *8*	B(E1)(W.u.)>1.4×10^{-5}; B(M2)(W.u.)<5.2 α(K)=0.00084 *7*; α(L)=0.000111 *9*; α(M)=2.38×10^{-5} *20* α(N)=5.5×10^{-6} *5*; α(O)=8.5×10^{-7} *7*; α(P)=5.7×10^{-8} *5*; α(IPF)=4.33×10^{-6} *9*

γ(^{148}Gd) (continued)

E_i(level)	J^π_i	E_γ [†]	I_γ [#]	E_f	J^π_f	Mult. [‡]	δ	α [d]	Comments
3029.59	8^-	334.9 *2*	63	2694.67	9^-	M1		0.0714	B(M1)(W.u.)=0.0042 *11* α(K)=0.0606 *9*; α(L)=0.00852 *12*; α(M)=0.00185 *3* α(N)=0.000425 *6*; α(O)=6.61×10^{-5} *10*; α(P)=4.46×10^{-6} *7*
		465.8 *2*	100	2563.81	7^-	M1		0.0303	B(M1)(W.u.)=0.0025 *7* α(K)=0.0257 *4*; α(L)=0.00358 *5*; α(M)=0.000776 *11* α(N)=0.000179 *3*; α(O)=2.78×10^{-5} *4*; α(P)=1.89×10^{-6} *3*
3045.7		1234.7 *3*	100	1810.98	6^+				
3065		1230 [e]	100	1834.59	$2^+,3^+$				
3076.12		1802.62 *24*	100	1273.492	3^-				
3089.70	$(1^-,2^+)$	1007.72 *9*	100 *9*	2082.11	5^-				
		1816.06 *9*	69 *4*	1273.492	3^-				
		3090.5 *15*	25 *8*	0.0	0^+				
3128.8		1317.8 *3*	100	1810.98	6^+				
3130.87	$(1,2^+)$	2345.1 *8*	63 *9*	784.433	2^+				
		3130.89 *16*	100 *7*	0.0	0^+				
3152.48	8^-	122.9 *1*	75	3029.59	8^-				
		457.9 *3*	100	2694.67	9^-				
		588.6 *3*	95	2563.81	7^-	M1		0.01675	α(K)=0.01424 *20*; α(L)=0.00197 *3*; α(M)=0.000425 *6* α(N)=9.79×10^{-5} *14*; α(O)=1.525×10^{-5} *22*; α(P)=1.039×10^{-6} *15*
3157.0		1346.0 *3*	100	1810.98	6^+				
3179.7	7^-	243.1 *5*	100	2936.61	7^-	M1		0.168	α(K)=0.1423 *22*; α(L)=0.0202 *3*; α(M)=0.00439 *7* α(N)=0.001010 *16*; α(O)=0.0001569 *24*; α(P)=1.054×10^{-5} *16*
3295.03	$(1,2^+)$	2510.56 *15*	100 *8*	784.433	2^+				
		3295.5 *10*	33 *11*	0.0	0^+				
3310.4	8^-	280.6 *5*		3029.59	8^-				
		373.8 *3*		2936.61	7^-	M1		0.0535	α(K)=0.0454 *7*; α(L)=0.00637 *9*; α(M)=0.001380 *20* α(N)=0.000318 *5*; α(O)=4.94×10^{-5} *7*; α(P)=3.34×10^{-6} *5*
3357.80		1546.9 *3*	100	1810.98	6^+				
3367.26	9^-	57		3310.4	8^-				E_γ,I_γ: measured by 2003Po02 which give I(γ+ce) branching=5.8%.
		214.8 *1*	48	3152.48	8^-	M1		0.235	B(M1)(W.u.)=0.0186 *21* α(K)=0.199 *3*; α(L)=0.0284 *4*; α(M)=0.00616 *9* α(N)=0.001419 *20*; α(O)=0.000220 *3*; α(P)=1.478×10^{-5} *21*
		337.7 *3*	57	3029.59	8^-	M1		0.0699	B(M1)(W.u.)=0.0057 *7* α(K)=0.0592 *9*; α(L)=0.00833 *12*; α(M)=0.00181 *3* α(N)=0.000416 *6*; α(O)=6.46×10^{-5} *10*; α(P)=4.37×10^{-6} *7*
		430.5 *4*	34	2936.61	7^-				
		673.9 *3*	100	2693.35	8^+	E1(+M2)	≤0.41	0.0047 *23*	B(E1)(W.u.)>1.0×10^{-5}; B(M2)(W.u.)<22 α(K)=0.0040 *19*; α(L)=0.0006 *3*; α(M)=0.00012 *7* α(N)=2.9×10^{-5} *15*; α(O)=4.4×10^{-6} *23*; α(P)=2.9×10^{-7} *15*
		803.4	46	2563.81	7^-				
3478.0	(8,9)	1667.0 *3*	100	1810.98	6^+				
3502.1		938.3 *3*	100	2563.81	7^-				
3574.94	$(1^-,2^+)$	2301.44 *21*	100 *10*	1273.492	3^-				

$^{148}_{64}Gd_{84}$-13

γ(^{148}Gd) (continued)

E_i(level)	J_i^π	E_γ†	I_γ#	E_f	J_f^π	Mult.‡	δ	α[d]	Comments
3574.94	(1^-,2^+)	3574.6 *10*	90 *13*	0.0	0^+				
3645.92	(8^+)	952.7 *3*	25	2693.35	8^+				
		1834.8 *3*	100	1810.98	6^+				
3666.6	10^-	971.9 *3*	100	2694.67	9^-	M1		0.00490	α(K)=0.00417 *6*; α(L)=0.000566 *8*; α(M)=0.0001223 *18* α(N)=2.82×10^{-5} *4*; α(O)=4.39×10^{-6} *7*; α(P)=3.02×10^{-7} *5*
3701.48	11^-	1006.8 *2*	100	2694.67	9^-	E2		0.00271	B(E2)(W.u.)>2.3 α(K)=0.00229 *4*; α(L)=0.000331 *5*; α(M)=7.20×10^{-5} *10* α(N)=1.650×10^{-5} *24*; α(O)=2.53×10^{-6} *4*; α(P)=1.587×10^{-7} *23*
3758.24	10^+	1063.6 *2*	100	2694.67	9^-	E1(+M2)	≤0.18	0.00115 *14*	B(E1)(W.u.)>2.2×10^{-5}; B(M2)(W.u.)<3.8 α(K)=0.00098 *12*; α(L)=0.000130 *17*; α(M)=2.8×10^{-5} *4* α(N)=6.4×10^{-6} *9*; α(O)=1.00×10^{-6} *14*; α(P)=6.7×10^{-8} *9*
3768.35		1957.2 *3*	100	1810.98	6^+				
3808.34	(8^+)	1113.7 *3*	39	2694.67	9^-				
		1115.0 *3*	50	2693.35	8^+				
		1997.3 *3*	100	1810.98	6^+				
3822.4	10^+	1127.5	100	2694.67	9^-				
		1129.1	29	2693.35	8^+				
3868.66		1174.0 *3*	100	2694.67	9^-				
		1175.4 *3*	28	2693.35	8^+				
3918.22	10^-	551.0 *2*	27	3367.26	9^-				
		765.7 *2*	100	3152.48	8^-	E2		0.00492	B(E2)(W.u.)=2.6 *5* α(K)=0.00411 *6*; α(L)=0.000634 *9*; α(M)=0.0001387 *20* α(N)=3.17×10^{-5} *5*; α(O)=4.81×10^{-6} *7*; α(P)=2.83×10^{-7} *4*
		888.6 *3*	73	3029.59	8^-				
3980.42	12^+	278.9 *2*	100.0@ *2*	3701.48	11^-	E1(+M2)	≤0.19	0.028 *9*	B(E1)(W.u.)>0.00016; B(M2)(W.u.)<3.9×10^2 α(K)=0.023 *7*; α(L)=0.0035 *13*; α(M)=0.0008 *3* α(N)=0.00018 *7*; α(O)=2.7×10^{-5} *10*; α(P)=1.7×10^{-6} *7*
		1285.6 *5*	2.7@ *2*	2694.67	9^-	E3		0.00331	B(E3)(W.u.)=69 *8* α(K)=0.00276 *4*; α(L)=0.000429 *6*; α(M)=9.41×10^{-5} *14* α(N)=2.16×10^{-5} *3*; α(O)=3.29×10^{-6} *5*; α(P)=2.00×10^{-7} *3*; α(IPF)=5.48×10^{-6} *9* Additional information 13.
3990.51	(8,9,10)$^+$	1208.2 *3*	87	2782.60					
		1295.5 *3*	17	2694.67	9^-				
		1297.2 *3*	100	2693.35	8^+				
4051.0	(2^+,3,4^+)	2634.6 *10*	39 *10*	1416.378	4^+				
		2777.5 *10*	≈20	1273.492	3^-				
		3266.4 *10*	100 *61*	784.433	2^+				
4068.22	(2)	2155.33 *25*	100 *16*	1912.97	4^-				
		2794.6 *10*	51 *11*	1273.492	3^-				
		4066.8 *10*	43 *11*	0.0	0^+				
4119.24	(8)$^+$	1089.7 *3*	13.0	3029.59	8^-				

$^{148}_{64}$Gd$_{84}$-14

γ(^{148}Gd) (continued)

E_i(level)	J^π_i	E_γ†	I_γ#	E_f	J^π_f	Mult.‡	αd	Comments
4119.24	(8)$^+$	1250.5 3	8.7	2868.74	(5)$^+$			
		1336.6 3	13.0	2782.60				
		1424.6 3	21.7	2694.67	9$^-$			
		1425.9 3	100	2693.35	8$^+$			
		1555.4 3	19.1	2563.81	7$^-$			
		2308.2 3	23.5	1810.98	6$^+$			
4121.47	11$^-$	420.6 5	5.4	3701.48	11$^-$			
		754.2 2	100	3367.26	9$^-$	E2	0.00509	B(E2)(W.u.)≈11 α(K)=0.00425 6; α(L)=0.000658 10; α(M)=0.0001441 21 α(N)=3.30×10^{-5} 5; α(O)=4.99×10^{-6} 7; α(P)=2.93×10^{-7} 4
4170.25	(8,9$^-$)	1475.6 3	100	2694.67	9$^-$			
		1476.9 3	80	2693.35	8$^+$			
		1606.4 3	33	2563.81	7$^-$			
4271.4		1578.0 3	100	2693.35	8$^+$			
4312.01	(8,9,10)$^+$	443.4 3	4.4	3868.66				
		954.3 3	22.2	3357.80				
		1282.3 3	23.3	3029.59	8$^-$			
		1618.7 3	100	2693.35	8$^+$			
		1748.1 3	50	2563.81	7$^-$			
4408.90	(8)$^+$	540.3 3	8.9	3868.66				
		640.4 3	23.2	3768.35				
		1540.1 3	7.1	2868.74	(5)$^+$			
		1714.3 3	28.6	2694.67	9$^-$			
		1715.7 3	100	2693.35	8$^+$			
		1845.0 3	37.5	2563.81	7$^-$			
4429.74	12$^-$	308.4 2	100	4121.47	11$^-$	M1	0.0888	B(M1)(W.u.)=0.029 22 α(K)=0.0753 11; α(L)=0.01062 15; α(M)=0.00230 4 α(N)=0.000530 8; α(O)=8.24×10^{-5} 12; α(P)=5.56×10^{-6} 8
		511.6	88	3918.22	10$^-$			
		727.9 5	20	3701.48	11$^-$			
4500.33	12$^+$	519.9 1	100	3980.42	12$^+$	E2	0.01260	B(E2)(W.u.)=40 22 α(K)=0.01028 15; α(L)=0.00181 3; α(M)=0.000401 6 α(N)=9.15×10^{-5} 13; α(O)=1.356×10^{-5} 19; α(P)=6.92×10^{-7} 10
		677.9 3	17	3822.4	10$^+$	E2	0.00653	B(E2)(W.u.)=1.8 10 α(K)=0.00542 8; α(L)=0.000866 13; α(M)=0.000190 3 α(N)=4.35×10^{-5} 7; α(O)=6.55×10^{-6} 10; α(P)=3.71×10^{-7} 6
		742.1 1	76	3758.24	10$^+$	E2	0.00529	B(E2)(W.u.)=5 3 α(K)=0.00441 7; α(L)=0.000686 10; α(M)=0.0001501 21 α(N)=3.43×10^{-5} 5; α(O)=5.20×10^{-6} 8; α(P)=3.03×10^{-7} 5
		798.9	9	3701.48	11$^-$			
4542.27		3125.4 3	47 6	1416.378	4$^+$			
		3269.2 3	100 8	1273.492	3$^-$			
4551.04	13$^-$	121.3 1	100	4429.74	12$^-$			

$^{148}_{64}$Gd$_{84}$-15

γ(^{148}Gd) (continued)

E_i(level)	J^π_i	E_γ†	I_γ#	E_f	J^π_f	Mult.‡	α[d]	Comments
4551.04	13^-	429.5 *3*	73	4121.47	11^-			
		571.0	30	3980.42	12^+			
4740.6	$13^{(-)}$	311.0 *4*	100	4429.74	12^-	D		
4906.0	14^-	355.0 *2*	100	4551.04	13^-			
5025.83	14^+	285.5 *5*	5	4740.6	$13^{(-)}$			
		475.3 *5*	13	4551.04	13^-	D		
		525.5 *1*	100	4500.33	12^+	E2	0.01225	B(E2)(W.u.)=10 *6* α(K)=0.01001 *14*; α(L)=0.001756 *25*; α(M)=0.000389 *6* α(N)=8.86×10^{-5} *13*; α(O)=1.315×10^{-5} *19*; α(P)=6.74×10^{-7} *10*
		1045.3 *3*	7	3980.42	12^+			
5117.51	15^-	211.5 *2*	78	4906.0	14^-	D		
		566.4 *2*	100	4551.04	13^-	E2	0.01012	B(E2)(W.u.)=7 *4* α(K)=0.00831 *12*; α(L)=0.001415 *20*; α(M)=0.000312 *5* α(N)=7.13×10^{-5} *10*; α(O)=1.063×10^{-5} *15*; α(P)=5.63×10^{-7} *8*
5167.8	14^+	1187.4 *3*	100	3980.42	12^+			
5355.57	16^+	238.0 *2*	13	5117.51	15^-	D		
		329.8 *2*	100	5025.83	14^+			
5438.6	16	321.1 *3*	100	5117.51	15^-			
		532.1	16	4906.0	14^-			
5578.6		410.8	100	5167.8	14^+			
5800.3		221.8	100	5578.6				
5832.7	18^+	477.1 *1*	100	5355.57	16^+	E2	0.01580	α(K)=0.01280 *18*; α(L)=0.00234 *4*; α(M)=0.000521 *8* α(N)=0.0001186 *17*; α(O)=1.748×10^{-5} *25*; α(P)=8.54×10^{-7} *12*
5882.8	17	444.3	100	5438.6	16			
5933.7	17	133.4	≈15	5800.3				
		495.1 *6*	100	5438.6	16	D		
		578.3	39	5355.57	16^+			
		816.0	36	5117.51	15^-			
6210.9	17	378.4	25	5832.7	18^+	D		
		855.3 *3*	100	5355.57	16^+			
6268.4	18	435.6	100	5832.7	18^+			
6381.4	18	447.7	100	5933.7	17			
		498.7	43	5882.8	17			
		548.8	36	5832.7	18^+			
6545.6	18^-	334.7 *3*	100	6210.9	17	D		
		612.1	9	5933.7	17			
6574.9	19^+	193.4	62	6381.4	18	D		
		306.3	27	6268.4	18			
		742.1	100	5832.7	18^+			
6640.8	19^-	808.1 *2*	100	5832.7	18^+	D		
6834.5	20^-	193.7 *2*	63	6640.8	19^-	D		
		259.4	13	6574.9	19^+	D		
		288.9 *2*	41	6545.6	18^-	E2	0.0677	B(E2)(W.u.)=0.96 *20*

$\gamma(^{148}Gd)$ (continued)

E_i(level)	J^π_i	E_γ†	I_γ#	E_f	J^π_f	Mult.‡	α[d]	Comments
								α(K)=0.0514 *8*; α(L)=0.01266 *18*; α(M)=0.00287 *4* α(N)=0.000649 *10*; α(O)=9.19×10^{-5} *13*; α(P)=3.19×10^{-6} *5*
6834.5	20$^-$	1001.9 *3*	100	5832.7	18$^+$			
7051.3	19$^+$	670.0	100	6381.4	18	D		
		1218.6	55	5832.7	18$^+$			
7110.3	20$^+$	1277.5	100	5832.7	18$^+$			
7155.7	21$^-$	321.1 *3*	100	6834.5	20$^-$	D		
		515.7	8	6640.8	19$^-$	E2	0.01287	α(K)=0.01049 *15*; α(L)=0.00186 *3*; α(M)=0.000411 *6* α(N)=9.37×10^{-5} *14*; α(O)=1.389×10^{-5} *20*; α(P)=7.05×10^{-7} *10*
7274.2	20$^+$	223.0	14	7051.3	19$^+$			
		699.3	100	6574.9	19$^+$			
7333.6		758.7	100	6574.9	19$^+$			
7530.8	21$^+$	197.2	28	7333.6				
		256.7	100	7274.2	20$^+$	D		
		420.4	7	7110.3	20$^+$			
		479.4	9	7051.3	19$^+$			
7790.8	22$^+$	260.0	100	7530.8	21$^+$	D		
		680.5	9	7110.3	20$^+$	E2	0.00647	α(K)=0.00537 *8*; α(L)=0.000857 *12*; α(M)=0.000188 *3* α(N)=4.30×10^{-5} *6*; α(O)=6.48×10^{-6} *9*; α(P)=3.68×10^{-7} *6*
8004.9	22$^-$	849.2	7	7155.7	21$^-$			
		1170.5	100	6834.5	20$^-$	E2	0.00200	α(K)=0.001690 *24*; α(L)=0.000238 *4*; α(M)=5.15×10^{-5} *8* α(N)=1.183×10^{-5} *17*; α(O)=1.82×10^{-6} *3*; α(P)=1.172×10^{-7} *17*; α(IPF)=2.88×10^{-6} *4*
8242.9	22$^-$	1408.4	100	6834.5	20$^-$			
8304.5	23$^-$	1148.8	100	7155.7	21$^-$			
8309.1	23$^+$	518.2	100	7790.8	22$^+$	D		
8364.0	23$^-$	573.5	5	7790.8	22$^+$			
		1208.2	100	7155.7	21$^-$	E2	0.00188	α(K)=0.001587 *23*; α(L)=0.000222 *4*; α(M)=4.81×10^{-5} *7* α(N)=1.105×10^{-5} *16*; α(O)=1.702×10^{-6} *24*; α(P)=1.101×10^{-7} *16*; α(IPF)=6.42×10^{-6} *9*
8455.5	23$^-$	151.1	21	8304.5	23$^-$			
		212.7	32	8242.9	22$^-$			
		450.6	73	8004.9	22$^-$			
		664.6	100	7790.8	22$^+$	D		
8609.1	23	818.2	100	7790.8	22$^+$			
8639.1	24$^-$	183.6	100	8455.5	23$^-$	D		
		330	31	8309.1	23$^+$			
		634.3	76	8004.9	22$^-$			
8832.1	24	222.9	45	8609.1	23			
		376.7	17	8455.5	23$^-$	D		
		468.2	12	8364.0	23$^-$			
		522.8	100	8309.1	23$^+$	D		
8987.1	25$^-$	155.0	65	8832.1	24			
		348.0	79	8639.1	24$^-$			

$\gamma(^{148}Gd)$ (continued)

E_i(level)	J_i^π	E_γ†	I_γ#	E_f	J_f^π	Mult.‡	αd	Comments
8987.1	25−	623.0	100	8364.0	23−	E2	0.00799	α(K)=0.00660 *10*; α(L)=0.001086 *16*; α(M)=0.000239 *4* α(N)=5.46×10^{-5} *8*; α(O)=8.18×10^{-6} *12*; α(P)=4.50×10^{-7} *7*
9243.7	25−	604.5	100	8639.1	24−			
9258.8		619.6	100	8639.1	24−			
		895	84	8364.0	23−			
9652.7	26−	665.7	100	8987.1	25−			
9757.6	26	513.9	54	9243.7	25−	D		
		770.7	100	8987.1	25−	D		
9934.3		1102.2	100	8832.1	24			
9957.3	26−	713.7	100	9243.7	25−			
10046.5	25−	787.9	24	9258.8				
		1682.4	100	8364.0	23−			
		1741.8	8	8304.5	23−			
10063.0	27	305.3	100	9757.6	26	D		
10317.9	27−	271.5	100	10046.5	25−	E2	0.0822	α(K)=0.0618 *9*; α(L)=0.01592 *23*; α(M)=0.00362 *5* α(N)=0.000818 *12*; α(O)=0.0001152 *17*; α(P)=3.79×10^{-6} *6*
		360.6	13	9957.3	26−	D		
		560.5	10	9757.6	26			
		665	12	9652.7	26−			
		1330.6	8	8987.1	25−			
10474.3	27	716.6	100	9757.6	26			
10694.0	27−	1041.5	100	9652.7	26−			
10760.1	28	697	100	10063.0	27			
10869.8	28	807	100	10063.0	27			
11158.4	28	464.5	12	10694.0	27−			
		684.1	19	10474.3	27			
		840.4	100	10317.9	27−	D		
11185.7	29	1122.6	100	10063.0	27	E2	0.00217	α(K)=0.00184 *3*; α(L)=0.000260 *4*; α(M)=5.65×10^{-5} *8* α(N)=1.295×10^{-5} *19*; α(O)=1.99×10^{-6} *3*; α(P)=1.273×10^{-7} *18*; α(IPF)=6.88×10^{-7} *10*
11456.9	29	271.1	22	11185.7	29			
		298.5	100	11158.4	28	D		
11477.9	29−	1160.0	100	10317.9	27−	E2	0.00203	α(K)=0.001720 *24*; α(L)=0.000243 *4*; α(M)=5.26×10^{-5} *8* α(N)=1.206×10^{-5} *17*; α(O)=1.86×10^{-6} *3*; α(P)=1.193×10^{-7} *17*; α(IPF)=2.19×10^{-6} *3*
11545.9	29−	851.9	76	10694.0	27−			
		1227.9	100	10317.9	27−	E2	0.00182	α(K)=0.001537 *22*; α(L)=0.000215 *3*; α(M)=4.65×10^{-5} *7* α(N)=1.068×10^{-5} *15*; α(O)=1.645×10^{-6} *23*; α(P)=1.066×10^{-7} *15*; α(IPF)=8.84×10^{-6} *13*
11587.0	30	130.1	100	11456.9	29			
11727.6	30	541.9	78	11185.7	29			
		858.0	74	10869.8	28			
		967.4	100	10760.1	28			
12012.8		555.9	100	11456.9	29			
12064.1	30	878.4	100	11185.7	29			
12138.6	31−	74.5		12064.1	30			

$^{148}_{64}Gd_{84}$-18

Adopted Levels, Gammas (continued)

$\gamma(^{148}\mathrm{Gd})$ (continued)

E_i(level)	J^{π}_i	E_{γ}†	I_{γ}#	E_f	J^{π}_f	Mult.‡	α^d	Comments
12138.6	31⁻	411.0	39	11727.6	30	D		
		551.8	14	11587.0	30			
		592.7	100	11545.9	29⁻	E2	0.00903	α(K)=0.00744 *11*; α(L)=0.001245 *18*; α(M)=0.000275 *4* α(N)=6.27×10^{-5} *9*; α(O)=9.37×10^{-6} *14*; α(P)=5.06×10^{-7} *7*
		660.7	48	11477.9	29⁻	E2	0.00694	α(K)=0.00575 *8*; α(L)=0.000927 *13*; α(M)=0.000204 *3* α(N)=4.65×10^{-5} *7*; α(O)=7.00×10^{-6} *10*; α(P)=3.93×10^{-7} *6*
12284.9	30	828.0	42	11456.9	29	D		
		1126.5	100	11158.4	28			
12381.9	31	925.0	100	11456.9	29			
12529.5	32	244.5	10	12284.9	30			
		390.9	100	12138.6	31⁻	D		
		942.6	19	11587.0	30			
12683.2	33	1096.0	100	11587.0	30			
13039.1	33	355.8	6	12683.2	33			
		509.7	100	12529.5	32	D		
		657.2	27	12381.9	31			
13125.9	33⁻	987.3	100	12138.6	31⁻			
13147.7	32	464.2	40	12683.2	33			
		765.8	100	12381.9	31			
		1009.3	60	12138.6	31⁻			
13244.0		561.0	100	12683.2	33			
13354.3?		824.8	100	12529.5	32			
13555.0	33	1025.6	100	12529.5	32			
13736.0	34	181.0	8	13555.0	33	D		
		492.1	5	13244.0				
		588.3	20	13147.7	32			
		696.7	100	13039.1	33	D		
13869.9	35	134.0	100	13736.0	34	D		
		1340.3	19	12529.5	32			
13888.3	33	849.2	100	13039.1	33			
13911.5		41.6	100	13869.9	35			
14011.3	34	972.2	100	13039.1	33			
14145.8	35	1106.7	100	13039.1	33	E2	0.00223	α(K)=0.00189 *3*; α(L)=0.000269 *4*; α(M)=5.83×10^{-5} *9* α(N)=1.336×10^{-5} *19*; α(O)=2.05×10^{-6} *3*; α(P)=1.310×10^{-7} *19*; α(IPF)=3.83×10^{-7} *6*
14206.6	36	295.1	14	13911.5				
		336.7	100	13869.9	35	D		
14924.4	36	778.6	100	14145.8	35			
		1036.1	27	13888.3	33			
15165.7?	38	959.1	100	14206.6	36	E2	0.00301	α(K)=0.00253 *4*; α(L)=0.000370 *6*; α(M)=8.05×10^{-5} *12* α(N)=1.84×10^{-5} *3*; α(O)=2.82×10^{-6} *4*; α(P)=1.753×10^{-7} *25*
15727.8	37	803.4	100	14924.4	36			
16077.6		349.8	100	15727.8	37			
16112.1	38	1187.7	100	14924.4	36			

Adopted Levels, Gammas (continued)

γ(^{148}Gd) (continued)

E$_i$(level)	J$^{\pi}_i$	E$_\gamma$[†]	I$_\gamma$[#]	E$_f$	J$^{\pi}_f$
16204.2?	40	1038.5	100	15165.7?	38
16257.4?	40	1091.7	100	15165.7?	38
16406.8	40	294.7	100	16112.1	38
16473.7	39	1308.0	100	15165.7?	38
17241.0?	40	834.2	100	16406.8	40
17320.2?		846.5	100	16473.7	39
17370.8	42	964.0	100	16406.8	40
18482	44	1110.9	100	17370.8	42
19149?	(46)	667[e]	100	18482	44
699.90+x	J+2	699.9 1	0.54[&] 15	x	J≈(29)
1447.80+x	J+4	747.9 1	0.87[&] 9	699.90+x	J+2
2243.61+x	J+6	795.8 1	0.99[&] 8	1447.80+x	J+4
3090.31+x	J+8	846.7 1	0.97[&] 8	2243.61+x	J+6
3988.21+x	J+10	897.9 1	1.00[&] 8	3090.31+x	J+8
4938.51+x	J+12	950.3 1	0.97[&] 8	3988.21+x	J+10
5942.4+x	J+14	1003.9 1	1.00[&] 10	4938.51+x	J+12
7001.1+x	J+16	1058.7 1	0.98[&] 9	5942.4+x	J+14
8115.3+x	J+18	1114.2 1	0.99[&] 10	7001.1+x	J+16
9285.9+x	J+20	1170.6 1	1.00[&] 15	8115.3+x	J+18
10513.7+x	J+22	1227.8 1	0.84[&] 7	9285.9+x	J+20
11799.3+x	J+24	1285.6 1	0.71[&] 8	10513.7+x	J+22
13143.4+x	J+26	1344.0 2	0.66[&] 7	11799.3+x	J+24
14545.9+x	J+28	1402.5 2	0.55[&] 6	13143.4+x	J+26
16007.3+x	J+30	1461.4 2	0.48[&] 7	14545.9+x	J+28
17527.8+x	J+32	1520.5 3	0.34[&] 5	16007.3+x	J+30
19108.3+x	J+34	1580.5 6	0.19[&] 3	17527.8+x	J+32
20748.3+x	J+36	1640.0 10	0.15[&] 5	19108.3+x	J+34
22448.6+x	J+38	1700.3 6	0.07[&] 3	20748.3+x	J+36
741.8+y	J1+2	741.8[a] 3		y	J1≈(30)
1530.7+y	J1+4	788.9 2	0.46[&] 10	741.8+y	J1+2
2369.5+y	J1+6	838.8 2	0.88[&] 9	1530.7+y	J1+4
3258.6+y	J1+8	889.1 2	0.89[&] 9	2369.5+y	J1+6
4198.4+y	J1+10	939.8 2	0.93[&] 15	3258.6+y	J1+8
5188.8+y	J1+12	990.4 3	1.00[&] 11	4198.4+y	J1+10
6228.5+y	J1+14	1039.7 2	0.95[&] 20	5188.8+y	J1+12
7316.3+y	J1+16	1087.8 2	1.03[&] 15	6228.5+y	J1+14
8451.5+y	J1+18	1135.2 2	0.94[&] 10	7316.3+y	J1+16
9634.2+y	J1+20	1182.7 2	0.82[&] 8	8451.5+y	J1+18
10865.4+y	J1+22	1231.2 2	0.79[&] 8	9634.2+y	J1+20
12146.3+y	J1+24	1280.9 2	0.77[&] 8	10865.4+y	J1+22
13478.6+y	J1+26	1332.2 2	0.62[&] 7	12146.3+y	J1+24
14861.9+y	J1+28	1383.3 3	0.56[&] 6	13478.6+y	J1+26
16299.4+y	J1+30	1437.5 5	0.44[&] 5	14861.9+y	J1+28
17790.5+y	J1+32	1491.1 8	0.27[&] 4	16299.4+y	J1+30
19336.7+y	J1+34	1546.2 10	0.23[&] 4	17790.5+y	J1+32
830.3+z	J2+2	830.3[b] 6	0.23[&b] 5	z	J2
1706.0+z	J2+4	875.7 3	0.42[&] 6	830.3+z	J2+2
2631.0+z	J2+6	925.0 2	0.43[&] 7	1706.0+z	J2+4
3606.7+z	J2+8	975.7 3	0.62[&] 7	2631.0+z	J2+6
4634.2+z	J2+10	1027.5 2	0.63[&] 8	3606.7+z	J2+8
5713.8+z	J2+12	1079.6 3	0.95[&] 11	4634.2+z	J2+10
6846.5+z	J2+14	1132.7 2	1.00[&] 12	5713.8+z	J2+12
8032.4+z	J2+16	1185.9 3	0.93[&] 30	6846.5+z	J2+14
9271.7+z	J2+18	1239.3 3	0.72[&] 15	8032.4+z	J2+16
10564.6+z	J2+20	1292.9 3	0.95[&] 20	9271.7+z	J2+18
11909.1+z	J2+22	1344.5 3	0.71[&] 18	10564.6+z	J2+20
13304.4+z	J2+24	1395.2 4	0.64[&] 15	11909.1+z	J2+22
14739.6+z	J2+26	1435.2 5	0.46[&] 8	13304.4+z	J2+24
16182.2+z	J2+28	1442.6 10	0.40[&] 12	14739.6+z	J2+26
17629.9+z	J2+30	1447.7 6	0.18[&] 9	16182.2+z	J2+28
19101.9+z	J2+32	1472.0 10	0.22[&] 8	17629.9+z	J2+30
849.7+u	J3+2	849.7[a] 3		u	J3
1739.7+u	J3+4	890.0 2	0.62[&] 15	849.7+u	J3+2
2678.4+u	J3+6	938.7 2	0.60[&] 12	1739.7+u	J3+4
3666.8+u	J3+8	988.4 3	0.64[&] 10	2678.4+u	J3+6
4706.4+u	J3+10	1039.6 3	0.68[&] 10	3666.8+u	J3+8
5797.5+u	J3+12	1091.1 3	0.92[&] 15	4706.4+u	J3+10
6941.7+u	J3+14	1144.2 3	1.05[&] 20	5797.5+u	J3+12
8139.7+u	J3+16	1198.0 3	1.00[&] 15	6941.7+u	J3+14
9392.5+u	J3+18	1252.8 3	1.02[&] 13	8139.7+u	J3+16
10700.6+u	J3+20	1308.1 3	0.88[&] 15	9392.5+u	J3+18
12065.0+u	J3+22	1364.4 3	0.90[&] 18	10700.6+u	J3+20
13486.4+u	J3+24	1421.3 4	0.82[&] 10	12065.0+u	J3+22
14964.9+u	J3+26	1478.5 4	0.57[&] 9	13486.4+u	J3+24

$^{148}_{64}$Gd$_{84}$-20

Adopted Levels, Gammas (continued)

γ(^{148}Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[#]	E_f	J^π_f
16501.8+u	J3+28	1536.9 *10*	0.30[&] *10*	14964.9+u	J3+26
853.7+v	J4+2	853.7 *3*	0.45[&] *6*	v	J4
1753.6+v	J4+4	899.9 *2*	0.83[&] *9*	853.7+v	J4+2
2698.5+v	J+6	944.9 *3*	0.85[&] *10*	1753.6+v	J4+4
3689.9+v	J4+8	991.4 *2*	0.86[&] *10*	2698.5+v	J+6
4727.8+v	J4+10	1037.9 *2*	0.85[&] *20*	3689.9+v	J4+8
5812.4+v	J4+12	1084.6 *2*	1.00[&] *15*	4727.8+v	J4+10
6944.3+v	J4+14	1131.9 *2*	1.00[&] *13*	5812.4+v	J4+12
8123.8+v	J4+16	1179.5 *2*	0.90[&] *10*	6944.3+v	J4+14
9350.3+v	J4+18	1226.5 *2*	0.80[&] *10*	8123.8+v	J4+16
10624.1+v	J4+20	1273.8 *2*	0.80[&] *10*	9350.3+v	J4+18
11946.2+v	J4+22	1322.1 *2*	0.52[&] *8*	10624.1+v	J4+20
13315.9+v	J4+24	1369.6 *2*	0.50[&] *10*	11946.2+v	J4+22
14733.0+v	J4+26	1417.1 *3*	0.44[&] *7*	13315.9+v	J4+24
16197.9+v	J4+28	1464.9 *4*	0.31[&] *5*	14733.0+v	J4+26
17711.0+v	J4+30	1513.1 *10*	0.26[&] *4*	16197.9+v	J4+28
19273.0+v	J4+32	1562[b] *1*	0.20[&b] *6*	17711.0+v	J4+30
802.2+w	J5+2	802.2[c] *3*		w	J5
1651.6+w	J5+4	849.44 *22*		802.2+w	J5+2
2549.0+w	J5+6	897.40 *16*	0.91[&] *12*	1651.6+w	J5+4
3494.9+w	J5+8	945.86 *15*	1.00[&] *12*	2549.0+w	J5+6
4491.0+w	J5+10	996.08 *19*	1.00[&] *22*	3494.9+w	J5+8
5537.8+w	J5+12	1046.83 *14*	1.00[&] *10*	4491.0+w	J5+10
6637.2+w	J5+14	1099.39 *16*	0.95[&] *18*	5537.8+w	J5+12
7789.4+w	J5+16	1152.20 *15*	0.97[&] *10*	6637.2+w	J5+14
8996.2+w	J5+18	1206.76 *24*	1.00[&] *15*	7789.4+w	J5+16
10257.2+w	J5+20	1261.00 *16*	1.00[&] *19*	8996.2+w	J5+18
11573.8+w	J5+22	1316.57 *14*	0.96[&] *10*	10257.2+w	J5+20
12945.9+w	J5+24	1372.10 *22*	0.78[&] *9*	11573.8+w	J5+22
14374.4+w	J5+26	1428.55 *24*	0.77[&] *10*	12945.9+w	J5+24
15859.6+w	J5+28	1485.15 *26*	0.70[&] *15*	14374.4+w	J5+26
17402.0+w	J5+30	1542.4 *4*	0.63[&] *15*	15859.6+w	J5+28
911.8+r	J6+2	911.8 *4*		r	J6
1873.7+r	J6+4	961.9 *3*		911.8+r	J6+2
2892.1+r	J6+6	1018.4 *3*		1873.7+r	J6+4

E_i(level)	J^π_i	E_γ[†]	E_f	J^π_f
3969.0+r	J6+8	1076.9 *3*	2892.1+r	J6+6
5101.0+r	J6+10	1132.0 *4*	3969.0+r	J6+8
6287.7+r	J6+12	1186.7 *3*	5101.0+r	J6+10
7527.4+r	J6+14	1239.7 *4*	6287.7+r	J6+12
8817.6+r	J6+16	1290.2 *3*	7527.4+r	J6+14
10152.6+r	J6+18	1335.0 *3*	8817.6+r	J6+16
11530.7+r	J6+20	1378.1 *4*	10152.6+r	J6+18
12956.2+r	J6+22	1425.4 *4*	11530.7+r	J6+20
14431.4+r	J6+24	1475.2 *4*	12956.2+r	J6+22
15960.3+r	J6+26	1528.9 *5*	14431.4+r	J6+24
887.0+s	J7+2	887.0 *3*	s	J7
1822.4+s	J7+4	935.4 *4*	887.0+s	J7+2
2812.3+s	J7+6	989.9 *4*	1822.4+s	J7+4
3858.2+s	J7+8	1045.9 *3*	2812.3+s	J7+6
4961.4+s	J7+10	1103.2 *10*	3858.2+s	J7+8
6120.6+s	J7+12	1159.2 *3*	4961.4+s	J7+10
7332.7+s	J7+14	1212.1 *3*	6120.6+s	J7+12
8596.7+s	J7+16	1264.0 *3*	7332.7+s	J7+14
9908.0+s	J7+18	1311.3 *3*	8596.7+s	J7+16
11263.4+s	J7+20	1355.4 *4*	9908.0+s	J7+18
12664.9+s	J7+22	1401.4 *4*	11263.4+s	J7+20
14115.5+s	J7+24	1450.6 *4*	12664.9+s	J7+22
15618.5+s	J7+26	1503.0 *5*	14115.5+s	J7+24
868.4+t	J8+2	868.4 *3*	t	J8
1783.4+t	J8+4	915.0 *3*	868.4+t	J8+2
2745.6+t	J8+6	962.2 *3*	1783.4+t	J8+4
3755.3+t	J8+8	1009.7 *2*	2745.6+t	J8+6
4811.6+t	J8+10	1056.3 *2*	3755.3+t	J8+8
5916.5+t	J8+12	1104.9 *2*	4811.6+t	J8+10
7069.9+t	J8+14	1153.4 *2*	5916.5+t	J8+12
8271.5+t	J8+16	1201.6 *3*	7069.9+t	J8+14
9521.3+t	J8+18	1249.8 *2*	8271.5+t	J8+16
10818.5+t	J8+20	1297.2 *3*	9521.3+t	J8+18
12157.8+t	J8+22	1339.3 *6*	10818.5+t	J8+20
13509.8+t	J8+24	1351.9 *7*	12157.8+t	J8+22

$\gamma(^{148}Gd)$ (continued)

[†] From ε decay, (HI,xnγ), and (HI,xnγ):SD.

[‡] Except where noted otherwise, mult assignments are based on conversion electron and $\gamma(\theta)$ of oriented nuclei from ε decay (60 min), conversion electron data from ε decay (2.20 min), $\gamma\gamma$ (θ), excitation function, conversion electron and $\gamma\gamma(\theta)$ data from (HI,xnγ).

[#] Relative photon branching from each level for gammas from normal deformed states as opposed to relative intensity within each SD band.

[@] Branching ratio from (HI,xnγ) (2000Po13).

[&] Relative intensity within each SD band, normalized to$\approx$1 for the most intense transition in that band.

[a] γ not reported by 1996De04.

[b] From 1996De04 only.

[c] From 1995DeZZ. γ not reported by 1996De04 and 1997Ha19.

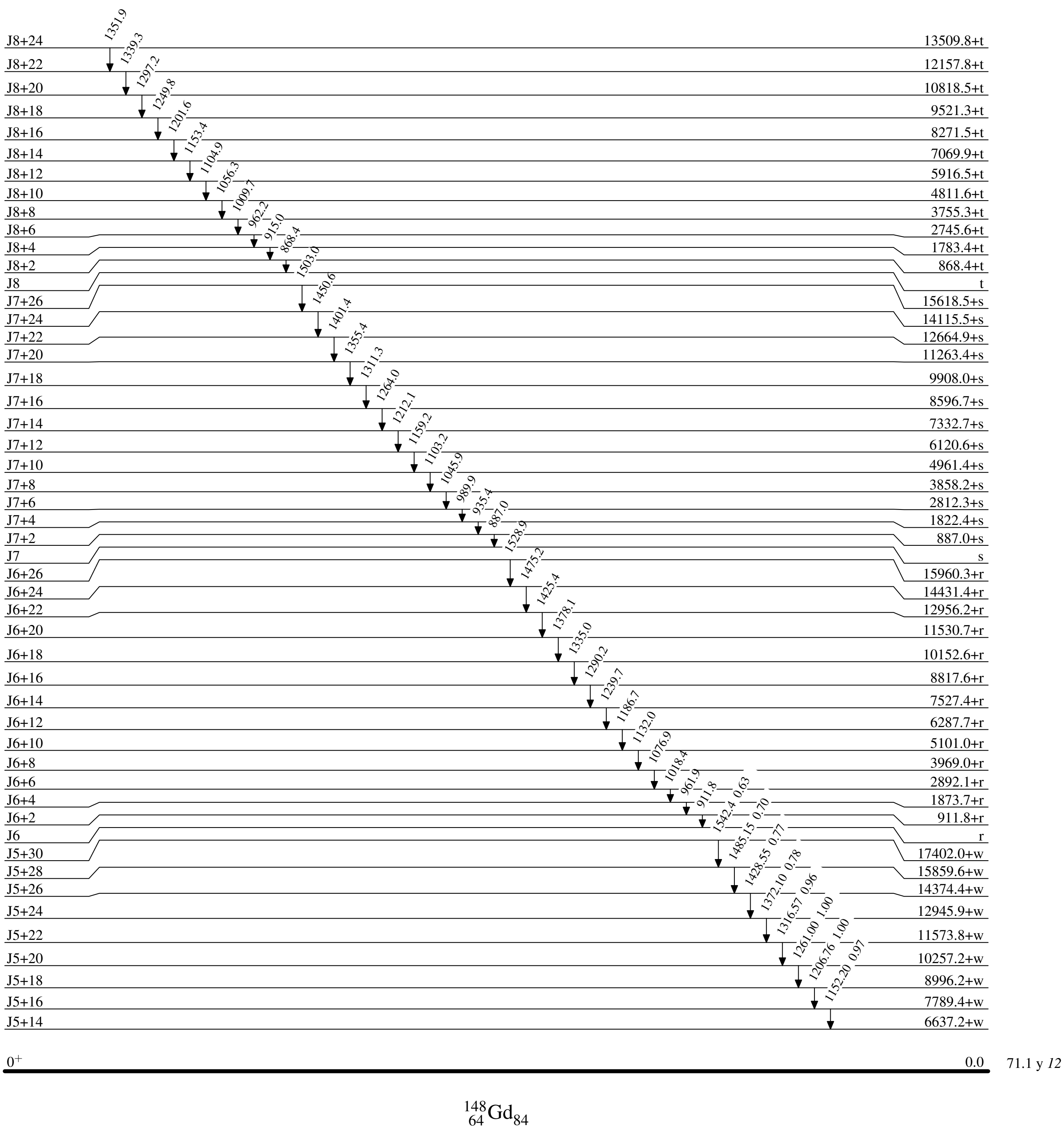
[d] Additional information 14.

[e] Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Level Scheme

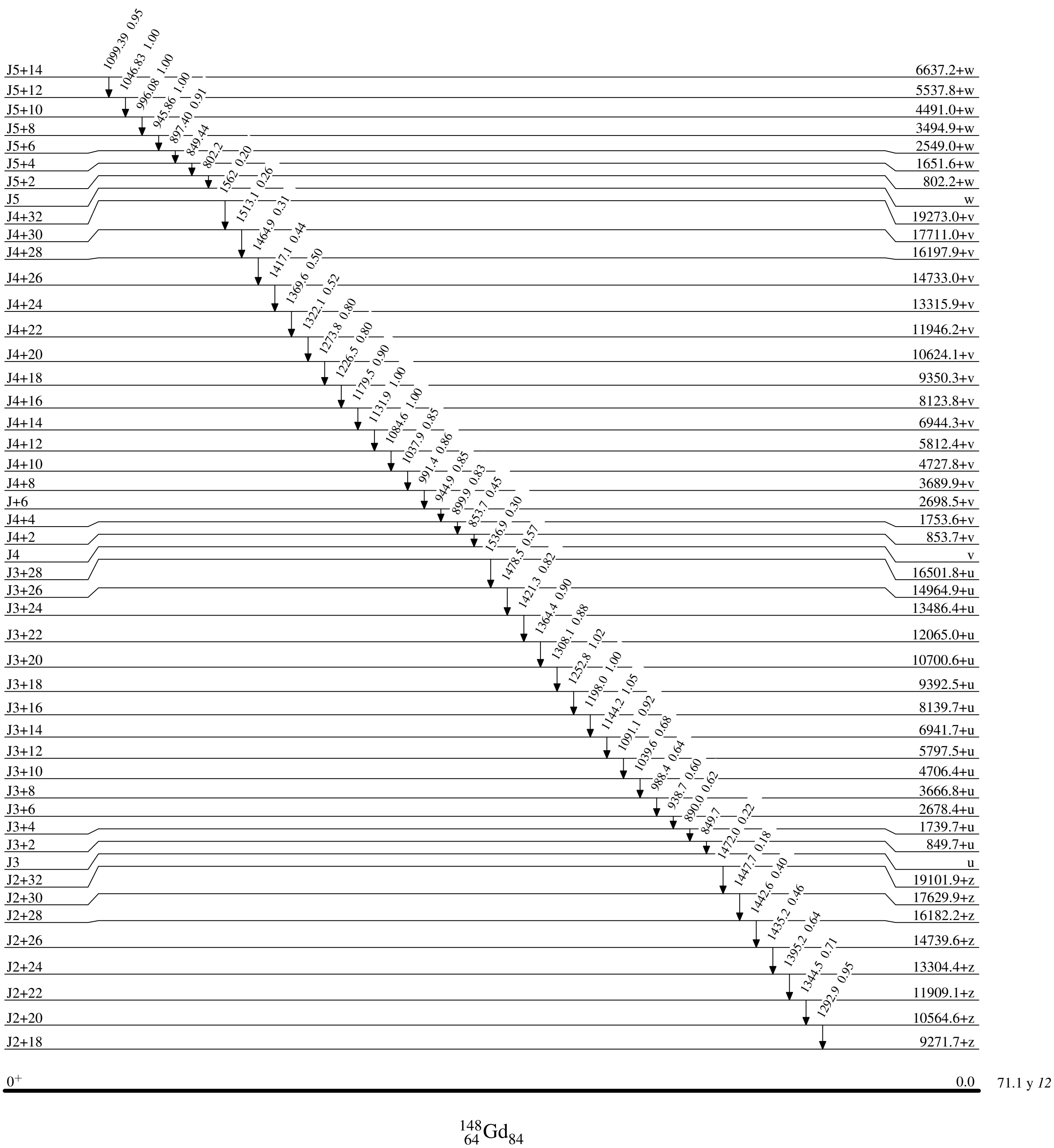
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

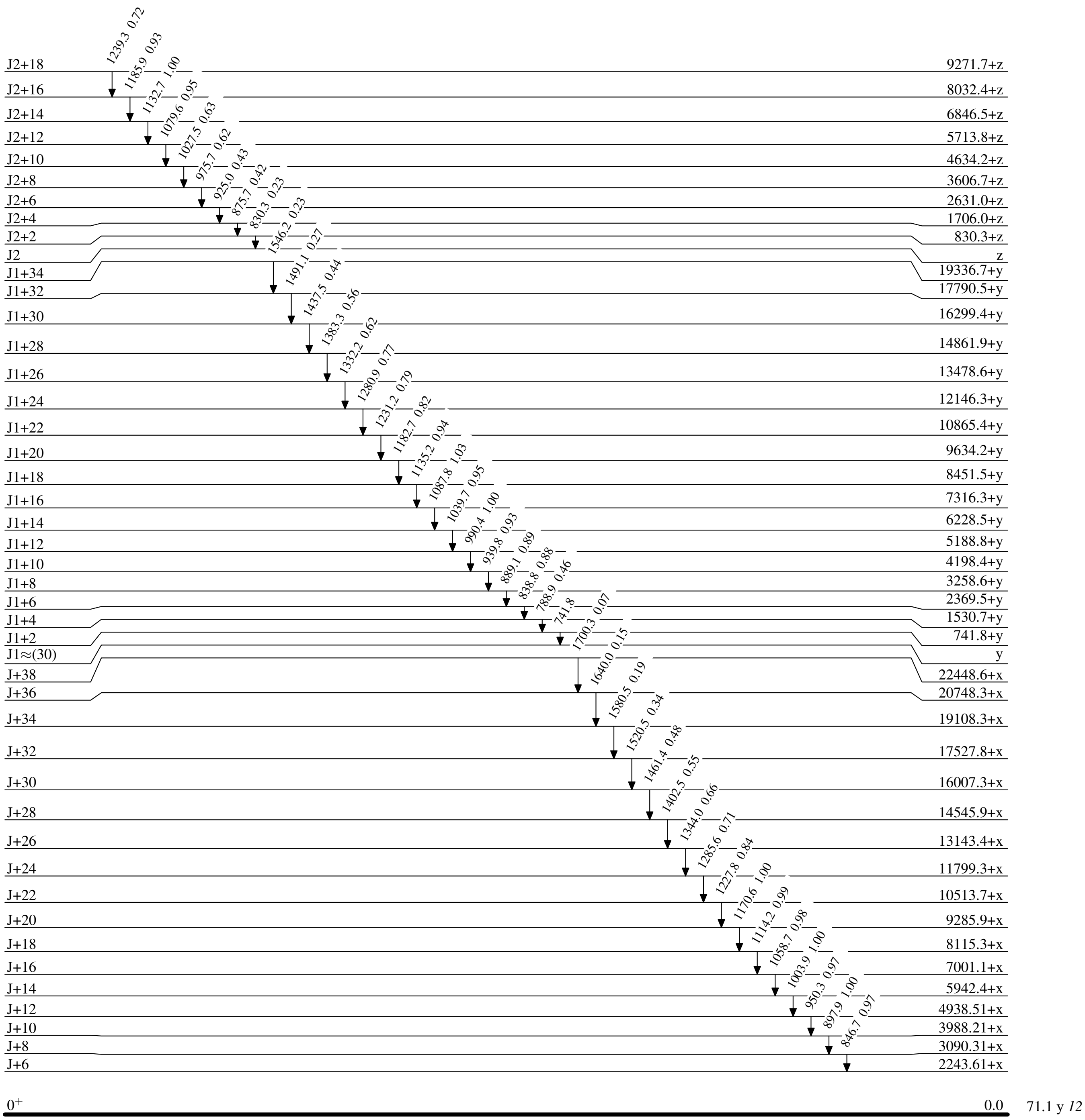
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

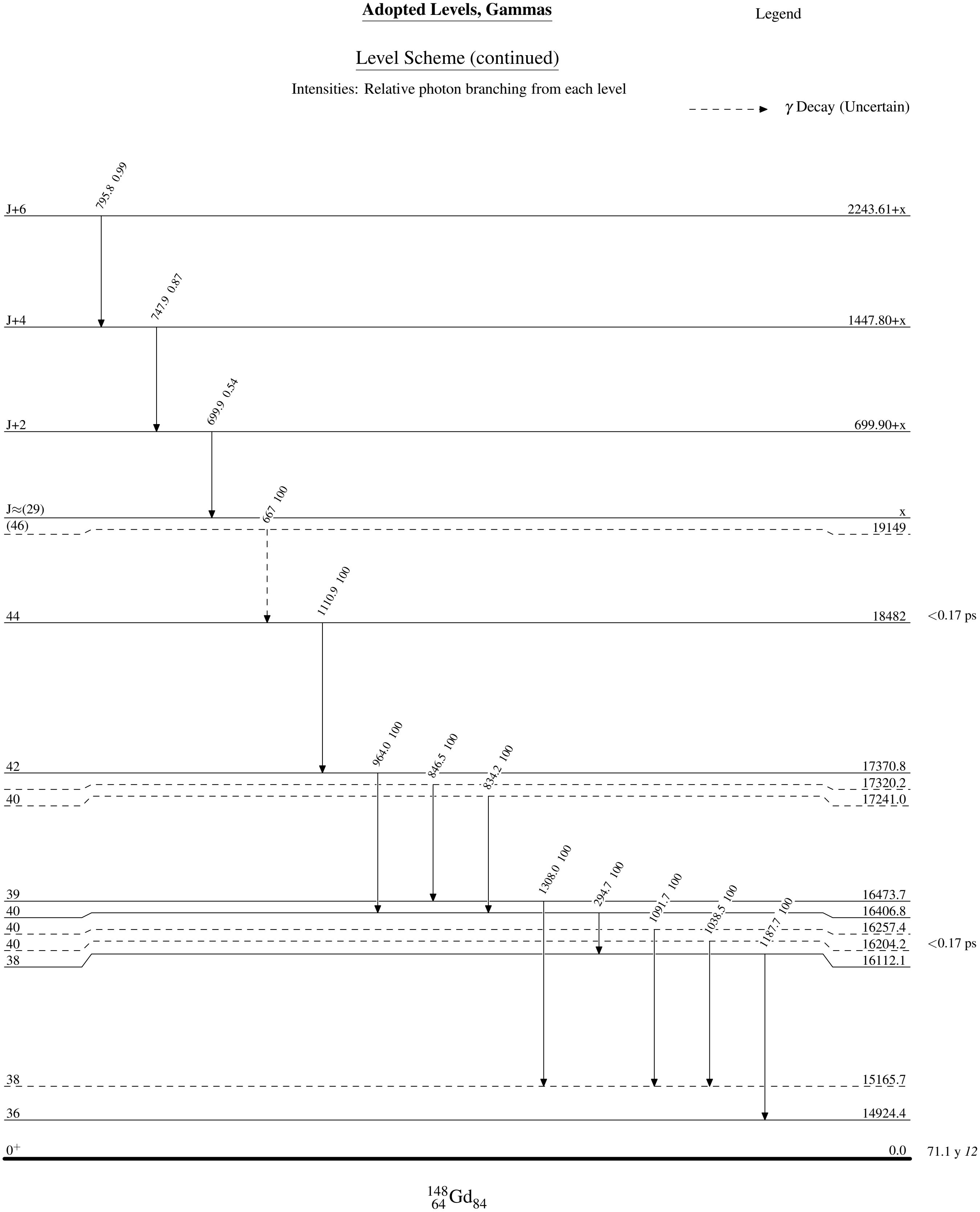


$^{148}_{64}Gd_{84}$

Adopted Levels, Gammas

Level Scheme (continued)

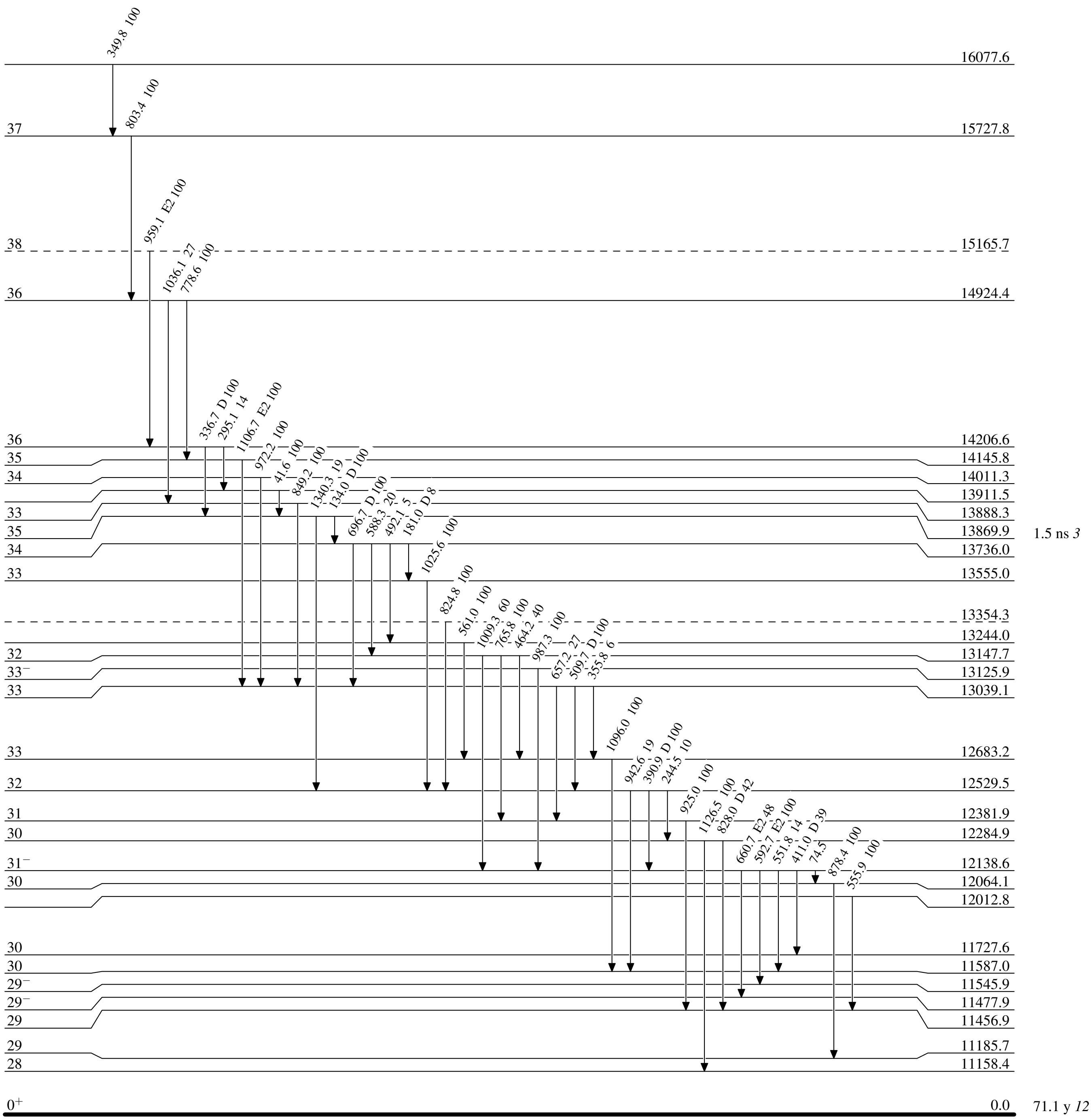
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

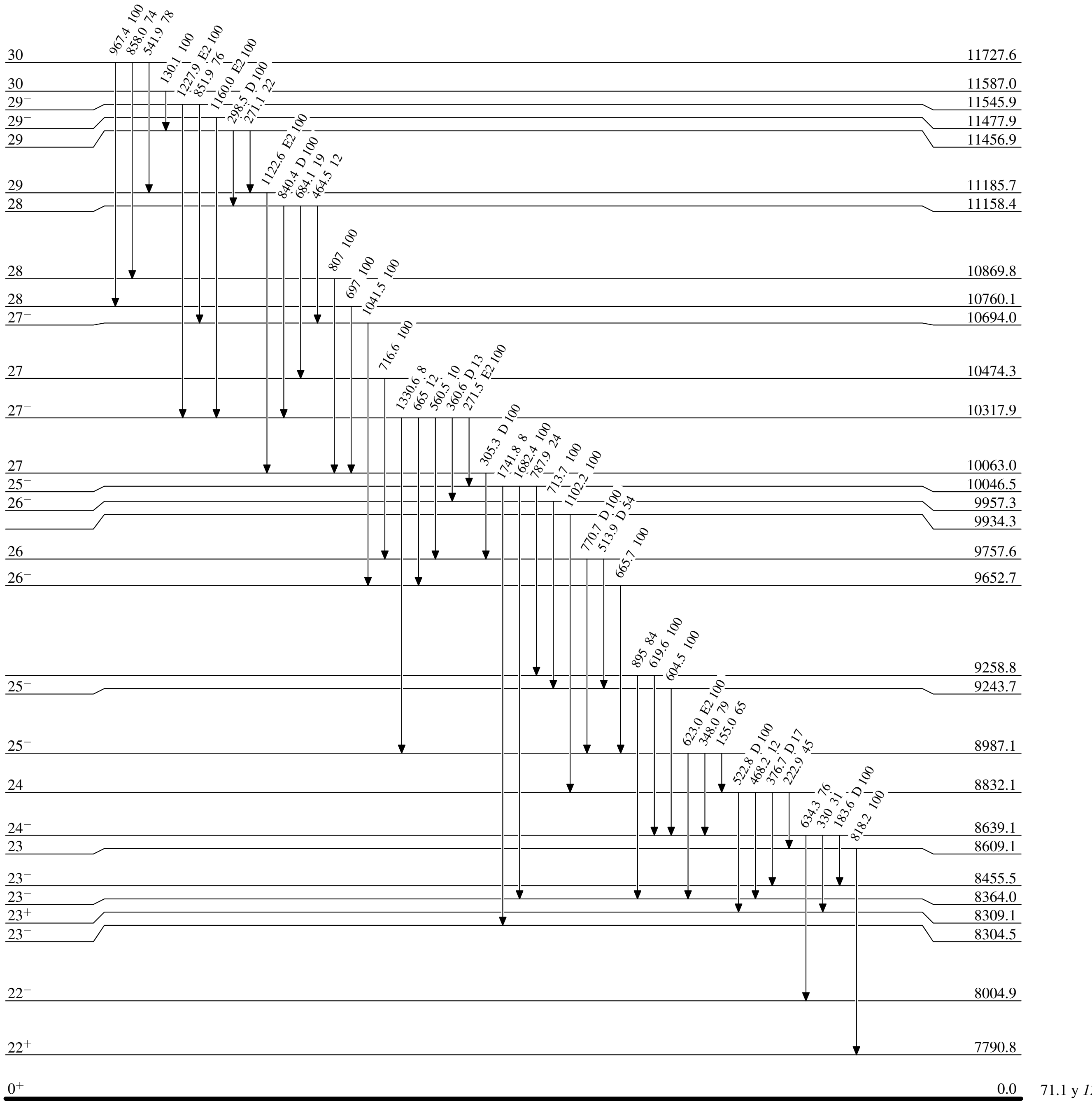


$^{148}_{64}Gd_{84}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

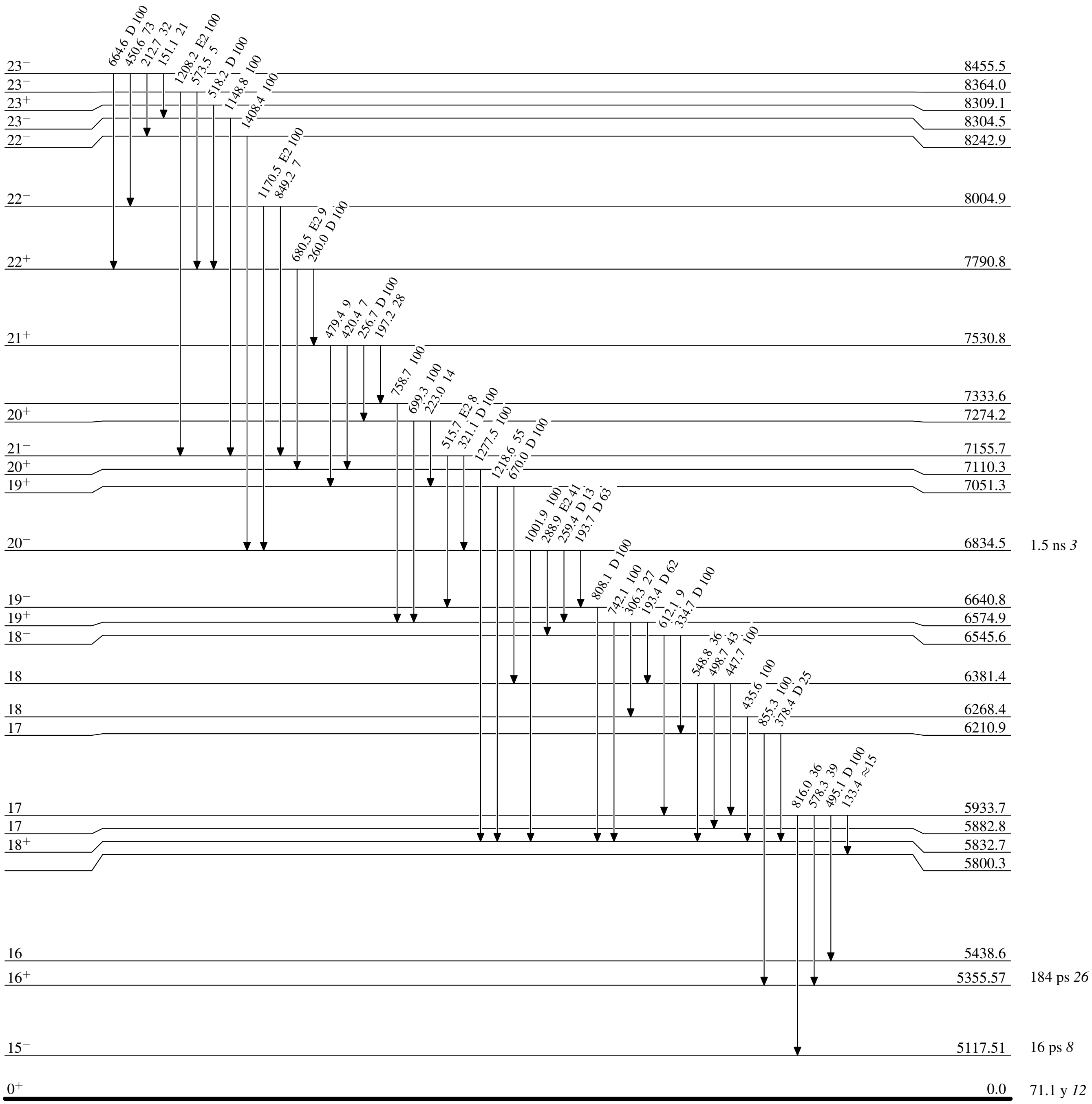


$^{148}_{64}Gd_{84}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

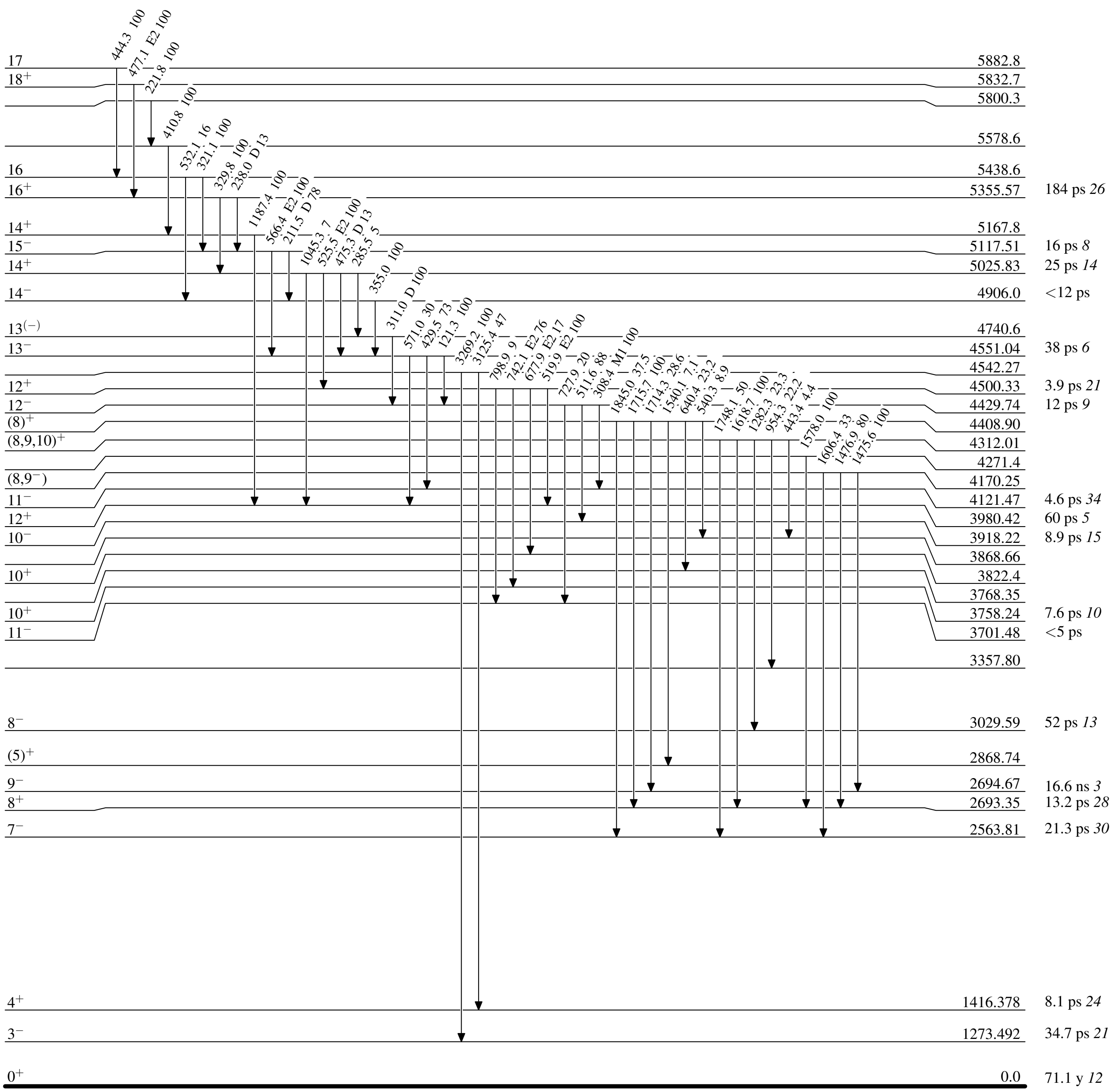


$^{148}_{64}Gd_{84}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

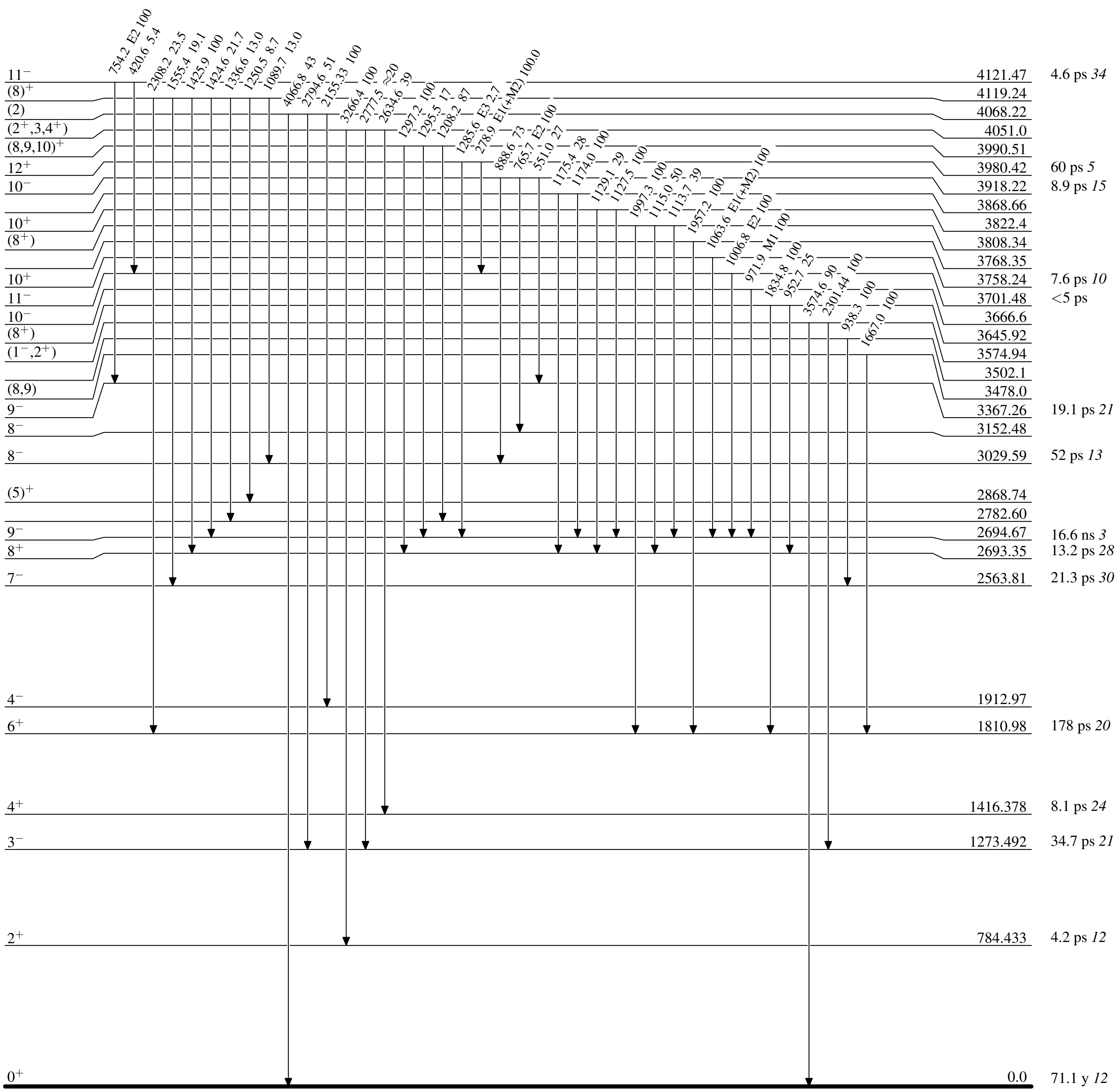


$^{148}_{64}Gd_{84}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{148}_{64}Gd_{84}$

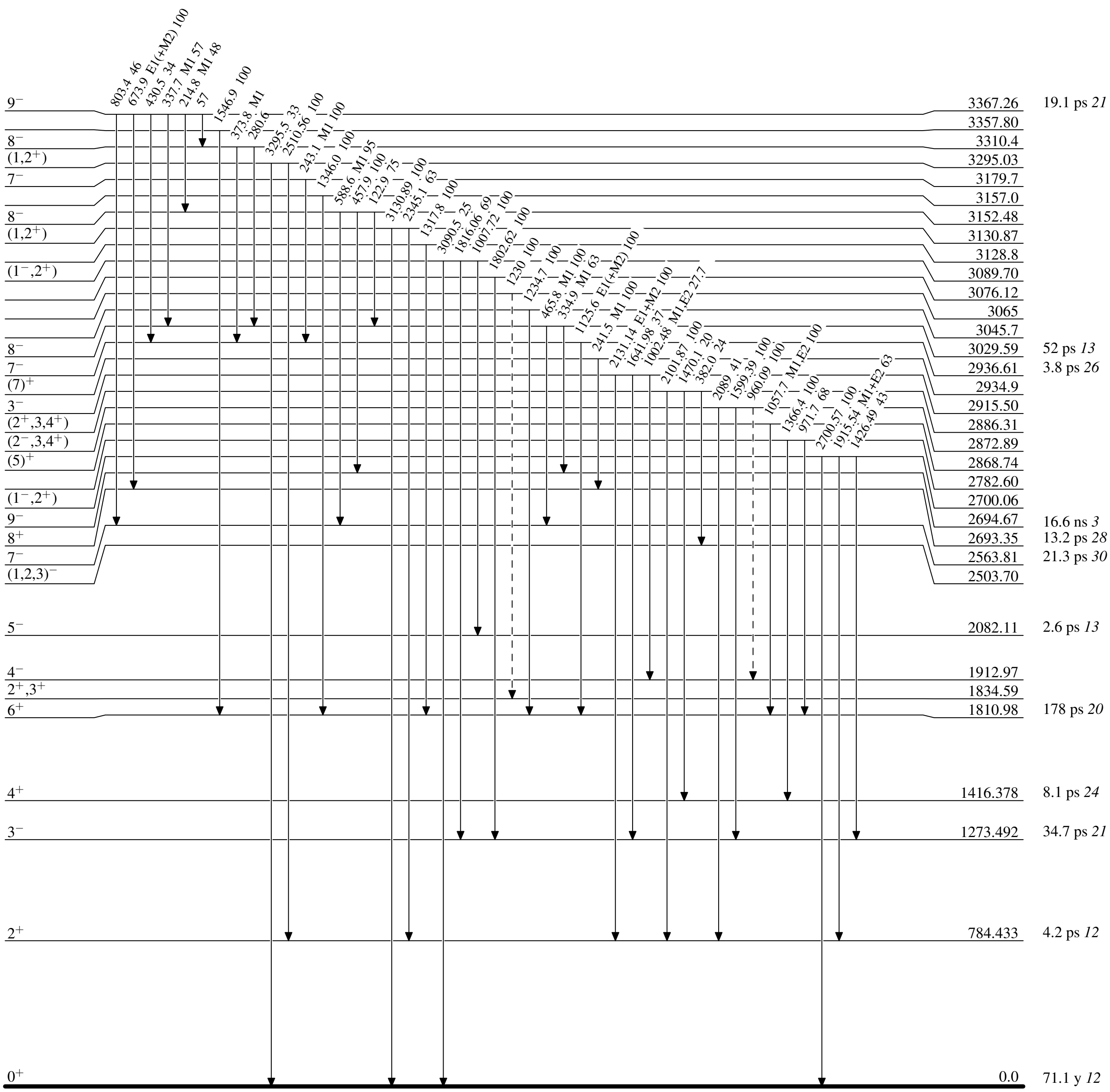
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

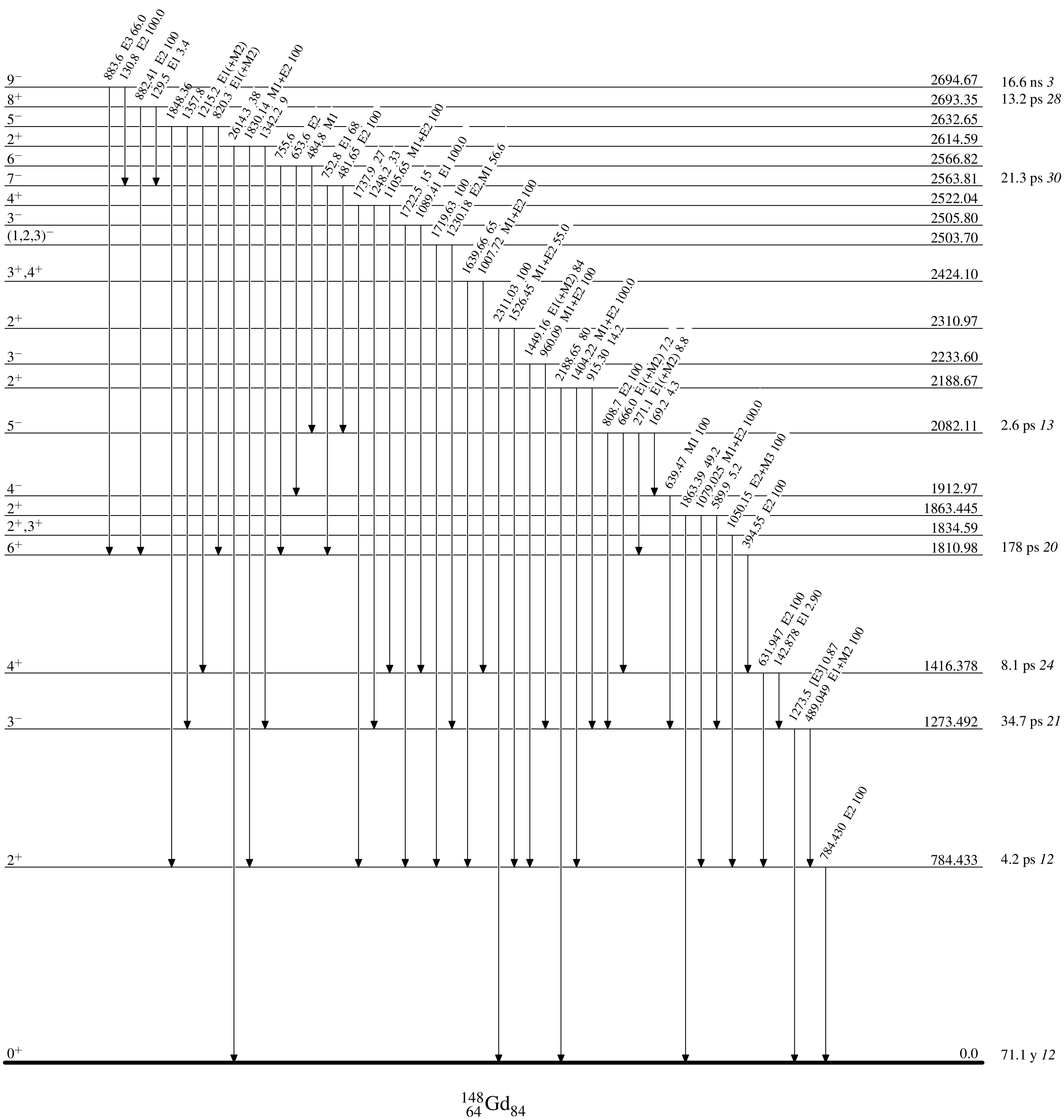


$^{148}_{64}Gd_{84}$

Adopted Levels, Gammas

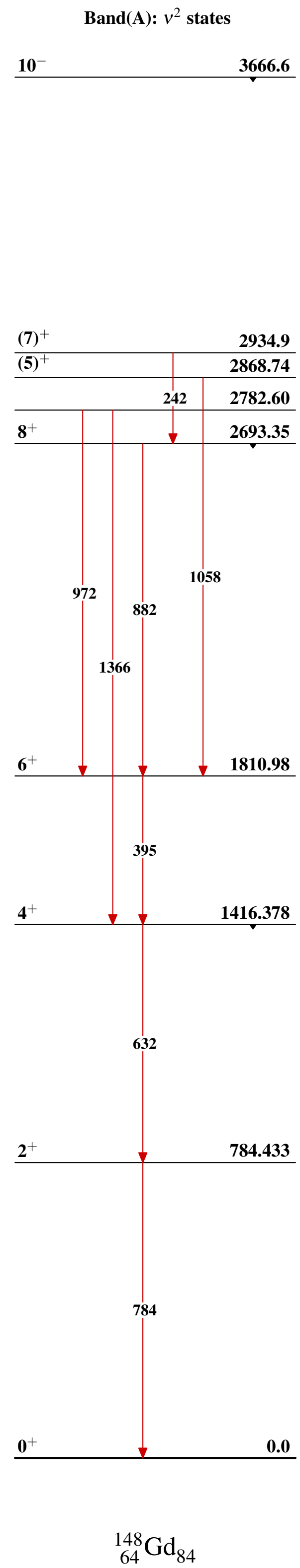
Level Scheme (continued)

Intensities: Relative photon branching from each level

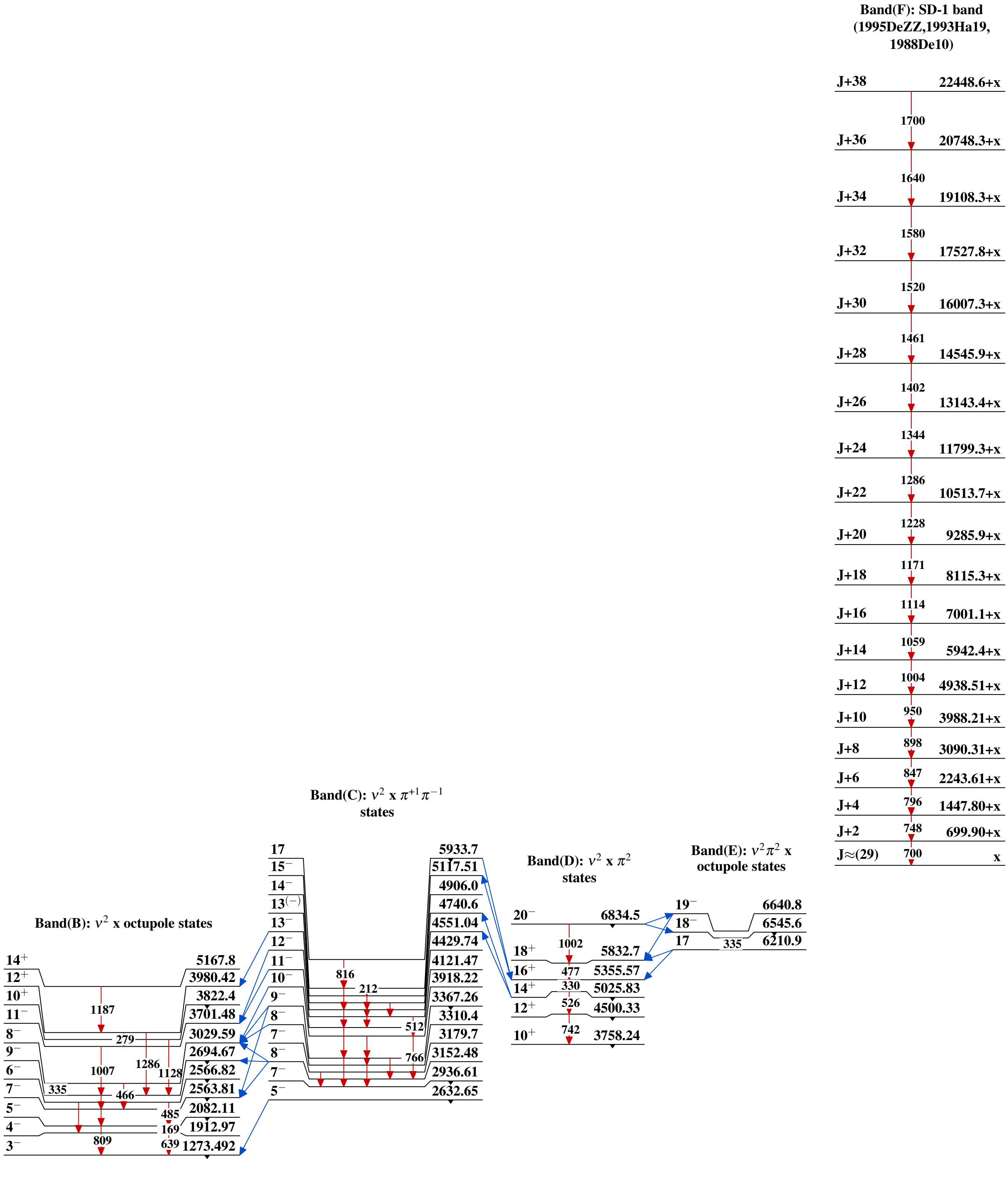


$^{148}_{64}Gd_{84}$

Adopted Levels, Gammas

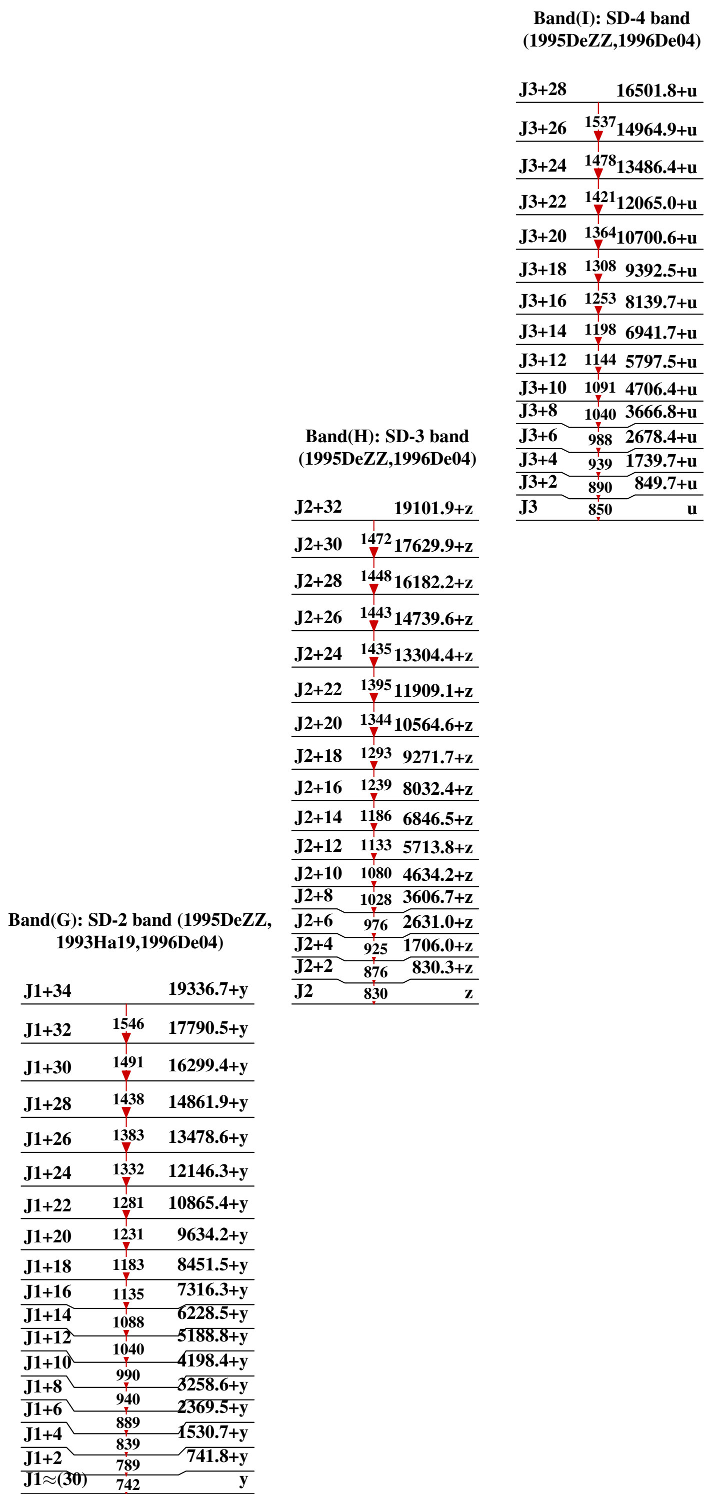


Adopted Levels, Gammas (continued)



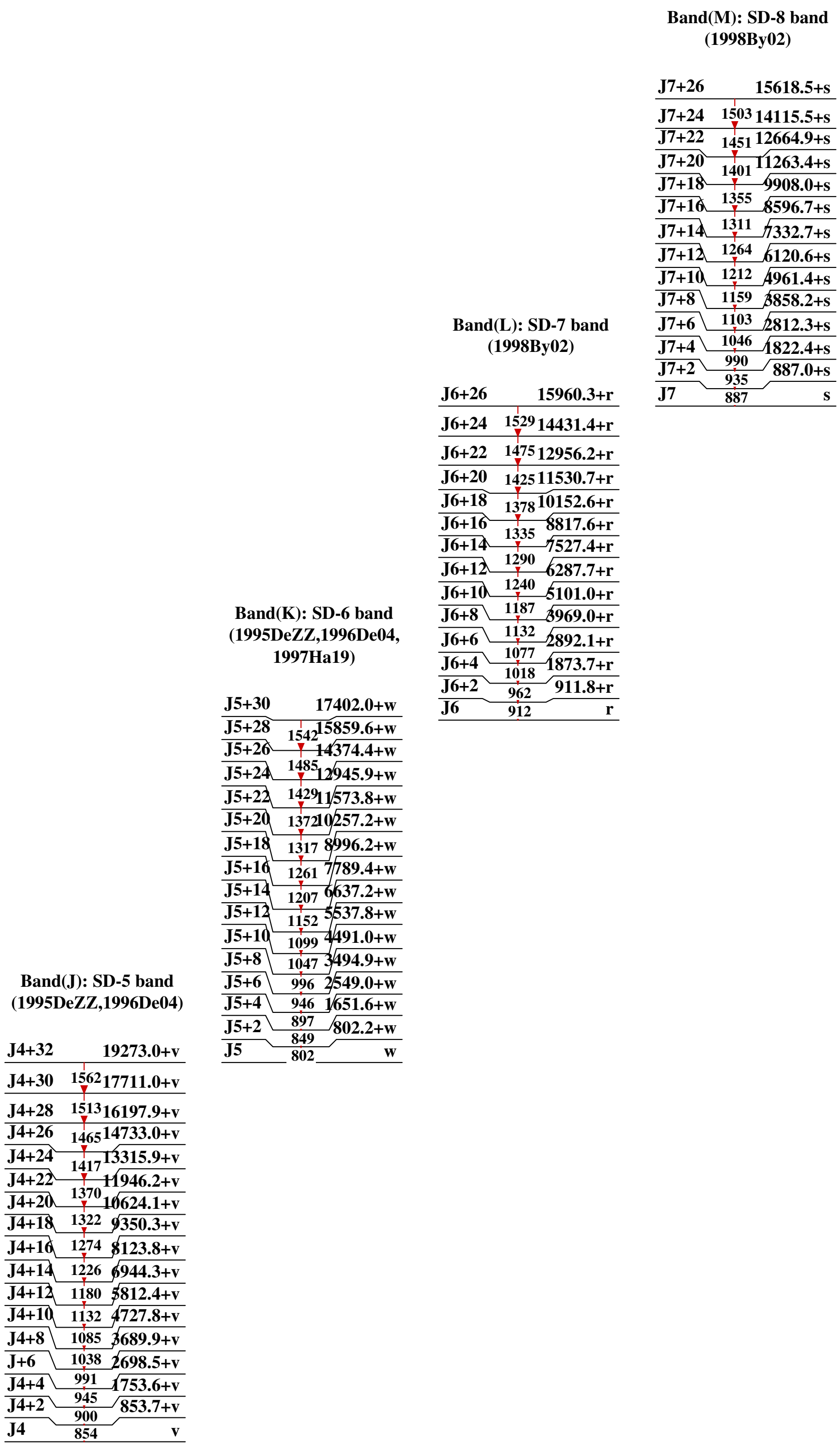
$^{148}_{64}Gd_{84}$

Adopted Levels, Gammas (continued)



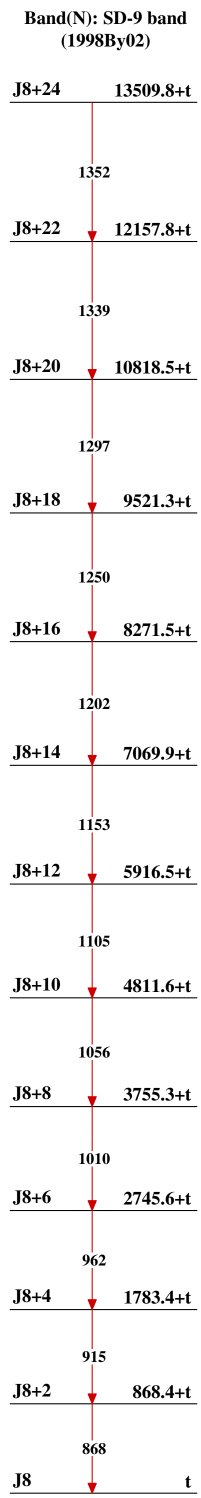
$^{148}_{64}Gd_{84}$

Adopted Levels, Gammas (continued)



$^{148}_{64}Gd_{84}$

Adopted Levels, Gammas (continued)



$^{148}_{64}Gd_{84}$

Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	S. K. Basu, A. A. Sonzogni	NDS 114, 435 (2013)	1-Apr-2013

Q(β^-)=−4658 *8*; S(n)=8708 *7*; S(p)=6612 *7*; Q(α)=2807 *6* 2017Wa10
S(2n)=15637 *7*; S(2p)=11006 *7* 2017Wa10
Additional information 1.

^{150}Gd Levels

Cross Reference (XREF) Flags

A	^{150}Eu β^- decay (12.8 h)	E	(HI,xnγ)	I	^{151}Eu(p,2nγ)
B	^{150}Tb ε decay (5.8 min)	F	(HI,xnγ):SD	J	^{152}Gd(p,t) E=18 MeV
C	^{150}Tb ε decay (3.48 h)	G	^{148}Sm(α,2nγ) E= 30 MeV		
D	^{154}Dy α decay	H	^{150}Sm(α,4nγ) E=50 MeV		

E(level)[†]	J$^\pi$[†]	T$_{1/2}$	XREF	Comments
0.0[d]	0$^+$	1.79×10^6 y *8*	ABCDE GHIJ	%α=100 T$_{1/2}$: weighted average of 2.1×10^6 y *3* (1962Si14), 1.4×10^6 y *4* (1965Og01), 1.78×10^6 y *8* (1966Fr11).
638.045[bd] *14*	2$^+$[@]		ABC E GHIJ	J$^\pi$: from E2 γ to 0$^+$.
1134.297[bc] *17*	3$^-$		BC E GHIJ	J$^\pi$: E1 γ to 2$^+$, E2 γ from 5$^-$.
1207.135 *20*	0$^+$		C J	J$^\pi$: from E0 transition to 0$^+$.
1288.42[bd] *3*	4$^+$[@]		BC E GHIJ	
1430.467 *18*	(2)$^+$		C IJ	J$^\pi$: E2 γ to 2$^+$, (E2) γ to 0$^+$.
1518.362 *21*	2$^+$		C I	J$^\pi$: E2 γ to 0$^+$.
1592.428 *24*	1		C	J$^\pi$: M1 γ to 0$^+$ and E1 γ to 2$^+$ agree with J=1 but disagree on the assignment of π.
1699.912[c] *25*	5$^-$		BC E GHIJ	J$^\pi$: E1 γ from 6$^+$, E1 γ to 4$^+$.
1814.13 *6*	3$^-$		C I	J$^\pi$: E1 γ to 2$^+$, γ to 4$^+$.
1936.31[bd] *16*	6$^+$[@]		B E GH	
1947.36 *3*	2$^-$,3$^-$,4$^-$		C IJ	J$^\pi$: M1 +E2 γ to 3$^-$. Spin 4$^-$ is ruled out if the observed small β feeding from (2$^-$) is real.
1955.371 *22*	2$^+$		C	J$^\pi$: E1 γ to 3$^-$, γ's to 0$^+$.
1969.99 *11*			C	
1980?			J	
1987.93 *3*	2$^+$,3$^+$,4$^+$		C I	J$^\pi$: E2 γ to 2$^+$ and γ to 4$^+$.
2080.61 *9*	(2,3,4)$^+$		C	J$^\pi$: E2 γ to 2$^+$, 4$^+$.
2083.96 *3*	2$^-$,3$^-$		C	J$^\pi$: M1 γ to 3$^-$, γ's to 1$^-$,2$^+$.
2091.623 *25*	2$^+$		C	J$^\pi$: E1 γ to 3$^-$, γ to 0$^+$.
2115.75[be] *9*	6$^+$[@]		B E GHI	J$^\pi$: E2 γ to 4$^+$.
2157.5 *7*			C	
2179.912 *21*	2$^+$		C	J$^\pi$: E1 γ to 3$^-$, γ to 0$^+$.
2209.54 *3*	2$^-$,3$^-$		C	J$^\pi$: M1 γ to 3$^-$. 4$^-$ excluded by γ to 2$^+$, since M2 transitions not expected.
2211.11[bc] *14*	7$^-$[&]		B E GH	
2262.21 *4*			C	
2306.2 *4*	(5$^-$,6$^+$)		G	J$^\pi$: γ's to 7$^-$, 5$^-$, 4$^+$.
2326.283 *17*			C	
2364.91 *5*	1,2$^+$		C	J$^\pi$: γ's to 0$^+$, 1$^-$, 2$^+$.
2392.06[‡b] *17*	(7)$^+$		B E GH	J$^\pi$: M1 γ from 8$^+$, (M1+E2) γ to 6$^+$.
2408.53 *5*	2$^+$		C	J$^\pi$: γ's to 0$^+$ and 4$^+$.
2416.7? *5*	3		C	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{150}Gd Levels (continued)

E(level)[†]	J^{π}[†]	XREF	Comments
2426.20 *3*	$1^-,2^+$	C	J^{π}: γ's to 0^+, 2^+, 3^-.
2434.34 *9*		C	
2521.56 *7*	$(2^+,3,4^+)$	C	J^{π}: γ's to 2^+ and 4^+.
2554.14[be] *12*	8^+[@]	B E GH	
2558.51 *20*	$1,2^+$	C	J^{π}: γ to 0^+.
2564.96 *13*	$(1^-,2^-,3^-)$	C	J^{π}: (E2) γ to 3^-, γ to 2^+.
2593.9 *7*		C	
2627.99? *8*		C	
2654.39 *7*		C	
2678.45 *13*	$1,2^+$	C	J^{π}: γ's to 0^+, 2^+.
2686.84 *4*	$1^-,2,3^-$	C	J^{π}: γ's to 1^- and 3^-.
2754.58 *6*	$2^+,3,4^+$	C	J^{π}: γ's to 2^+ and 4^+.
2767.3?[‡] *6*	(8^+)	H	J^{π}: possible stretched E2 to 6^+ hence member of g.s. band.
2786.49 *5*	$1^-,2^+$	C	J^{π}: γ's to 0^+ and 3^-.
2816.1[c] *4*	9^-[&]	E H	
2827.81 *7*		C	
2834.8? *4*	8^-	H	
2845.41 *5*	$1,2^+$	C	J^{π}: γ's to 0^+ and 2^+.
2868.27 *10*		C	
2906.0?[b] *5*	8^+	B H	J^{π}: ε decay from $(8^+,9^+)$, E2 γ to 6^+.
2956.20 *5*		C	
2984.95 *11*	$1,2^+$	C	J^{π}: γ's to 0^+ and 2^+.
3024.7 *3*		C	
3035.64 *5*	$1^-,2^+$	C	J^{π}: γ's to 0^+ and 3^-.
3042.61 *24*		C	
3083.76? *17*		C	
3118.75 *8*		C	
3134.13 *6*		C	
3176.8 *5*		G	
3177.732 *17*		C	
3220.3[‡#] *4*	10^-	E H	J^{π}: M1+E2 γ to 9^-.
3251.5 *5*		C	
3269.32? *11*		C	
3288.2[‡#e] *4*	10^+[@]	E H	J^{π}: E2 γ to 8^+.
3298.34 *22*		C	
3329.33 *16*		C	
3344.68 *6*	(2^+)	C	J^{π}: γ's to 0^+, 4^+.
3366.4[‡#c] *4*	11^-[&]	E H	
3375.72 *14*		C	
3378.11 *11*		C	
3389.2 *5*		C	
3461.7 *5*	2^+	C	J^{π}: γ's to 0^+, 4^+.
3510.72 *17*	$(1^-,2^+)$	C	J^{π}: γ's to 0^+, 2^+, 3^-.
3522.4 *6*		C	
3631.4 *3*		C	
3657.35? *19*	2^+	C	J^{π}: γ's to 0^+, 4^+.
3712.40 *22*		C	
3726.63 *15*		C	
3772.03 *19*		C	
3828.4? *4*	$(1,2^+)$	C	J^{π}: γ's to 0^+, 2^+.
3840.04 *17*		C	
3963.64 *23*		C	
4021.2? *4*	$(1,2^+)$	C	J^{π}: γ's to 0^+, 2^+.
4105.4[#e] *10*	12^+[@]	E	J^{π}: E2 γ to 10^+.

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Adopted Levels, Gammas (continued)

^{150}Gd Levels (continued)

E(level)[†]	J^{π}[†]	XREF	Comments
4111.07? 25	$1^-,2^+$	C	J^{π}: γ's to 0^+, 2^+, 3^-.
4131.1[‡#c] 5	13^-[&]	E H	
4143.8? 3	$(1^-,2^+)$	C	J^{π}: γ's to 0^+, 3^-.
4151.0 4		C	
4164.0 4	2^+	C	J^{π}: γ's to 0^+, 4^+.
4178.6 5		C	
4186.9[‡] 5	$(12)^-$	H	J^{π}: E2 γ to 10^-.
4206.9 3	$(1,2^+)$	C	J^{π}: γ to 0^+.
4235.2? 6	$(1^-,2^+)$	C	J^{π}: γ's to 0^+, 3^-.
4246.2? 3	$(1,2^+)$	C	J^{π}: γ to 0^+.
4258.0 3	$(1^-,2^+)$	C	J^{π}: γ's to 0^+, 3^-.
4264.6 3	2^+	C	J^{π}: γ's to 0^+, 4^+.
4283.1? 10	$(1,2^+)$	C	J^{π}: γ to 0^+.
4289.4? 3	$(1,2^+)$	C	J^{π}: γ to 0^+.
4296.7 10		C	
4303.2 3		C	
4314.0 3	$1,2^+$	C	J^{π}: γ to 0^+.
4322.0 3	2^+	C	J^{π}: γ's to 0^+, 4^+.
4343.9 4	$(1,2^+)$	C	J^{π}: γ to 0^+.
4378.6? 6	$(1^+,2^+)$	C	J^{π}: γ's to 0^+, $(3^+,4^+)$.
4405.3 3	$(1,2^+)$	C	J^{π}: γ to 0^+.
4419.7 6	(13)	H	
4435.2 6		C	
4445.9 3	$1,2^+$	C	J^{π}: γ to 0^+.
4462.3 8		C	
4492.8 7		C	
4499.8 8		C	
4522.8? 6		C	
4529.4? 4	$(1,2^+)$	C	J^{π}: γ to 0^+.
4545.6 6		C	
4557.2 10		C	
4563.3 10		C	
4739.6[#e] 11	14^+[@]	E	
4744.9 3		C	
4834.9[‡#c] 10	15^-[&]	E H	
5428.8[#e] 11	16^+[@]	E	
5450.9[#c] 13	17^-[&]	E H	
5632.8[#] 14	17^+	E	J^{π}: γ from 18^+, γ to 16^+.
5764.8[#e] 13	18^+[@]	E	J^{π}: γ to 16^+, dipole to 17^-.
6311.8[#] 16	(19^-)	E	
6450.8[#e] 16	(20^+)[@]	E	
6495.8[#f] 19	(21^-)[a]	E	
7275.8[#f] 22	(23^-)[a]	E	
7929.8[#f] 24	(25^-)[a]	E	
8325[#f] 3	(27^-)[a]	E	
9410?[#] 3	(28^+)	E	
9497[#] 3	(29^-)	E	
9582[#] 3	(29^+)	E	
9851[#] 3	(30^+)	E	
10532[#] 3	(31^+)	E	
11231[#] 4	(33^+)	E	

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Adopted Levels, Gammas (continued)

^{150}Gd Levels (continued)

E(level)†	Jπ†	XREF
12185# 4	(34⁻)	E
12678# 4	(36⁻,34⁺)	E
x[g]	J≈(30⁺)	F
815.00+x[g] 10	J+2	F
1021.1+x[h] 8	J+2	F
1664.10+x[g] 15	J+4	F
1931.3+x[h] 8	J+4	F
2156.6+x 18	J+4	F
2552.00+x[g] 18	J+6	F
2897.4+x[h] 7	J+6	F
3012.6+x 15	J+6	F
3480.90+x[g] 20	J+8	F
3893.0+x[h] 6	J+8	F
3960.6+x 12	J+8	F
4451.79+x[g] 23	J+10	F
4861.7+x[h] 6	J+10	F
5465.28+x[g] 25	J+12	F
5860.7+x[h] 5	J+12	F
6521.8+x[g] 3	J+14	F
6907.6+x[h] 5	J+14	F
7621.8+x[g] 3	J+16	F
8005.2+x[h] 5	J+16	F
8766.4+x[g] 3	J+18	F
9154.0+x[h] 5	J+18	F
9956.9+x[g] 4	J+20	F
10354.0+x[h] 5	J+20	F
11194.8+x[g] 4	J+22	F
11604.9+x[h] 6	J+22	F
12481.4+x[g] 4	J+24	F
12906.1+x[h] 6	J+24	F
13818.0+x[g] 4	J+26	F
14257.7+x[h] 6	J+26	F
15205.8+x[g] 4	J+28	F
15658.7+x[h] 7	J+28	F
16645.9+x[g] 4	J+30	F
17109.1+x[h] 7	J+30	F
18139.1+x[g] 5	J+32	F
18608.2+x[h] 8	J+32	F
19686.1+x[g] 6	J+34	F
20155.8+x[h] 9	J+34	F
21287.8+x[g] 7	J+36	F
21751.8+x[h] 11	J+36	F
23397.3+x[h] 14	J+38	F
y[j]	K≈(27⁻)	F
688.1+y[j] 3	K+2	F
1287.6+y[i] 15	K+2	F
1423.8+y[j] 5	K+4	F
2015.5+y[i] 15	K+4	F

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Adopted Levels, Gammas (continued)

^{150}Gd Levels (continued)

E(level)†	Jπ†	XREF	Comments
2208.9+y[j] *7*	K+6	F	
2787.0+y[i] *15*	K+6	F	
3043.3+y[j] *8*	K+8	F	
3601.3+y[i] *15*	K+8	F	
3928.6+y[j] *9*	K+10	F	
4458.6+y[i] *14*	K+10	F	
4865.1+y[j] *10*	K+12	F	
5359.3+y[i] *13*	K+12	F	
5853.7+y[j] *10*	K+14	F	
6304.6+y[i] *13*	K+14	F	
6894.6+y[j] *10*	K+16	F	
7295.2+y[i] *13*	K+16	F	
7989.9+y[j] *10*	K+18	F	
8331.9+y[i] *13*	K+18	F	
9139.2+y[j] *10*	K+20	F	
9415.2+y[i] *13*	K+20	F	
10343.1+y[j] *11*	K+22	F	
10546.6+y[i] *12*	K+22	F	
11602.4+y[j] *11*	K+24	F	
11725.9+y[i] *12*	K+24	F	
12916.1+y[j] *11*	K+26	F	
12955.8+y[i] *12*	K+26	F	
14229.1+y[i] *12*	K+28	F	
14293.5+y[j] *11*	J+28	F	
15557.7+y[i] *12*	K+30	F	
15721.8+y[j] *11*	K+30	F	
16936.3+y[i] *12*	K+32	F	
17208.2+y[j] *12*	K+32	F	
18366.7+y[i] *13*	K+34	F	
18751.4+y[j] *12*	K+34	F	
19848.9+y[i] *13*	K+36	F	
20351.6+y[j] *14*	K+36	F	
21384.3+y[i] *14*	K+38	F	
22010.0+y[j] *15*	K+38	F	
22972.1+y[i] *15*	J+40	F	
z[k]	L≈(28⁻)	F	Gamma rays of 617.1 and 664.3 keV (1993Be37) are not assigned by 1999ErZZ to low lying levels in ^{149}Gd.
712.5+z[k] *3*	L+2	F	
1473.7+z[k] *5*	L+4	F	
2284.2+z[k] *6*	L+6	F	
3144.2+z[k] *6*	L+8	F	
4054.7+z[k] *8*	L+10	F	
5017.2+z[k] *9*	L+12	F	
6032.1+z[k] *9*	L+14	F	
7100.3+z[k] *9*	L+16	F	
8222.7+z[k] *10*	L+18	F	
9399.8+z[k] *10*	L+20	F	
10632.1+z[k] *11*	L+22	F	

Adopted Levels, Gammas (continued)

^{150}Gd Levels (continued)

E(level)[†]	J^{π}[†]	XREF	Comments
11919.8+z[k] *11*	L+24	F	

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Adopted Levels, Gammas (continued)

^{150}Gd Levels (continued)

E(level)[†]	Jπ[†]	XREF	E(level)[†]	Jπ[†]	XREF
13263.6+z[k] *12*	L+26	F	4993.1+w[n] *10*	J1+12	F
14664.1+z[k] *12*	L+28	F	6001.3+w[n] *10*	J1+14	F
16121.2+z[k] *12*	L+30	F	7062.1+w[n] *10*	J1+16	F
17635.1+z[k] *13*	L+32	F	8176.0+w[n] *10*	J1+18	F
19204.2+z[k] *13*	L+34	F	9344.4+w[n] *11*	J1+20	F
u[l]	M≈(27+)	F	10567.0+w[n] *11*	J1+22	F
771.5+u[l] *4*	M+2	F	11845.0+w[n] *11*	J1+24	F
1588.6+u[l] *5*	M+4	F	13178.7+w[n] *11*	J1+26	F
2451.5+u[l] *6*	M+6	F	14568.9+w[n] *12*	J1+28	F
3359.9+u[l] *6*	M+8	F	16015.7+w[n] *12*	J1+30	F
4313.1+u[l] *6*	M+10	F	17519.6+w[n] *13*	J1+32	F
5311.3+u[l] *7*	M+12	F	19080.3+w[n] *14*	J1+34	F
6353.7+u[l] *7*	M+14	F	20698.2+w[n] *16*	J1+36	F
7441.4+u[l] *9*	M+16	F	s[o]	J2≈(31+)	F
8574.4+u[l] *9*	M+18	F	800.4+s[o] *4*	J2+2	F
9753.9+u[l] *9*	M+20	F	1650.3+s[o] *5*	J2+4	F
10980.9+u[l] *10*	M+22	F	2552.7+s[o] *6*	J2+6	F
12256.0+u[l] *10*	M+24	F	3507.9+s[o] *7*	J2+8	F
13581.2+u[l] *11*	M+26	F	4518.1+s[o] *7*	J2+10	F
14956.3+u[l] *11*	M+28	F	5584.2+s[o] *7*	J2+12	F
16382.4+u[l] *11*	M+30	F	6706.4+s[o] *7*	J2+14	F
17862.5+u[l] *12*	M+32	F	7886.2+s[o] *8*	J2+16	F
19379.2+u[l] *12*	M+34	F	9124.2+s[o] *8*	J2+18	F
20915.2+u[l] *13*	M+36	F	10420.8+s[o] *9*	J2+20	F
22505.2+u[l] *15*	M+38	F	11776.5+s[o] *9*	J2+22	F
v[m]	N≈(29+)	F	13191.5+s[o] *10*	J2+24	F
733.20+v[m] *20*	N+2	F	14665.5+s[o] *11*	J2+26	F
1511.4+v[m] *3*	N+4	F	16199.5+s[o] *12*	J2+28	F
2341.2+v[m] *4*	N+6	F	17793.6+s[o] *14*	J2+30	F
3221.1+v[m] *4*	N+8	F	19446.1+s[o] *17*	J2+32	F
4151.2+v[m] *5*	N+10	F	t[p]	J3≈(33+)	F
5132.6+v[m] *5*	N+12	F	827.6+t[p] *5*	J3+2	F
6166.5+v[m] *6*	N+14	F	1702.9+t[p] *7*	J3+4	F
7253.5+v[m] *6*	N+16	F	2627.2+t[p] *7*	J3+6	F
8394.9+v[m] *6*	N+18	F	3601.5+t[p] *9*	J3+8	F
9590.4+v[m] *7*	N+20	F	4626.6+t[p] *9*	J3+10	F
10841.4+v[m] *7*	N+22	F	5703.4+t[p] *10*	J3+12	F
12147.9+v[m] *8*	N+24	F	6832.3+t[p] *11*	J3+14	F
13510.5+v[m] *8*	N+26	F	8014.8+t[p] *12*	J3+16	F
14929.5+v[m] *9*	N+28	F	9250.8+t[p] *13*	J3+18	F
16404.8+v[m] *10*	N+30	F	10540.9+t[p] *13*	J3+20	F
17937.1+v[m] *11*	N+32	F	11885.9+t[p] *14*	J3+22	F
19527.0+v[m] *14*	N+34	F	13286.0+t[p] *15*	J3+24	F
21171.8+v[m] *16*	N+36	F	14741.9+t[p] *16*	J3+26	F
w[n]	J1≈(28+)	F	16253.7+t[p] *17*	J3+28	F
711.1+w[n] *5*	J1+2	F	17821.0+t[p] *20*	J3+30	F
1469.4+w[n] *9*	J1+4	F	a[q]	J4≈(32+)	F
2275.8+w[n] *9*	J1+6	F	804.0+a[q] *4*	J4+2	F
3131.3+w[n] *9*	J1+8	F	1655.6+a[q] *6*	J4+4	F
4036.7+w[n] *10*	J1+10	F	2555.8+a[q] *7*	J4+6	F

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Adopted Levels, Gammas (continued)

^{150}Gd Levels (continued)

E(level)[†]	J$^{\pi}$[†]	XREF
3507.0+a[q] *8*	J4+8	F
4508.5+a[q] *9*	J4+10	F
5562.2+a[q] *9*	J4+12	F
6660.4+a[q] *10*	J4+14	F
7822.2+a[q] *10*	J4+16	F
9034.6+a[q] *11*	J4+18	F
10300.5+a[q] *12*	J4+20	F
11621.0+a[q] *13*	J4+22	F
12996.6+a[q] *14*	J4+24	F
14427.3+a[q] *16*	J4+26	F
15912.7+a[q] *19*	J4+28	F
17451.6+a[q] *21*	J4+30	F
b[r]	J5≈(34^{+})	F
830.0+b[r] *5*	J5+2	F
1706.5+b[r] *7*	J5+4	F
2629.1+b[r] *9*	J5+6	F
3599.1+b[r] *9*	J5+8	F
4615.7+b[r] *10*	J5+10	F
5680.0+b[r] *11*	J5+12	F
6792.0+b[r] *12*	J5+14	F
7952.0+b[r] *14*	J5+16	F
9159.7+b[r] *15*	J5+18	F
10414.1+b[r] *16*	J5+20	F
11716.8+b[r] *17*	J5+22	F
13068.5+b[r] *17*	J5+24	F
14468.6+b[r] *18*	J5+26	F
15917.5+b[r] *19*	J5+28	F
17412.5+b[r] *21*	J5+30	F
c[s]	J6≈(29^{+})	F
815.1+c[s] *7*	J6+2	F
1664.1+c[s] *8*	J6+4	F
2553.1+c[s] *12*	J6+6	F
3430.8+c[s] *13*	J6+8	F
4353.5+c[s] *14*	J6+10	F
5322.9+c[s] *15*	J6+12	F
6338.5+c[s] *16*	J6+14	F
7403.9+c[s] *17*	J6+16	F
8516.3+c[s] *18*	J6+18	F
9682.2+c[s] *19*	J6+20	F
10901.0+c[s] *20*	J6+22	F
12172.4+c[s] *21*	J6+24	F
13499.3+c[s] *22*	J6+26	F
14881.7+c[s] *23*	J6+28	F
16320.1+c[s] *24*	J6+30	F
17816.2+c[s] *25*	J6+32	F
19373+c[s] *3*	J6+34	F
d[t]	J7≈(28^{+})	F
808.9+d[t] *5*	J7+2	F
1667.4+d[t] *9*	J7+4	F
2577.0+d[t] *12*	J7+6	F
3433.3+d[t] *15*	J7+8	F
4334.0+d[t] *15*	J7+10	F
5279.6+d[t] *16*	J7+12	F
6271.1+d[t] *17*	J7+14	F
7311.5+d[t] *19*	J7+16	F
8404.3+d[t] *21*	J7+18	F
9544.6+d[t] *22*	J7+20	F
10736.6+d[t] *22*	J7+22	F
11981.5+d[t] *23*	J7+24	F
13280.5+d[t] *24*	J7+26	F
14635.3+d[t] *25*	J7+28	F
16047+d[t] *3*	J7+30	F
17515+d[t] *3*	J7+32	F
19046+d[t] *3*	J7+34	F
20638+d[t] *3*	J7+36	F

† Above the 18^{+} level the decay scheme and J^{π} assignments are based on $\gamma\gamma$, $\gamma(\theta)$, and Iγ measurements in (^{30}Si,4nγ).

‡ From ^{150}Sm(α,4nγ).

From ^{124}Sn(^{30}Si,4nγ).

@ Member of ΔJ=2 positive-parity band built on the g.s.

& Member of ΔJ=2 negative-parity sequence which is interpreted by 1977Ha21 in terms of the vibrator model. Up to spin 9^{-} the levels may represent a band built on an octupole vibration while those above 11^{-} may be a band built on a quasiparticle state. 1983BaZG discusses in the N=87 region the transition from collective rotations at low spin to noncollective rotations at high spin.

^{a} Member of ΔJ=2 sequence of negative parity states of noncollective nature. 1983BaZG discusses these states in terms of shape change and the transition from collective to noncollective rotations at high spin.

^{b} From ^{150}Tb ε decay (5.8 min).

^{c} Band(A): Member of ΔJ=2 negative-parity band from J$^{\pi}$=17^{-} to 3^{-}.

^{d} Band(B): Member of ΔJ=2, positive-parity band.

^{e} Band(C): Member of ΔJ=2, positive-parity band.

^{f} Band(D): Member of ΔJ=2 negative-parity band from J$^{\pi}$=27^{-} to J$^{\pi}$=21^{-}.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{150}Gd Levels (continued)

[g] Band(E): Yrast SD-1 band (1991Fa07,1999ErZZ). Q(intrinsic)=17.0 *+5−4* (1998Be06) from DSAM data for 17 transitions in the cascade. Other: 17 *3* (1991Fa07) Percent population=1.0 (1989Fa02). Intruder configuration=$\pi6^2\nu7^2$; π=+,α=0 (1991Fa07).

[h] Band(F): SD-2 band (1994Fa13,1999ErZZ). Q(intrinsic)=16.8 *12* (1998Be06) from DSAM data for 15 transitions in the cascade. Intensity, relative to SD-1 band, is 47% *3* (1999ErZZ). Configuration (relative to yrast SD band): $\pi1/2[301]^{-2}\pi3/2[651]^2$; π=+,α=0, also possibly coupled to β vibration (1999ErZZ,1994Fa13). This band is identical to ^{152}Dy SD-1 band. The band undergoes backbending at low frequencies and decays into the yrast band, rather than directly to the normal deformation states, at few hundred keV excitation.

[i] Band(G): SD-3 band (1990By01,1993Be37,1999ErZZ). Q(intrinsic)=17.4 *+5−4* (1998Be06) from DSAM data for 17 transitions in the cascade. Intensity, relative to SD-1 band, is 45% *3* (1999ErZZ). Configuration (relative to yrast SD band): $\pi1/2[301]^{-1}\pi6^1_3$; π=−,α=1 (1999ErZZ,1993Be37). Identical to ^{151}Tb SD band with $\pi6^3\times([301]1/2)^{-1}\nu7^2$ intruder configuration (1993Be37).

[j] Band(H): SD-4 band (1993Be37,1999ErZZ). Q(intrinsic)=15.0 *+6−4* (1998Be06) from DSAM data for 15 transitions in the cascade. Intensity, relative to SD-1 band, is 44% *3* (1999ErZZ). Configuration (relative to yrast SD band): $\nu7_2^{-1}\nu5/2[402]^1$; π=−,α=1 (1999ErZZ,1993Be37). SD-4 and SD-5 bands are interpreted (1999ErZZ) as signature partners.

[k] Band(I): SD-5 band (1993Be37,1999ErZZ). Q(intrinsic)=16.2 *4* (1998Be06) from DSAM data for 17 transitions in the cascade. Intensity, relative to SD-1 band, is 42% *3* (1999ErZZ). Configuration (relative to yrast SD band): $\nu7_2^{-1}\nu5/2[402]^1$; π=−,α=0 (1999ErZZ,1993Be37). SD-4 and SD-5 bands are interpreted (1999ErZZ) as signature partners.

[l] Band(J): SD-6 Band (1999ErZZ). Q(intrinsic)=15.4 *+8−5* (1998Be06) from DSAM data for 14 transitions in the cascade. Intensity, relative to SD-1 band, is 30% *3* (1999ErZZ). Configuration (relative to yrast SD band): $\nu7_2^{-1}\nu7^1_3$; π=+,α=1 (1999ErZZ).

[m] Band(K): SD-7 Band (1999ErZZ). Intensity, relative to SD-1 band, is 19% *2* (1999ErZZ). Configuration (relative to yrast SD band): $\nu7_2^{-1}\nu9/2[514]^1$; π=+,α=1 (1999ErZZ). SD-7 and SD-8 bands are interpreted (1999ErZZ) as signature partners.

[n] Band(L): SD-8 Band (1999ErZZ). Intensity, relative to SD-1 band, is 19% *2* (1999ErZZ). Configuration (relative to yrast SD band): $\nu7_2^{-1}\nu9/2[514]^1$; π=+,α=0 (1999ErZZ). SD-7 and SD-8 bands are interpreted (1999ErZZ) as signature partners.

[o] Band(M): SD-9 Band (1999ErZZ). Intensity, relative to SD-1 band, is 18% *2* (1999ErZZ). Configuration (relative to yrast SD band): $(\nu7_2^{-1}6_4^{-1})\nu5/2[402]^2$ or $(\nu7_2^{-1}6_4^{-1})\nu9/2[514]^2$; π=+,α=1 (1999ErZZ).

[p] Band(N): SD-10 Band (1999ErZZ). Intensity, relative to SD-1 band, is 10% *2* (1999ErZZ). Configuration (relative to yrast SD band): $\pi1/2[301]^{-1}$,$\nu7_2^{-1}\pi6^1_3$,$\nu5/2[402]^1$; π=+,α=1 (1999ErZZ). SD-10 and SD-11 bands are interpreted (1999ErZZ) as signature partners.

[q] Band(O): SD-11 Band (1999ErZZ). Intensity, relative to SD-1 band, is 8% *2* (1999ErZZ). Configuration (relative to yrast SD band): $\pi1/2[301]^{-1}$,$\nu7_2^{-1}\pi6^1_3$,$\nu5/2[402]^1$; π=+,α=0 (1999ErZZ). SD-10 and SD-11 bands are interpreted (1999ErZZ) as signature partners. Intensity (0.09 *3*) for an additional gamma ray near 1590 keV (possibly at the top of this band) is shown in the intensity plot of 1998ErZY.

[r] Band(P): SD-12 Band (1999ErZZ). Intensity, relative to SD-1 band, is 6% *1* (1999ErZZ). Configuration (relative to yrast SD band): $\pi1/2[301]^{-2}\pi3/2[651]^2$; π=+,α=0 (1999ErZZ). Intensities of 0.27 *3* and 0.05 *3* for additional gamma rays near 1550 keV and 1600 keV, respectively, (possibly at the top of this band) are shown in the intensity plot of 1998ErZY.

[s] Band(Q): SD-13 Band (1999ErZZ). Intensity, relative to SD-1 band, is 6% *1* (1999ErZZ). Configuration (relative to yrast SD band): $\nu6_4^{-1}\nu5/2[402]^1$; π=+,α=1 (1999ErZZ). SD-13 and SD-14 bands are interpreted (1999ErZZ) as signature partners. Intensity (0.07 *3*) for an additional gamma ray near 1600 keV (possibly at the top of this band) is shown in the intensity plot of 1998ErZY.

[t] Band(d): SD-14 Band (1999ErZZ). Intensity, relative to SD-1 band, is 6% *1* (1999ErZZ). Configuration (relative to yrast SD band): $\nu6_4^{-1}\nu5/2[402]^1$; π=+,α=0 (1999ErZZ). SD-13 and SD-14 bands are interpreted (1999ErZZ) as signature partners.

Adopted Levels, Gammas (continued)

$\gamma(^{150}Gd)$

E_i(level)	J^π_i	E_γ	I_γ[a]	E_f	J^π_f	Mult.[†]	α[g]	$I_{(\gamma+ce)}$	Comments
638.045	2^+	638.050 *16*	100	0.0	0^+	E2[‡]	0.00754		α(K)=0.00624 *9*; α(L)=0.001017 *15*; α(M)=0.000224 *4*; α(N)=5.11×10^{-5} *8*; α(O)=7.68×10^{-6} *11* α(P)=4.26×10^{-7} *6*; α(N+..)=5.92×10^{-5} *9*
1134.297	3^-	496.242 *15*	100	638.045	2^+	E1	0.00479		α(K)=0.00409 *6*; α(L)=0.000552 *8*; α(M)=0.0001189 *17*; α(N)=2.72×10^{-5} *4*; α(O)=4.18×10^{-6} *6* α(P)=2.69×10^{-7} *4*; α(N+..)=3.17×10^{-5} *5*
1207.135	0^+	569.083 *15*	100 *5*	638.045	2^+	E2+M1	0.014 *5*		α(K)=0.012 *4*; α(L)=0.0018 *4*; α(M)=0.00039 *8*; α(N)=8.9×10^{-5} *19*; α(O)=1.4×10^{-5} *3* α(P)=8.E−7 *3*; α(N+..)=0.000103 *22*
		1207.2 *2*		0.0	0^+	E0		1.04 *15*	$I_{(\gamma+ce)}$: this is from observed ce(K) corrected by evaluators to include ce(L), using theoretical ratios given by 1969Ha61. E_γ: transition energy calculated from observed conversion electron energies.
1288.42	4^+	154.07[h] *6*	1.8[h] *4*	1134.297	3^-	(E1)			
		650.36	100	638.045	2^+	E2	0.00720		α(K)=0.00597 *9*; α(L)=0.000967 *14*; α(M)=0.000212 *3*; α(N)=4.86×10^{-5} *7*; α(O)=7.30×10^{-6} *11* α(P)=4.08×10^{-7} *6*; α(N+..)=5.63×10^{-5} *8*
1430.467	$(2)^+$	792.385 *20*	100	638.045	2^+	E2	0.00456		α(K)=0.00381 *6*; α(L)=0.000582 *9*; α(M)=0.0001272 *18*; α(N)=2.91×10^{-5} *4*; α(O)=4.42×10^{-6} *7* α(P)=2.63×10^{-7} *4*; α(N+..)=3.38×10^{-5} *5*
		1430.46 *4*	56 *4*	0.0	0^+	(E2)	1.39×10^{-3}		α(K)=0.001143 *16*; α(L)=0.0001566 *22*; α(M)=3.38×10^{-5} *5*; α(N)=7.77×10^{-6} *11* α(O)=1.201×10^{-6} *17*; α(P)=7.93×10^{-8} *12*; α(N+..)=6.12×10^{-5} *9*
1518.362	2^+	384.06 *4*	13.2	1134.297	3^-				
		880.27 *3*	100 *5*	638.045	2^+	M1+(E2+E0)[‡]	0.0049 *13*		α(K)=0.0042 *12*; α(L)=0.00059 *14*; α(M)=0.00013 *3*; α(N)=2.9×10^{-5} *7*; α(O)=4.5×10^{-6} *11* α(P)=3.0×10^{-7} *9*; α(N+..)=3.4×10^{-5} *8*
		1518.34	93	0.0	0^+	E2	1.28×10^{-3}		α(K)=0.001021 *15*; α(L)=0.0001389 *20*; α(M)=3.00×10^{-5} *5*; α(N)=6.89×10^{-6} *10* α(O)=1.066×10^{-6} *15*; α(P)=7.09×10^{-8} *10*; α(N+..)=8.85×10^{-5} *13*
1592.428	1	385.35	2.2	1207.135	0^+				
		954.46 *4*	61 *3*	638.045	2^+	E1	1.24×10^{-3}		α(K)=0.001063 *15*; α(L)=0.0001391 *20*; α(M)=2.99×10^{-5} *5*; α(N)=6.86×10^{-6} *10* α(O)=1.062×10^{-6} *15*; α(P)=7.14×10^{-8} *10*; α(N+..)=7.99×10^{-6} *12*
		1592.51 *4*	100.0 *18*	0.0	0^+	M1	1.66×10^{-3}		α(K)=0.001312 *19*; α(L)=0.0001754 *25*; α(M)=3.78×10^{-5} *6*; α(N)=8.70×10^{-6} *13*

$\gamma(^{150}$Gd) (continued)

E_i(level)	J_i^π	E_γ	I_γ[a]	E_f	J_f^π	Mult.[†]	δ	α[g]	Comments
									α(O)=1.358×10^{-6} *19*; α(P)=9.41×10^{-8} *14*; α(N+..)=0.0001319 *19*
1699.912	5$^-$	411.490 *15*	77 *4*	1288.42	4$^+$	M1		0.0417	α(K)=0.0354 *5*; α(L)=0.00495 *7*; α(M)=0.001071 *15*; α(N)=0.000247 *4*; α(O)=3.84×10^{-5} *6* α(P)=2.60×10^{-6} *4*; α(N+..)=0.000288 *4*
		565.64 *2*	100	1134.297	3$^-$	E1		0.00359	α(K)=0.00306 *5*; α(L)=0.000411 *6*; α(M)=8.84×10^{-5} *13*; α(N)=2.03×10^{-5} *3*; α(O)=3.12×10^{-6} *5* α(P)=2.03×10^{-7} *3*; α(N+..)=2.36×10^{-5} *4*
		1061.52[@] *10*	15 *3*	638.045	2$^+$				
1814.13	3$^-$	525.70 *20*	35	1288.42	4$^+$	[E1]		0.00421	α(K)=0.00360 *5*; α(L)=0.000484 *7*; α(M)=0.0001042 *15*; α(N)=2.39×10^{-5} *4*; α(O)=3.67×10^{-6} *6* α(P)=2.37×10^{-7} *4*; α(N+..)=2.78×10^{-5} *4*
		1176.08 *6*	100 *6*	638.045	2$^+$	E1		8.60×10^{-4}	α(K)=0.000724 *11*; α(L)=9.40×10^{-5} *14*; α(M)=2.02×10^{-5} *3*; α(N)=4.63×10^{-6} *7*; α(O)=7.19×10^{-7} *10* α(P)=4.88×10^{-8} *7*; α(N+..)=2.13×10^{-5} *3*
1936.31	6$^+$	235.9 *3*	≈3	1699.912	5$^-$	(E1)			
		648.4 *3*	100 *26*	1288.42	4$^+$	E2		0.00726	α(K)=0.00601 *9*; α(L)=0.000974 *14*; α(M)=0.000214 *3*; α(N)=4.89×10^{-5} *7*; α(O)=7.36×10^{-6} *11* α(P)=4.11×10^{-7} *6*; α(N+..)=5.67×10^{-5} *8*
1947.36	2$^-$,3$^-$,4$^-$	813.06 *2*	100	1134.297	3$^-$	(E2)[‡]		0.00430	α(K)=0.00360 *5*; α(L)=0.000546 *8*; α(M)=0.0001194 *17*; α(N)=2.73×10^{-5} *4*; α(O)=4.15×10^{-6} *6* α(P)=2.48×10^{-7} *4*; α(N+..)=3.17×10^{-5} *5*
1955.371	2$^+$	436.980 *25*	66 *3*	1518.362	2$^+$	M1+E2	1.2 *4*	0.026 *4*	α(K)=0.022 *3*; α(L)=0.00355 *24*; α(M)=0.00078 *5*; α(N)=0.000179 *12*; α(O)=2.69×10^{-5} *21* α(P)=1.54×10^{-6} *24*; α(N+..)=0.000207 *14*
		524.90 *20*	38	1430.467	(2)$^+$	(M1)		0.0224	α(K)=0.0190 *3*; α(L)=0.00263 *4*; α(M)=0.000570 *8*; α(N)=0.0001312 *19*; α(O)=2.04×10^{-5} *3* α(P)=1.389×10^{-6} *20*; α(N+..)=0.0001530 *22*
		748.23	34	1207.135	0$^+$				
		821.067 *20*	100 *6*	1134.297	3$^-$	E1		1.66×10^{-3}	α(K)=0.001420 *20*; α(L)=0.000187 *3*; α(M)=4.02×10^{-5} *6*; α(N)=9.22×10^{-6} *13* α(O)=1.426×10^{-6} *20*; α(P)=9.51×10^{-8} *14*; α(N+..)=1.074×10^{-5} *15*
		1317.50 *6*	29.7 *16*	638.045	2$^+$				
		1955.3[h] *2*	7.2[h] *16*	0.0	0$^+$				
1969.99		377.82 *15*	83 *25*	1592.428	1				
		450	5	1518.362	2$^+$				
		539.26 *15*	50 *25*	1430.467	(2)$^+$				
		1332.3 *4*	1.0×10^2 *4*	638.045	2$^+$				
1987.93	2$^+$,3$^+$,4$^+$	557.45 *3*	36.5 *16*	1430.467	(2)$^+$	E2		0.01053	α(K)=0.00864 *12*; α(L)=0.001480 *21*; α(M)=0.000327

$^{150}_{64}$Gd$_{86}$-11

γ(^{150}Gd) (continued)

E_i(level)	J_i^π	E_γ	I_γ[a]	E_f	J_f^π	Mult.[†]	α[g]	Comments
								5; α(N)=7.46×10^{-5} *11* α(O)=1.111×10^{-5} *16*; α(P)=5.85×10^{-7} *9*; α(N+..)=8.63×10^{-5} *12*
1987.93	2$^+$,3$^+$,4$^+$	699.47	22.2	1288.42	4$^+$			
		1349.83	100	638.045	2$^+$	E2	1.53×10^{-3}	α(K)=0.001278 *18*; α(L)=0.0001763 *25*; α(M)=3.81×10^{-5} *6*; α(N)=8.75×10^{-6} *13* α(O)=1.351×10^{-6} *19*; α(P)=8.87×10^{-8} *13*; α(N+..)=4.06×10^{-5} *6*
2080.61	(2,3,4)$^+$	560	17.5	1518.362	2$^+$			
		650.33	75	1430.467	(2)$^+$	(E2)	0.00720	α(K)=0.00597 *9*; α(L)=0.000967 *14*; α(M)=0.000213 *3*; α(N)=4.86×10^{-5} *7*; α(O)=7.30×10^{-6} *11* α(P)=4.08×10^{-7} *6*; α(N+..)=5.63×10^{-5} *8*
		792.38	75	1288.42	4$^+$	(E2)	0.00456	α(K)=0.00381 *6*; α(L)=0.000582 *9*; α(M)=0.0001272 *18*; α(N)=2.91×10^{-5} *4*; α(O)=4.42×10^{-6} *7* α(P)=2.63×10^{-7} *4*; α(N+..)=3.38×10^{-5} *5*
		945.7 *2*	30 *8*	1134.297	3$^-$			
		1442.7 *1*	<100	638.045	2$^+$			
2083.96	2$^-$,3$^-$	491.57 *5*	2.3 *23*	1592.428	1			
		565.71	13.1	1518.362	2$^+$			
		949.90 *5*	100 *5*	1134.297	3$^-$	(M1)	0.00517	α(K)=0.00441 *7*; α(L)=0.000599 *9*; α(M)=0.0001293 *19*; α(N)=2.98×10^{-5} *5*; α(O)=4.64×10^{-6} *7* α(P)=3.19×10^{-7} *5*; α(N+..)=3.47×10^{-5} *5*
		1446.1 *1*	51 *5*	638.045	2$^+$			
2091.623	2$^+$	573.30	9.4	1518.362	2$^+$	M1	0.0179	α(K)=0.01521 *22*; α(L)=0.00210 *3*; α(M)=0.000455 *7*; α(N)=0.0001047 *15* α(O)=1.630×10^{-5} *23*; α(P)=1.110×10^{-6} *16*; α(N+..)=0.0001221 *17*
		661.18 *4*	1.48	1430.467	(2)$^+$			
		803	0.93	1288.42	4$^+$			
		884.45 *5*	5.7 *4*	1207.135	0$^+$	[E2]	0.00358	α(K)=0.00301 *5*; α(L)=0.000447 *7*; α(M)=9.73×10^{-5} *14*; α(N)=2.23×10^{-5} *4*; α(O)=3.40×10^{-6} *5* α(P)=2.08×10^{-7} *3*; α(N+..)=2.59×10^{-5} *4*
		957.33 *4*	19.6 *12*	1134.297	3$^-$	E1	1.23×10^{-3}	α(K)=0.001057 *15*; α(L)=0.0001383 *20*; α(M)=2.97×10^{-5} *5*; α(N)=6.82×10^{-6} *10* α(O)=1.056×10^{-6} *15*; α(P)=7.10×10^{-8} *10*; α(N+..)=7.94×10^{-6} *12*
		1453.55 *4*	100 *6*	638.045	2$^+$	(M1)	0.00196	α(K)=0.001618 *23*; α(L)=0.000217 *3*; α(M)=4.67×10^{-5} *7*; α(N)=1.076×10^{-5} *15* α(O)=1.680×10^{-6} *24*; α(P)=1.162×10^{-7} *17*; α(N+..)=7.91×10^{-5} *11*
		2091.56 *10*	48.0 *24*	0.0	0$^+$			
2115.75	6$^+$	179.4[#i] *3*	≈1.3[#]	1936.31	6$^+$	E2	0.320	α(K)=0.215 *4*; α(L)=0.0815 *13*; α(M)=0.0189 *3*; α(N)=0.00424 *7*; α(O)=0.000577 *9* α(P)=1.203×10^{-5} *18*; α(N+..)=0.00483 *8*
		415.3[#@] *2*	25[#] *11*	1699.912	5$^-$	E1	0.00722	α(K)=0.00615 *9*; α(L)=0.000838 *12*; α(M)=0.000181 *3*; α(N)=4.14×10^{-5} *6*; α(O)=6.33×10^{-6} *9* α(P)=4.01×10^{-7} *6*; α(N+..)=4.81×10^{-5} *7*

$^{150}_{64}$Gd$_{86}$-12

$\gamma(^{150}Gd)$ (continued)

E_i(level)	J_i^π	E_γ	I_γ[a]	E_f	J_f^π	Mult.[†]	α[g]	Comments
2115.75	6^+	827.48[#@] 10	100[#] 14	1288.42	4^+	E2	0.00414	α(K)=0.00347 5; α(L)=0.000524 8; α(M)=0.0001143 16; α(N)=2.62×10^{-5} 4; α(O)=3.98×10^{-6} 6 α(P)=2.39×10^{-7} 4; α(N+..)=3.04×10^{-5} 5
2157.5		1023	4	1134.297	3^-			
		1519.6	100	638.045	2^+			
2179.912	2^+	224.4 1	3.9 12	1955.371	2^+			
		587	2.8	1592.428	1			
		661.55 4	4.5	1518.362	2^+			
		749.43 2	3.9	1430.467	$(2)^+$			
		1045.60 3	100 5	1134.297	3^-	E1	1.05×10^{-3}	α(K)=0.000897 13; α(L)=0.0001169 17; α(M)=2.51×10^{-5} 4; α(N)=5.76×10^{-6} 8 α(O)=8.93×10^{-7} 13; α(P)=6.03×10^{-8} 9; α(N+..)=6.71×10^{-6} 10
		1541.94 6	39.66 22	638.045	2^+			
		2179.9[h] 2	33.1[h] 17	0.0	0^+			
2209.54	$2^-,3^-$	779.09 4	47 5	1430.467	$(2)^+$			
		1075.25 3	100 5	1134.297	3^-	M1	0.00384	α(K)=0.00328 5; α(L)=0.000444 7; α(M)=9.57×10^{-5} 14; α(N)=2.20×10^{-5} 3; α(O)=3.44×10^{-6} 5 α(P)=2.37×10^{-7} 4; α(N+..)=2.57×10^{-5} 4
		1571.26[@] 12	21 4	638.045	2^+			
2211.11	7^-	95.5 2	2.0 4	2115.75	6^+	(E1)		
		274.9 3	8 3	1936.31	6^+	E1[b]	0.0199	α(K)=0.01687 24; α(L)=0.00235 4; α(M)=0.000507 8; α(N)=0.0001158 17; α(O)=1.76×10^{-5} 3 α(P)=1.066×10^{-6} 16; α(N+..)=0.0001344 20 Mult.: from (α,2nγ).
		511	100 16	1699.912	5^-	E2	0.01318	α(K)=0.01074 15; α(L)=0.00191 3; α(M)=0.000423 6; α(N)=9.63×10^{-5} 14; α(O)=1.426×10^{-5} 20 α(P)=7.21×10^{-7} 10; α(N+..)=0.0001113 16
2262.21		743.86 6	20.8	1518.362	2^+			
		831.73 7	14.6	1430.467	$(2)^+$			
		1127.7 1	65 4	1134.297	3^-			
		1624.20 6	100 7	638.045	2^+			
2306.2	$(5^-,6^+)$	≈95[b]		2211.11	7^-			
		606.8 5	100[d] 10	1699.912	5^-			
		1017.2 5	14 2	1288.42	4^+			
2326.283		338.36 5	36 6	1987.93	$2^+,3^+,4^+$			
		626.47 10	24 6	1699.912	5^-			
		807.71[@] 15	20 4	1518.362	2^+			
		895.86 5	48 4	1430.467	$(2)^+$			
		1037.9 3	14 6	1288.42	4^+			
		1688.23 1	100[e] 10	638.045	2^+			

$^{150}_{64}Gd_{86}$-13

$\gamma(^{150}Gd)$ (continued)

E_i(level)	J^π_i	E_γ	I_γ[a]	E_f	J^π_f	Mult.[†]	α[g]	Comments
2364.91	1,2+	772.52 8	17.2 19	1592.428	1			
		846.5 2	3.1 19	1518.362	2+			
		1157.76 8	16.0 13	1207.135	0+			
		1231	1.840	1134.297	3−			
		1726.85 15	23.9 25	638.045	2+			
		2364.93 10	100 5	0.0	0+			
2392.06	(7)+	180.9[#] 3	[#]	2211.11	7−	(M1+E2)		
		276[@]		2115.75	6+			
		455.7[#@] 2	[#]	1936.31	6+	M1	0.0320	α(K)=0.0272 4; α(L)=0.00379 6; α(M)=0.000821 12; α(N)=0.000189 3; α(O)=2.94×10^{-5} 5 α(P)=1.99×10^{-6} 3; α(N+..)=0.000220 3
2408.53	2+	328 1	6 4	2080.61	(2,3,4)+			
		977.78 8	20.5 24	1430.467	(2)+			
		1120.1 5	16 8	1288.42	4+			
		1274.51 10	45 4	1134.297	3−			
		1770.45 6	100 5	638.045	2+			
2416.7?	3	1778.6 5	100	638.045	2+			
2426.20	1−,2+	908.1 3	1.9 12	1518.362	2+			
		995.38 10	10.4 19	1430.467	(2)+			
		1291.66 3	85 5	1134.297	3−			
		1788.91 5	100 5	638.045	2+			
		2425.98 10	63 3	0.0	0+			
2434.34		916.1 3	19 7	1518.362	2+			
		1003.8 2	9.375	1430.467	(2)+			
		1796.29 10	100 10	638.045	2+			
2521.56	(2+,3,4+)	574.1 5	15.79	1947.36	2−,3−,4−			
		1003.2[h] 2	26.32[h]	1518.362	2+			
		1091.0 1	47.37	1430.467	(2)+			
		1233.2 2	53 8	1288.42	4+			
		1387.2	21 14	1134.297	3−			
		1883.6 1	100 8	638.045	2+			
2554.14	8+	162.0[#@] 2	14[#] 4	2392.06	(7)+	M1	0.513	α(K)=0.434 7; α(L)=0.0622 9; α(M)=0.01352 20; α(N)=0.00311 5; α(O)=0.000483 7 α(P)=3.23×10^{-5} 5; α(N+..)=0.00363 6
		343.07[#@] 10	59[#] 19	2211.11	7−	E1	0.01142	α(K)=0.00972 14; α(L)=0.001337 19; α(M)=0.000288 4; α(N)=6.59×10^{-5} 10 α(O)=1.005×10^{-5} 14; α(P)=6.25×10^{-7} 9; α(N+..)=7.66×10^{-5} 11
		438.37[#] 10	100[#] 45	2115.75	6+	E2	0.0199	α(K)=0.01598 23; α(L)=0.00305 5; α(M)=0.000680 10; α(N)=0.0001546 22 α(O)=2.26×10^{-5} 4; α(P)=1.057×10^{-6} 15; α(N+..)=0.0001783 25
2558.51	1,2+	1351.2	16.67	1207.135	0+			

$^{150}_{64}Gd_{86}$-14

Adopted Levels, Gammas (continued)

γ(^{150}Gd) (continued)

E_i(level)	J_i^π	E_γ	I_γ[a]	E_f	J_f^π	Mult.[†]	α[g]	Comments
2558.51	1,2$^+$	2558.49 *20*	100 *10*	0.0	0$^+$			
2564.96	(1$^-$,2$^-$,3$^-$)	972.7 *2*	27 *14*	1592.428	1			
		1134	90.91	1430.467	(2)$^+$			
		1430.5 *04*	9.×10^{1}[e] *9*	1134.297	3$^-$	(E2)	1.39×10^{-3}	α(K)=0.001143 *16*; α(L)=0.0001566 *22*; α(M)=3.38×10^{-5} *5*; α(N)=7.77×10^{-6} *11* α(O)=1.201×10^{-6} *17*; α(P)=7.93×10^{-8} *12*; α(N+..)=6.12×10^{-5} *9*
		1926.6 *2*	100 *14*	638.045	2$^+$			
		2565.4 *3*	50 *14*	0.0	0$^+$			
2593.9		1387.3	5.×10^{1} *7*	1207.135	0$^+$			
		1459	100	1134.297	3$^-$			
2627.99?		1035.8 *3*	30 *13*	1592.428	1			
		1493.67 *8*	100 *13*	1134.297	3$^-$			
		1989.6 *8*	48 *22*	638.045	2$^+$			
2654.39		666.49[@] *8*	6.7 *21*	1987.93	2$^+$,3$^+$,4$^+$			
		699.03	12.75	1955.371	2$^+$			
		1223.8[h] *5*	5.4[h] *21*	1430.467	(2)$^+$			
		2016.30 *10*	100 *5*	638.045	2$^+$			
2678.45	1,2$^+$	864.41	7.273	1814.13	3$^-$			
		1247.9 *2*	16 *4*	1430.467	(2)$^+$			
		1544.1 *5*	31 *15*	1134.297	3$^-$			
		2040.4 *2*	100 *8*	638.045	2$^+$			
		2678.6[h] *3*	40[h] *6*	0.0	0$^+$			
2686.84	1$^-$,2,3$^-$	322.0 *1*	16 *4*	2364.91	1,2$^+$			
		602.78 *6*	39 *4*	2083.96	2$^-$,3$^-$			
		739.6 *3*	7 *5*	1947.36	2$^-$,3$^-$,4$^-$			
		987.3 *3*	7 *4*	1699.912	5$^-$			
		1094.41 *5*	52.46	1592.428	1			
		1168.64 *6*	100 *7*	1518.362	2$^+$			
		1256.4	13 *5*	1430.467	(2)$^+$			
		1552.3[h] *5*	21[h] *10*	1134.297	3$^-$			
2754.58	2$^+$,3,4$^+$	492.35 *5*	15.6	2262.21				
		1466.1 *3*	5 *8*	1288.42	4$^+$			
		1620.30 *10*	33 *5*	1134.297	3$^-$			
		2116.8 *2*	100 *5*	638.045	2$^+$			
		2754.6 *8*	25 *8*	0.0	0$^+$			
2767.3?	(8$^+$)	831.0[#] *5*	100[#]	1936.31	6$^+$	[E2][f]	0.00410	α(K)=0.00344 *5*; α(L)=0.000518 *8*; α(M)=0.0001131 *16*; α(N)=2.59×10^{-5} *4*; α(O)=3.94×10^{-6} *6* α(P)=2.37×10^{-7} *4*; α(N+..)=3.01×10^{-5} *5*
2786.49	1$^-$,2$^+$	831.18 *7*	4.3	1955.371	2$^+$			
		839.2 *2*	4.3 *13*	1947.36	2$^-$,3$^-$,4$^-$			
		1193.9 *1*	8.0 *19*	1592.428	1			

$^{150}_{64}Gd_{86}$-15

$\gamma(^{150}Gd)$ (continued)

E_i(level)	J^π_i	E_γ	I_γ[a]	E_f	J^π_f	Mult.[†]	α[g]	Comments
2786.49	$1^-,2^+$	1267	4.3	1518.362	2^+			
		1356.01 *10*	15.3 *19*	1430.467	$(2)^+$			
		1652.26	13.5 *19*	1134.297	3^-			
		2148.44 *10*	100 *5*	638.045	2^+			
2816.1	9^-	605.0 *3*	100	2211.11	7^-	E2[&]	0.00859	α(K)=0.00708 *10*; α(L)=0.001176 *17*; α(M)=0.000259 *4*; α(N)=5.92×10^{-5} *9*; α(O)=8.86×10^{-6} *13* α(P)=4.82×10^{-7} *7*; α(N+..)=6.85×10^{-5} *10*
2827.81		743.84 *6*	100	2083.96	$2^-,3^-$			
		874		1955.371	2^+			
2834.8?	8^-	623.4[i] *3*	30[e] *10*	2211.11	7^-			
2845.41	$1,2^+$	753.8 *3*	1.6 *11*	2091.623	2^+			
		1326.7 *2*	7.1 *17*	1518.362	2^+			
		1414.95 *6*	27.5 *17*	1430.467	$(2)^+$			
		1638.06[@] *10*	14.3 *22*	1207.135	0^+			
		2207.58 *10*	100 *5*	638.045	2^+			
		2845.65[h] *25*	19[h] *3*	0.0	0^+			
2868.27		1579.92 *10*	100 *20*	1288.42	4^+			
		1733.7 *2*	88 *16*	1134.297	3^-			
2906.0?	8^+	789.9[#i] *4*	100[#]	2115.75	6^+	E2	0.00459	α(K)=0.00384 *6*; α(L)=0.000587 *9*; α(M)=0.0001282 *18*; α(N)=2.94×10^{-5} *5*; α(O)=4.45×10^{-6} *7* α(P)=2.64×10^{-7} *4*; α(N+..)=3.41×10^{-5} *5*
2956.20		746	12.7	2209.54	$2^-,3^-$			
		864.55	12.7	2091.623	2^+			
		871.9 *2*	10 *4*	2083.96	$2^-,3^-$			
		968.3 *5*	32 *8*	1987.93	$2^+,3^+,4^+$			
		1001.0 *2*	27 *7*	1955.371	2^+			
		1008.1 *3*	19 *7*	1947.36	$2^-,3^-,4^-$			
		1365.3 *3*	16 *5*	1592.428	1			
		1525.70 *5*	98 *5*	1430.467	$(2)^+$			
		1822.2 *5*	16 *7*	1134.297	3^-			
		2318.14 *10*	100 *5*	638.045	2^+			
2984.95	$1,2^+$	997.8 *24*	19 *6*	1987.93	$2^+,3^+,4^+$			
		1392.4[@] *4*	17 *6*	1592.428	1			
		1466.6 *3*	10 *7*	1518.362	2^+			
		1554.4 *4*	38 *9*	1430.467	$(2)^+$			
		1778.8	27.78	1207.135	0^+			
		2346.9 *2*	38 *5*	638.045	2^+			
		2984.90 *15*	100 *6*	0.0	0^+			
3024.7		1596	100	1430.467	$(2)^+$			
		3024.5 *3*	100 *17*	0.0	0^+			
3035.64	$1^-,2^+$	826.34 *15*	7.1 *11*	2209.54	$2^-,3^-$			
		952	30	2083.96	$2^-,3^-$			

$^{150}_{64}Gd_{86}$-16

$\gamma(^{150}Gd)$ (continued)

E_i(level)	J^π_i	E_γ	I_γ[a]	E_f	J^π_f	Mult.[†]	α[g]	Comments
3035.64	$1^-,2^+$	1443.3 *1*	>40.40	1592.428	1			
		1517.4	10.10	1518.362	2^+			
		1605.44 *11*	22 *3*	1430.467	$(2)^+$			
		1747.3	30	1288.42	4^+			
		1901.74 *10*	97 *5*	1134.297	3^-			
		2397.04 *10*	100 *5*	638.045	2^+			
		3034.86 *15*	53 *3*	0.0	0^+			
3042.61		1908.6 *4*	50 *19*	1134.297	3^-			
		3042.4 *3*	100 *9*	0.0	0^+			
3083.76?		1130.4 *7*	20 *14*	1955.371	2^+			
		1652.6	20 *10*	1430.467	$(2)^+$			
		1876.6 *4*	20 *10*	1207.135	0^+			
		1949.3 *2*	100 *10*	1134.297	3^-			
		2446.1 *10*	50 *17*	638.045	2^+			
3118.75		1600.10 *15*	78 *13*	1518.362	2^+			
		1688.27 *10*	70 *22*	1430.467	$(2)^+$			
		1830.7 *5*	39 *18*	1288.42	4^+			
		1984.9 *2*	100 *18*	1134.297	3^-			
3134.13		1541.94 *6*	27 *16*	1592.428	1			
		1615.37 *10*	58 *12*	1518.362	2^+			
		1702.5 *3*	31 *12*	1430.467	$(2)^+$			
		2494.7 *8*	100 *20*	638.045	2^+			
		3133.6 *2*	58 *8*	0.0	0^+			
3176.8		622.7 *5*	100	2554.14	8^+			
3177.732		1094.19 *5*	10.1	2083.96	$2^-,3^-$			
		1585.19 *14*	9 *4*	1592.428	1			
		1659.9	14 *4*	1518.362	2^+			
		1747.8	12.66	1430.467	$(2)^+$			
		2043.7 *10*	14 *9*	1134.297	3^-			
		2539.645 *10*	100 *5*	638.045	2^+			
3220.3	10^-	404.3[#@] *3*	100[#]	2816.1	9^-	M1+E2	0.034 *10*	α(K)=0.028 *9*; α(L)=0.0046 *7*; α(M)=0.00100 *12*; α(N)=0.00023 *3*; α(O)=3.5×10^{-5} *6* α(P)=2.0×10^{-6} *8*; α(N+..)=0.00027 *4*
3251.5		1660.0	100 *19*	1592.428	1			
		2614.3 *10*	$8.\times10^1$ *4*	638.045	2^+			
		3250.8 *6*	38 *13*	0.0	0^+			
3269.32?		1089.4 *1*	100	2179.912	2^+			
3288.2	10^+	472		2816.1	9^-			
		734.0[#@] *3*	100[#]	2554.14	8^+	E2	0.00542	α(K)=0.00452 *7*; α(L)=0.000705 *10*; α(M)=0.0001544 *22*; α(N)=3.53×10^{-5} *5*; α(O)=5.34×10^{-6} *8* α(P)=3.11×10^{-7} *5*; α(N+..)=4.10×10^{-5} *6*
3298.34		1351.7	42	1947.36	$2^-,3^-,4^-$			

$^{150}_{64}Gd_{86}$-17

Adopted Levels, Gammas (continued)

$\gamma(^{150}Gd)$ (continued)

E_i(level)	J^π_i	E_γ	I_γ[a]	E_f	J^π_f
3298.34		2661.20 *25*	100 *13*	638.045	2^+
3329.33		1737.2 *6*	17 *10*	1592.428	1
		1811.9 *3*	24 *8*	1518.362	2^+
		2194.6 *2*	100 *8*	1134.297	3^-
		2691.0[@] *5*	44 *8*	638.045	2^+
3344.68	(2^+)	935.4 *2*	7 *4*	2408.53	2^+
		1253.0[h] *1*	22[h] *4*	2091.623	2^+
		1260.5 *2*	10 *5*	2083.96	$2^-,3^-$
		1389.6 *4*	29 *7*	1955.371	2^+
		1530.5 *3*	12 *5*	1814.13	3^-
		1645.5 *2*	22 *5*	1699.912	5^-
		1752.1 *2*	32 *5*	1592.428	1
		1826.2 *5*	24 *9*	1518.362	2^+
		1914.3 *2*	100 *11*	1430.467	$(2)^+$
		2056.3 *2*	20 *5*	1288.42	4^+
		2210	34	1134.297	3^-
		2706.86 *15*	88 *5*	638.045	2^+
		3344.3 *5*	13.6 *17*	0.0	0^+
3366.4	11^-	≈78[@i]		3288.2	10^+
		146.2[#@] *3*	42[#] *23*	3220.3	10^-
		550.3[#@] *3*	100[#] *30*	2816.1	9^-
3375.72		1049.3 *4*	16 *10*	2326.283	
		2241.42[@] *15*	53 *7*	1134.297	3^-
		2737.8 *5*	100 *19*	638.045	2^+
		3375.5 *7*	14 *5*	0.0	0^+
3378.11		1563.96 *10*	50 *7*	1814.13	3^-
		1947	16.7	1430.467	$(2)^+$
		2740.3 *4*	100 *17*	638.045	2^+
3389.2		2751.0 *10*	$6.\times10^1$ *5*	638.045	2^+
		3389.2 *5*	100 *13*	0.0	0^+
3461.7	2^+	1943	4	1518.362	2^+
		2173.4 *5*	1.0×10^2 *3*	1288.42	4^+
3510.72	$(1^-,2^+)$	1918	17.95	1592.428	1
		2376.6[@] *2*	85 *8*	1134.297	3^-
		2872.2 *3*	100 *13*	638.045	2^+
3522.4		3522.4 *6*	100	0.0	0^+
3631.4		2201.4 *8*	1.0×10^2 *4*	1430.467	$(2)^+$
		2498	29	1134.297	3^-
		2993.2 *3*	71 *15*	638.045	2^+
3657.35?	2^+	1668.8[@] *3*	56 *17*	1987.93	$2^+,3^+,4^+$
		2450.2 *10*	44 *23*	1207.135	0^+

$\gamma(^{150}Gd)$ (continued)

E_i(level)	J^π_i	E_γ	I_γ[a]	E_f	J^π_f	Mult.[†]	α[g]	Comments
3657.35?	2^+	3657.74 25	100 6	0.0	0^+			
3712.40		1631.7 2	1.0×10^2 4	2080.61	$(2,3,4)^+$			
		2579.5 8	$9.\times10^1$ 4	1134.297	3^-			
3726.63		1518.24	85.11	2209.54	$2^-,3^-$			
		2296.9[h] 8	6[h] 5	1430.467	$(2)^+$			
		2592.25 15	100 7	1134.297	3^-			
3772.03		2636.8 5	$5.\times10^1$ 3	1134.297	3^-			
		3134.1 2	100	638.045	2^+			
3828.4?	$(1,2^+)$	2621.8[h] 5	1.0×10^2[h] 4	1207.135	0^+			
		3828.0 4	33 7	0.0	0^+			
3840.04		1852 2	16.39	1987.93	$2^+,3^+,4^+$			
		2409.36 20	100 5	1430.467	$(2)^+$			
		3202.4 3	20 4	638.045	2^+			
3963.64		2372	28	1592.428	1			
		2532.5 3	1.0×10^2 3	1430.467	$(2)^+$			
		2828.5 6	33 17	1134.297	3^-			
		3327.7 5	67 6	638.045	2^+			
4021.2?	$(1,2^+)$	3383.6[@] 5	1.0×10^2 5	638.045	2^+			
		4020.8 4	0.71 7	0.0	0^+			
4105.4	12^+	817[@]	100	3288.2	10^+	E2[&]	0.00425	α(K)=0.00357 5; α(L)=0.000540 8; α(M)=0.0001179 17; α(N)=2.70×10^{-5} 4; α(O)=4.10×10^{-6} 6; α(P)=2.46×10^{-7} 4; α(N+..)=3.14×10^{-5} 5
4111.07?	$1^-,2^+$	2822.7 6	27 14	1288.42	4^+			
		2975.9[h] 6	40[h] 14	1134.297	3^-			
		4111.2 3	100 14	0.0	0^+			
4131.1	13^-	764.7[#@] 2	100[#]	3366.4	11^-	E2[&]	0.00494	α(K)=0.00412 6; α(L)=0.000636 9; α(M)=0.0001391 20; α(N)=3.18×10^{-5} 5; α(O)=4.82×10^{-6} 7; α(P)=2.84×10^{-7} 4; α(N+..)=3.69×10^{-5} 6
4143.8?	$(1^-,2^+)$	3008.9 3	100 17	1134.297	3^-			
		4145.4 5	67 9	0.0	0^+			
4151.0		3512.1 7	1.0×10^2 4	638.045	2^+			
		4151.3 5	40 9	0.0	0^+			
4164.0	2^+	2876.6 6	100 23	1288.42	4^+			
		3525.7 8	23 9	638.045	2^+			
		4163.3 5	13.6 23	0.0	0^+			
4178.6		2971.7 10	1.0×10^2 7	1207.135	0^+			
		4178.5 5	80 17	0.0	0^+			
4186.9	$(12)^-$	966.6[#] 3	100[#]	3220.3	10^-	E2[&]	0.00296	α(K)=0.00249 4; α(L)=0.000363 5; α(M)=7.90×10^{-5} 11; α(N)=1.81×10^{-5} 3; α(O)=2.77×10^{-6} 4; α(P)=1.725×10^{-7} 25; α(N+..)=2.11×10^{-5} 3

$^{150}_{64}Gd_{86}$-19

$\gamma(^{150}Gd)$ (continued)

E_i(level)	J^{π}_i	E_γ	I_γ[a]	E_f	J^{π}_f
4206.9	(1,2$^+$)	3570.6[@] 6	52 8	638.045	2$^+$
		4206.4 3	100 6	0.0	0$^+$
4235.2?	(1$^-$,2$^+$)	4235.1[@] 6	100	0.0	0$^+$
4246.2?	(1,2$^+$)	3609.4 8	43 11	638.045	2$^+$
		4246.0 3	100 6	0.0	0$^+$
4258.0	(1$^-$,2$^+$)	3124.0[@] 3	100 14	1134.297	3$^-$
		4256.5 6	14 4	0.0	0$^+$
4264.6	2$^+$	4264.5 3	100	0.0	0$^+$
4283.1?	(1,2$^+$)	4283.0 10	100	0.0	0$^+$
4289.4?	(1,2$^+$)	4289.3 3	100	0.0	0$^+$
4296.7		4296.6 10	100	0.0	0$^+$
4303.2		3096.1 3	100 11	1207.135	0$^+$
		4302.4 8	7 3	0.0	0$^+$
4314.0	1,2$^+$	3675.3 5	100 23	638.045	2$^+$
		4314.2 3	70 6	0.0	0$^+$
4322.0	2$^+$	3684.3[@] 4	65 11	638.045	2$^+$
		4321.6 4	100 6	0.0	0$^+$
4343.9	(1,2$^+$)	2913.7 4	100 20	1430.467	(2)$^+$
		4343.3[@] 6	10 3	0.0	0$^+$
4378.6?	(1$^+$,2$^+$)	4378.5[@] 6	100	0.0	0$^+$
4405.3	(1,2$^+$)	3768.4 10	7.×10^1 4	638.045	2$^+$
		4405.1 3	100 6	0.0	0$^+$
4419.7	(13)	232.4 3	25 10	4186.9	(12)$^-$
4435.2		3797.4 7	1.0×10^2 4	638.045	2$^+$
		4434.4 10	19 10	0.0	0$^+$
4445.9	1,2$^+$	3239.2 5	61 7	1207.135	0$^+$
		4445.7 3	100 5	0.0	0$^+$
4462.3		4462.2 8	100	0.0	0$^+$
4492.8		3854.5 8	1.0×10^2 5	638.045	2$^+$
		4493.3 15	12 9	0.0	0$^+$
4499.8		4499.7 8	100	0.0	0$^+$
4522.8?		3884.7[@] 6	100	638.045	2$^+$
4529.4?	(1,2$^+$)	2935.6[@] 4	100 20	1592.428	1
		4531.5[@] 5	9.0 20	0.0	0$^+$
4545.6		3907.5 6	100	638.045	2$^+$
4557.2		4557.1 10	100	0.0	0$^+$
4563.3		4563.2 10	100	0.0	0$^+$
4739.6	14$^+$	634	100	4105.4	12$^+$
4744.9		3152.4 3	100 15	1592.428	1
		3314.5[@] 6	29 8	1430.467	(2)$^+$

$\gamma(^{150}Gd)$ (continued)

E_i(level)	J^π_i	E_γ	I_γ[a]	E_f	J^π_f	Mult.[†]
4834.9	15^-	704[#@]	100[#]	4131.1	13^-	
5428.8	16^+	594[@]		4834.9	15^-	
		689[@]		4739.6	14^+	
5450.9	17^-	616[@]	100	4834.9	15^-	
5632.8	17^+	204[@]	100	5428.8	16^+	
5764.8	18^+	132[@]		5632.8	17^+	
		314[@]		5450.9	17^-	D
		336[@]		5428.8	16^+	
6311.8	(19^-)	547[@]	100	5764.8	18^+	
6450.8	(20^+)	686[@]	100	5764.8	18^+	
6495.8	(21^-)	184[@]	100	6311.8	(19^-)	
7275.8	(23^-)	780[@]	100	6495.8	(21^-)	
7929.8	(25^-)	654[@]	100	7275.8	(23^-)	
8325	(27^-)	395[@]	100	7929.8	(25^-)	
9410?	(28^+)	1085[@]	100	8325	(27^-)	
9497	(29^-)	1172[@]	100	8325	(27^-)	
9582	(29^+)	172[@]	100	9410?	(28^+)	
9851	(30^+)	269[@]		9582	(29^+)	
		354[@]		9497	(29^-)	
10532	(31^+)	950[@]	100	9582	(29^+)	
11231	(33^+)	699[@]	100	10532	(31^+)	
12185	(34^-)	954[@]	100	11231	(33^+)	
12678	$(36^-,34^+)$	493[@]	100	12185	(34^-)	
815.00+x	J+2	815.0 *1*	0.66[c] *2*	x	$J\approx(30^+)$	
1664.10+x	J+4	849.1 *1*	0.88[c] *1*	815.00+x	J+2	
1931.3+x	J+4	910.2 *2*	0.39[c] *2*	1021.1+x	J+2	
2552.00+x	J+6	887.9 *1*	1.00[c] *1*	1664.10+x	J+4	
2897.4+x	J+6	966.1 *3*	0.53[c] *3*	1931.3+x	J+4	
3012.6+x	J+6	856		2156.6+x	J+4	
3480.90+x	J+8	928.9 *1*	1.00[c] *1*	2552.00+x	J+6	
3893.0+x	J+8	995.6 *3*	0.55[c] *3*	2897.4+x	J+6	
3960.6+x	J+8	948		3012.6+x	J+6	
4451.79+x	J+10	970.9 *1*	1.00[c] *1*	3480.90+x	J+8	
4861.7+x	J+10	901		3960.6+x	J+8	
		968.6 *3*	0.60[c] *3*	3893.0+x	J+8	
		1380	≈0.05[c]	3480.90+x	J+8	
5465.28+x	J+12	1013.5 *1*	0.99[c] *1*	4451.79+x	J+10	

$^{150}_{64}Gd_{86}$-21

γ(^{150}Gd) (continued)

E_i(level)	J^π_i	E_γ	I_γ[a]	E_f	J^π_f
5860.7+x	J+12	999.0 2	0.86[c] 3	4861.7+x	J+10
		1408	≈0.05	4451.79+x	J+10
6521.8+x	J+14	1056.5 1	1.00[c] 1	5465.28+x	J+12
6907.6+x	J+14	1046.8 2	0.89[c] 3	5860.7+x	J+12
		1442	≈0.05[c]	5465.28+x	J+12
7621.8+x	J+16	1100.1 1	0.97[c] 1	6521.8+x	J+14
8005.2+x	J+16	1097.6 2	0.96[c] 2	6907.6+x	J+14
		1484	≈0.05[c]	6521.8+x	J+14
8766.4+x	J+18	1144.6 1	0.99[c] 1	7621.8+x	J+16
9154.0+x	J+18	1148.7 2	0.98[c] 2	8005.2+x	J+16
		1532	≈0.05[c]	7621.8+x	J+16
9956.9+x	J+20	1190.5 1	0.95[c] 1	8766.4+x	J+18
10354.0+x	J+20	1199.9 2	1.00[c] 1	9154.0+x	J+18
		1588	≈0.05[c]	8766.4+x	J+18
11194.8+x	J+22	1237.9 1	0.96[c] 2	9956.9+x	J+20
11604.9+x	J+22	1250.9 2	1.02[c] 3	10354.0+x	J+20
		1649	≈0.05[c]	9956.9+x	J+20
12481.4+x	J+24	1286.6 1	0.89[c] 2	11194.8+x	J+22
12906.1+x	J+24	1301.2 2	0.96[c] 3	11604.9+x	J+22
13818.0+x	J+26	1336.6 1	0.81[c] 2	12481.4+x	J+24
14257.7+x	J+26	1351.6 2	0.85[c] 3	12906.1+x	J+24
15205.8+x	J+28	1387.8 1	0.65[c] 2	13818.0+x	J+26
15658.7+x	J+28	1401.0 2	0.71[c] 2	14257.7+x	J+26
16645.9+x	J+30	1440.1 1	0.48[c] 2	15205.8+x	J+28
17109.1+x	J+30	1450.4 2	0.54[c] 2	15658.7+x	J+28
18139.1+x	J+32	1493.1 2	0.28[c] 2	16645.9+x	J+30
18608.2+x	J+32	1499.1 3	0.39[c] 2	17109.1+x	J+30
19686.1+x	J+34	1547.0 3	0.13[c] 2	18139.1+x	J+32
20155.8+x	J+34	1547.6 4	0.14[c] 1	18608.2+x	J+32
21287.8+x	J+36	1601.7 4	0.05[c] 2	19686.1+x	J+34
21751.8+x	J+36	1595.9 7	0.044[c] 10	20155.8+x	J+34
23397.3+x	J+38	1645.5 9		21751.8+x	J+36
688.1+y	K+2	688.1 3	0.35[c] 5	y	K≈(27$^-$)
1423.8+y	K+4	735.8 4	0.48[c] 4	688.1+y	K+2
2015.5+y	K+4	727.9 2	0.41[c] 2	1287.6+y	K+2
2208.9+y	K+6	785.2 5	0.71[c] 5	1423.8+y	K+4
2787.0+y	K+6	771.5 2	0.81[c] 2	2015.5+y	K+4
3043.3+y	K+8	834.4 3	0.92[c] 4	2208.9+y	K+6
3601.3+y	K+8	814.3 2	0.94[c] 2	2787.0+y	K+6
3928.6+y	K+10	885.3 3	0.92[c] 2	3043.3+y	K+8

γ(^{150}Gd) (continued)

E$_i$(level)	J$^\pi_i$	E$_\gamma$	I$_\gamma$[a]	E$_f$	J$^\pi_f$	Comments
4458.6+y	K+10	857.3 *5*	0.97[c] *2*	3601.3+y	K+8	
4865.1+y	K+12	936.6 *4*	0.93[c] *2*	3928.6+y	K+10	
5359.3+y	K+12	900.7 *2*	1.00[c] *2*	4458.6+y	K+10	
5853.7+y	K+14	988.6 *2*	0.93[c] *2*	4865.1+y	K+12	
6304.6+y	K+14	945.3 *2*	0.99[c] *2*	5359.3+y	K+12	
6894.6+y	K+16	1040.9 *2*	0.95[c] *2*	5853.7+y	K+14	
7295.2+y	K+16	990.6 *2*	0.99[c] *2*	6304.6+y	K+14	
7989.9+y	K+18	1095.3 *2*	0.97[c] *2*	6894.6+y	K+16	
8331.9+y	K+18	1036.7 *2*	0.99[c] *2*	7295.2+y	K+16	
9139.2+y	K+20	1149.3 *2*	1.00[c] *2*	7989.9+y	K+18	
9415.2+y	K+20	1083.3 *2*	1.00[c] *2*	8331.9+y	K+18	
10343.1+y	K+22	1203.9 *2*	1.00[c] *2*	9139.2+y	K+20	
10546.6+y	K+22	1131.4 *3*	1.01[c] *2*	9415.2+y	K+20	
11602.4+y	K+24	1259.3 *2*	0.93[c] *2*	10343.1+y	K+22	
11725.9+y	K+24	1179.3 *2*	1.00[c] *2*	10546.6+y	K+22	
12916.1+y	K+26	1313.7 *2*	0.81[c] *2*	11602.4+y	K+24	
12955.8+y	K+26	1229.8 *2*	0.94[c] *2*	11725.9+y	K+24	
		1354	≈0.03[c]	11602.4+y	K+24	
14229.1+y	K+28	1273.4 *2*	0.81[c] *2*	12955.8+y	K+26	
		1314		12916.1+y	K+26	I$_\gamma$: Iγ(1314)/Iγ(1273)=0.22 *4* (1998ErZY).
14293.5+y	J+28	1338		12955.8+y	K+26	I$_\gamma$: Iγ(1338)/Iγ(1377)=0.095 *6* (1998ErZY).
		1377.3 *2*	0.69[c] *2*	12916.1+y	K+26	
15557.7+y	K+30	1328.6 *2*	0.73[c] *2*	14229.1+y	K+28	
15721.8+y	K+30	1428.3 *2*	0.55[c] *2*	14293.5+y	J+28	
		1494		14229.1+y	K+28	
16936.3+y	K+32	1378.6 *2*	0.58[c] *2*	15557.7+y	K+30	
17208.2+y	K+32	1486.4 *3*	0.40[c] *2*	15721.8+y	K+30	
18366.7+y	K+34	1430.3 *2*	0.46[c] *2*	16936.3+y	K+32	
18751.4+y	K+34	1543.2 *4*	0.19[c] *1*	17208.2+y	K+32	
19848.9+y	K+36	1482.2 *3*	0.26[c] *2*	18366.7+y	K+34	
20351.6+y	K+36	1600.1 *6*	0.08[c] *1*	18751.4+y	K+34	
21384.3+y	K+38	1535.4 *4*	0.097[c] *10*	19848.9+y	K+36	
22010.0+y	K+38	1658.4 *6*	0.044[c] *10*	20351.6+y	K+36	
22972.1+y	J+40	1587.8 *7*	0.035[c] *10*	21384.3+y	K+38	
712.5+z	L+2	712.5 *3*	0.76[c] *2*	z	L≈(28$^-$)	
1473.7+z	L+4	761.2 *3*	0.89[c] *3*	712.5+z	L+2	
2284.2+z	L+6	810.5 *3*	0.94[c] *3*	1473.7+z	L+4	
3144.2+z	L+8	860.0 *3*	0.97[c] *2*	2284.2+z	L+6	
4054.7+z	L+10	910.6 *4*	1.03[c] *2*	3144.2+z	L+8	
5017.2+z	L+12	962.5 *4*	1.02[c] *2*	4054.7+z	L+10	

$^{150}_{64}$Gd$_{86}$-23

$\gamma(^{150}Gd)$ (continued)

E_i(level)	J^π_i	E_γ	I_γ[a]	E_f	J^π_f	Comments
6032.1+z	L+14	1014.9 *3*	1.03[c] *2*	5017.2+z	L+12	
7100.3+z	L+16	1068.2 *2*	1.03[c] *2*	6032.1+z	L+14	
8222.7+z	L+18	1122.4 *3*	1.01[c] *2*	7100.3+z	L+16	
9399.8+z	L+20	1177.1 *3*	1.03[c] *2*	8222.7+z	L+18	
10632.1+z	L+22	1232.2 *3*	1.02[c] *2*	9399.8+z	L+20	
11919.8+z	L+24	1287.7 *3*	0.97[c] *3*	10632.1+z	L+22	
13263.6+z	L+26	1343.8 *3*	0.90[c] *2*	11919.8+z	L+24	
14664.1+z	L+28	1400.5 *3*	0.76[c] *2*	13263.6+z	L+26	
16121.2+z	L+30	1457.1 *3*	0.59[c] *2*	14664.1+z	L+28	
17635.1+z	L+32	1513.9 *3*	0.38[c] *1*	16121.2+z	L+30	
19204.2+z	L+34	1569.1 *3*	0.23[c] *1*	17635.1+z	L+32	
771.5+u	M+2	771.6 *4*		u	M≈(27$^+$)	
1588.6+u	M+4	817.1 *3*	0.78[c] *3*	771.5+u	M+2	
2451.5+u	M+6	862.9 *2*	0.88[c] *3*	1588.6+u	M+4	
3359.9+u	M+8	908.4 *2*	0.89[c] *3*	2451.5+u	M+6	
4313.1+u	M+10	953.2 *2*	0.99[c] *3*	3359.9+u	M+8	
5311.3+u	M+12	998.3 *2*	0.93[c] *3*	4313.1+u	M+10	
6353.7+u	M+14	1042.4 *3*	0.93[c] *3*	5311.3+u	M+12	
7441.4+u	M+16	1087.7 *4*	1.06[c] *3*	6353.7+u	M+14	
8574.4+u	M+18	1133.1 *2*	1.04[c] *3*	7441.4+u	M+16	
9753.9+u	M+20	1179.4 *2*	1.04[c] *3*	8574.4+u	M+18	
10980.9+u	M+22	1227.1 *4*	1.03[c] *3*	9753.9+u	M+20	
12256.0+u	M+24	1275.1 *2*	1.00[c] *4*	10980.9+u	M+22	
13581.2+u	M+26	1325.2 *3*	0.91[c] *4*	12256.0+u	M+24	
14956.3+u	M+28	1375.1 *3*	0.71[c] *4*	13581.2+u	M+26	
16382.4+u	M+30	1426.1 *3*	0.53[c] *3*	14956.3+u	M+28	
17862.5+u	M+32	1480.1 *3*	0.32[c] *3*	16382.4+u	M+30	
19379.2+u	M+34	1516.7 *4*		17862.5+u	M+32	
20915.2+u	M+36	1536.0 *4*		19379.2+u	M+34	E_γ: From 1998ErZY.
22505.2+u	M+38	1589.9 *8*		20915.2+u	M+36	
733.20+v	N+2	733.2 *2*		v	N≈(29$^+$)	
1511.4+v	N+4	778.2 *2*		733.20+v	N+2	
2341.2+v	N+6	829.9 *2*	0.93[c] *2*	1511.4+v	N+4	
3221.1+v	N+8	879.8 *2*	0.99[c] *2*	2341.2+v	N+6	
4151.2+v	N+10	930.2 *2*	1.01[c] *2*	3221.1+v	N+8	
5132.6+v	N+12	981.4 *2*	1.03[c] *1*	4151.2+v	N+10	
6166.5+v	N+14	1033.9 *2*	1.04[c] *1*	5132.6+v	N+12	
7253.5+v	N+16	1087.0 *2*	1.03[c] *1*	6166.5+v	N+14	
8394.9+v	N+18	1141.4 *2*	1.02[c] *1*	7253.5+v	N+16	
9590.4+v	N+20	1195.6 *3*	0.98[c] *1*	8394.9+v	N+18	

$^{150}_{64}Gd_{86}$-24

Adopted Levels, Gammas (continued)

γ(^{150}Gd) (continued)

E$_i$(level)	J$^\pi_i$	E$_\gamma$	I$_\gamma$[a]	E$_f$	J$^\pi_f$	E$_i$(level)	J$^\pi_i$	E$_\gamma$	I$_\gamma$[a]	E$_f$	J$^\pi_f$
10841.4+v	N+22	1250.9 2	0.95[c] 1	9590.4+v	N+20	16199.5+s	J2+28	1534.0 5	0.37[c] 3	14665.5+s	J2+26
12147.9+v	N+24	1306.5 2	0.95[c] 1	10841.4+v	N+22	17793.6+s	J2+30	1594.1 7	0.17[c] 3	16199.5+s	J2+28
13510.5+v	N+26	1362.7 3	0.91[c] 1	12147.9+v	N+24	19446.1+s	J2+32	1652.5 9	0.05[c] 3	17793.6+s	J2+30
14929.5+v	N+28	1419.0 3	0.77[c] 2	13510.5+v	N+26	827.6+t	J3+2	827.8 5	0.59[c] 2	t	J3≈(33$^+$)
16404.8+v	N+30	1475.3 4	0.51[c] 2	14929.5+v	N+28	1702.9+t	J3+4	875.4 4	0.70[c] 2	827.6+t	J3+2
17937.1+v	N+32	1532.3 6	0.34[c] 2	16404.8+v	N+30	2627.2+t	J3+6	924.4 3	0.91[c] 2	1702.9+t	J3+4
19527.0+v	N+34	1589.9 7	0.14[c] 3	17937.1+v	N+32	3601.5+t	J3+8	974.4 4	0.96[c] 2	2627.2+t	J3+6
21171.8+v	N+36	1644.7 9		19527.0+v	N+34	4626.6+t	J3+10	1025.1 3	1.00[c] 2	3601.5+t	J3+8
711.1+w	J1+2	711.2 5	[c]	w	J1≈(28$^+$)	5703.4+t	J3+12	1076.9 4	0.99[c] 2	4626.6+t	J3+10
1469.4+w	J1+4	758.5 7	[c]	711.1+w	J1+2	6832.3+t	J3+14	1128.9 4	1.02[c] 2	5703.4+t	J3+12
2275.8+w	J1+6	806.4 2	0.78[c] 1	1469.4+w	J1+4	8014.8+t	J3+16	1182.5 5	1.04[c] 2	6832.3+t	J3+14
3131.3+w	J1+8	855.6 2	0.86[c] 1	2275.8+w	J1+6	9250.8+t	J3+18	1236.1 4	0.98[c] 2	8014.8+t	J3+16
4036.7+w	J1+10	905.4 2	0.92[c] 1	3131.3+w	J1+8	10540.9+t	J3+20	1290.1 4	0.97[c] 2	9250.8+t	J3+18
4993.1+w	J1+12	956.4 2	1.00[c] 1	4036.7+w	J1+10	11885.9+t	J3+22	1345.0 4	0.97[c] 2	10540.9+t	J3+20
6001.3+w	J1+14	1008.2 2	1.04[c] 1	4993.1+w	J1+12	13286.0+t	J3+24	1400.1 5	0.84[c] 2	11885.9+t	J3+22
7062.1+w	J1+16	1060.8 2	1.01[c] 1	6001.3+w	J1+14	14741.9+t	J3+26	1455.9 6	0.67[c] 2	13286.0+t	J3+24
8176.0+w	J1+18	1113.9 2	1.01[c] 1	7062.1+w	J1+16	16253.7+t	J3+28	1511.8 7	0.50[c] 3	14741.9+t	J3+26
9344.4+w	J1+20	1168.4 2	1.03[c] 1	8176.0+w	J1+18	17821.0+t	J3+30	1567.3 9	0.18[c] 4	16253.7+t	J3+28
10567.0+w	J1+22	1222.6 2	1.00[c] 1	9344.4+w	J1+20	804.0+a	J4+2	804.1 4		a	J4≈(32$^+$)
11845.0+w	J1+24	1278.0 2	0.94[c] 1	10567.0+w	J1+22	1655.6+a	J4+4	851.7 4	0.87[c] 1	804.0+a	J4+2
13178.7+w	J1+26	1333.7 2	0.75[c] 1	11845.0+w	J1+24	2555.8+a	J4+6	900.2 3	0.91[c] 1	1655.6+a	J4+4
14568.9+w	J1+28	1390.2 3	0.58[c] 1	13178.7+w	J1+26	3507.0+a	J4+8	951.3 4	0.95[c] 1	2555.8+a	J4+6
16015.7+w	J1+30	1446.8 3	0.41[c] 2	14568.9+w	J1+28	4508.5+a	J4+10	1001.5 3	0.98[c] 1	3507.0+a	J4+8
17519.6+w	J1+32	1503.9 4	0.24[c] 2	16015.7+w	J1+30	5562.2+a	J4+12	1053.8 4	0.99[c] 1	4508.5+a	J4+10
19080.3+w	J1+34	1560.7 6	0.15[c] 2	17519.6+w	J1+32	6660.4+a	J4+14	1098.1 3	0.99[c] 1	5562.2+a	J4+12
20698.2+w	J1+36	1617.9 8	0.08[c] 3	19080.3+w	J1+34	7822.2+a	J4+16	1161.8 3	1.00[c] 1	6660.4+a	J4+14
800.4+s	J2+2	800.6 4	0.38[c] 2	s	J2≈(31$^+$)	9034.6+a	J4+18	1212.4 3	1.00[c] 1	7822.2+a	J4+16
1650.3+s	J2+4	850.0 3	0.83[c] 2	800.4+s	J2+2	10300.5+a	J4+20	1265.9 5	1.00[c] 1	9034.6+a	J4+18
2552.7+s	J2+6	902.4 2	0.90[c] 2	1650.3+s	J2+4	11621.0+a	J4+22	1320.6 5	1.01[c] 1	10300.5+a	J4+20
3507.9+s	J2+8	955.3 3	0.97[c] 2	2552.7+s	J2+6	12996.6+a	J4+24	1375.6 5	0.92[c] 2	11621.0+a	J4+22
4518.1+s	J2+10	1010.2 2	1.03[c] 1	3507.9+s	J2+8	14427.3+a	J4+26	1430.7 8	0.84[c] 2	12996.6+a	J4+24
5584.2+s	J2+12	1066.2 2	1.00[c] 1	4518.1+s	J2+10	15912.7+a	J4+28	1485.4 9	0.48[c] 2	14427.3+a	J4+26
6706.4+s	J2+14	1122.2 2	0.99[c] 1	5584.2+s	J2+12	17451.6+a	J4+30	1538.9 9	0.33[c] 3	15912.7+a	J4+28
7886.2+s	J2+16	1179.8 2	0.99[c] 1	6706.4+s	J2+14	830.0+b	J5+2	830.1 5	0.86[c] 1	b	J5≈(34$^+$)
9124.2+s	J2+18	1238.0 3	0.99[c] 1	7886.2+s	J2+16	1706.5+b	J5+4	876.6 4	0.91[c] 1	830.0+b	J5+2
10420.8+s	J2+20	1296.6 3	0.99[c] 2	9124.2+s	J2+18	2629.1+b	J5+6	922.6 5	0.95[c] 1	1706.5+b	J5+4
11776.5+s	J2+22	1355.7 3	0.84[c] 1	10420.8+s	J2+20	3599.1+b	J5+8	970.0 3	0.97[c] 1	2629.1+b	J5+6
13191.5+s	J2+24	1415.0 3	0.68[c] 2	11776.5+s	J2+22	4615.7+b	J5+10	1016.6 4	0.97[c] 1	3599.1+b	J5+8
14665.5+s	J2+26	1474.0 4	0.53[c] 2	13191.5+s	J2+24	5680.0+b	J5+12	1064.3 4	0.99[c] 1	4615.7+b	J5+10

$^{150}_{64}Gd_{86}$-25

γ(^{150}Gd) (continued)

E_i(level)	J^π_i	E_γ	I_γ[a]	E_f	J^π_f	Comments
6792.0+b	J5+14	1112.0 5	1.00[c] 1	5680.0+b	J5+12	
7952.0+b	J5+16	1160.0 7	0.97[c] 1	6792.0+b	J5+14	
9159.7+b	J5+18	1207.7 6	1.01[c] 1	7952.0+b	J5+16	
10414.1+b	J5+20	1254.4 5	1.01[c] 1	9159.7+b	J5+18	
11716.8+b	J5+22	1302.7 5	1.01[c] 1	10414.1+b	J5+20	
13068.5+b	J5+24	1351.7 5	1.01[c] 1	11716.8+b	J5+22	
14468.6+b	J5+26	1400.1 5	0.99[c] 2	13068.5+b	J5+24	
15917.5+b	J5+28	1448.9 5	0.82[c] 2	14468.6+b	J5+26	
17412.5+b	J5+30	1495.0 9	0.50[c] 2	15917.5+b	J5+28	
815.1+c	J6+2	815.1 7		c	J6≈(29$^+$)	
1664.1+c	J6+4	849.1 4		815.1+c	J6+2	
2553.1+c	J6+6	889.1 8		1664.1+c	J6+4	
3430.8+c	J6+8	877.7 6	0.79[c] 2	2553.1+c	J6+6	
4353.5+c	J6+10	922.7 5	0.97[c] 2	3430.8+c	J6+8	
5322.9+c	J6+12	969.4 5	0.99[c] 1	4353.5+c	J6+10	
6338.5+c	J6+14	1015.6 5	0.99[c] 1	5322.9+c	J6+12	
7403.9+c	J6+16	1065.4 6	0.99[c] 1	6338.5+c	J6+14	
8516.3+c	J6+18	1112.5 6	1.00[c] 1	7403.9+c	J6+16	
9682.2+c	J6+20	1165.9 7	1.02[c] 1	8516.3+c	J6+18	
10901.0+c	J6+22	1218.8 6	0.99[c] 2	9682.2+c	J6+20	
12172.4+c	J6+24	1271.4 6	0.94[c] 2	10901.0+c	J6+22	
13499.3+c	J6+26	1326.9 5	0.80[c] 2	12172.4+c	J6+24	
14881.7+c	J6+28	1382.4 7	0.73[c] 2	13499.3+c	J6+26	
16320.1+c	J6+30	1438.4 6	0.59[c] 2	14881.7+c	J6+28	
17816.2+c	J6+32	1496.1 8	0.42[c] 2	16320.1+c	J6+30	
19373+c	J6+34	1556.6 9	0.18[c] 3	17816.2+c	J6+32	
808.9+d	J7+2	808.9 5	0.76[c] 2	d	J7≈(28$^+$)	
1667.4+d	J7+4	858.6 7		808.9+d	J7+2	
2577.0+d	J7+6	909.8 8		1667.4+d	J7+4	
3433.3+d	J7+8	856.5 8	0.75[c] 2	2577.0+d	J7+6	I_γ: Probably combined for 856.6+858.6.
4334.0+d	J7+10	900.7 5	0.89[c] 2	3433.3+d	J7+8	I_γ: Probably combined for 900.7+909.8.
5279.6+d	J7+12	945.7 5	0.95[c] 2	4334.0+d	J7+10	
6271.1+d	J7+14	991.6 5	1.02[c] 2	5279.6+d	J7+12	
7311.5+d	J7+16	1040.3 8	1.00[c] 1	6271.1+d	J7+14	
8404.3+d	J7+18	1093.0 9	1.00[c] 1	7311.5+d	J7+16	
9544.6+d	J7+20	1140.3 5	0.99[c] 1	8404.3+d	J7+18	
10736.6+d	J7+22	1192.0 5	0.98[c] 1	9544.6+d	J7+20	
11981.5+d	J7+24	1244.9 6	0.97[c] 1	10736.6+d	J7+22	
13280.5+d	J7+26	1299.1 6	0.80[c] 1	11981.5+d	J7+24	
14635.3+d	J7+28	1354.8 8	0.63[c] 1	13280.5+d	J7+26	

$^{150}_{64}Gd_{86}$-26

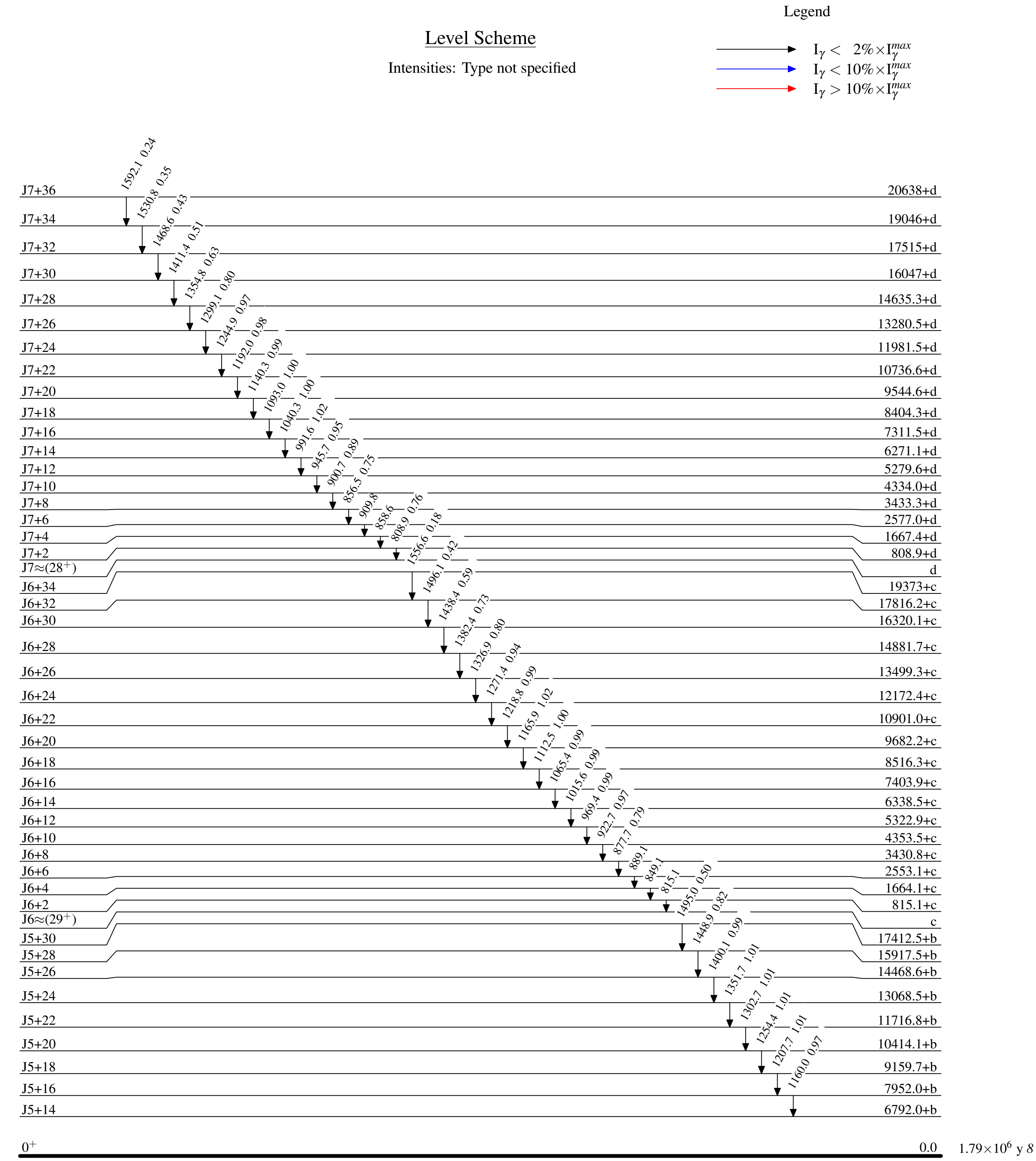
$\gamma(^{150}Gd)$ (continued)

E_i(level)	J^π_i	E_γ	I_γ[a]	E_f	J^π_f
16047+d	J7+30	1411.4 *6*	0.51[c] *2*	14635.3+d	J7+28
17515+d	J7+32	1468.6 *8*	0.43[c] *3*	16047+d	J7+30
19046+d	J7+34	1530.8 *8*	0.35[c] *4*	17515+d	J7+32
20638+d	J7+36	1592.1 *9*	0.24[c] *4*	19046+d	J7+34

† Transition multipolarities were determined from K-conversion coefficients in ^{150}Tb ε decay (3.48 h) (1977Ha31) or ^{150}Tb ε decay (5.8 min) (1977Ha21), unless otherwise noted.
‡ From (p,2nγ).
# From ^{150}Sm(α,4nγ).
@ From ^{124}Sn(^{30}Si,4nγ).
& From (α,4nγ).
[a] Relative photon branching at each level. Data from ^{150}Tb ε decay (3.48 h), except as noted.
[b] From (α,2nγ).
[c] Relative intensity within each SD band, normalized to ≈1 for the most intense transitions in the band. The values are read off the intensity plots provided by 1998ErZY.
[d] Placement may not be unique.
[e] Corrected for unresolved impurity peak by authors.
[f] Assumed stretched E2 although E1 not completely excluded by α(K)exp.
[g] 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.
[h] Multiply placed with undivided intensity.
[i] Placement of transition in the level scheme is uncertain.

$^{150}_{64}Gd_{86}$-27

Adopted Levels, Gammas

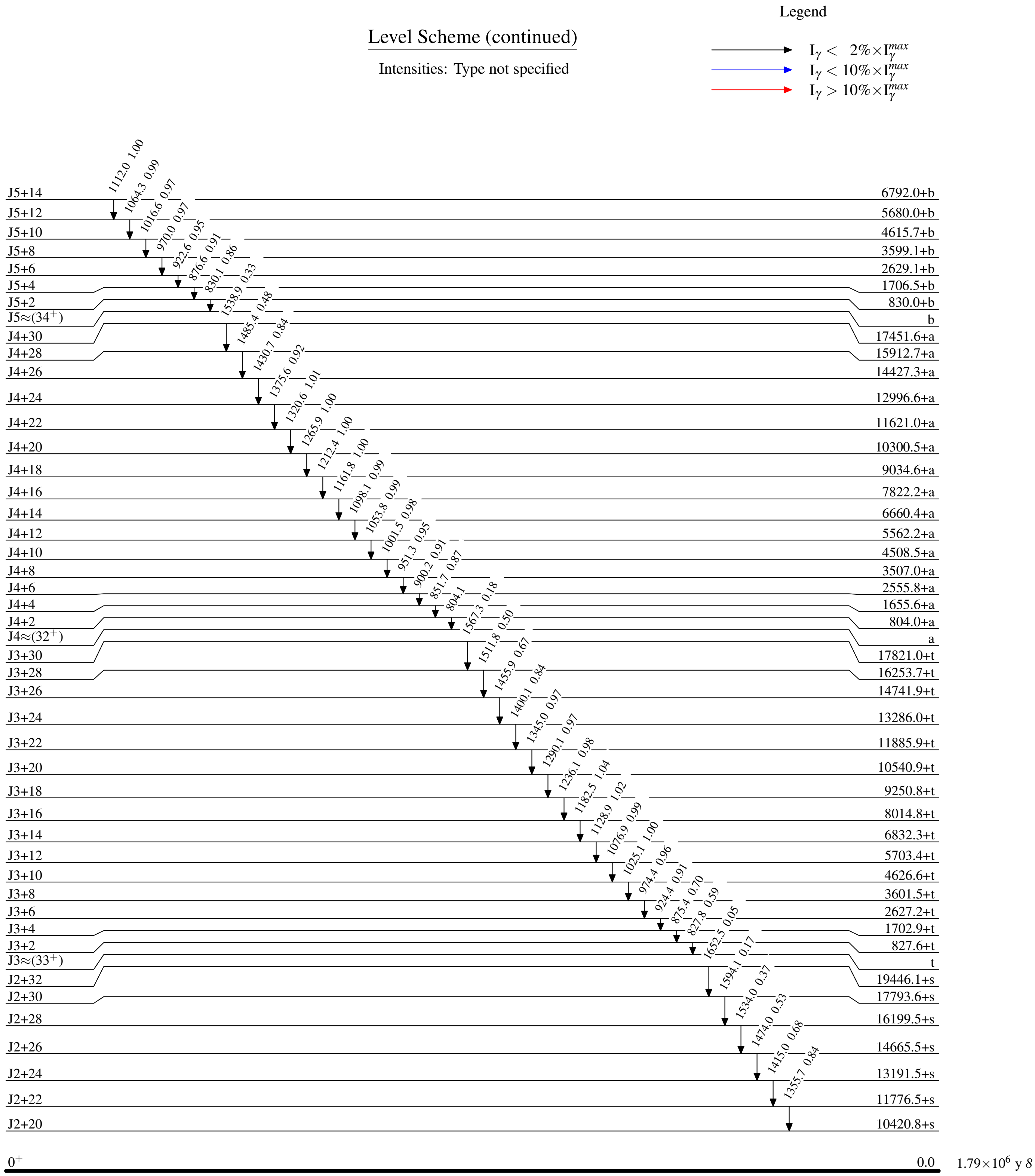


$^{150}_{64}Gd_{86}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified

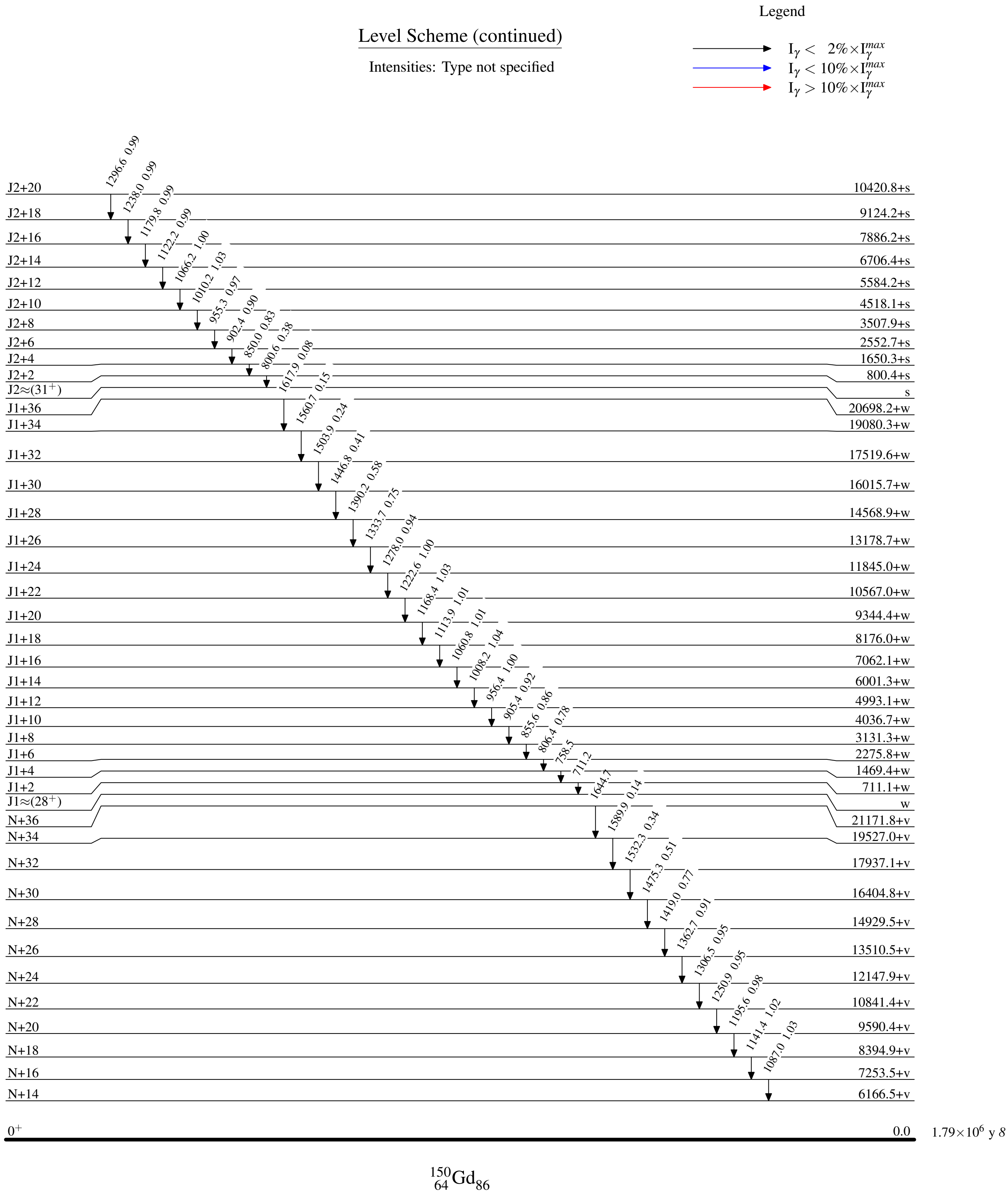


$^{150}_{64}Gd_{86}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified



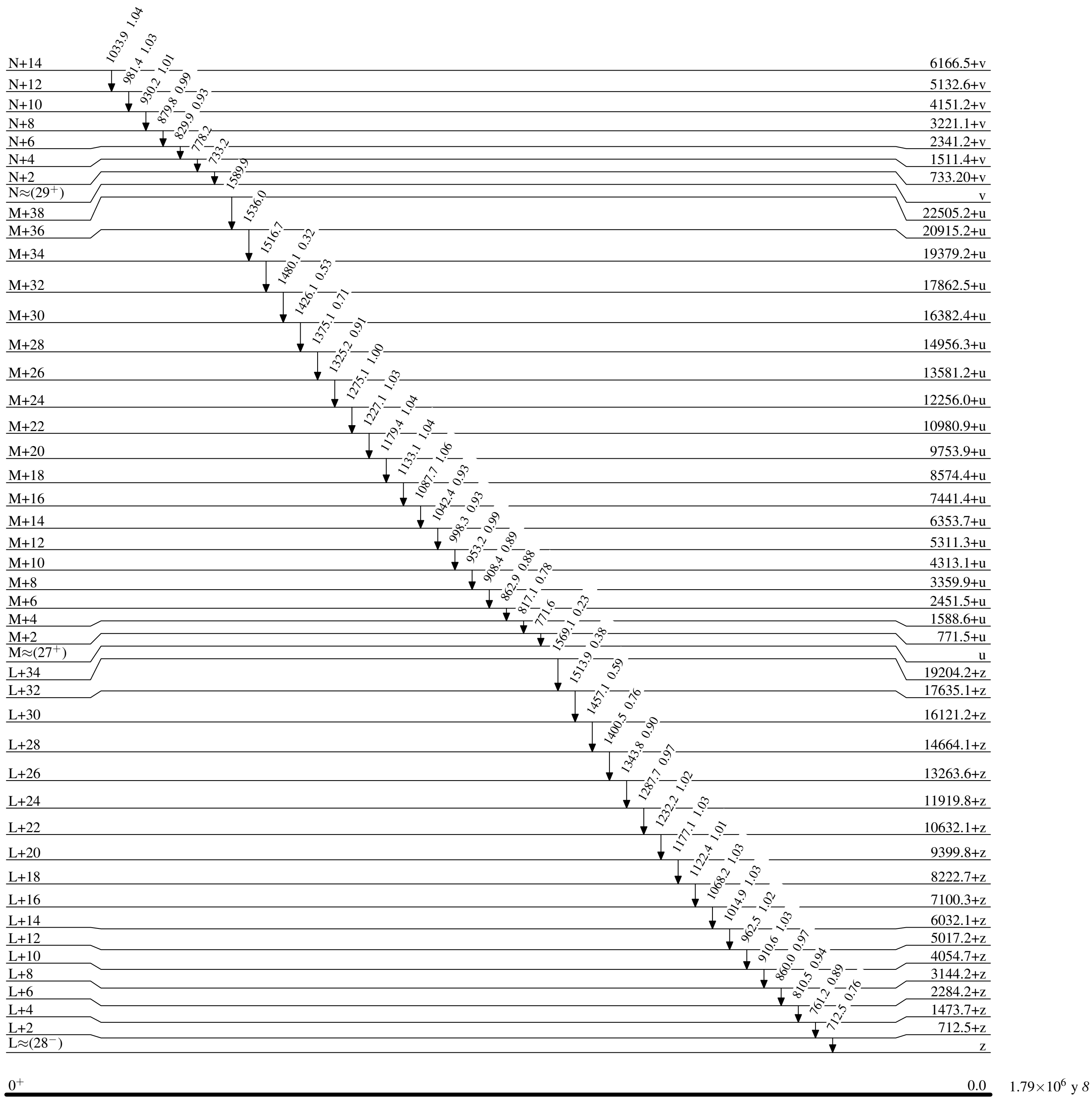
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified

Legend

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



$^{150}_{64}Gd_{86}$

Adopted Levels, Gammas

Level Scheme (continued)

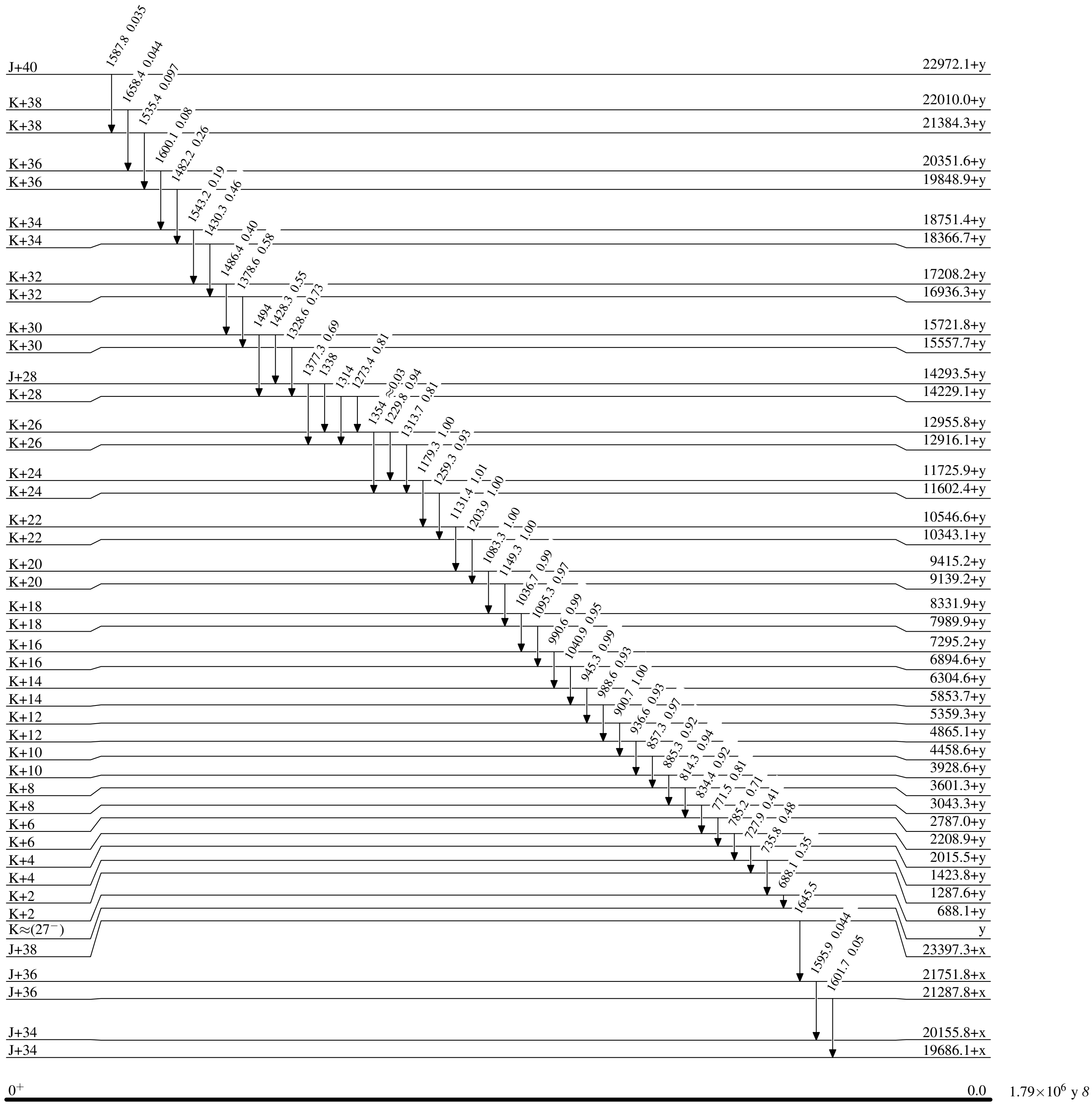
Intensities: Type not specified

Legend

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

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

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



$^{150}_{64}$Gd$_{86}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified

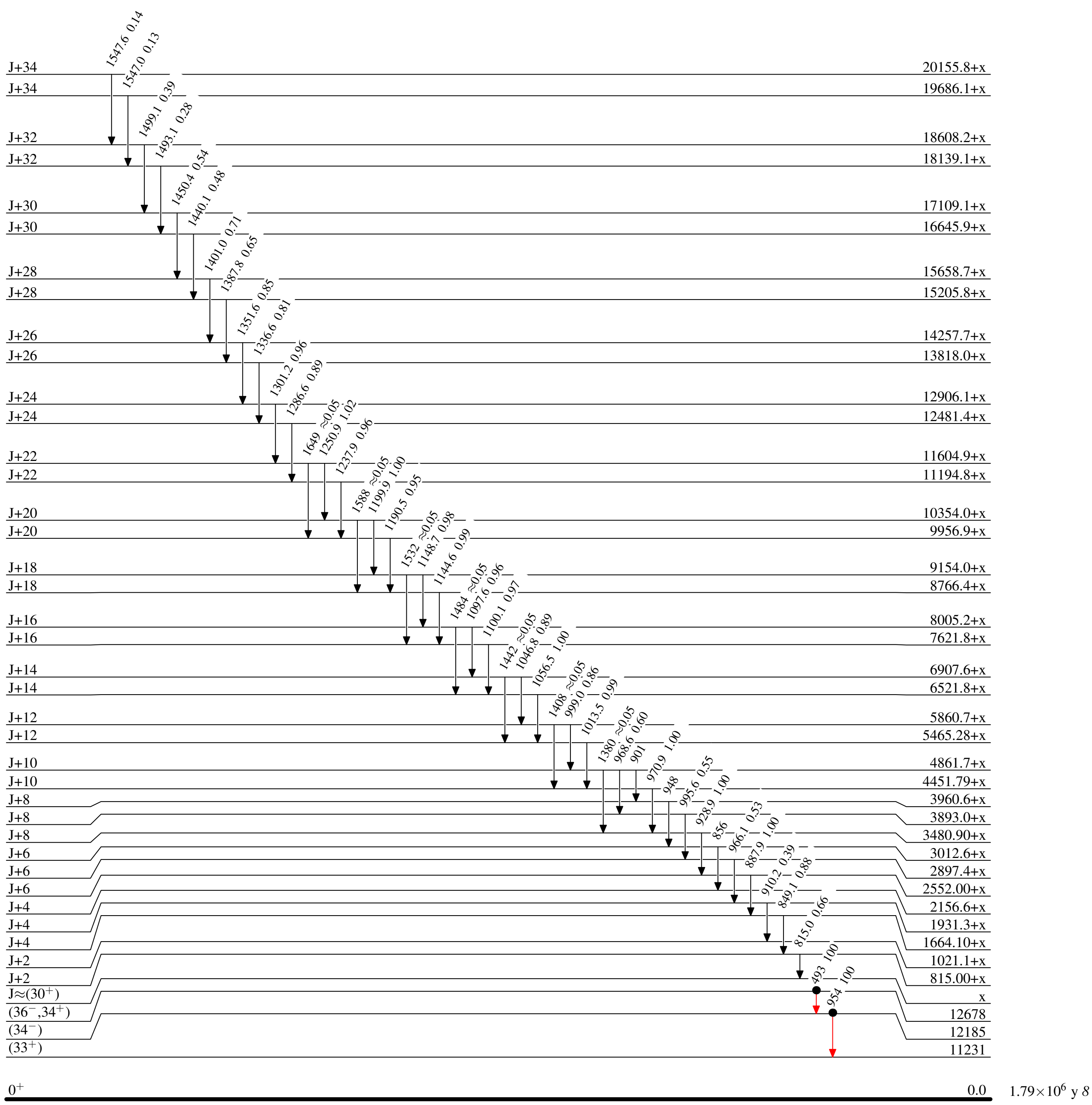
Legend

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

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

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

Coincidence

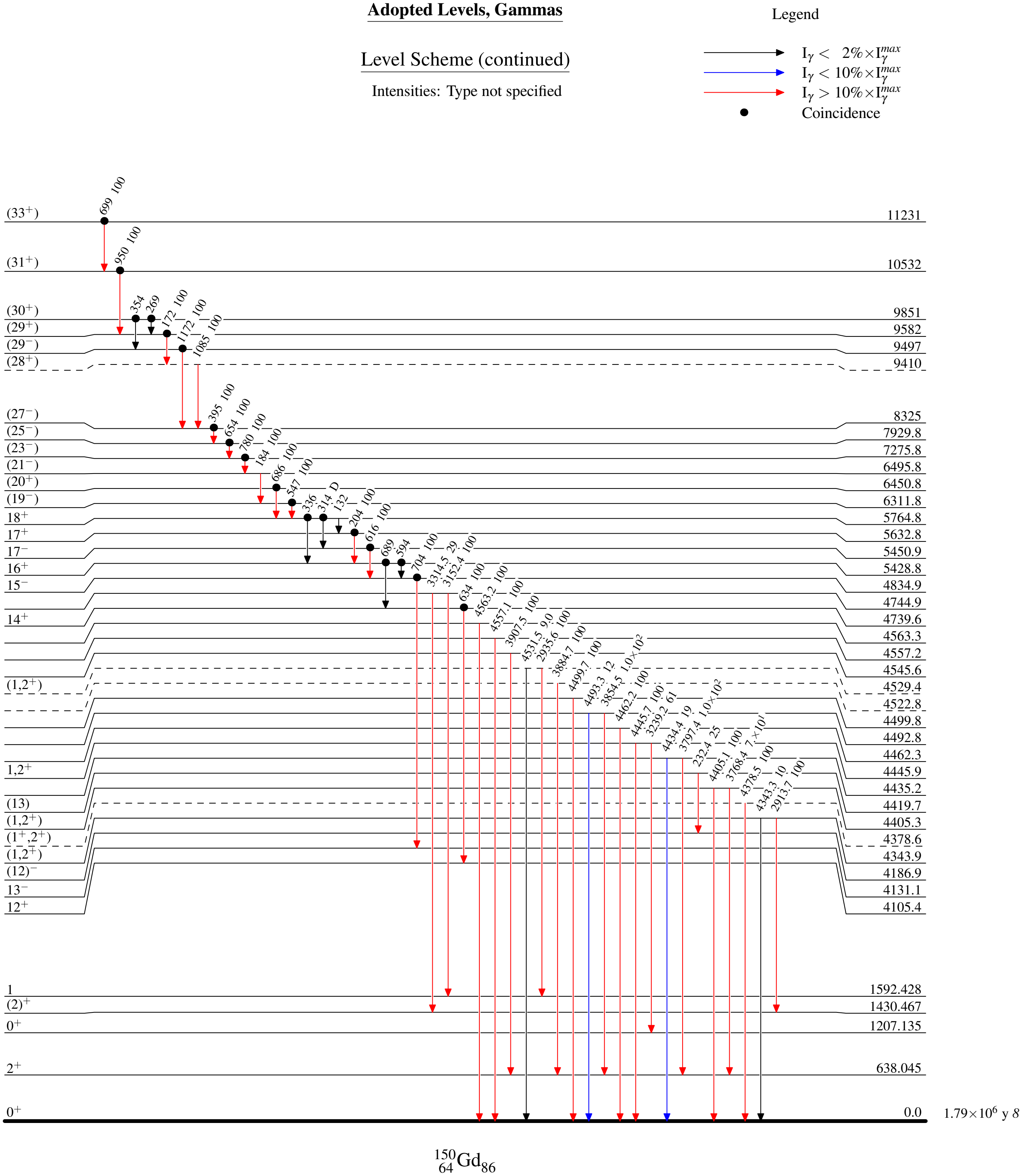


$^{150}_{64}Gd_{86}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified

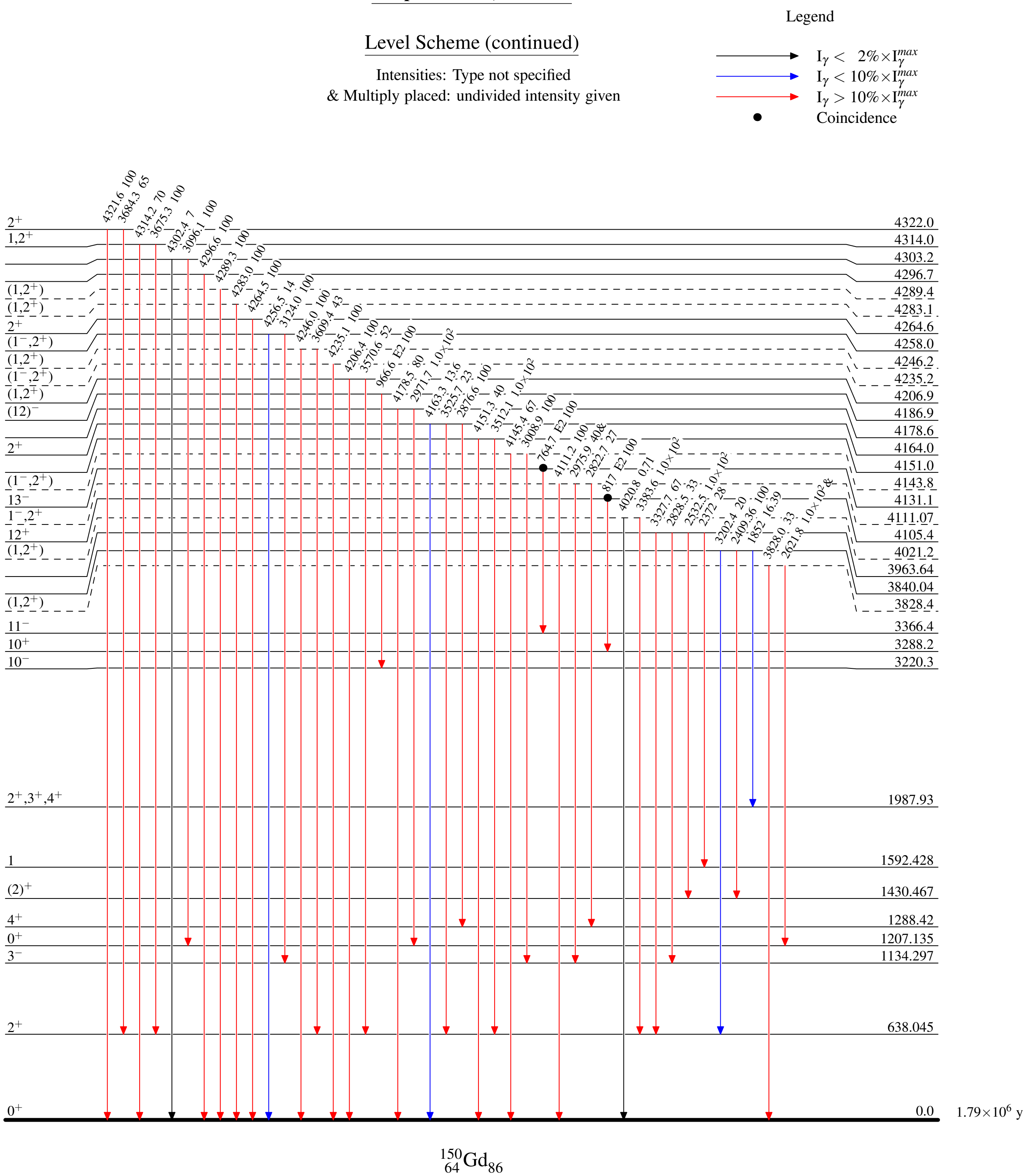


Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified

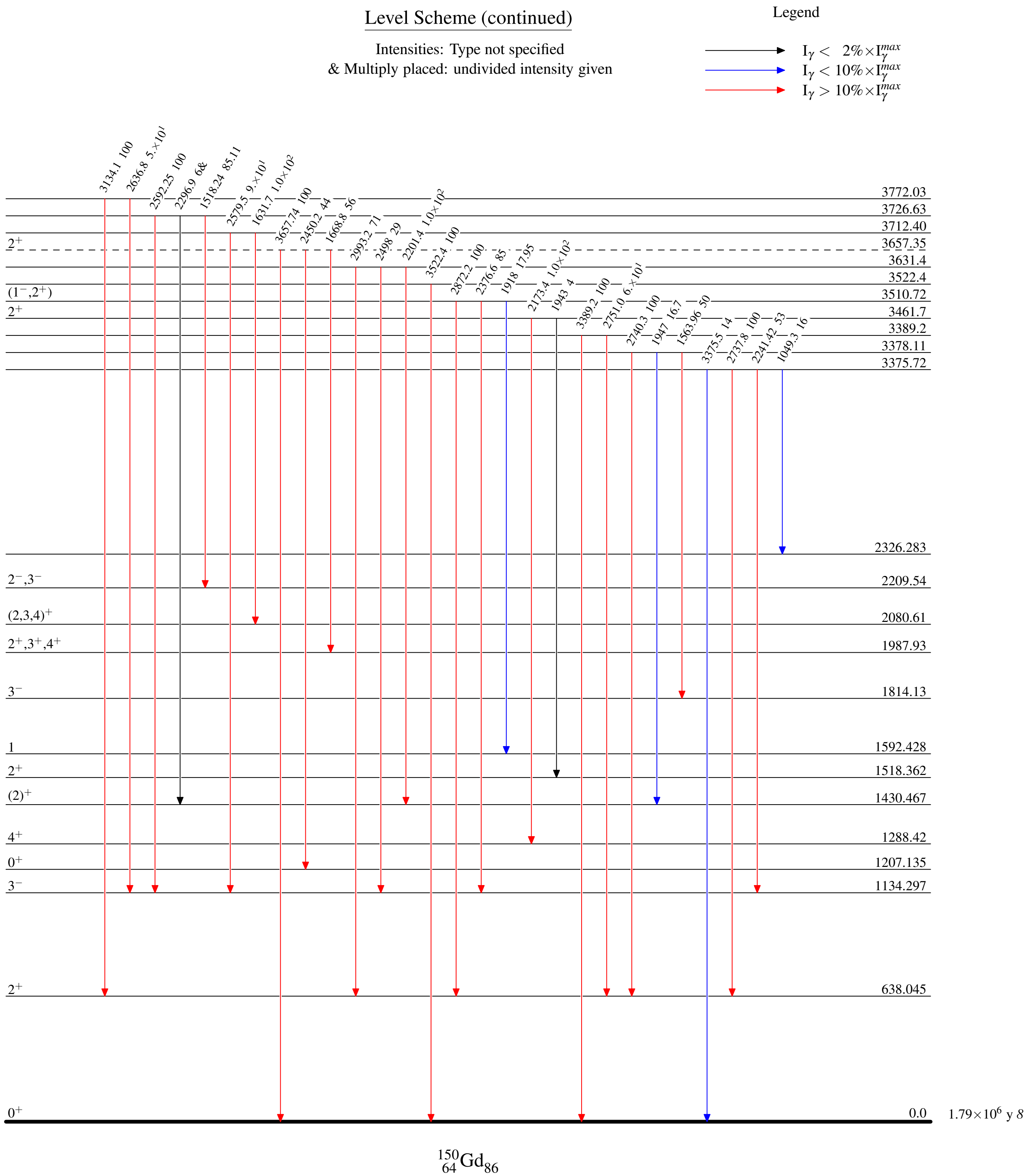
& Multiply placed: undivided intensity given



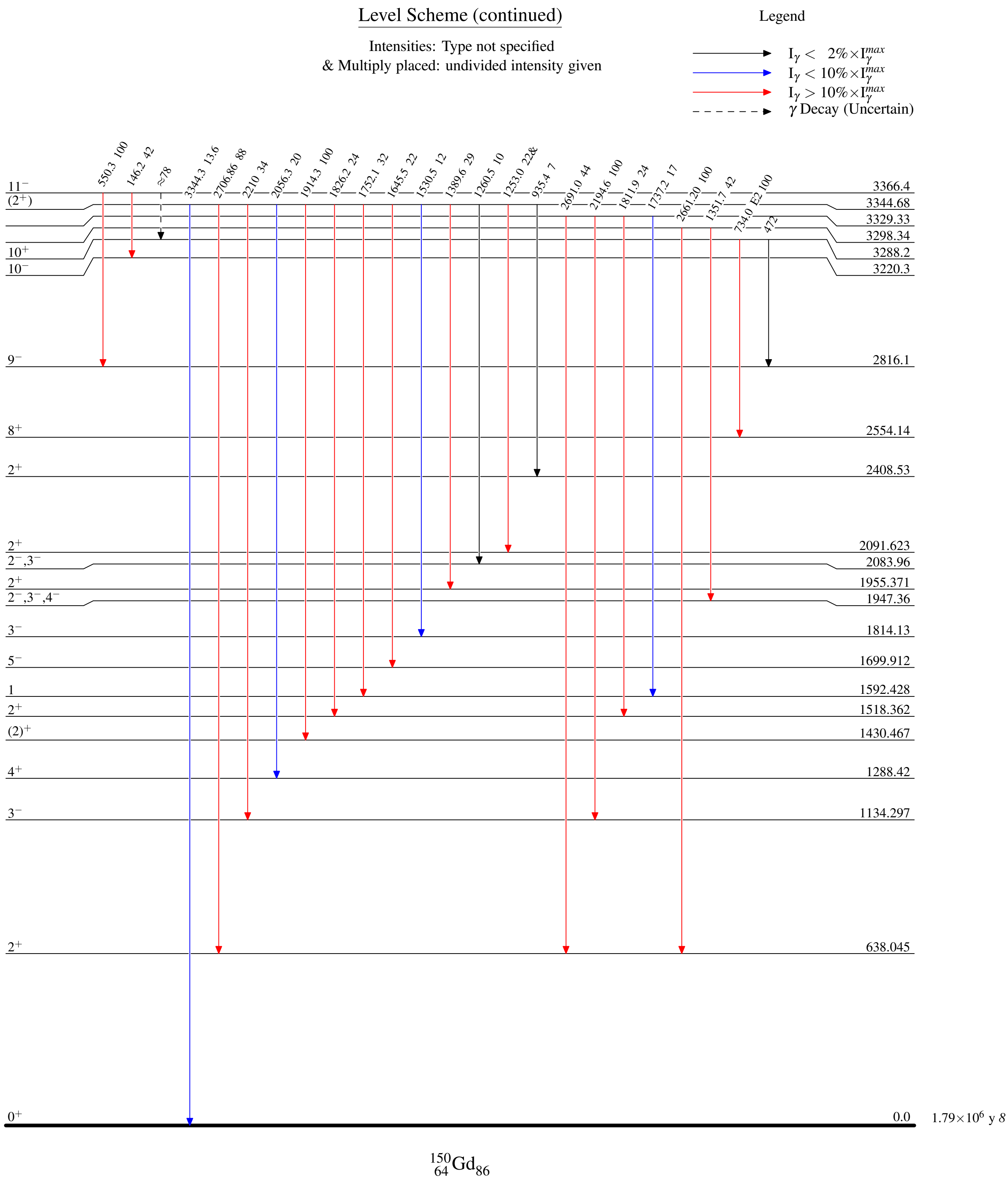
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified
& Multiply placed: undivided intensity given



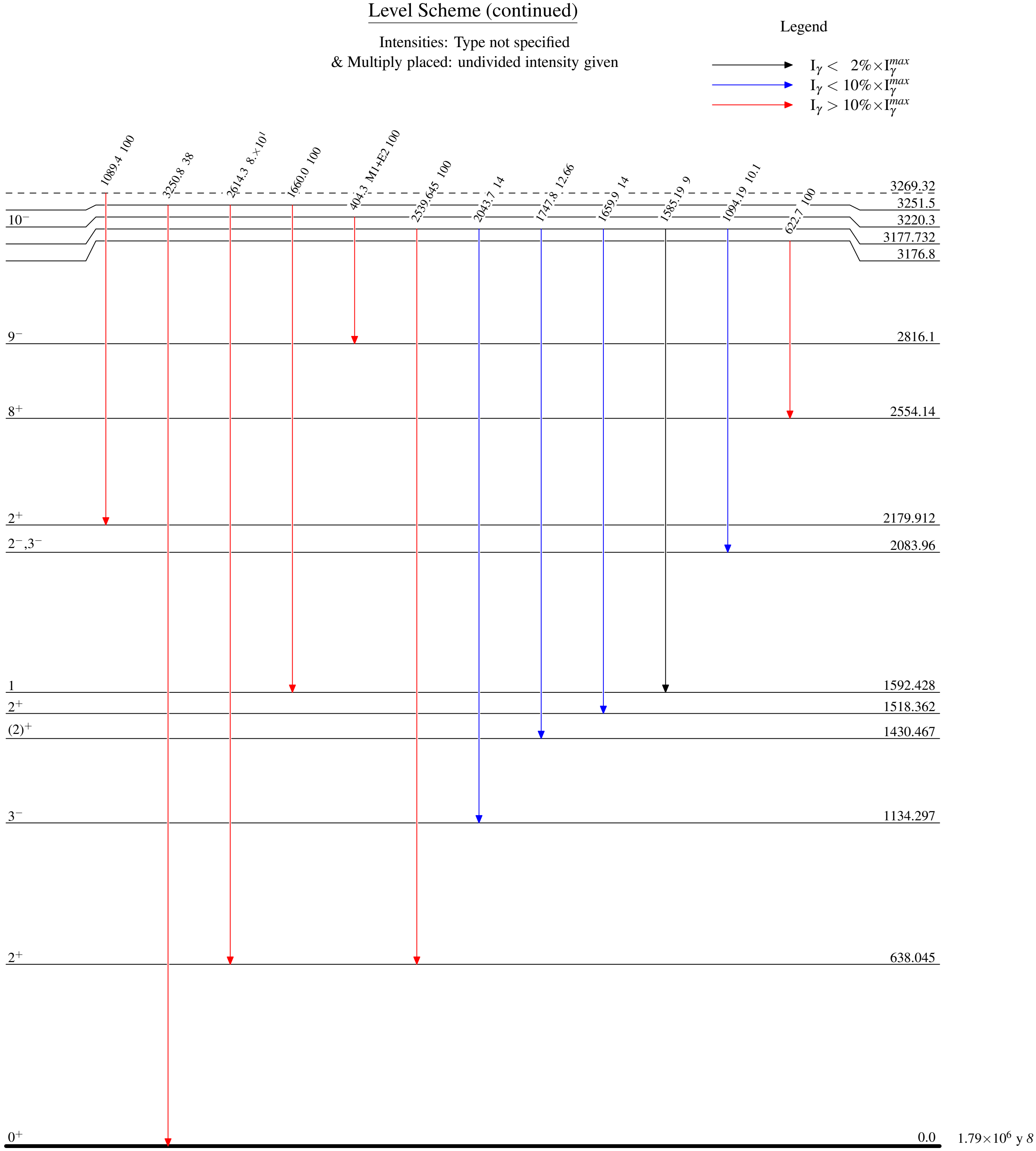
Adopted Levels, Gammas



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified
& Multiply placed: undivided intensity given



$^{150}_{64}Gd_{86}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified

& Multiply placed: undivided intensity given

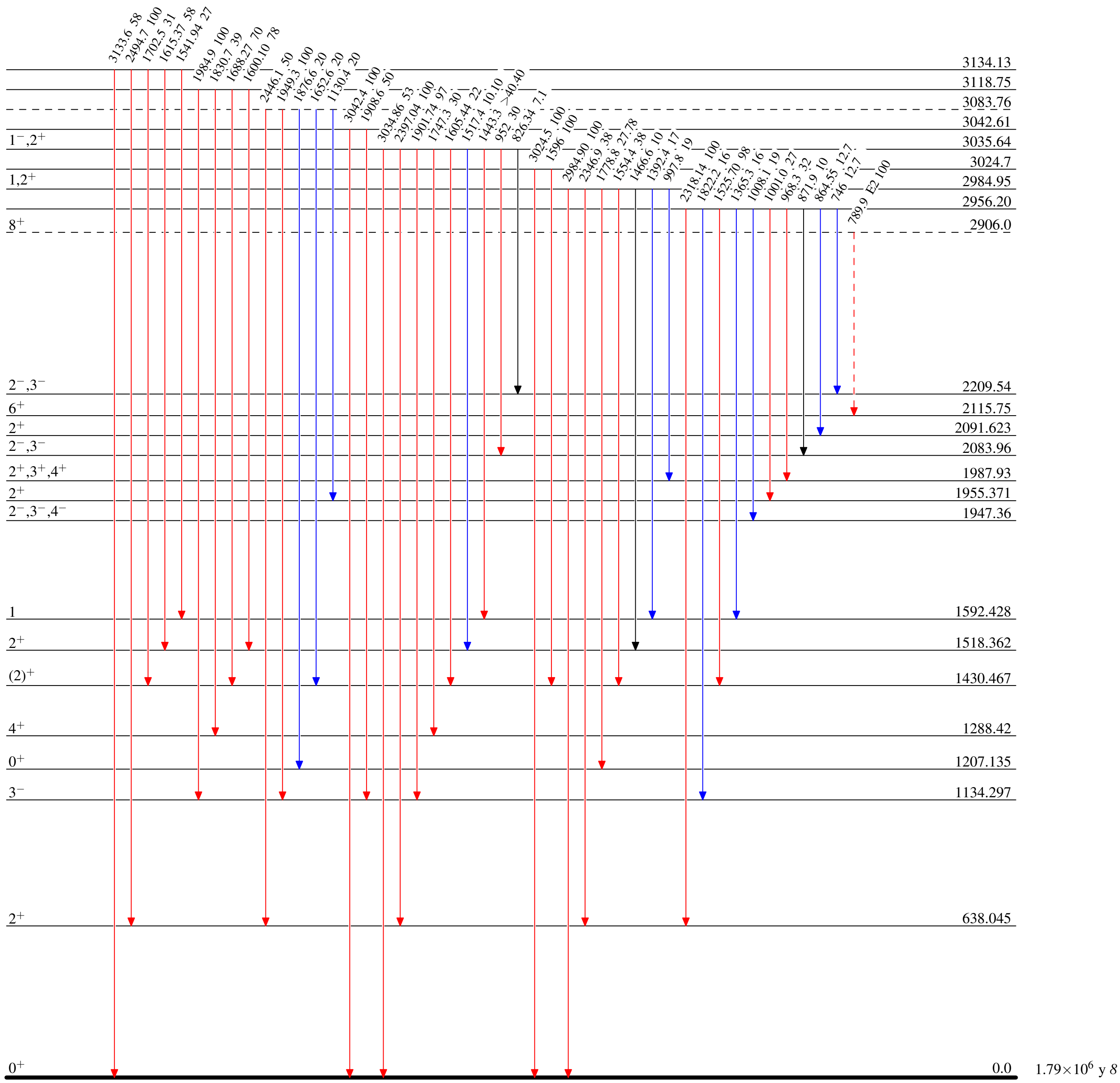
Legend

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

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

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

γ Decay (Uncertain)



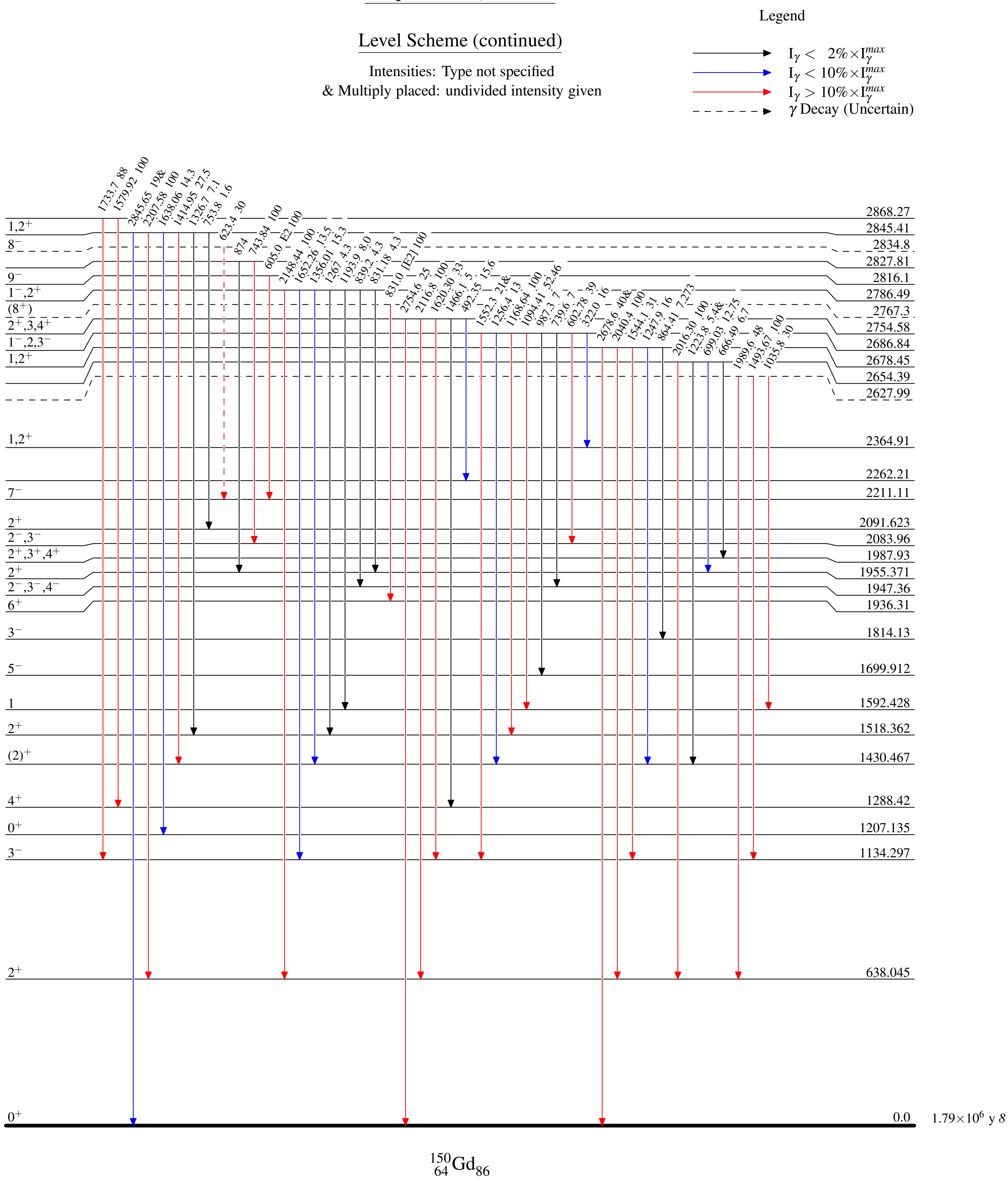
$^{150}_{64}Gd_{86}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified

& Multiply placed: undivided intensity given



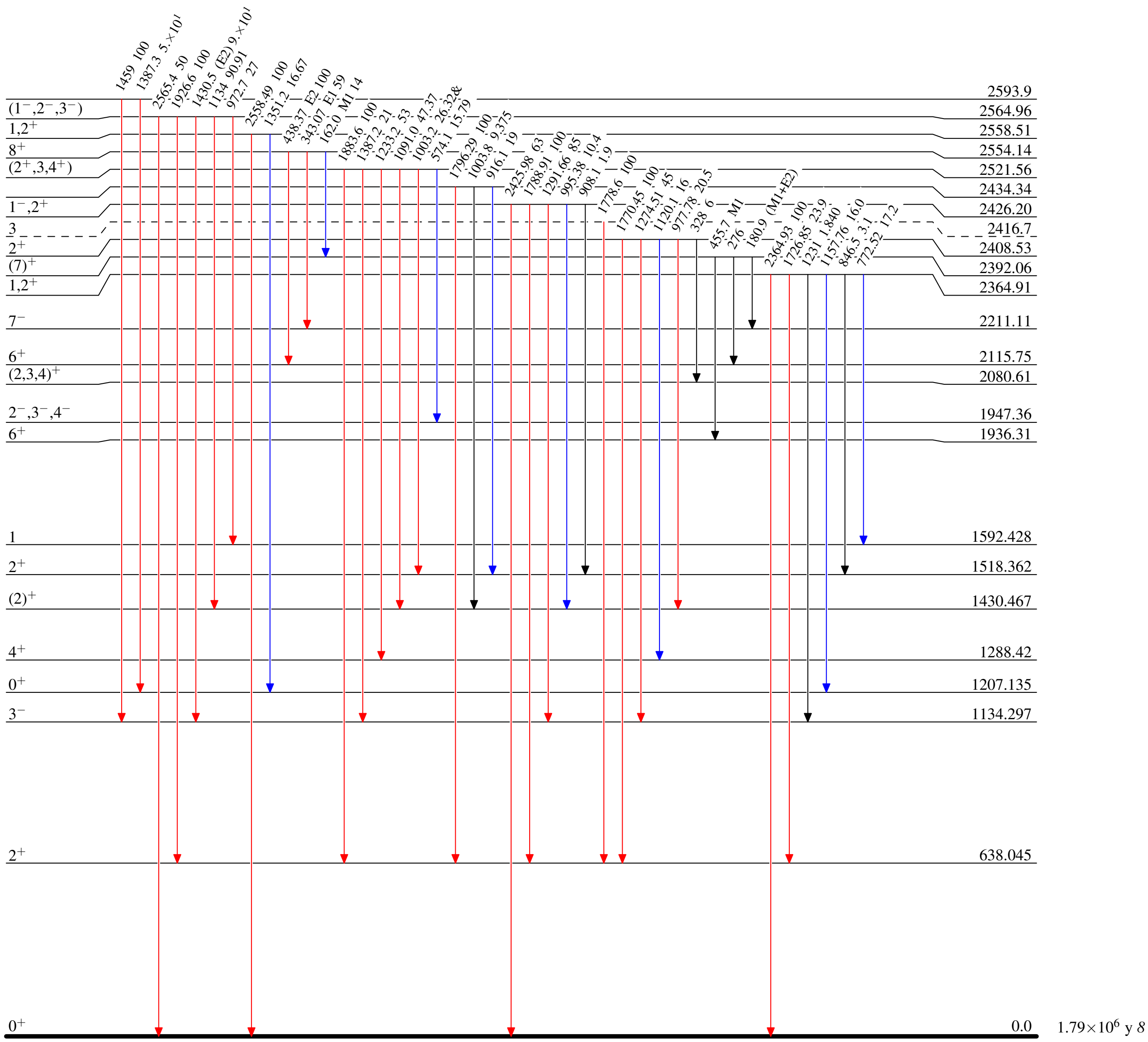
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified
& Multiply placed: undivided intensity given

Legend

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



$^{150}_{64}Gd_{86}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified

& Multiply placed: undivided intensity given

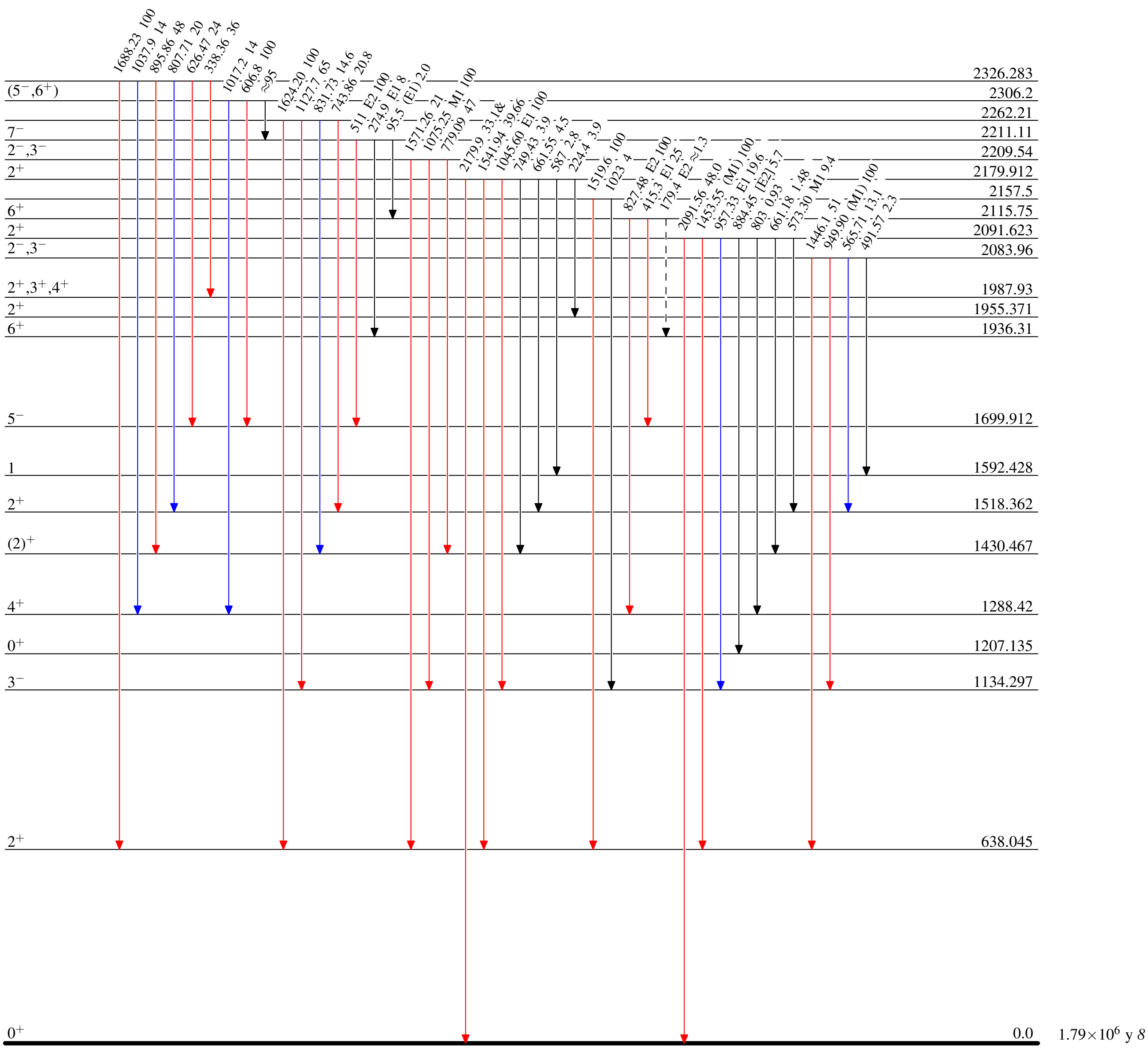
Legend

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

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

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

γ Decay (Uncertain)



$^{150}_{64}$Gd$_{86}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified

& Multiply placed: undivided intensity given

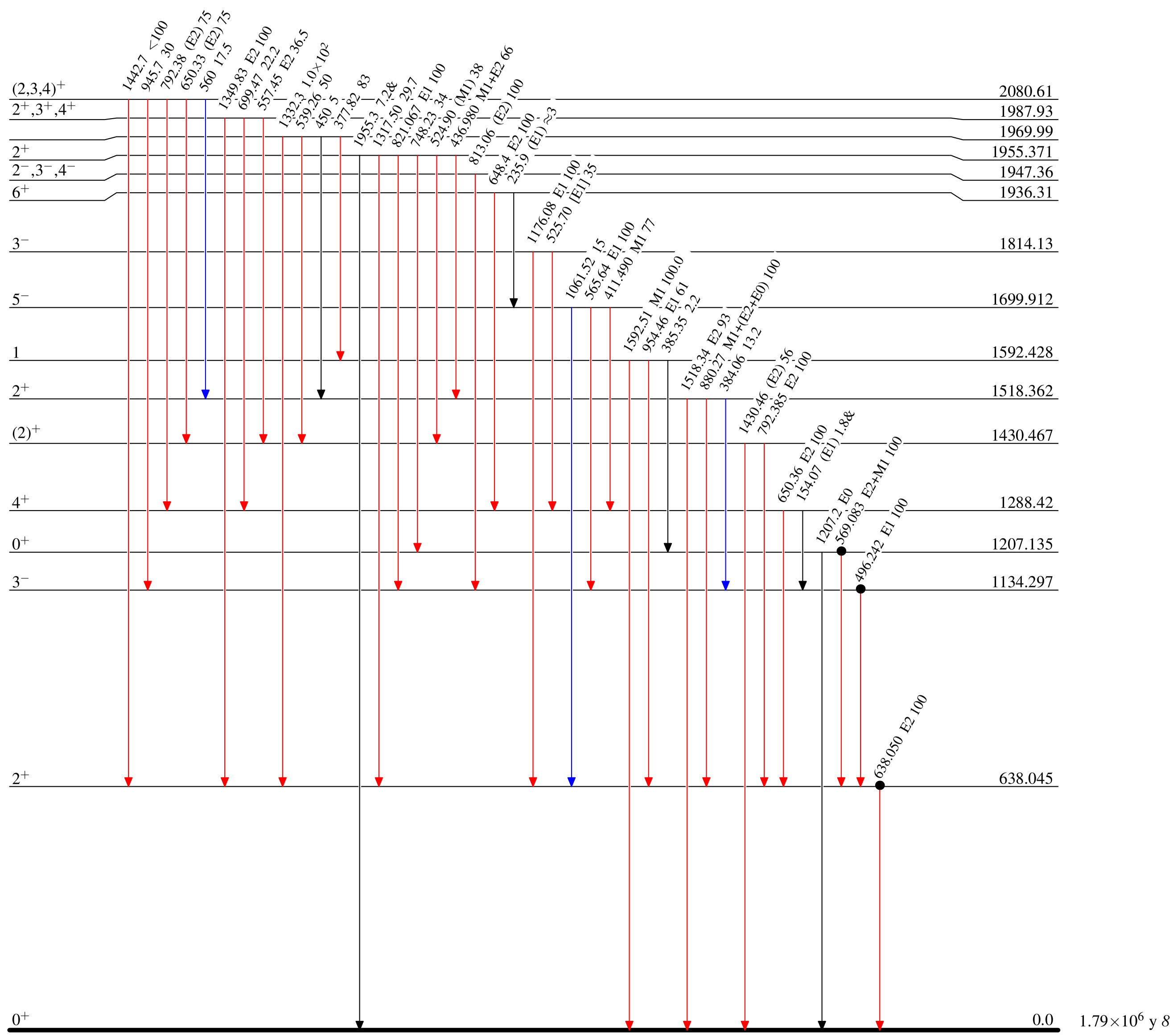
Legend

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

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

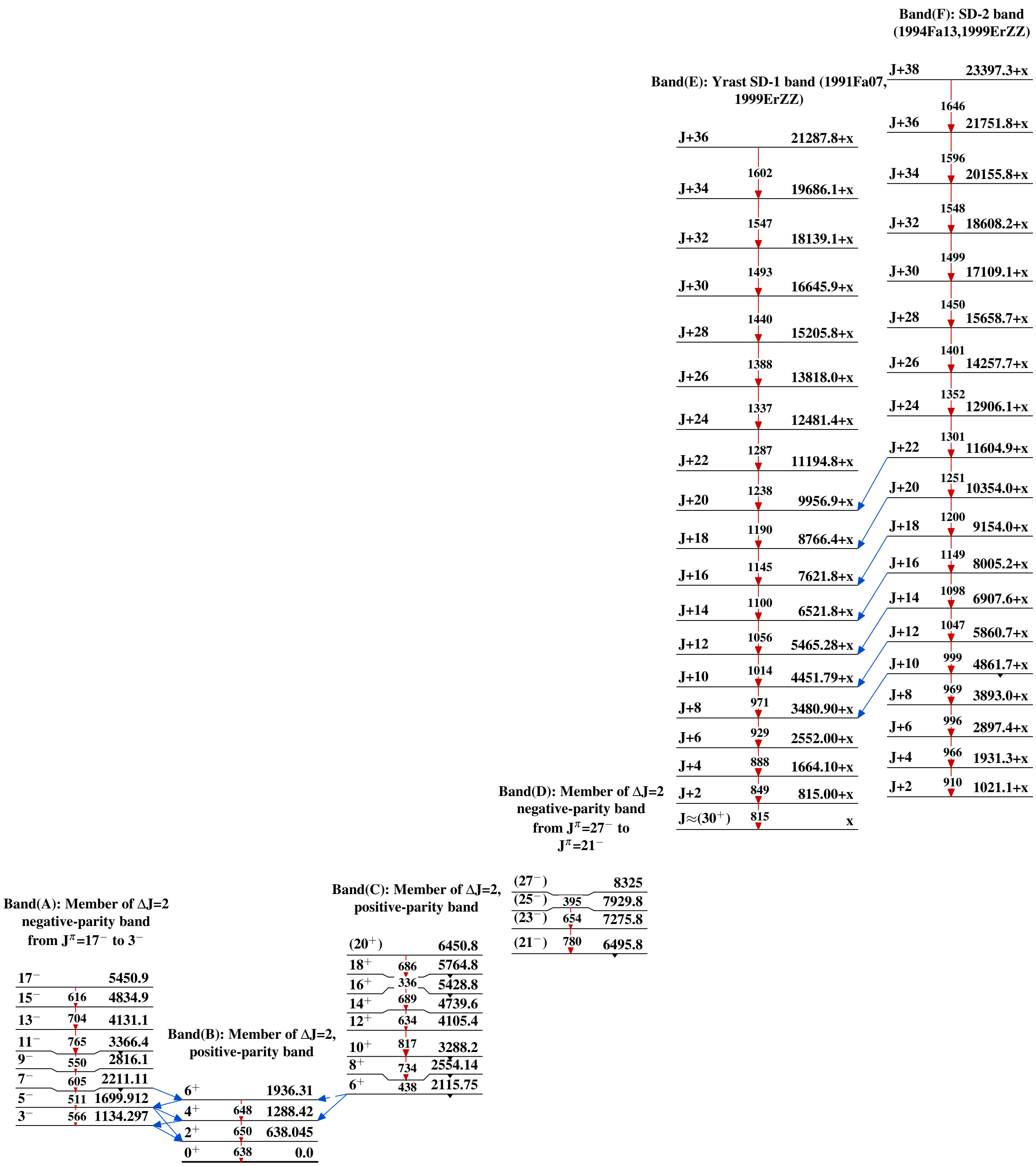
$I_\gamma > 10\% \times I_\gamma^{max}$

Coincidence



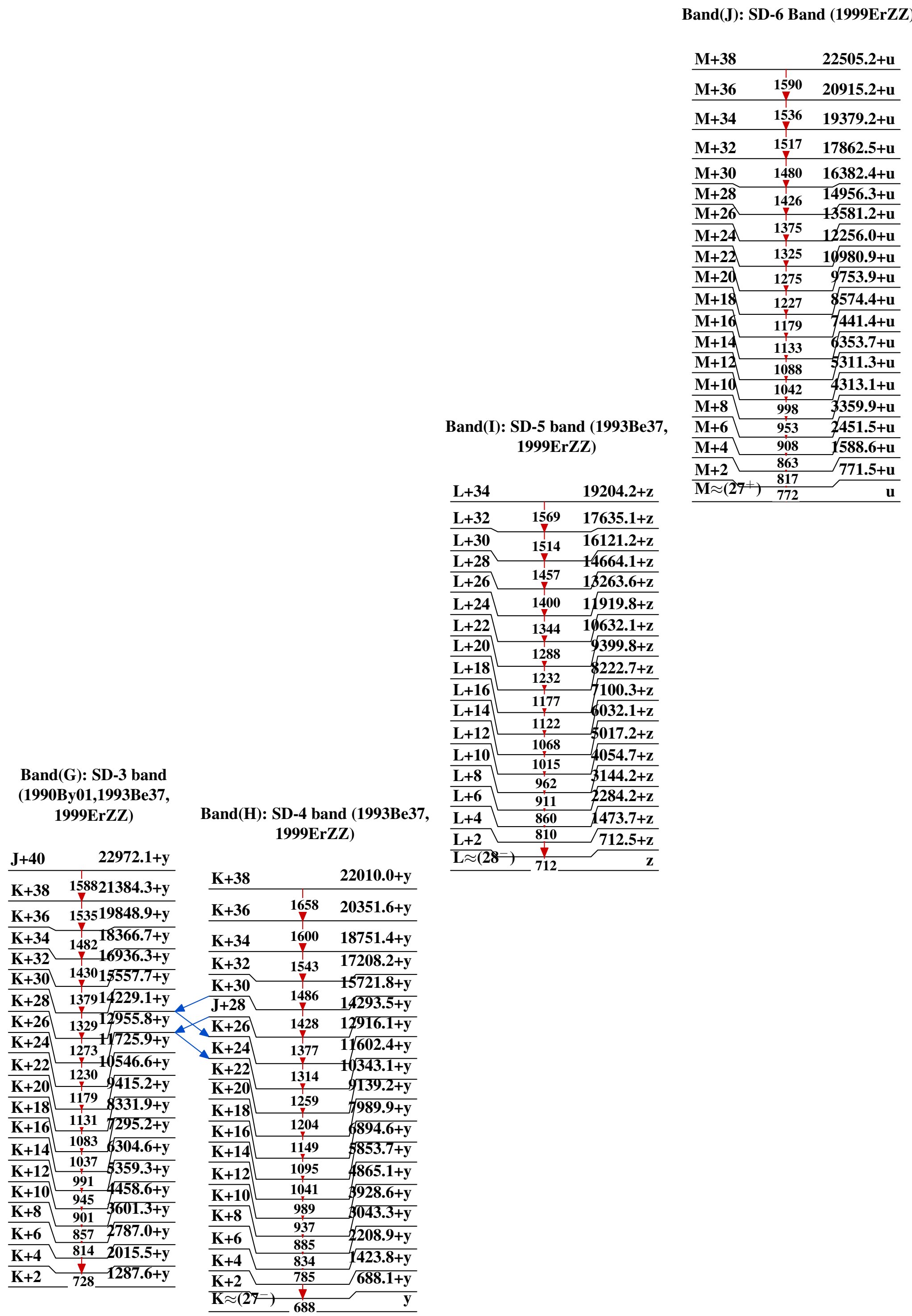
$^{150}_{64}Gd_{86}$

Adopted Levels, Gammas

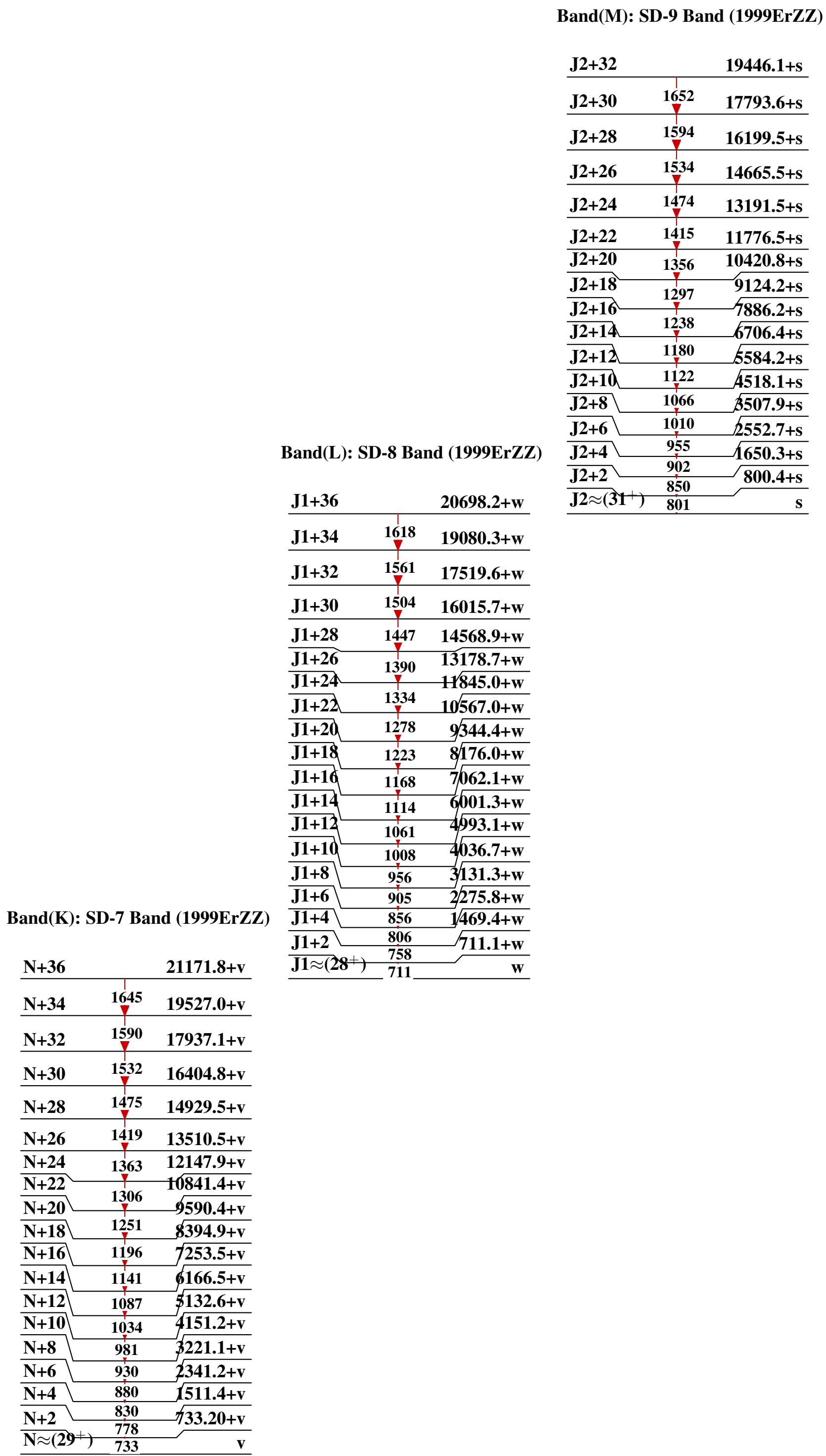


$^{150}_{64}Gd_{86}$

Adopted Levels, Gammas (continued)

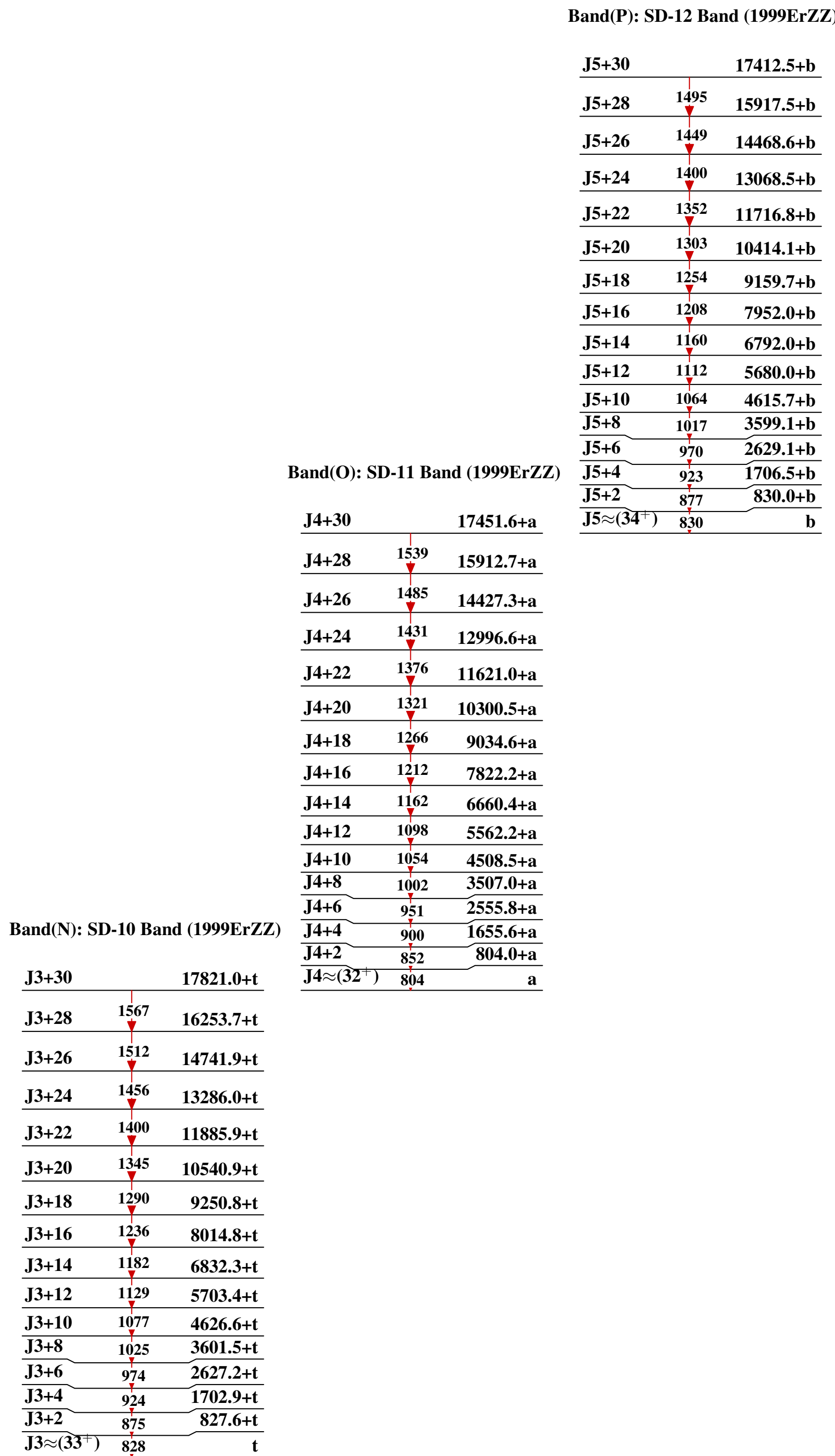


Adopted Levels, Gammas (continued)



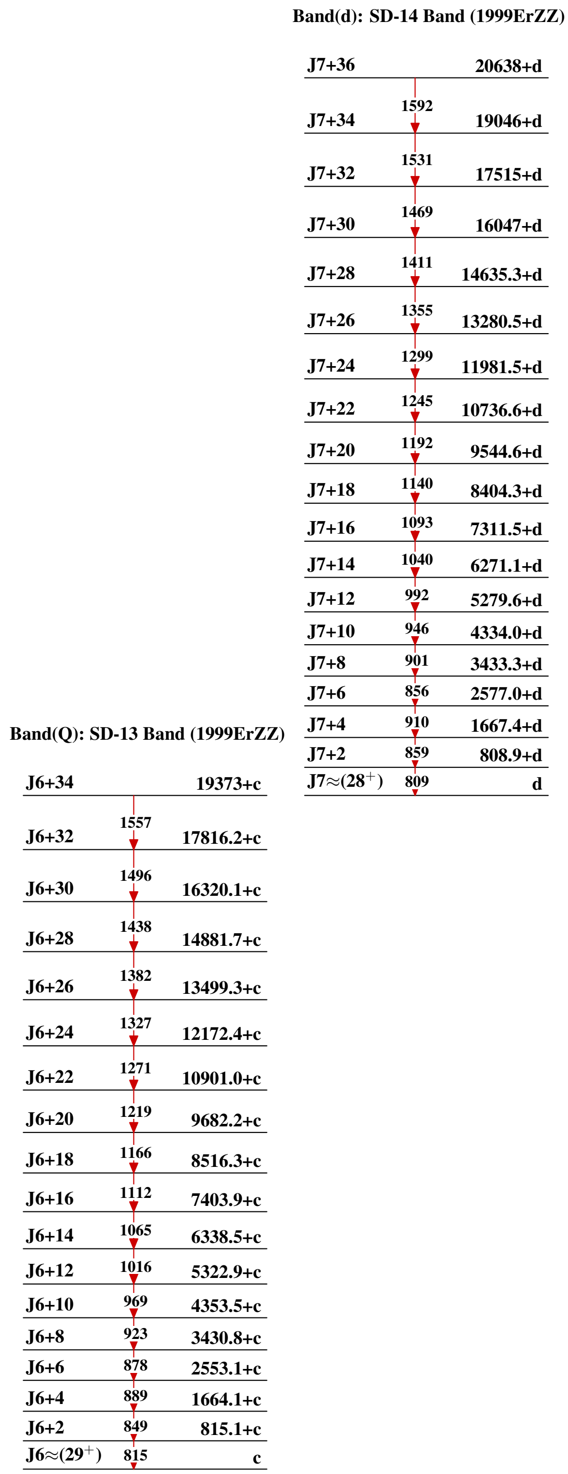
$^{150}_{64}Gd_{86}$

Adopted Levels, Gammas (continued)



$^{150}_{64}Gd_{86}$

Adopted Levels, Gammas (continued)



$^{150}_{64}Gd_{86}$

Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	M. J. Martin	NDS 114, 1497 (2013)	31-Aug-2013

Q(β^-)=−3.99×10^3 *4*; S(n)=8590 *3*; S(p)=7343.0 *7*; Q(α)=2204.4 *10* 2017Wa10
S(2n)=15086 *3*; S(2p)=12233.7 *7* 2017Wa10
Additional information 1.

^{152}Gd Levels

Calculations, systematics:
Equilibrium deformation, single-quasiparticle proton bandheads: 1990Na14.
E2/M1 mixing ratios: 1988De14, 1987Li11.
g.s. band: 1994Bo21, 1990Ha22.
g.s. properties: 1996La03.
Isotope shift, hyperfine structure: 2000Bl10, 1990Wa25.
Levels, transition probabilities: 1996He01, 1995Dr06, 1995Go14, 1995Ke09, 1995Zh26, 1991De05.
Magnetic moment and g-factor: 1995St11.
Negative parity states: 1985Ha33.
Octupole bands: 1981Ko05.
Quasiparticle levels: 1986Be10.
Search of α-decay of high-spin isomers: 1981Ko21.
Very extended nuclear shape: 1995Ch67.

Cross Reference (XREF) Flags

A	^{152}Eu β^- decay (13.517 y)	E	^{150}Sm(α,2nγ), ^{152}Sm(α,4nγ)	I	^{154}Gd(p,t)
B	^{152}Eu β^- decay (9.3116 h)	F	^{152}Gd(d,d′)	J	^{148}Nd(^{9}Be,5nγ)
C	^{152}Tb ε decay (17.5 h)	G	Coulomb excitation	K	^{124}Sn(^{36}S,α4nγ)
D	^{152}Tb ε decay (4.2 min)	H	^{153}Eu(p,2nγ)		

E(level)[†]	J$^\pi$[#]	T$_{1/2}$[@]	XREF	Comments
0.0[&]	0$^+$	1.08×10^{14} y *8*	ABCDEFGHIJK	%α=100 T$_{1/2}$: from 1961Ma05, see also 1985HoZN. Others: >1.6×10^{13} y (1948Ke27), >8×10^{13} y (1956Po16), 9.5×10^{14} y (1959Ri34,1966Ka23). <r^2>$^{1/2}$=5.082 fm 3 (2000An14).
344.2790[&] *12*	2$^+$	32.0 ps *27*	ABCDEFGHIJK	μ=+0.93 *6* μ: Weighted average of +0.96 *8* (1974Ar23) and +0.90 *8* (1987Be08). see also the evaluation 2005St24. J$^\pi$: E2 γ to 0$^+$ level. T$_{1/2}$: From Doppler shift recoil distance and B(E2) in Coulomb excitation others: 36 ps *5* and 37 ps *7* in 13-y Eu β^- decay.
615.386[a] *14*	0$^+$	37 ps *8*	ABCDEFGHIJ	J$^\pi$: E0 transition to 0$^+$.
755.3961[&] *17*	4$^+$	7.3 ps *4*	A CDEFGHIJK	μ=2.0 *5* (1999Ma06,2005St24) J$^\pi$: E2 ΔJ=2 γ to 2$^+$. L(p,t) not 0.
930.545[a] *3*	2$^+$	7.3 ps *6*	ABCDEFGHIJK	J$^\pi$: E0 component in transition to 2$^+$.
1047.80[l] *3*	0$^+$		ABC F HI	J$^\pi$: E0 transition to 0$^+$.
1109.202[i] *15*	2$^+$		ABCDEF I	J$^\pi$: E2 γ to 0$^+$.
1123.1857[b] *21*	3$^-$		ABCDEF IJK	J$^\pi$: E1 γ′s to 2$^+$ and 4$^+$.

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Adopted Levels, Gammas (continued)

^{152}Gd Levels (continued)

E(level)[†]	J^{π}[#]	$T_{1/2}$[@]	XREF	Comments
1227.37[&] 7	6^+	2.5 ps 5	CDE GHIJK	μ=4.4 39 μ: From g/g(2^+) in Coulomb excitation. J^π: E2 ΔJ=2 γ to 4^+. No γ to J<4. Band member.
1274.27 7	1,2^+		C	J^π: γ to 0^+.
1282.246[a] 24	4^+		A CDEF HI K	J^π: E0 component in transition to 4^+.
1314.613[b] 8	1^-		ABC F	J^π: E1 γ to 0^+.
1318.414[l] 15	2^+		A C I	J^π: E0 component in transition to 2^+.
1434.020[j] 4	3^+		A CDE	J^π: M1+E2 γ to 2^+. E2(+M1) γ to 4^+. $\gamma\gamma(\theta)$(678γ) rules out J=2.
1460.53? 12	(1,2^+)		B	J^π: γ's to 0^+ and 2^+. E(level): This level is perhaps questionable. IT is seen only in 9.3-h Eu β^- decay and the transitions are weak. In particular, it is not seen in 17.5-h Tb ε decay which populates all other levels below E=2000 with J<5.
1470.43[b] 17	5^-		DEF JK	J^π: D+Q γ to 4^+. γ to 3^-. Band member.
1470.63 5	2^+		C	J^π: γ's to 0^+ and 4^+.
1533.92 9			C	J^π: γ to 2^+.
1550.16[i] 4	4^+		A CDEF	J^π: D(+Q) γ to 4^+. 1205γ to 2^+ is M1 or E2 thus π=+. Band member.
1605.609 22	2^+		A C I	J^π: E0 component in transition to 2^+.
1643.418[k] 8	2^-		A C	J^π: E1(+M2) γ to 2^+. $\gamma(\theta$,H,t)(1299γ) rules out J=1. For J=3, $\gamma(\theta$,H,t)(1299γ) requires δ=0.50 5, inconsistent with<0.06 from α(K)exp.
1668.13[a] 9	6^+		DE HIJK	J^π: E2 ΔJ=2 γ to 4^+. D+Q γ to 6^+.
1680.74 5	0^+		C I	J^π: L(p,t)=0.
1692.42 3	2^+,3^+		A C	J^π: M1+E2 γ to 2^+. γ to 4^+ rules out J=1.
1734.44 12			C	J^π: γ to 4^+.
1746.78[&] 11	8^+		DE H JK	J^π: E2 ΔJ=2 γ to 6^+. No γ to J<6. Band member.
1755.97[k] 4	1^-		BC	J^π: γ's to 0^+ and 3^-. log *ft*=6.4 from 0^-.
1771.57 4	2^+		C	J^π: γ's to 0^+ and 4^+.
1785.21 10	2^+		C	J^π: E0 component in the transition to 2^+.
1807.52 7			CDE	J^π: γ to 4^+.
1808.96 7			C	J^π: γ's to 2^+. γ from 2^-.
1839.71 3	2^+		C	J^π: E0 component in transition to 2^+.
1861.58[j] 9	5^+		DE	J^π: E2 γ to 3^+. γ to 6^+. Band member.
1861.90 3	2^+		C	J^π: E0 component in transition to 2^+.
1862.05 5	2^+		C	J^π: M1+E2 γ to 2^+. γ's to 1^- and 4^+.
1880.2[b] 3	7^-		DE JK	J^π: E1 γ to 6^+. γ to 5^-. Band member.
1915.17 6	$(4)^+$		C f	J^π: γ's to 4^+ and 6^+. Possible ε feeding from 2^-.
1915.77 5	2^+,3,4^+		C f	J^π: γ's to 2^+ and 4^+.
1941.177 16	2^+		C F	J^π: E2 γ to 0^+.
1961.9 5	(0^+)		F I	J^π: L(p,t)=(0).
1975.72 5	1^+,2^+		C	J^π: M1(+E2) γ to 2^+. γ's to 0^+.
1997.85[i] 17	6^+		DE	J^π: γ's to 4^+ and 6^+. γ from 7^+. Band member.
2011.67 4	1^+,2^+		C	J^π: M1+E2 γ to 2^+. γ to 1^-.
2069.4 10			E	J^π: γ to 4^+.
2121.05 7	2^+,3^-,4^+		C F	J^π: γ's to 2^+ and 4^+. Seen in (d,d′).
2133.38 14	1^+,2^+		C	J^π: M1 γ to 2^+. γ to 1^-.
2138.79[a] 25	8^+		DE JK	J^π: E2 ΔJ=2 γ to 6^+. γ to 8^+.
2169.64 5	2^+		C	J^π: γ's to 0^+ and 2^+. $\gamma(\theta$,H,t) in 17,5-h Tb ε decay rules out J=1.
2173.41[c] 18	6^-		DE	J^π: γ to 6^+. γ from 7^+. Band member.
2190	(2^+)		F	J^π: From dσ(90°)/dσ(125°)(systematics) in (d,d′).
2201.71 5	2^+		C	J^π: γ's to 0^+ and 4^+.
2234			F	
2246.81 3	2^+		C	J^π: γ's to 0^+ and 4^+. M1+E2 γ's to 2^+.
2258.17 6	2^+,3,4^+		C	J^π: γ's to 2^+ and 4^+.

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Adopted Levels, Gammas (continued)

^{152}Gd Levels (continued)

E(level)[†]	J^π[#]	XREF	Comments
2264.86 *7*	$1^-,2,3^-$	C	J^π: γ's to 1^- and 3^-.
2265.30 *8*	$1^+,2^+,3^+$	C	J^π: M1+E2 γ to 2^+.
2267.71? *9*		C	E(level): The proposed level has incompatible modes of decay. The 953γ feeds a 1^- level and the 1040γ feeds a 6^+ level.
2299.5[&] *6*	10^+	E JK	J^π: $\gamma(\theta)$. Band member.
2299.66 *3*	$2,3^-$	C F	J^π: γ's to 1^-, 3^-, and 3^+ give J^π=2 or 3^-. α(K)exp gives mult assignments for the 1369 and 1955γ's, but these are inconsistent. mult(1369γ) to 2^+ is consistent only with M1+E2, eliminating the 2^- alternative and giving $J^\pi=2^+$ with $\delta=-0.14$ *7*. Mult(1955γ) to 2^+ is consistent only with E1, eliminating the $J^\pi=2^+$ alternative, with $\delta=<-0.24$, -0.23 *+4−5*, and +0.27 *4* for J=1, 2, and 3, respectively. For the strong 1190γ, no Ice(K) is seen, suggesting mult=E1; however, even for E1, the Ice(K) expected is as large as that for the adjacent 1186γ. $\gamma(\theta$,H,t)(1190γ) gives $-0.75\leq\delta\leq-0.34$, -0.21 *3*, and +0.28 *5* for J=1, 2, and 3, respectively.
2301.82[j] *13*	7^+	DE	J^π: γ's to 5^+ and 6^+. Band member.
2325.69 *7*		C	J^π: γ to 3^-.
2330		F	
2330.72 *9*	$2^+,3,4^+$	C	J^π: γ's to 2^+ and 4^+.
2331.1[b] *5*	9^-	E JK	J^π: E2 ΔJ=2 γ to 7^-. Dipole γ to 8^+.
2363.2 *6*	0^+	I	J^π: L(p,t)=0.
2386.95 *7*	$(2)^+$	C	J^π: Probable E0 component in transition to 2^+.
2394.19 *10*	7^+	DE	J^π: M1 γ's to 6^+ and 8^+.
2395		F	
2401.52 *5*	$1^+,2,3^-$	C	J^π: γ's to 1^- and 3^+.
2414		F	
2421.5 *7*	0^+	I	J^π: L(p,t)=0.
2437.43 *5*	2^+	C	J^π: M1 γ to 2^+. E1 γ to 3^-. γ to 0^+.
2448.02 *9*	+	C	J^π: M1,E2 to 2^+.
2460.6[i] *8*	8^+	E	J^π: γ's to 6^+. Band structure.
2491.9 *7*	(0^+)	I	J^π: L(p,t)=(0).
2495.18 *6*		C	
2513.9 *3*	$1,2^+$	C	J^π: γ's to 0^+ and 2^+. See comment on mult 2169.6 in 17.5-h Tb ε decay that discusses the possibility of mult=E1 for the transition to 2^+. This would give $J^\pi(2514)=1^-$.
2523.81 *3*	2^+	C	J^π: M1 γ to 2^+. E1 γ to 1^-. $\gamma(\theta$,H,t) in 17.5-h Tb ε decay gives $\delta(1209\gamma)=-0.34$ *5* for J=1, inconsistent with $\delta<0.05$ from α(K)exp. γ to 3^- also suggests J^π not 1^+.
2529.43 *4*	$2^+,3^+$	C	J^π: M1G to 2^+. γ to 4^+.
2536.6[c] *6*	8^-	E JK	J^π: γ's to 6^- and 8^+. Band member.
2540.47 *6*	$2^+,3^+$	C	J^π: M1 γ to 2^+. γ to 4^+.
2544.01 *6*		C	J^π: γ's to 2^+ and 3^-.
2551.14 *7*		C	J^π: γ's to 2^+ and 3^+.
2557.87 *5*	2^+	C	J^π: γ's to 0^+ and 4^+.
2579.8 *7*	0^+	I	J^π: L(p,t)=0.
2598.80 *5*	$1^+,2^+$	C	J^π: M1(+E2) γ to 2^+. γ to 0^+.
2604.33 *6*	$1^-,2,3^-$	C	J^π: γ's to 1^- and 3^-.
2641.58 *7*	$1^-,2^-,3^-$	C	J^π: M1,E2 γ to 3^-. γ to 2^+.
2667.55 *6*	1^-	C	J^π: E0 component in transition to 1^-.
2686.87 *9*	2^+	C	J^π: E0 component in transition to 2^+.
2691.7[a] *8*	10^+	E JK	J^π: $\gamma(\theta)$. Band member.
2696.8[h] *10*	8^-	E	J^π: γ to 8^+. Band member.
2709.42 *3*	2^+	C	J^π: E0 component in transition to 2^+.
2719.63 *3*	2^+	C	J^π: M1+E2 γ's to 2^+. γ to 0^+. γ to 3^-.
2729.17 *4*	2^+	C	J^π: E0 component in transition to 2^+.
2734.07 *7*		C	J^π: There is an inconsistency in the mults for transitions from this level. The 2118 and 2734 γ's both feed levels with $J^\pi=0^+$; however, mult=M1 and E1, respectively, for these transitions.

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Adopted Levels, Gammas (continued)

^{152}Gd Levels (continued)

E(level)[†]	J^{π}[#]	XREF	Comments
2744.04 *10*	1^-	C	J^{π}: E1 γ to 0^+.
2749.24 *4*	$2^+,3^+$	C	J^{π}: M1 γ to 2^+. γ to 4^+.
2767.7 *7*	0^+	I	J^{π}: L(p,t)=0.
2772.47 *5*	2^+	C	J^{π}: E0 component in transition to 2^+.
2774.5[j] *7*	9^+	E	J^{π}: γ to 7^+ and 8^+. Band member.
2810.2 *7*	0^+	I	J^{π}: L(p,t)=0.
2814.0[b] *7*	11^-	E JK	J^{π}: E2 ΔJ=2 γ to 9^-. Dipole γ to 10^+.
2862.65 *5*	$1^-,2,3^-$	C	J^{π}: γ S to 1^- and 3^-.
2869.84? *10*		C	E(level): See discussion on this level in the 17.5-h Tb ε decay dataset.
2874.7[d] *7*	8^-	E K	J^{π}: γ to 7^-. Band member.
2880.67 *3*	2^+	C	J^{π}: M1 γ's to 2^+. γ's to 0^+ and 3^-.
2883.5[&] *7*	12^+	E JK	J^{π}: $\gamma(\theta)$(583γ) to 10^+. Band member.
2889.2[c] *7*	10^-	E JK	J^{π}: $\gamma(\theta)$(γ's) to 9^+ and 10^+. Band member.
2914.19 *6*	2^+	C	J^{π}: γ's to 0^+ and 4^+.
2920.10 *10*	$1^-,2,3,4^+$	C	J^{π}: γ's to 2^+ and 3^-.
2927.86 *5*	$2^+,3^+$	C	J^{π}: M1,E2 γ to 2^+. γ to 4^+. Possible E0 component in the 1818γ to 2^+ would eliminate the 3^+ possibility.
2928.73 *16*		C	J^{π}: γ's to 2^+.
2932.71 *6*	2^+	C	J^{π}: M1,E2 γ to 2^+. γ's to 0^+ and 3^-.
2964.32 *5*	2^-	C	J^{π}: E1 γ to 2^+. γ to 3^+. From $\gamma(\theta$,H,t)(2033γ), J=3 would require δ(M2/E1)$\geq$0.25 compared with δ<0.34 from α(K)exp. J=3 is thus possible but highly unlikely.
2981.45 *8*	$2^+,3,4^+$	C	J^{π}: γ's to 2^+ and 4^+.
2989.02 *8*		C	J^{π}: γ's to 2^+.
2999.55 *5*	$1^+,2^+$	C	J^{π}: M1,E2 γ's to 2^+. γ to 0^+.
3006.77 *5*	2^+	C	J^{π}: γ's to 0^+ and 4^+. M1 γ to 2^+.
3009.28 *5*	3^-	C	J^{π}: E0 component in transition to 3^-.
3010.8[e] *6*	9^-	E K	J^{π}: γ's to 7^- and 9^-. Band member.
3012.37 *8*	$2^+,3^+,4^+$	C	J^{π}: M1,E2 γ to 2^+. γ to 4^+.
3033.0[h] *10*	(11)	E	J^{π}: γ to 10^+. Shown with J=11 by 2006ShZY.
3042.29 *5*	2^+	C	J^{π}: M1 γ to 2^+. γ to 1^-. $\gamma(\theta$,H,t)(2698γ) in 17.5-h Tb ε decay rules out J=1.
3060.1 *12*		E	J^{π}: γ to 9^-.
3067.42 *10*	3^-	C	J^{π}: E0 component in transition to 3^-.
3074.85 *12*	$2^+,3,4^+$	C	J^{π}: γ's to 2^+ and 4^+.
3079.69 *12*	$2^+,3^+,4^+$	C	J^{π}: E2 γ to 2^+. γ to 4^+. A possible E0 component in the 2324γ to 4^+ would give J^{π}(3079 level)=4^+.
3090.42 *16*		C	J^{π}: γ to 4^+.
3099.02 *8*	$1^+,2^+,3^+$	C	J^{π}: M1 γ to 2^+.
3105.52 *7*	2^+	C	J^{π}: γ's to 0^+ and 4^+.
3110.94 *10*	$1^+,2^+$	C	J^{π}: M1 or E2 γ to 0^+.
3112.52 *7*	$1^+,2^+$	C	J^{π}: M1 γ to 2^+. γ to 0^+.
3140.21 *6*	$1,2^+$	C	J^{π}: γ's to 0^+ and 2^+.
3143.97 *7*	3^-	C	J^{π}: M1,E2 γ to 3^-. γ's to 2^+ and 4^+.
3152.89 *9*	3^-	C	J^{π}: E1 γ to 2^+. γ to 4^+.
3157.0[d] *7*	10^-	E K	J^{π}: γ's to 8^- and 9^-. Band member.
3214?[‡] *1*		C	J^{π}: γ's to 3^+ and 2^+.
3226.1[h] *12*	10^-	E	J^{π}: γ to 9^-. Band member.
3232.05 *8*		C	J^{π}: The decay modes are not consistent with a single J^{π} assignment. the 1626 and 2887γ's feed 2^+ levels, but the 2004γ feeds 6^+, and the 1917γ feeds 1^-.
3236.96 *7*	$2^+,3,4^+$	C	J^{π}: γ's to 2^+ and 4^+.
3249.3[f] *10*	12^+	E JK	J^{π}: γ to 10^+. Band member.
3285.11 *7*	2^+	C	J^{π}: M1,E2 γ to 2^+. γ's to 1^- and 3^-.
3294.1[j] *8*	11^+	E	J^{π}: γ's to 9^+ and 10^+. Band member.
3317.3[e] *6*	11^-	E K	J^{π}: γ's to 9^- and 11^-. Band member.

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Adopted Levels, Gammas (continued)

^{152}Gd Levels (continued)

E(level)[†]	J^{π}[#]	XREF	Comments
3337.8[b] 9	13^-	E JK	J^{π}: $\gamma(\theta)$. Band member.
3340.64 6	1^-,2,3,4^+	C	J^{π}: γ's to 2^+ and 3^-. The 2217γ might have an E0 component, in which case $J^{\pi}=3^-$.
3345.4[c] 9	12^-	E JK	J^{π}: $\gamma(\theta)$. Band member.
3358.27 11	2^+	C	J^{π}: γ to 1^- and mult(2603γ)=M1 or E2 to 4^+ gives $J^{\pi}=2^+$ and limits mult(2603γ) to E2.
3498.9[&] 10	14^+	E JK	J^{π}: $\gamma(\theta)$.
3507.9[d] 8	12^-	E K	
3586.5[h] 9	13^-	E	
3699.4[f] 10	14^+	E JK	
3727.6[e] 8	13^-	E K	
3829.2[j] 10	13^+	E	
3897.4[c] 14	14^-	E JK	
3938.4[b] 11	15^-	E JK	J^{π}: $\gamma(\theta)$. E2 γ to 13^-.
3974.9[d] 10	14^-	E K	
4103.5 13		E	
4141.9[&] 13	16^+	E JK	J^{π}: $\gamma(\theta)$. E2 γ to 14^+.
4195.4[f] 11	16^+	E JK	
4246.3[e] 11	15^-	E K	
4246.5[h] 13	15^-	E	
4362.9 14		E	
4526.3[c] 17	16^-	E JK	
4539.8[d] 12	16^-	E K	
4609.0[b] 15	17^-	E JK	J^{π}: E2 γ to 15^-.
4745.8[f] 13	18^+	E JK	
4835.8[&] 15	18^+	E JK	
4852.0[e] 13	17^-	E K	
5010.5[h] 17	17^-	E	
5183.9[d] 13	18^-	K	
5213.8[c] 20	18^-	E JK	
5334.0[b] 18	19^-	E JK	
5385.2[f] 15	20^+	E JK	
5529.9[e] 14	19^-	K	
5550.1[&] 18	20^+	JK	
5853.1[g] 20	21^-	K	
5888.9[d] 15	20^-	K	
5923.8[c] 22	20^-	E K	
6081.3[b] 20	21^-	E JK	
6096.2[f] 18	22^+	K	
6258.9[e] 16	21^-	K	
6302.1[&] 21	22^+	K	
6598.8[c] 25	22^-	K	
6627.2[g] 21	23^-	K	
6636.9[d] 16	22^-	K	
6835.3[b] 23	23^-	K	
6876.2[f] 21	24^+	K	
7024.9[e] 17	23^-	K	
7091.1[&] 23	24^+	K	
7265.2[g] 23	25^-	K	

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Adopted Levels, Gammas (continued)

^{152}Gd Levels (continued)

E(level)[†]	J^{π}[#]	XREF	Comments
7280[c] *3*	24^-	K	
7420.9[d] *19*	24^-	K	
7533.3[b] *25*	25^-	K	
7721.2[f] *23*	26^+	K	
7830.9[e] *20*	25^-	K	
7861.1[&] *25*	26^+	K	
7990[c] *3*	26^-	K	
8129.2[g] *25*	27^-	K	
8246?[d]	$(26)^-$	K	
8292[b] *3*	27^-	K	
8620.2[f] *25*	28^+	K	
8638.2 *25*	28^+	K	
8677?[e]	$(27)^-$	K	
8726[c] *3*	28^-	K	
9027[g] *3*	29^-	K	
9106?[d]	$(28)^-$	K	
9436.2[f] *25*	30^+	K	
9544[c] *4*	30^-	K	
9957[g] *3*	31^-	K	
10225[f] *3*	32^+	K	
10353?	$(32)^+$	K	
10452[c] *4*	32^-	K	
10918[g] *3*	33^-	K	
11064[f] *3*	34^+	K	
11522?[c] *4*	34^-	K	
11889[g] *4*	35^-	K	Possible band crossing at 35^- level.
11931 *4*	35^-	K	
11952[f] *3*	36^+	K	
12268[c] *4*	36^-	K	
12712[g] *4*	37^-	K	
13065[f] *4*	38^+	K	
13088[c] *4*	38^-	K	
13547[g] *4*	39^-	K	
13944[c] *4*	40^-	K	
14120?[f] *4*	40^+	K	
14400[g] *4*	41^-	K	
15125?[f] *4*	42^+	K	
15486[g] *4*	43^-	K	
16184[f] *4*	44^+	K	
17361[f] *4*	46^+	K	
18722[f] *4*	48^+	K	

† From a least squares fit to adopted Eγ.

‡ The three transitions from the 3214 level do not yield consistent energies. The 887, 1045, and 1521γ′s give E(level)=3213.14 *14*, 3214.89 *24*, and 3213.99 *17*, respectively. 2003Ad25 give 3214.23 *9*. The evaluator adopts E=3214 *1* and considers the level as tentative.

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Adopted Levels, Gammas (continued)

^{152}Gd Levels (continued)

[#] Arguments are given up to 3400. For higher levels, the assignments are based on the band structure of 2006ShZY in (α,xnγ) and of 2007Ca25 in (^{36}S,α4nγ). $\gamma(\theta)$ and mult arguments are given in the few cases where they are available.

[@] From Doppler shift recoil distance in Coulomb excitation (1982Jo04), except for the g.s. and 344 levels, as noted.

[&] Band(A): $K^\pi=0^+$ g.s. band.

[a] Band(B): $K^\pi=0^+$ quasi-β band.

[b] Band(C): $K^\pi=1^-$ negative-parity odd-spin band.

[c] Band(D): $K^\pi=6^-$ negative-parity even-spin band.

[d] Band(E): $K^\pi=8^-$ negative-parity even-spin band,

[e] Band(F): $K^\pi=9^-$ negative-parity odd-spin band.

[f] Band(G): $K^\pi=12^+$ positive-parity even-spin band.

[g] Band(H): $K^\pi=21^-$ negative-parity odd-spin band.

[h] Band(I): $K^\pi=8^-$ possible negative-parity band.

[i] Band(J): $K^\pi=2^+$ even-spin γ vibrational band.

[j] Band(K): $K^\pi=3^+$ odd-spin γ vibrational band.

[k] Band(L): $K^\pi=1^-$ band.

[l] Band(M): $K^\pi=0^+$ band.

$\gamma(^{152}Gd)$

E_i(level)	J_i^π	E_γ[†]	I_γ[@]	E_f	J_f^π	Mult.[a]	α[b]	$I_{(\gamma+ce)}$	Comments
344.2790	2^+	344.2785 *12*		0.0	0^+	E2	0.0399		B(E2)(W.u.)=73 *+7−6*
615.386	0^+	271.10 *3*	100	344.2790	2^+	E2	0.0831		B(E2)(W.u.)=178 *+53−33*
		615.41 *5*		0.0	0^+	E0		13.4 *5*	$I_{(\gamma+ce)}$: Weighted average of I(γ+ce)/Iγ(271γ)=0.140 *5* from 13-y Eu β^- decay 0.133 *6* from 17.5-h Tb ε decay, and 0.120 *9* from 9.3-h Eu β^- decay. ρ^2=0.066 *14* (17.5-h Tb ε decay).
755.3961	4^+	411.1165 *12*	100	344.2790	2^+	E2	0.0238		B(E2)(W.u.)=133 *+8−7* Mult.: Non-zero δ(M3/E2) values have been reported in 17.5-h Tb ε decay, and in 13-y Eu β^- decay; however, these values greatly exceed the RUL limit of B(M3)(W.u.)<10 which requires $\delta<4.4\times10^{-5}$.
930.545	2^+	175.09 *3*	0.27 *6*	755.3961	4^+	[E2]	0.352		B(E2)(W.u.)=23 *5* Mult.: α(K)exp gives mult=M1, but placement from 2^+ to 4^+ requires E2.
		315.11 *3*	8.80 *18*	615.386	0^+	E2	0.0520		α(K)= 0.0401; α(L)=0.00930; α(M)=0.00210; α(N+..)=0.000577 B(E2)(W.u.)=36 *4*
		586.2648 *26*	100.0 *8*	344.2790	2^+	E2+M1+E0	0.0242 *11*		B(E2)(W.u.)=16.5 *14*; B(M1)(W.u.)=0.00114 *14* δ: δ(E2/M1)=−3.05 *14*. ρ^2=0.046 *4* (17.5-h Tb ε decay). Ice(K)(E0)/Ice(K)(E2)=1.73 *19* from α(K)exp and δ.
		930.50 *4*	16.0 *4*	0.0	0^+	(E2)	0.00322		B(E2)(W.u.)=0.31 *3* Mult.: α(K)exp is consistent with M1 or E2; however, the decay scheme requires ΔJ=2.
1047.80	0^+	117.25 *7*	3.31 *10*	930.545	2^+	E2	1.42		
		432.52 *10*		615.386	0^+	E0		31 *4*	
		703.52 *5*	100 *3*	344.2790	2^+	E2	0.00603		
		1048.1 *3*		0.0	0^+	E0		1.7 *5*	
1109.202	2^+	178.58 *11*	0.44 *4*	930.545	2^+	M1,E2			
		353.88 *17*	0.51 *6*	755.3961	4^+	[E2]			I_γ: From 13-y Eu β^- decay. Iγ=1.04 *5* is reported in 17.5-h Tb ε decay.
		493.81 *7*	5.16 *12*	615.386	0^+	[E2]	0.0145		
		764.88 *4*	100.0 *23*	344.2790	2^+	M1+E2(+E0)	0.0070 *6*		δ: δ=4.30 *+7−6*. α: From α(K)exp=0.0059 *5* and α/α(K)=1.18. Mult.: A comparison of α(K)exp=0.0059 *5* with the theory value of 0.0044 deduced from the measured δ, suggests the possibility of an E0 component.
		1109.18 *5*	94 *3*	0.0	0^+	(E2)	0.00224		Mult.: α(K)exp is consistent with mult=M1 or E2, but placement in the decay scheme requires ΔJ=2.
1123.1857	3^-	192.60 *4*	0.0526 *17*	930.545	2^+	[E1]	0.0504		
		367.7891 *20*	6.63 *8*	755.3961	4^+	E1	0.00966		δ: δ(M2/E1)=+0.015 *19*.
		778.9045 *24*	100.0 *5*	344.2790	2^+	E1	0.00185		δ: δ(M2/E1)=+0.003 *6*.
1227.37	6^+	471.98 *9*	100	755.3961	4^+	E2	0.0164		B(E2)(W.u.)=197 *+49−35*

$^{152}_{64}Gd_{88}$-8

Adopted Levels, Gammas (continued)

$\gamma(^{152}Gd)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[@]	E_f	J^π_f	Mult.[a]	δ	α[b]	Comments
1274.27	1,2$^+$	658.83 11	100	615.386	0$^+$				
1282.246	4$^+$	159.16 16	3.6 4	1123.1857	3$^-$	[E1]		0.0835	
		172.1[d] 4	3.3 16	1109.202	2$^+$	[E2]		0.365	E_γ,I_γ: From 13-y Eu β^- decay. Not reported in 17.5-h Tb ε decay.
		351.69 4	88.4 22	930.545	2$^+$	E2		0.0375	
		526.88 5	100.0 22	755.3961	4$^+$	M1+E2+E0		0.094 8	
1314.613	1$^-$	191.6 3	0.08 5	1123.1857	3$^-$	[E2]		0.259	
		266.92 22	0.12 6	1047.80	0$^+$	[E1]		0.0215	
		699.28 4	7.51 26	615.386	0$^+$	[E1]		0.00231	
		970.321 8	61.6 16	344.2790	2$^+$	E1+M2	−0.021 12	0.00121	
		1314.61 6	100.0 17	0.0	0$^+$	E1		0.00069	
1318.414	2$^+$	195.17 6	13.3 3	1123.1857	3$^-$	E1		0.0487	
		209.14 8	1.20 5	1109.202	2$^+$	M1+E2(+E0)		0.50 13	
		387.86 5	12.4 4	930.545	2$^+$	E0+M1+E2		0.45 11	
		562.98 9	2.22 7	755.3961	4$^+$	[E2]		0.0104	
		703.025[‡] 22	28.3 11	615.386	0$^+$	E2		0.00604	
		974.08 4	100.0 21	344.2790	2$^+$	M1+E2	+0.58 7	0.0041 7	
		1318.29 11	9.5 7	0.0	0$^+$	[E2]		0.00159	
1434.020	3$^+$	324.83 3	3.93 11	1109.202	2$^+$	[M1,E2]		0.063 16	I_γ: From 13-y Eu β^- decay. $I\gamma$=4.65 21 in 17.5-h Tb ε decay.
		503.467 9	8.79 11	930.545	2$^+$	E2		0.0139	I_γ: From 13-y Eu β^- decay. $I\gamma$=7.18 21 in 17.5-h Tb ε decay.
		678.623 5	27.25 19	755.3961	4$^+$	M1+E2	+4.1 +17−11	0.00652 1	I_γ: From 13-y Eu β^- decay. $I\gamma$=24.9 6 in 17.5-h Tb ε decay.
		1089.737 5	100.0 5	344.2790	2$^+$	M1+E2	+22 +13−6	0.00232	
1460.53?	(1,2$^+$)	412.0[d] 3	7 5	1047.80	0$^+$				
		845.4[d] 5	100 15	615.386	0$^+$				
		1116.0[d] 10	11 7	344.2790	2$^+$				
		1460.65[d] 13	17 5	0.0	0$^+$				
1470.43	5$^-$	345		1123.1857	3$^-$				
		715.0 2		755.3961	4$^+$	D+Q			Mult.: $\gamma(\theta)$ (α,xnγ).
1470.63	2$^+$	715.19 8	100.0 25	755.3961	4$^+$	[E2]			
		855.24[‡] 6	45 9	615.386	0$^+$	[E2]			
1533.92		603.18 14	100	930.545	2$^+$				
1550.16	4$^+$	440.96 8	26.1 7	1109.202	2$^+$	[E2]		0.0197	I_γ: From 17.5-h Tb ε decay. $I\gamma$=50 6 reported in 13-y Eu β^- decay.
		794.76 4	100.0 26	755.3961	4$^+$	D(+Q)	−0.4 +7−12	0.0077 21	
		1205.91 9	61 6	344.2790	2$^+$	(E2)			
1605.609	2$^+$	287.10 12	2.42 21	1318.414	2$^+$	[M1,E2]			
		482.34 9	6.44 16	1123.1857	3$^-$	[E1]			E_γ,I_γ: From 17.5-h Tb ε decay. The transition is a doublet in 13-y Eu β^- decay.
		496.37 7	16.2 4	1109.202	2$^+$	M1+E2+E0		0.074 5	E_γ: From 17.5-h Tb ε decay. The transition is a doublet in 13-y Eu β^- decay.
		557.80[‡] 4	8.0 8	1047.80	0$^+$	[E2]		0.0106	

$^{152}_{64}Gd_{88}$-9

Adopted Levels, Gammas (continued)

$\gamma(^{152}Gd)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[@]	E_f	J_f^π	Mult.[a]	δ	α[b]	Comments
1605.609	2^+	675.01 *7*	58.8 *12*	930.545	2^+	M1+E2	+2.2 *4*	0.0076 *4*	E_γ,I_γ: From 17.5-h Tb ε decay. The transition is a doublet in 13-y Eu β^- decay.
		850.16 *12*	2.30 *24*	755.3961	4^+	[E2]			I_γ: From 13-y Eu β^- decay. $I\gamma$=3.3 *3* reported in 17.5-h Tb ε decay.
		990.18 *35*	80 *3*	615.386	0^+	E2			
		1261.35 *5*	100.0 *21*	344.2790	2^+	M1		0.00271	
		1605.62 *7*	23.6 *11*	0.0	0^+	E2			Mult.: From α(K)exp in 13-y Eu β^- decay. α(K)exp in 17.5-h Tb ε decay requires mult=E1, inconsistent with the placement.
1643.418	2^-	209.41 *13*	0.073 *25*	1434.020	3^+	[E1]		0.0404	
		324.914 *26*	0.305 *15*	1318.414	2^+	[E1]			
		328.764 *26*	0.212 *13*	1314.613	1^-				
		520.25 *4*	3.18 *13*	1123.1857	3^-	[M1,E2]		0.018 *5*	
		534.25 *5*	2.52 *6*	1109.202	2^+	[E1]			
		712.83 *5*	5.74 *18*	930.545	2^+	(E1)		0.00221	Mult.,δ: D(+Q) with δ(Q/D)=+0.06 *+19−15* from 13-y Eu β^- decay.
		1299.141 *8*	100.0 *5*	344.2790	2^+	E1+M2	+0.043 *17*		
1668.13	6^+	197.4 *3*	8.9 *7*	1470.43	5^-	[E1]		0.0472	
		385.9 *1*	100 *6*	1282.246	4^+	E2		0.0286	
		440.8 *2*	12 *5*	1227.37	6^+	(M1+E2)		0.021 *15*	E_γ: From the level energy difference. The transition is a doublet in 4.2-min Tb ε decay. $E\gamma$=439.8 in (α,xnγ) and 440.7 in (^{9}Be,5nγ). Mult.: Mult=D+Q from $\gamma(\theta)$ in (α,xnγ). $\Delta\pi$=no from the level scheme.
1680.74	0^+	366.15 *9*	24.0 *16*	1314.613	1^-	[E1]			
		750.06 *9*	10.1 *10*	930.545	2^+	[E2]			
		1336.54 *8*	100.0 *21*	344.2790	2^+	[E2]			
1692.42	$2^+,3^+$	937.04 *9*	19.1 *8*	755.3961	4^+	[M1,E2]			
		1348.12 *6*	100.0 *23*	344.2790	2^+	M1+E2	15 *6*	0.00153	δ: δ=−13 *+4−7* for J=3 and +12 *+9−4* for J=2.
1734.44		979.04 *12*	100	755.3961	4^+				
1746.78	8^+	519.4 *1*	100	1227.37	6^+	E2		0.0128	Mult.: ΔJ=2.
1755.97	1^-	632.8 *3*	2.6 *16*	1123.1857	3^-				
		646.9 *3*	1.6 *10*	1109.202	2^+				
		825.5 *3*	1.6 *10*	930.545	2^+				
		1411.76 *5*	100.0 *19*	344.2790	2^+				
		1755.98 *7*	6.5 *6*	0.0	0^+				
1771.57	2^+	456.92 *7*	39.2 *18*	1314.613	1^-	[E1]			
		489.59 *13*	22.9 *18*	1282.246	4^+	[E2]		0.01475	
		648.31 *7*	100.0 *24*	1123.1857	3^-	[E1]			
		723.67 *10*	19.4 *8*	1047.80	0^+	[E2]			
		841.10 *9*	43.4 *24*	930.545	2^+	[M1,E2]			
		1427.32 *7*	99.4 *24*	344.2790	2^+	[M1,E2]			
1785.21	2^+	662.02 *10*	63 *8*	1123.1857	3^-	[E1]			

$^{152}_{64}Gd_{88}$-10

$\gamma(^{152}Gd)$ (continued)

E_i(level)	J^{π}_i	E_{γ}[†]	I_{γ}[@]	E_f	J^{π}_f	Mult.[a]	δ	α[b]	Comments
1785.21	2+	854.69	100 *20*	930.545	2+	E0+M1+E2			
1807.52		1052.15 *7*	100	755.3961	4+				
1808.96		490.66 *9*	100 *4*	1318.414	2+				
		878.13 *19*	41 *4*	930.545	2+				
1839.71	2+	557.46[‡] *6*	31 *6*	1282.246	4+	(E2)		0.01053	
		909.15 *7*	100 *3*	930.545	2+	[M1,E2]			
		1084.30[‡] *5*	36 *8*	755.3961	4+	[E2]			
		1495.44 *8*	84 *3*	344.2790	2+	E0+M1+E2			
1861.58	5+	311.4 *4*	2.8 *11*	1550.16	4+	[M1,E2]		0.071 *17*	
		427.6 *2*	33.2 *19*	1434.020	3+	E2		0.0214	
		579.2 *3*	7.9 *7*	1282.246	4+	[M1,E2]		0.014 *4*	
		634.2 *2*	33.6 *26*	1227.37	6+	[M1,E2]		0.011 *3*	
		1106.2 *2*	100 *7*	755.3961	4+	E2			
1861.90	2+	218.42 *9*	3.03 *16*	1643.418	2−	[E1]		0.0360	
		427.85 *11*	4.4 *3*	1434.020	3+	[M1,E2]		0.029 *9*	
		543.58 *7*	42.1 *10*	1318.414	2+	E0+M1+E2		0.016 *5*	δ: (E2/M1)$−3 +8−*INFNT*$T_{1/2}$ (1981Fe01).
		579.63 *9*	6.5 *4*	1282.246	4+	[E2]			
		738.69 *9*	46.7 *13*	1123.1857	3−	[E1]			
		752.59 *9*	6.9 *6*	1109.202	2+	[M1,E2]			
		814.09[‡] *5*	5.3 *10*	1047.80	0+	[E2]			
		1861.94 *8*	100.0 *21*	0.0	0+	(E2)			Mult.: α(K)exp is consistent with mult=M1 or E2; however, placement in the decay scheme requires ΔJ=2.
1862.05	2+	547.47 *7*	13.9 *4*	1314.613	1−	[E1]			
		1106.59 *8*	75.8 *23*	755.3961	4+	[E2]			
		1517.76[‡] *6*	100 *8*	344.2790	2+	M1+E2	−0.28 *5*		
1880.2	7−	410		1470.43	5−				
		652.9 *3*		1227.37	6+	E1		0.00266	
1915.17	(4)+	687.62 *14*	3.6 *10*	1227.37	6+				
		1159.82 *7*	100.0 *24*	755.3961	4+				
1915.77	2+,3,4+	597.57 *11*	6.7 *5*	1318.414	2+				
		633.60 *9*	11.8 *5*	1282.246	4+				
		792.56 *11*	12.6 *8*	1123.1857	3−				
		1571.25 *8*	100.0 *20*	344.2790	2+				
1941.177	2+	248.75 *9*	6.8 *9*	1692.42	2+,3+	[M1,E2]		0.133 *25*	
		298.06 *21*	0.74 *11*	1643.418	2−	[E1]		0.01619	
		335.56 *7*	6.41 *21*	1605.609	2+	[M1,E2]		0.057 *15*	
		390.82 *15*	0.81 *13*	1550.16	4+				
		622.79 *7*	100.0 *21*	1318.414	2+	M1(+E2)	+0.018 *+42−18*	0.011 *4*	δ: δ=+0.018 *+42−18* or +2.1 *3*. α(K)exp rules out the large solution. δ: Other: +1.0 *5* (1981Fe01).
		817.99[‡] *3*	10.3 *17*	1123.1857	3−	[E1]			

$^{152}_{64}Gd_{88}$-11

γ(^{152}Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[@]	E_f	J^π_f	Mult.[a]	δ	α[b]	Comments
1941.177	2^+	831.94 8	12.3 4	1109.202	2^+	[M1,E2]			
		893.34 7	69.6 15	1047.80	0^+	[E2]			Mult.: α(K)exp is larger than the theory values of 0.00511 for M1 and 0.00294 for E2. Placement in the decay scheme requires mult=E2. $\gamma(\theta)$ is consistent with ΔJ=2.
		1010.60 7	43.6 9	930.545	2^+	M1(+E2+E0)			δ: +0.03 +3−10 or +2.1 5.
		1185.73 7	23.2 6	755.3961	4^+	(E2)			Mult.: α(K)exp is consistent with mult=E1 or E2; however, placement in the decay scheme requires Δπ=no. δ: δ(O/Q)=−0.3 3 (1981Fe01).
		1325.86 7	85.5 21	615.386	0^+	E2			
		1596.89[‡] 3	33.0 17	344.2790	2^+	M1+E2	−0.28 12		
		1941.23 8	76.4 16	0.0	0^+	(E2)			Mult.: α(K)exp lies between α(K)=0.000310 for E1 and 0.000647 for E2. placement in the decay scheme requires ΔJ=2.
1975.72	$1^+,2^+$	1360.43 11	39.2 18	615.386	0^+				
		1631.43[‡] 7	92 7	344.2790	2^+	M1(+E2)			
		1975.65 8	100.0 26	0.0	0^+				
1997.85	6^+	447.7 4	62 15	1550.16	4^+	[E2]		0.0189	
		770.4 3	100 15	1227.37	6^+				
		1242.6 4	65 12	755.3961	4^+				
2011.67	$1^+,2^+$	577.57 9	2.65 14	1434.020	3^+				
		693.13 16	4.1 3	1318.414	2^+				
		697.20 16	2.3 8	1314.613	1^-				
		902.46 8	21.8 6	1109.202	2^+				
		1667.38 8	100.0 23	344.2790	2^+	M1+E2		0.00134 20	Mult.,δ: α(K)exp and $\gamma(\theta)$ in 17.5-h Tb ε decay require a mixed M1+E2 mult.
2069.4		1314	100	755.3961	4^+				
2121.05	$2^+,3^-,4^+$	839.6 4	15 3	1282.246	4^+				
		1365.69 8	100.0 22	755.3961	4^+				
		1776.3 3	16.9 22	344.2790	2^+				
2133.38	$1^+,2^+$	818.76[#]	1.3 5	1314.613	1^-				
		1202.84[#]	5.7 16	930.545	2^+				
		1518.02[#]	6.6 13	615.386	0^+				
		1789.11[#]	100 3	344.2790	2^+	M1			
2138.79	8^+	258		1880.2	7^-				E_γ: Reported only in (α,xnγ).
		392		1746.78	8^+				E_γ: Reported only in (^{36}S,α4nγ).
		470.7 5		1668.13	6^+	E2		0.0165	Mult.: ΔJ=2.
2169.64	2^+	855.03[‡] 7	11 3	1314.613	1^-				
		1554.04 16	8.9 8	615.386	0^+				
		1825.37 9	100.0 21	344.2790	2^+				
2173.41	6^-	946.0 2	100	1227.37	6^+				

$^{152}_{64}$Gd$_{88}$-12

γ(^{152}Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[@]	E_f	J^π_f	Mult.[a]	δ	α[b]	Comments
2201.71	2^+	1092.26 *14*	19.9 *11*	1109.202	2^+				
		1446.31[‡] *7*	48 *5*	755.3961	4^+	[E2]			
		1857.48 *8*	100.0 *22*	344.2790	2^+	M1+E2			δ: δ=−0.8 +*2*−*5* or −4 +*2*−*4*.
		2201.65 *26*	7.3 *8*	0.0	0^+				
2246.81	2^+	407.12 *21*	0.83 *12*	1839.71	2^+	[M1,E2]		0.034 *10*	
		641.20 *7*	3.50 *9*	1605.609	2^+	[M1,E2]		0.010 *3*	
		812.80 *8*	11.8 *3*	1434.020	3^+	[M1,E2]			
		928.43 *7*	21.4 *5*	1318.414	2^+	M1,E2			
		932.09 *8*	11.5 *4*	1314.613	1^-	[E1(+M2)]			
		1137.56 *7*	50.8 *11*	1109.202	2^+	M1+E2			δ: δ=−0.40 +*4*−*2* or +23 +*72*−*10*.
		1316.32 *12*	11.7 *9*	930.545	2^+				
		1491.62 *22*	1.00 *7*	755.3961	4^+				
		1631.41[‡] *4*	9.5 *6*	615.386	0^+	[E2]			
		1902.51[‡] *4*	100.0 *23*	344.2790	2^+	M1+E2	−0.97 +*15*−*36*		
2258.17	2^+,3,4^+	939.84 *9*	79 *3*	1318.414	2^+				
		1148.99 *10*	100 *5*	1109.202	2^+				
		1502.62 *10*	35.8 *12*	755.3961	4^+				
2264.86	1^-,2,3^-	947.1 *3*	19 *4*	1318.414	2^+				
		950.34 *16*	43.4 *19*	1314.613	1^-				
		1141.68 *10*	100 *5*	1123.1857	3^-				
2265.30	1^+,2^+,3^+	1921.00 *8*	100	344.2790	2^+	M1+E2			δ: δ=−0.23 +*9*−*13*, −0.27 *3*, +0.22 *3* for J=1, 2, and 3, respectively.
2267.71?		953.07[d] *9*	100.0 *25*	1314.613	1^-	M1			
		1040.6[d] *3*	10.4 *22*	1227.37	6^+				
2299.5	10^+	553.6	100	1746.78	8^+				
2299.66	2,3^-	656.42 *9*	8.9 *4*	1643.418	2^-				
		865.62 *8*	10.0 *4*	1434.020	3^+				
		984.90 *8*	15.4 *9*	1314.613	1^-				
		1176.53 *9*	7.2 *3*	1123.1857	3^-				
		1190.44 *7*	100.0 *20*	1109.202	2^+				
		1369.04 *9*	33.1 *8*	930.545	2^+				
		1955.36 *8*	90.7 *20*	344.2790	2^+				
2301.82	7^+	303.7 *4*	9 *5*	1997.85	6^+				
		440.3[c] *2*	54[c] *27*	1861.58	5^+				
		1074.5 *2*	100 *7*	1227.37	6^+				
2325.69		1202.50[‡] *9*	100	1123.1857	3^-				
2330.72	2^+,3,4^+	1575.30 *9*	100 *3*	755.3961	4^+				
		1986.8 *4*	8.0 *18*	344.2790	2^+				
2331.1	9^-	451.1	28	1880.2	7^-	E2		0.0185	Mult.: ΔJ=2.
		584.6	100	1746.78	8^+	D			
2386.95	$(2)^+$	1072.16 *15*	28 *4*	1314.613	1^-				
		1263.84 *11*	100 *4*	1123.1857	3^-				

$^{152}_{64}Gd_{88}$-13

γ(^{152}Gd) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[@]	E_f	J_f^π	Mult.[a]	δ	α[b]	Comments
2386.95	(2)$^+$	2042.65[‡] 9	100 8	344.2790	2$^+$	M1+E2(+E0)			
2394.19	7$^+$	92.4 2	6.8 7	2301.82	7$^+$				
		220.7 3	10.1 9	2173.41	6$^-$				
		255.4 3	8.5 7	2138.79	8$^+$	M1,E2		0.125 25	
		396.4 3	3.1 7	1997.85	6$^+$				
		532.6 1	100 6	1861.58	5$^+$	E2		0.0120	
		647.4 2	100 7	1746.78	8$^+$	M1		0.0135	
		726.0 2	74 4	1668.13	6$^+$	M1		0.0102	
		1166.9 2	86 6	1227.37	6$^+$	M1		0.00325	
2401.52	1$^+$,2,3$^-$	708.98 8	27.8 10	1692.42	2$^+$,3$^+$				
		1083.12[‡] 7	25 6	1318.414	2$^+$				
		1087.12 10	100 4	1314.613	1$^-$				
2437.43	2$^+$	1314.24 8	100 4	1123.1857	3$^-$	E1			
		1506.90 8	21.7 9	930.545	2$^+$	M1(+E0)			
		2093.15[‡] 5	59 5	344.2790	2$^+$	M1+E2(+E0)			
		2437.11 21	3.7 3	0.0	0$^+$				
2448.02	$^+$	2103.73 12	100	344.2790	2$^+$	M1,E2			
2460.6	8$^+$	464		1997.85	6$^+$				
		1232		1227.37	6$^+$				
2495.18		1372.04 9	22.0 7	1123.1857	3$^-$				
		2150.85 8	100.0 20	344.2790	2$^+$				
2513.9	1,2$^+$	2169.6 4	100 28	344.2790	2$^+$				
		2513.9 4	11.1 28	0.0	0$^+$				
2523.81	2$^+$	684.12 9	6.0 7	1839.71	2$^+$				
		880.29 10	14.3 5	1643.418	2$^-$				
		1209.03 9	100.0 22	1314.613	1$^-$	E1+M2	+0.06 4		
		1400.61[‡] 4	34 3	1123.1857	3$^-$				
		1593.37 9	32.0 9	930.545	2$^+$				
		2179.42 11	20.5 6	344.2790	2$^+$	M1			
		2523.92 9	28.9 7	0.0	0$^+$	(E2)			Mult.: α(K)exp is consistent with mult=M1 or E2. Placement in the decay scheme requires ΔJ=2.
2529.43	2$^+$,3$^+$	722.00 12	5.6 4	1807.52					
		1247.07 7	58.4 17	1282.246	4$^+$				
		1406.16 8	44.7 11	1123.1857	3$^-$	(E1)			Mult.: α(K)exp has a large uncertainty and is more consistent with E2 than with E1; however, placement in the level scheme requires $\Delta\pi$=yes.
		1598.90 8	96.6 22	930.545	2$^+$				
		2185.24 9	100.0 20	344.2790	2$^+$	M1		0.00118	
2536.6	8$^-$	363		2173.41	6$^-$				
		657		1880.2	7$^-$				
		790.2		1746.78	8$^+$	(E1+M2)			
2540.47	2$^+$,3$^+$	1221.95 12	22.6 15	1318.414	2$^+$				

$^{152}_{64}Gd_{88}$-14

$\gamma(^{152}Gd)$ (continued)

E_i(level)	J^π_i	E_γ [†]	I_γ [@]	E_f	J^π_f	Mult. [a]	δ	α [b]	Comments
2540.47	$2^+,3^+$	1417.18 *15*	21.3 *11*	1123.1857	3^-				
		1785.15 *11*	52 *3*	755.3961	4^+				
		2196.20 *10*	100.0 *21*	344.2790	2^+	M1			
2544.01		1420.76 *8*	100 *3*	1123.1857	3^-				
		1613.53 *9*	95 *4*	930.545	2^+				
2551.14		1117.15 *11*	20.3 *8*	1434.020	3^+				
		1441.91 *8*	100 *3*	1109.202	2^+				
2557.87	2^+	914.35 *7*	80.3 *24*	1643.418	2^-				
		1434.54 *11*	44.2 *22*	1123.1857	3^-				
		1802.67 *9*	100 *3*	755.3961	4^+				
		2211.7 [d]		344.2790	2^+	(E0)			
		2557.91 *12*	38.1 *12*	0.0	0^+				
2598.80	$1^+,2^+$	993.14 *11*	66 *3*	1605.609	2^+				
		1489.60 *10*	68.7 *20*	1109.202	2^+	M1(+E2)			
		1983.41 *8*	76.0 *20*	615.386	0^+				
		2254.54 *9*	100.0 *20*	344.2790	2^+	M1,E2			
2604.33	$1^-,2,3^-$	1289.64 *9*	45.4 *15*	1314.613	1^-				
		1481.18 *8*	94 *5*	1123.1857	3^-				
		2260.05 *11*	100.0 *24*	344.2790	2^+				
2641.58	$1^-,2^-,3^-$	1518.38 [‡] *9*	100 *8*	1123.1857	3^-	M1,E2			
		1711.02 *9*	19.2 *6*	930.545	2^+				
2667.55	1^-	1352.98 *11*	49 *5*	1314.613	1^-	E0+M1+E2			
		1544.29 *8*	100.0 *25*	1123.1857	3^-				
		1737.03 *9*	69.2 *18*	930.545	2^+				
2686.87	2^+	2342.57 *9*	100	344.2790	2^+	M1+E2(+E0)			δ: δ(E2/M1)=−0.05 +*17*−*15* or +2.1 *9*.
2691.7	10^+	361		2331.1	9^-				
		552.4		2138.79	8^+	E2		0.0109	
2696.8	8^-	950	100	1746.78	8^+				
2709.42	2^+	1066.2 *3*	1.18 *9*	1643.418	2^-				
		1586.22 *7*	100.0 *21*	1123.1857	3^-	E1+M2	+0.19 +*3*−*14*		
		1778.78 *9*	11.4 *4*	930.545	2^+	M1+E2			δ: δ=−0.26 *10* or +5.9 +*70*−*22*.
		2094.02 [‡] *5*	8.4 *8*	615.386	0^+	[E2]			
		2365.13 *9*	39.3 *10*	344.2790	2^+	E0+M1+E2			δ: δ(E2/M1)≤0.25 or +1.8 +*6*−*5*.
		2709.47 *9*	18.9 *4*	0.0	0^+	E2			
2719.63	2^+	454.8 *3*	0.64 *15*	2264.86	$1^-,2,3^-$				
		1027.16 *21*	1.36 *16*	1692.42	$2^+,3^+$				
		1401.22 [‡] *5*	7.3 *3*	1318.414	2^+				
		1596.45 [‡] *5*	19.8 *15*	1123.1857	3^-	[E1]			
		1789.08 [‡] *5*	11.8 *9*	930.545	2^+	M1+E2	+0.26 +*9*−*6*		
		2104.24 [‡] *5*	4.4 *10*	615.386	0^+	[E2]			
		2375.34 *9*	100.0 *21*	344.2790	2^+	M1+E2	+0.15 *8*		

$^{152}_{64}Gd_{88}$-15

γ(^{152}Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[@]	E_f	J^π_f	Mult.[a]	δ	α[b]	Comments
2719.63	2+	2719.61 8	32.7 8	0.0	0+	(E2)			Mult.: α(K)exp allows mult=M1 or E2; however, placement in the decay scheme requires ΔJ=2.
2729.17	2+	813.40[‡] 6	5.2 24	1915.77	2+,3,4+				
		1036.74 7	52.1 12	1692.42	2+,3+				
		1085.68 11	65.2 21	1643.418	2−	D+Q	−0.18 14		
		1258.45 10	22.7 9	1470.63	2+				
		1410.75[‡] 4	100 6	1318.414	2+	M1+E2	+4.3 +9−13		
		1605.98[‡] 4	73 9	1123.1857	3−	(E1)			
		1681.53 8	19.9 5	1047.80	0+				
		1798.45 9	47.9 18	930.545	2+	E2(+M1)	≥14.3		
		2113.70 9	41.2 9	615.386	0+	(E2)			Mult.: α(K)exp allows mult=M1 or E2; however, placement in the decay scheme requires ΔJ=2.
		2384.94 9	43.9 9	344.2790	2+	E0+M1+E2			δ: δ(E2/M1)=−0.22 8 or 4.8 +28−13.
		2729.25 11	7.9 3	0.0	0+				
2734.07		2118.66 9	61.5 16	615.386	0+	M1			
		2734.06 10	100.0 21	0.0	0+				
2744.04	1−	1634.0 3	8.9 21	1109.202	2+				
		2744.10 10	100.0 25	0.0	0+	E1			
2749.24	2+,3+	301.8 3	0.38 11	2448.02	+				
		1056.79 7	1.72 6	1692.42	2+,3+				
		1215.20 11	0.80 9	1533.92					
		1430.76 7	7.2 3	1318.414	2+				
		1475.04 14	0.72 24	1274.27	1,2+				
		1640.08 9	3.30 11	1109.202	2+	M1			
		1993.87 8	6.96 15	755.3961	4+				
		2405.00 9	100.0 20	344.2790	2+	(E2)			Mult.: α(K)exp is consistent with mult=E1 or E2; however, the decay scheme requires Δπ=no.
2772.47	2+	857.33 11	100 7	1915.17	(4)+				
		1016.60 9	88.9 24	1755.97	1−				
		1128.65 10	34 4	1643.418	2−				
		1338.5 4	15.1 24	1434.020	3+				
		1454.08 12	28.1 16	1318.414	2+				
		1663.67 14	53 3	1109.202	2+	E0+M1+E2			
		1841.91[‡] 5	33 4	930.545	2+	M1,E2			
		2772.44 18	6.3 4	0.0	0+				
2774.5	9+	476		2299.5	10+				
		1025		1746.78	8+				
2814.0	11−	483.1	54	2331.1	9−	E2		0.0154	Mult.: ΔJ=2.
		514.3	100	2299.5	10+	D			
2862.65	1−,2,3−	1547.95 9	36.1 10	1314.613	1−				
		1739.46 8	67.6 17	1123.1857	3−				
		2518.42 9	100.0 23	344.2790	2+				

$^{152}_{64}$Gd$_{88}$-16

$\gamma(^{152}Gd)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[@]	E_f	J^π_f	Mult.[a]	α[b]	Comments
2869.84?		2254.44[d]		615.386	0^+			
		2525.43[d]		344.2790	2^+			
2874.7	8^-	995		1880.2	7^-			
2880.67	2^+	747.29 *14*	1.55 *11*	2133.38	$1^+,2^+$			
		868.94 *11*	4.06 *15*	2011.67	$1^+,2^+$			
		1188.37 *11*	5.53 *23*	1692.42	$2^+,3^+$			
		1275.04 *7*	15.3 *4*	1605.609	2^+			
		1446.64[‡] *3*	25.2 *26*	1434.020	3^+	M1,E2		
		1562.45 *8*	12.7 *3*	1318.414	2^+	M1		
		1565.97 *8*	15.6 *4*	1314.613	1^-			
		1757.42 *7*	100.0 *23*	1123.1857	3^-	(E1)		Mult.: α(K)exp lies between the theoretical values for E1 and M1 or E2. The placement in the decay scheme requires $\Delta\pi$=yes.
		1771.43 *8*	51.0 *11*	1109.202	2^+	M1		
		2265.33 *9*	13.0 *3*	615.386	0^+			
		2536.30 *7*	38.9 *11*	344.2790	2^+	M1		
2883.5	12^+	583.4	100	2299.5	10^+		0.00948	
2889.2	10^-	353.6	62	2536.6	8^-		0.0370	
		558		2331.1	9^-			
		589.9	100	2299.5	10^+		0.00922	
2914.19	2^+	998.37 *11*	8.1 *5*	1915.77	$2^+,3,4^+$			
		2158.72 *10*	43.5 *12*	755.3961	4^+	(E2)		Mult.: α(K)exp gives mult=M1 or E2. Placement in the decay scheme requires ΔJ=2.
		2569.85 *10*	100.0 *24*	344.2790	2^+	(M1,E2)		Mult.: α(K)exp lies between the theoretical values for E1 and M1 or E2. placement in the decay scheme requires $\Delta\pi$=no.
		2914.42 *14*	4.78 *24*	0.0	0^+			Mult.: α(K)exp is slightly larger than the theoretical values for M1 or E2. placement in the decay scheme requires ΔJ=2.
2920.10	$1^-,2,3,4^+$	1004.2 *3*	11.9 *18*	1915.77	$2^+,3,4^+$			
		1796.83 *14*	100 *6*	1123.1857	3^-			
		1811.3 *3*	30 *4*	1109.202	2^+			
		2575.82 *17*	53.7 *23*	344.2790	2^+			
2927.86	$2^+,3^+$	1235.57 *10*	57.1 *20*	1692.42	$2^+,3^+$			
		1284.42 *9*	100.0 *24*	1643.418	2^-			
		1457.25 *11*	22.8 *18*	1470.63	2^+			
		1818.56 *9*	73.2 *24*	1109.202	2^+	M1,E2		
		2172.45 *11*	38.9 *14*	755.3961	4^+			
		2583.0 *4*	37 *7*	344.2790	2^+			
2928.73		1610.11 *19*	28.5 *24*	1318.414	2^+			
		2584.9 *3*	100 *9*	344.2790	2^+			
2932.71	2^+	1809.53 *10*	22.2 *7*	1123.1857	3^-			
		2317.61 *24*	1.80 *18*	615.386	0^+			
		2588.36 *8*	100.0 *21*	344.2790	2^+	M1,E2(+E0)		Mult.: α(K)exp in 17.5-h Tb ε decay suggests a possible E0 component, consistent with its placement as a 2^+ to 2^+ transition.

$^{152}_{64}Gd_{88}$-17

γ(^{152}Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[@]	E_f	J^π_f	Mult.[a]	Comments
2964.32	2^-	638.35 *10*	7.9 *10*	2325.69			
		1155.48 *13*	15.3 *19*	1808.96			
		1414.40 *14*	27.4 *10*	1550.16	4^+		
		1530.07 *15*	7.2 *6*	1434.020	3^+		
		1645.92 *8*	48.6 *14*	1318.414	2^+		
		1841.13[‡] *5*	38 *5*	1123.1857	3^-	M1,E2	
		2033.89 *9*	100.0 *23*	930.545	2^+	E1	δ: δ(M2/E1)$\leq$0.37.
2981.45	2^+,3,4^+	860.84 *14*	38 *4*	2121.05	2^+,3^-,4^+		
		2226.01 *23*	64 *4*	755.3961	4^+		
		2636.93 *10*	100.0 *24*	344.2790	2^+		
2989.02		1047.9[d]	<48	1941.177	2^+		
		1714.65 *25*	24 *4*	1274.27	1,2^+		
		2058.47 *9*	55 *5*	930.545	2^+		
		2644.74 *16*	100 *6*	344.2790	2^+		
2999.55	1^+,2^+	829.6 *3*	9 *3*	2169.64	2^+		
		1393.86 *9*	50.1 *13*	1605.609	2^+		
		2069.00 *8*	100.0 *21*	930.545	2^+	M1,E2	
		2655.29 *10*	60.1 *17*	344.2790	2^+	M1,E2	
		2999.69 *16*	34.4 *6*	0.0	0^+		
3006.77	2^+	837.08 *11*	12.0 *7*	2169.64	2^+		
		1167.0 *3*	7.1 *15*	1839.71	2^+		
		1363.39 *14*	15.3 *10*	1643.418	2^-		
		1732.42 *11*	6.8 *6*	1274.27	1,2^+		
		2076.21 *10*	22.0 *9*	930.545	2^+	M1	Mult.: α(K)exp in 17.5-h Tb ε decay suggests a possible E0 component, consistent with its placement as a 2^+ to 2^+ transition.
		2251.41 *9*	46.8 *11*	755.3961	4^+		
		2662.55 *10*	100.0 *19*	344.2790	2^+	M1+E2	δ: δ=−0.74 +*11*−*50* or −4.6 +*18*−*24*.
		3006.63 *14*	4.39 *15*	0.0	0^+		
3009.28	3^-	1253.48 *9*	32.1 *17*	1755.97	1^-		
		1690.68 *9*	28.6 *12*	1318.414	2^+		
		1694.60 *13*	24.7 *11*	1314.613	1^-		
		1886.08 *13*	43 *3*	1123.1857	3^-	E0+M1+E2	
		2078.63 *9*	48.7 *23*	930.545	2^+	[E1]	
		2665.18 *12*	100 *3*	344.2790	2^+		
3010.8	9^-	137[d]		2874.7	8^-		E_γ: Reported only in (^{36}S,α4nγ).
		679		2331.1	9^-		E_γ: Reported only in (α,xnγ).
		1131		1880.2	7^-		E_γ: Reported only in (α,xnγ).
3012.37	2^+,3^+,4^+	810.44 *23*	7.6 *9*	2201.71	2^+		
		1000.41 *20*	6.0 *6*	2011.67	1^+,2^+		
		1096.60 *19*	15.1 *15*	1915.77	2^+,3,4^+		
		1903.16[‡] *8*	10.0 *20*	1109.202	2^+		
		2257.22 *22*	11.5 *7*	755.3961	4^+		

$^{152}_{64}$Gd$_{88}$-18

$\gamma(^{152}Gd)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[@]	E_f	J^π_f	Mult.[a]	δ	Comments
3012.37	$2^+,3^+,4^+$	2668.13 *10*	100.0 *20*	344.2790	2^+	M1,E2		
3033.0	(11)	733	100	2299.5	10^+			
3042.29	2^+	1436.67 *9*	23.8 *7*	1605.609	2^+			
		1727.72 *8*	41.4 *11*	1314.613	1^-			
		1932.94 *12*	20.4 *11*	1109.202	2^+	M1,E2		
		2697.99 *10*	100.0 *22*	344.2790	2^+	M1(+E2)	≤0.22	
3060.1		729	100	2331.1	9^-			
3067.42	3^-	1944.22[‡] *10*	<6.2	1123.1857	3^-	E0(+M1,E2)		
		2312.00 *10*	100 *3*	755.3961	4^+			
3074.85	$2^+,3,4^+$	1792.71 *14*	100 *8*	1282.246	4^+			
		1965.42 *19*	30.1 *18*	1109.202	2^+			
3079.69	$2^+,3^+,4^+$	1761.22 *16*	100 *6*	1318.414	2^+	E2		
		2324.32 *17*	62 *4*	755.3961	4^+			Mult.: The 2324γ is part of a doublet with the other component unplaced. From α(K)exp for the doublet, one or both components must have an E0 component. If partly E0, the 2324γ to 4^+ would give $J^\pi(3079)=4^+$.
3090.42		2335.00 *16*	100	755.3961	4^+			
3099.02	$1^+,2^+,3^+$	500.23 *12*	6.6 *11*	2598.80	$1^+,2^+$			
		2168.46[‡] *8*	53 *13*	930.545	2^+			
		2754.70 *10*	100.0 *20*	344.2790	2^+	M1,E2		
3105.52	2^+	805.84 *9*	100 *5*	2299.66	$2,3^-$			
		2350.30 *15*	71 *5*	755.3961	4^+			
		2761.15 *12*	53.7 *22*	344.2790	2^+			
		3105.45 *16*	53.1 *22*	0.0	0^+			
3110.94	$1^+,2^+$	2495.53 *9*		615.386	0^+	M1,E2		
3112.52	$1^+,2^+$	583.00 *11*	76 *7*	2529.43	$2^+,3^+$			
		1171.2 *3*	100 *19*	1941.177	2^+			
		2182.10 *15*	67 *3*	930.545	2^+	M1		
		2768.27 *10*	70.0 *17*	344.2790	2^+			
		3112.3 *3*	6.8 *5*	0.0	0^+			
3140.21	$1,2^+$	874.8 *3*	6.4 *20*	2265.30	$1^+,2^+,3^+$			
		1198.97 *11*	35 *3*	1941.177	2^+			
		2209.71 *13*	48 *3*	930.545	2^+			
		2795.92 *11*	100.0 *22*	344.2790	2^+			
		3140.20 *12*	27.7 *7*	0.0	0^+			
3143.97	3^-	1022.73 *11*	53 *4*	2121.05	$2^+,3^-,4^+$			
		2020.67 *14*	50 *3*	1123.1857	3^-	M1,E2		
		2388.72 *11*	100 *3*	755.3961	4^+			
		2799.81 *14*	46.8 *19*	344.2790	2^+			
3152.89	3^-	1870.55 *18*	17.1 *23*	1282.246	4^+			
		2043.79	43 *6*	1109.202	2^+	[E1]		
		2808.61 *10*	100.0 *23*	344.2790	2^+	E1		
3157.0	10^-	146		3010.8	9^-			

$^{152}_{64}Gd_{88}$-19

γ(^{152}Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[@]	E_f	J^π_f	Mult.[a]	α[b]	Comments
3157.0	10⁻	282		2874.7	8⁻			
		826		2331.1	9⁻			
3214?		887.32[&d] *10*	100 *4*	2325.69				
		1045.31[&d] *23*	22 *3*	2169.64	2⁺			
		1521.57[&d] *16*	56 *6*	1692.42	2⁺,3⁺			
3226.1	10⁻	895		2331.1	9⁻			
3232.05		1626.39 *19*	42 *4*	1605.609	2⁺			
		1917.55 *15*	100.0 *25*	1314.613	1⁻			
		2004.93 *17*	21.2 *18*	1227.37	6⁺			
		2887.52 *13*	47.3 *16*	344.2790	2⁺			
3236.96	2⁺,3,4⁺	788.88 *10*	100 *4*	2448.02	⁺			
		911.73 *13*	43.0 *24*	2325.69				
		2306.15 *10*	93 *3*	930.545	2⁺			
		2481.8 *3*	16.8 *24*	755.3961	4⁺			
3249.3	12⁺	557.5		2691.7	10⁺			
3285.11	2⁺	1342.0		1941.177	2⁺	E0		
		1970.49 *9*	68.5 *19*	1314.613	1⁻			
		2162.05 *15*	44.8 *21*	1123.1857	3⁻			
		2940.75 *11*	100.0 *21*	344.2790	2⁺	M1,E2		
3294.1	11⁺	518		2774.5	9⁺			
		995		2299.5	10⁺			
3317.3	11⁻	160		3157.0	10⁻			
		307		3010.8	9⁻			
		503		2814.0	11⁻			
		987		2331.1	9⁻			
		1018		2299.5	10⁺			
3337.8	13⁻	454.5	23	2883.5	12⁺	D		
		523.6	100	2814.0	11⁻		0.0125	
3340.64	1⁻,2,3,4⁺	1075.87 *9*	65 *8*	2264.86	1⁻,2,3⁻			
		1424.76 *19*	25.6 *24*	1915.77	2⁺,3,4⁺			
		2217.40 *9*	100.0 *26*	1123.1857	3⁻			Mult.: Possible E0 component. See comment in 17.5-h Tb ε decay.
		2996.26 *12*	57.7 *14*	344.2790	2⁺			
3345.4	12⁻	456.0		2889.2	10⁻			
		462		2883.5	12⁺			
3358.27	2⁺	2043.64[‡] *11*	16 *4*	1314.613	1⁻	[E1]		
		2602.85 *11*	100 *3*	755.3961	4⁺	(E2)		
3498.9	14⁺	615.4		2883.5	12⁺			
3507.9	12⁻	191		3317.3	11⁻			
		351		3157.0	10⁻			
3586.5	13⁻	553		3033.0	(11)			
		703		2883.5	12⁺			
		773		2814.0	11⁻			

$^{152}_{64}$Gd$_{88}$-20

Adopted Levels, Gammas (continued)

$\gamma(^{152}Gd)$ (continued)

E_i(level)	J_i^π	E_γ †	E_f	J_f^π	Mult.[a]	α[b]
3699.4	14^+	450	3249.3	12^+		
		816	2883.5	12^+		
3727.6	13^-	220	3507.9	12^-		
		411	3317.3	11^-		
		843	2883.5	12^+		
3829.2	13^+	534	3294.1	11^+		
		941	2889.2	10^-		
3897.4	14^-	552	3345.4	12^-		
3938.4	15^-	439.5	3498.9	14^+		
		600.5	3337.8	13^-	E2	0.00882
3974.9	14^-	247	3727.6	13^-		
		467	3507.9	12^-		
4103.5		1220	2883.5	12^+		
4141.9	16^+	643.5	3498.9	14^+	E2	0.00745
4195.4	16^+	495.9	3699.4	14^+		
		696	3498.9	14^+		
4246.3	15^-	271	3974.9	14^-		
		519	3727.6	13^-		
4246.5	15^-	660	3586.5	13^-		
		909[d]	3337.8	13^-		
4362.9		864	3498.9	14^+		
4526.3	16^-	628.9	3897.4	14^-		
4539.8	16^-	293	4246.3	15^-		
		565	3974.9	14^-		
4609.0	17^-	670.6	3938.4	15^-	E2	0.00675
4745.8	18^+	550	4195.4	16^+		
		604.8	4141.9	16^+		
4835.8	18^+	693.5	4141.9	16^+		
4852.0	17^-	312	4539.8	16^-		
		606	4246.3	15^-		
5010.5	17^-	764	4246.5	15^-		
5183.9	18^-	332	4852.0	17^-		
		644	4539.8	16^-		
5213.8	18^-	687.5	4526.3	16^-		
5334.0	19^-	725.0	4609.0	17^-		
5385.2	20^+	549	4835.8	18^+		
		639.7	4745.8	18^+		
5529.9	19^-	346	5183.9	18^-		
		678	4852.0	17^-		
5550.1	20^+	714.3	4835.8	18^+		
5853.1	21^-	519	5334.0	19^-		
5888.9	20^-	359	5529.9	19^-		
		705	5183.9	18^-		

E_i(level)	J_i^π	E_γ †	E_f	J_f^π
5923.8	20^-	710	5213.8	18^-
6081.3	21^-	747.5	5334.0	19^-
6096.2	22^+	711	5385.2	20^+
6258.9	21^-	370	5888.9	20^-
		729	5529.9	19^-
6302.1	22^+	752	5550.1	20^+
6598.8	22^-	675	5923.8	20^-
6627.2	23^-	546	6081.3	21^-
		774	5853.1	21^-
6636.9	22^-	378	6258.9	21^-
		748	5888.9	20^-
6835.3	23^-	754	6081.3	21^-
6876.2	24^+	780	6096.2	22^+
7024.9	23^-	388	6636.9	22^-
		766	6258.9	21^-
7091.1	24^+	789	6302.1	22^+
7265.2	25^-	638	6627.2	23^-
7280	24^-	681	6598.8	22^-
7420.9	24^-	784	6636.9	22^-
7533.3	25^-	698	6835.3	23^-
		906[d]	6627.2	23^-
7721.2	26^+	845	6876.2	24^+
7830.9	25^-	806	7024.9	23^-
7861.1	26^+	770	7091.1	24^+
7990	26^-	710	7280	24^-
8129.2	27^-	864	7265.2	25^-
8246?	$(26)^-$	826[d]	7420.9	24^-
8292	27^-	759	7533.3	25^-
8620.2	28^+	899	7721.2	26^+
8638.2	28^+	917	7721.2	26^+
8677?	$(27)^-$	847[d]	7830.9	25^-
8726	28^-	736	7990	26^-
9027	29^-	734[d]	8292	27^-
		898	8129.2	27^-
9106?	$(28)^-$	860[d]	8246?	$(26)^-$
9436.2	30^+	798	8638.2	28^+
		816.0	8620.2	28^+
9544	30^-	818	8726	28^-
9957	31^-	930	9027	29^-
10225	32^+	789	9436.2	30^+
10353?	$(32)^+$	918[d]	9436.2	30^+
10452	32^-	908	9544	30^-
10918	33^-	961	9957	31^-

$^{152}_{64}Gd_{88}$-21

Adopted Levels, Gammas (continued)

$\gamma(^{152}Gd)$ (continued)

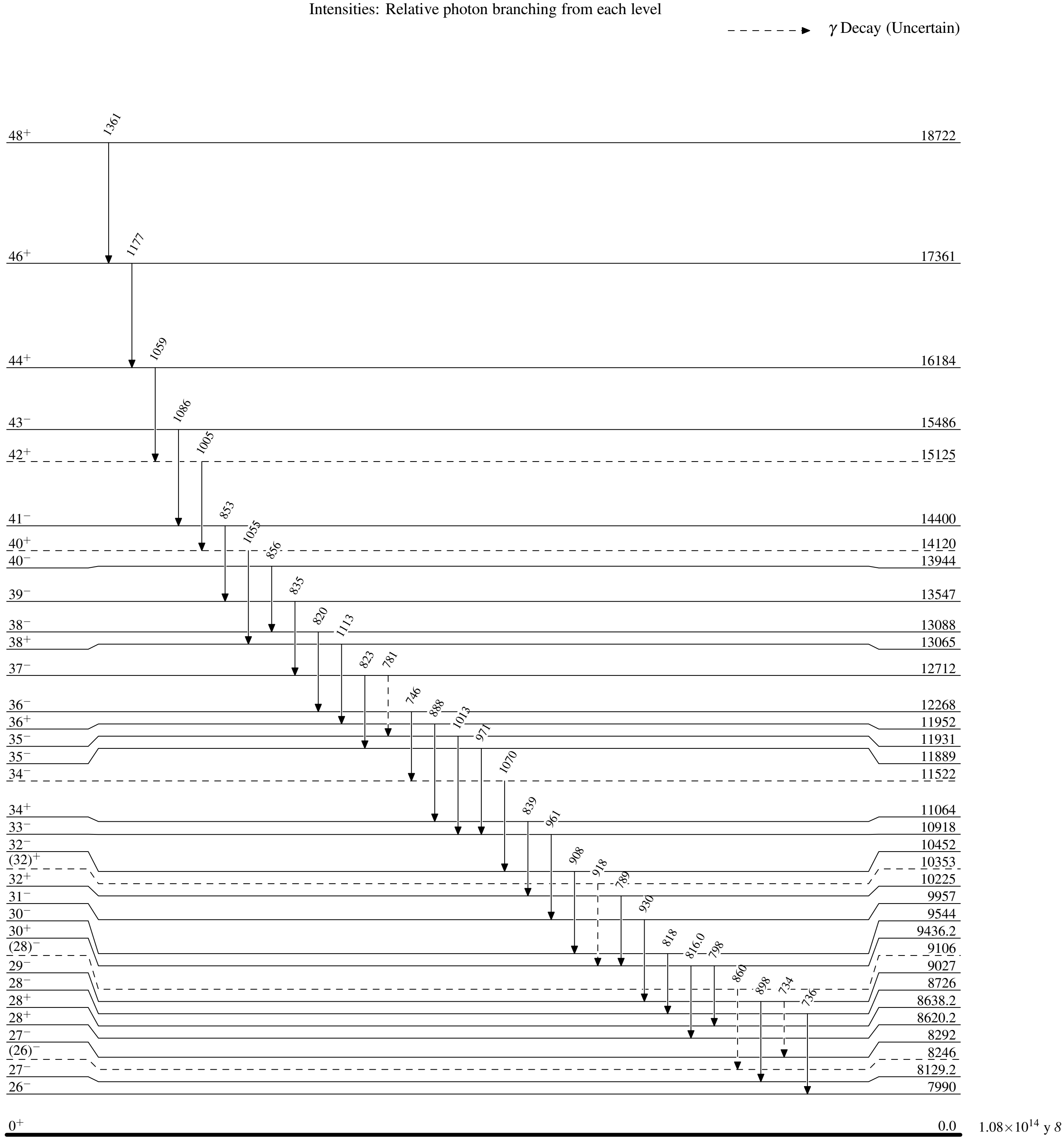
E_i(level)	J^π_i	E_γ[†]	E_f	J^π_f	E_i(level)	J^π_i	E_γ[†]	E_f	J^π_f	E_i(level)	J^π_i	E_γ[†]	E_f	J^π_f
11064	34^+	839	10225	32^+	12712	37^-	823	11889	35^-	15125?	42^+	1005	14120?	40^+
11522?	34^-	1070	10452	32^-	13065	38^+	1113	11952	36^+	15486	43^-	1086	14400	41^-
11889	35^-	971	10918	33^-	13088	38^-	820	12268	36^-	16184	44^+	1059	15125?	42^+
11931	35^-	1013	10918	33^-	13547	39^-	835	12712	37^-	17361	46^+	1177	16184	44^+
11952	36^+	888	11064	34^+	13944	40^-	856	13088	38^-	18722	48^+	1361	17361	46^+
12268	36^-	746	11522?	34^-	14120?	40^+	1055	13065	38^+					
12712	37^-	781[d]	11931	35^-	14400	41^-	853	13547	39^-					

[†] Weighted average from all available source data, except that energies from 13-y Eu β^- decay are adopted where available, unless noted otherwise.
[‡] From the level energy difference. The transition is doubly placed in the source dataset(S).
[#] Rounded-off value from table 15 of 2004AdZZ. All the transitions from this level are doublets.
[@] Weighted average from all available source data, except that intensities from 13-y Eu decay are adopted where available, unless noted otherwise.
[&] Poor fit. See comment on the 3214 level.
[a] From α data in Eu and Tb decays and from $\gamma(\theta)$ and DCO ratios in the in-beam works.
[b] 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.
[c] Multiply placed with intensity suitably divided.
[d] Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



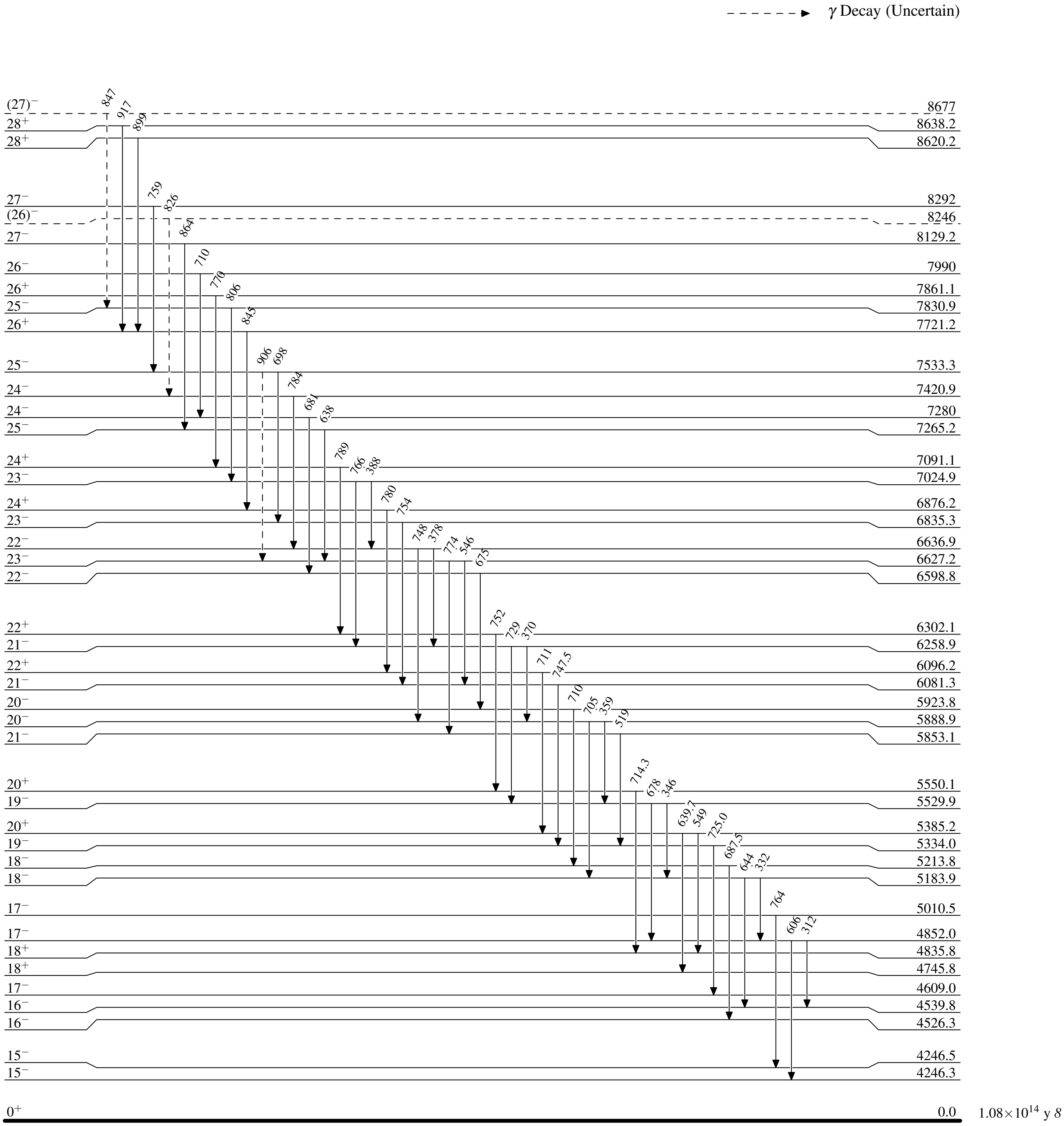
$^{152}_{64}Gd_{88}$

Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{152}_{64}Gd_{88}$

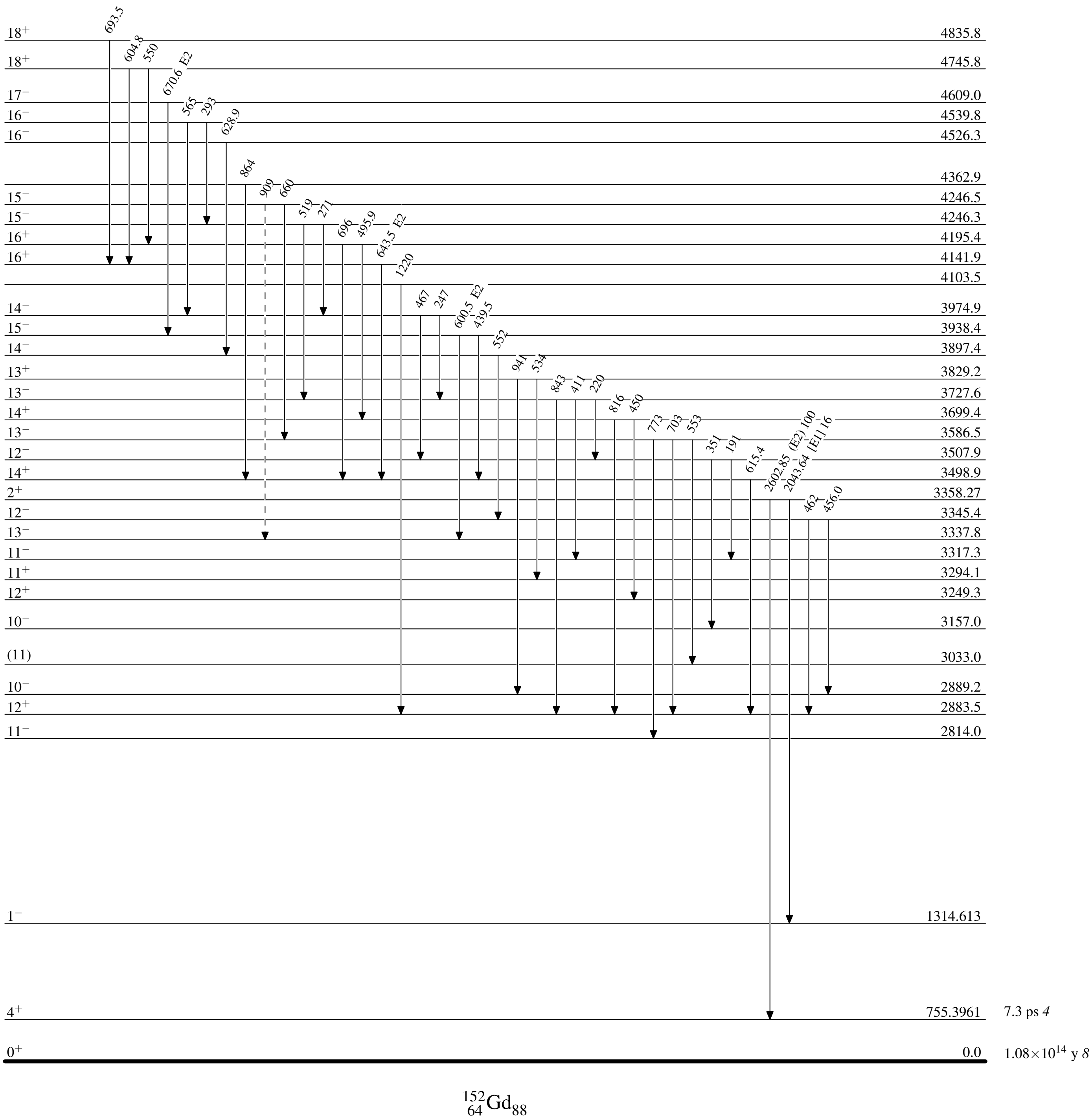
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

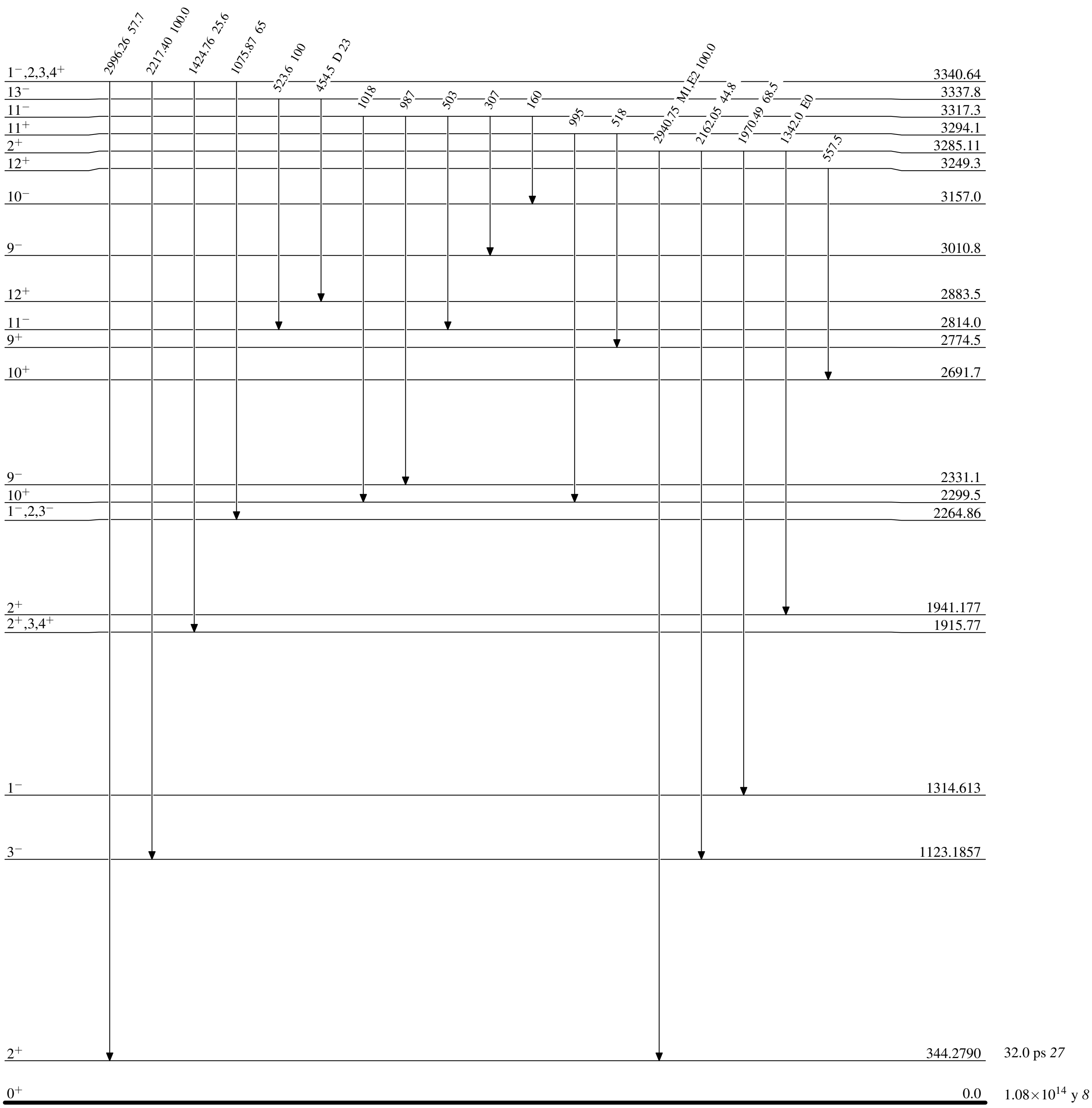
γ Decay (Uncertain)



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

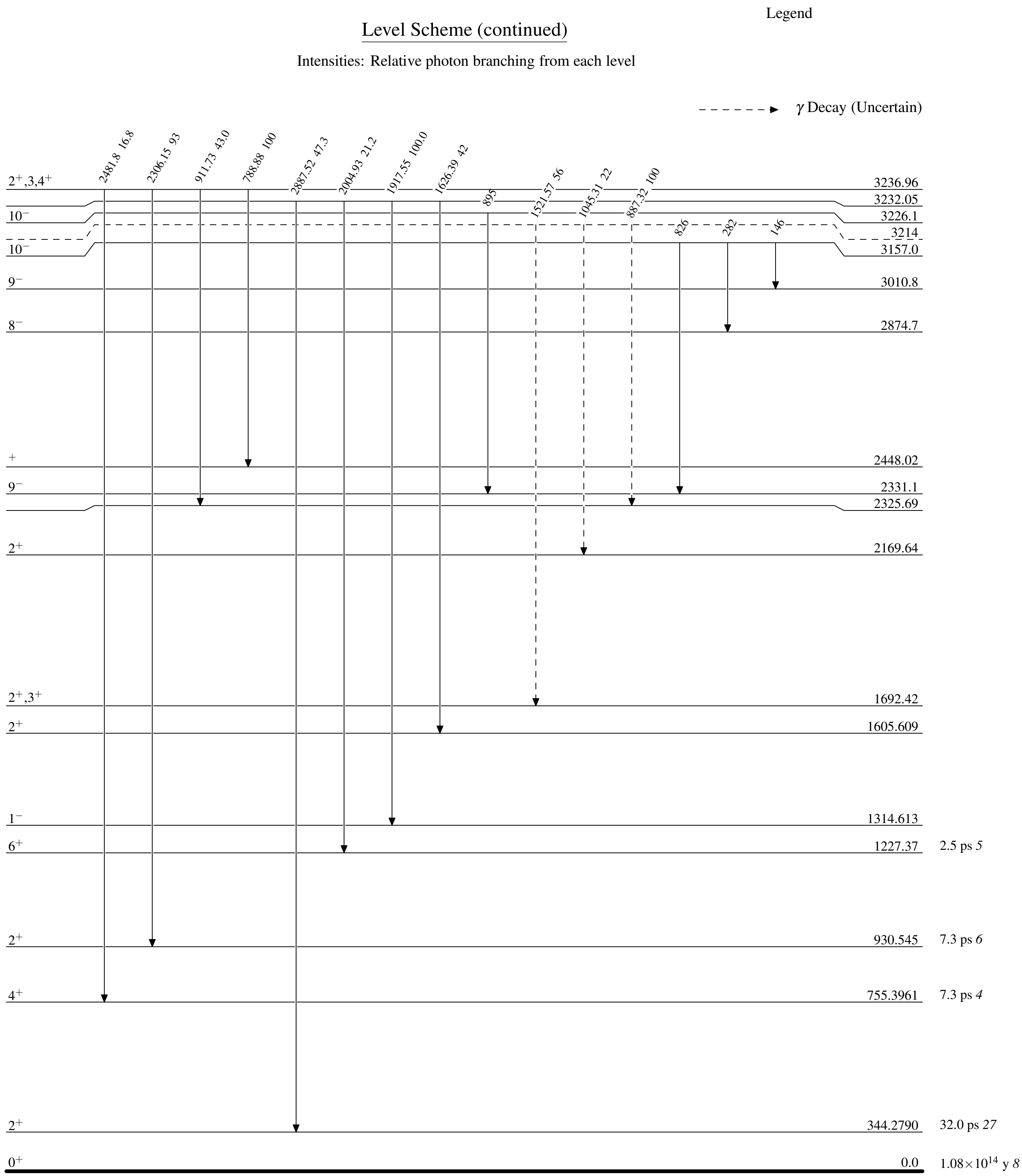


$^{152}_{64}Gd_{88}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

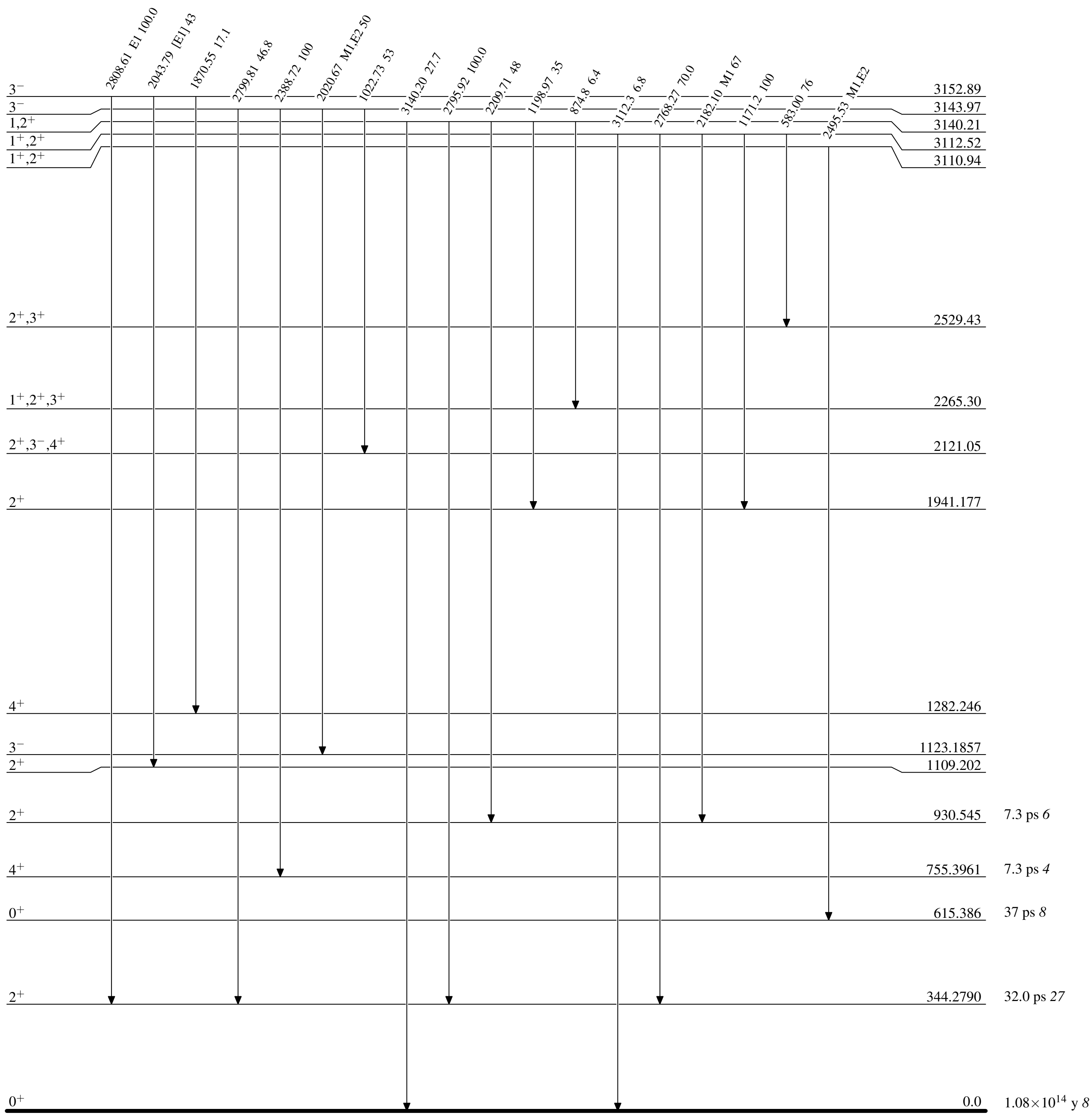


$^{152}_{64}Gd_{88}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

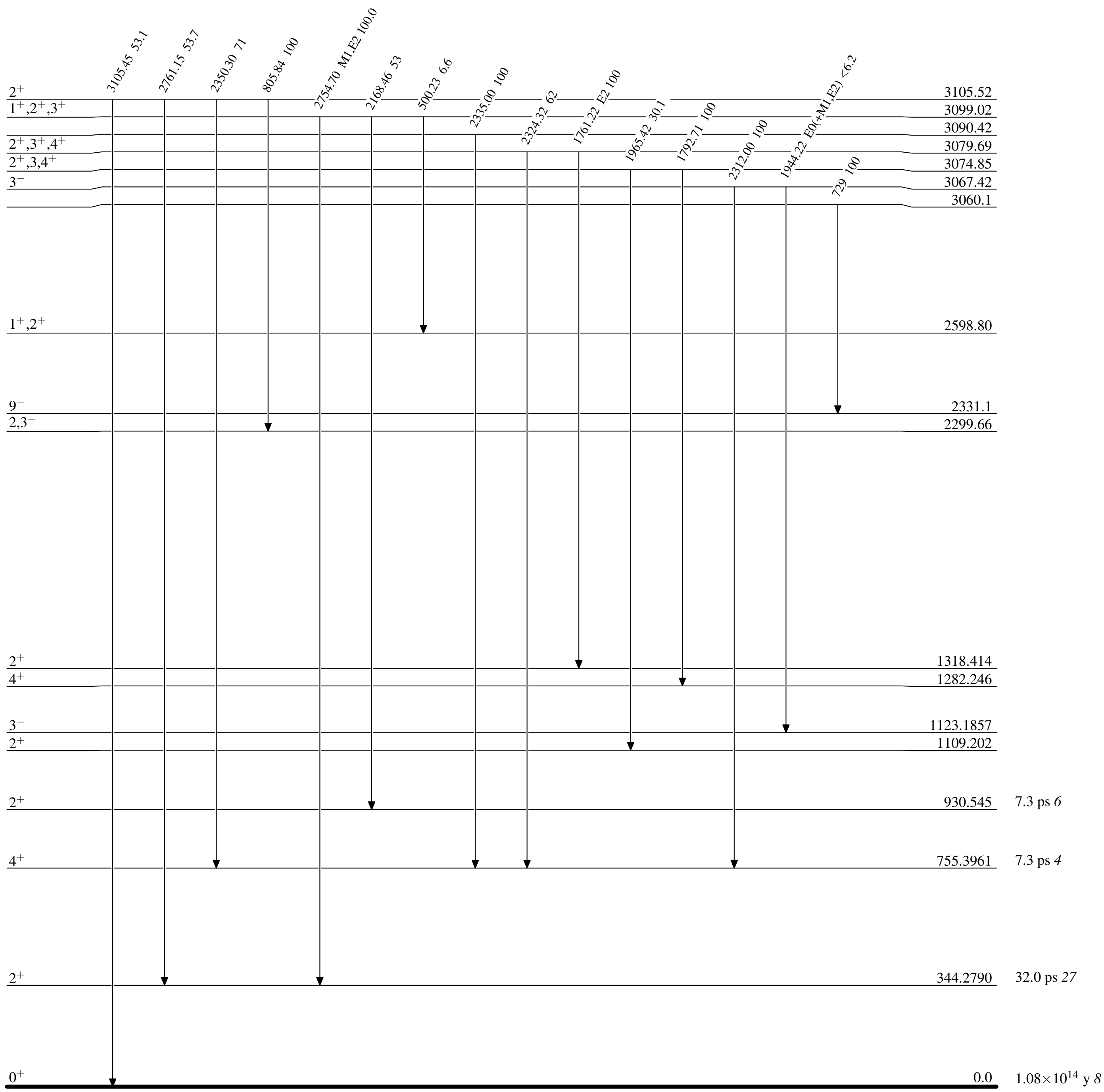


$^{152}_{64}Gd_{88}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

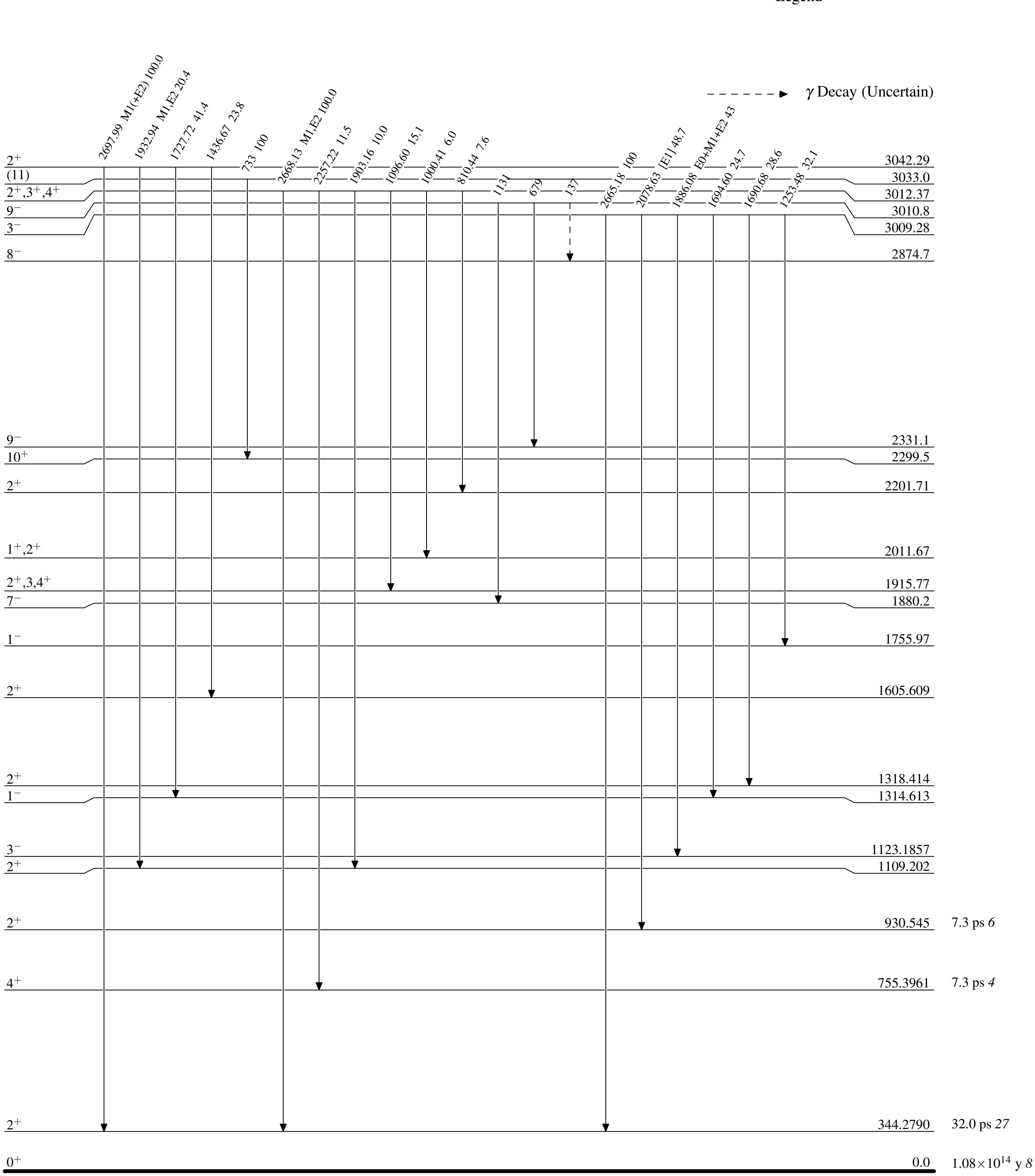


$^{152}_{64}Gd_{88}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

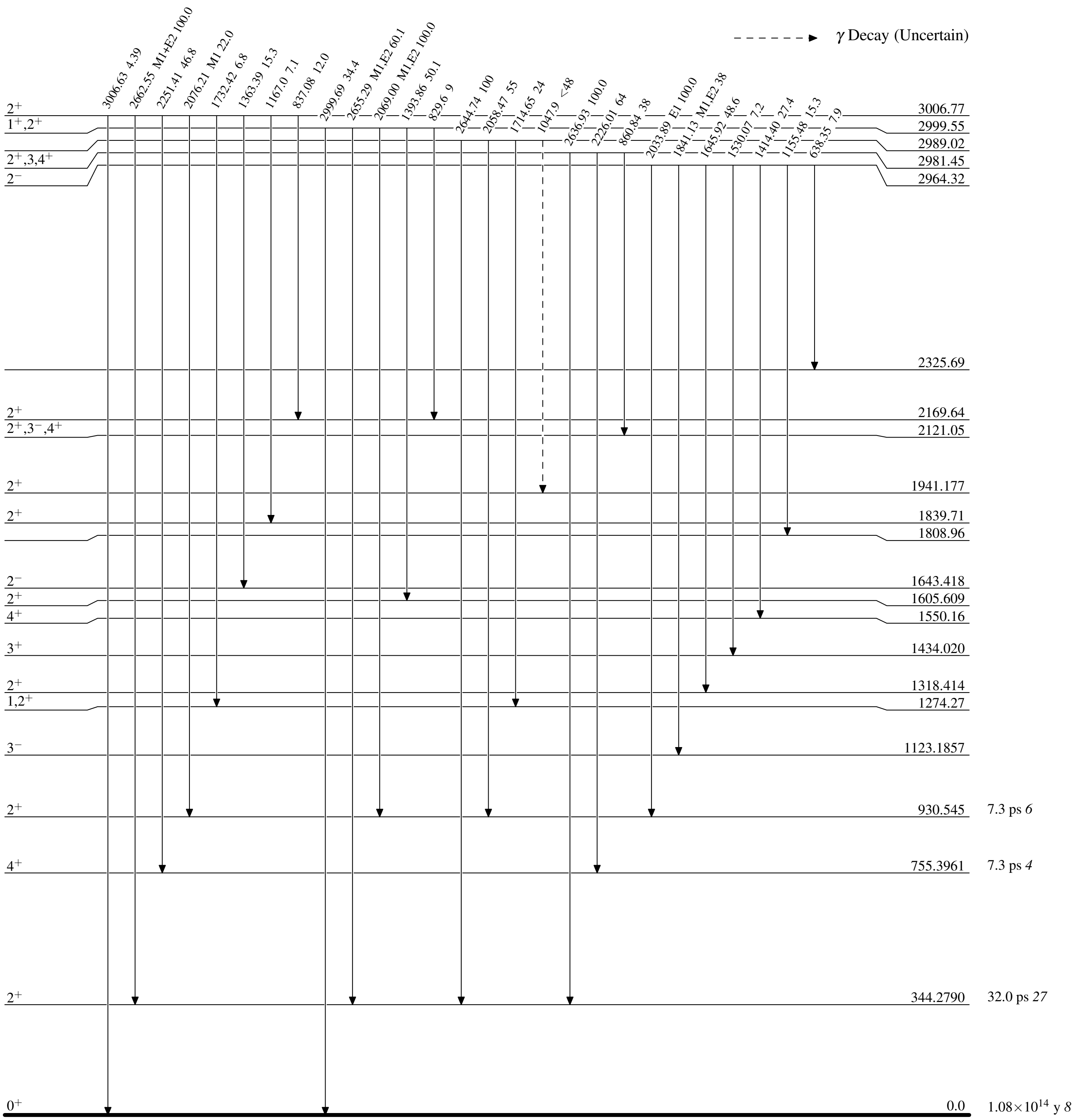


Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

Legend

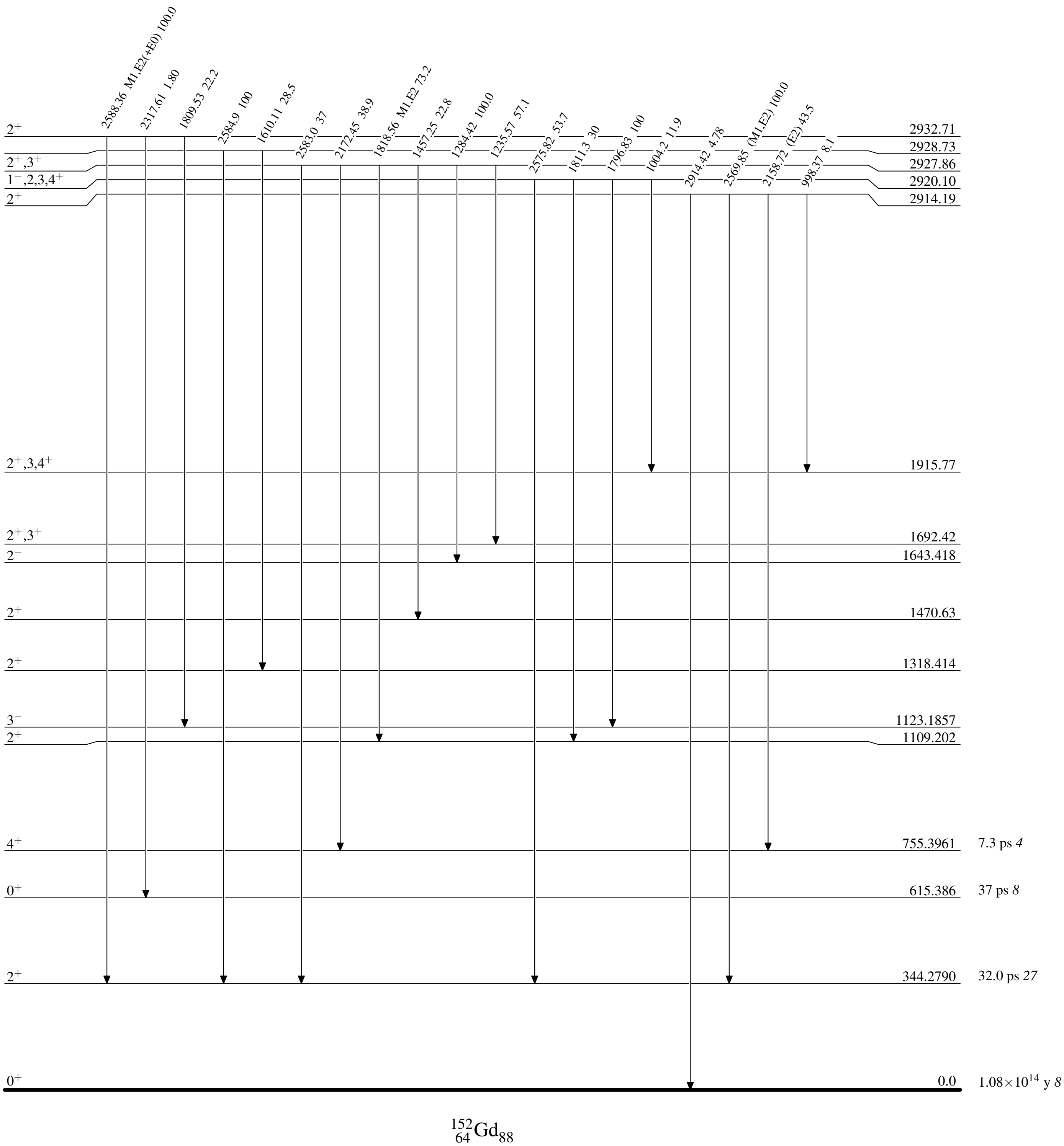


$^{152}_{64}Gd_{88}$

Adopted Levels, Gammas

Level Scheme (continued)

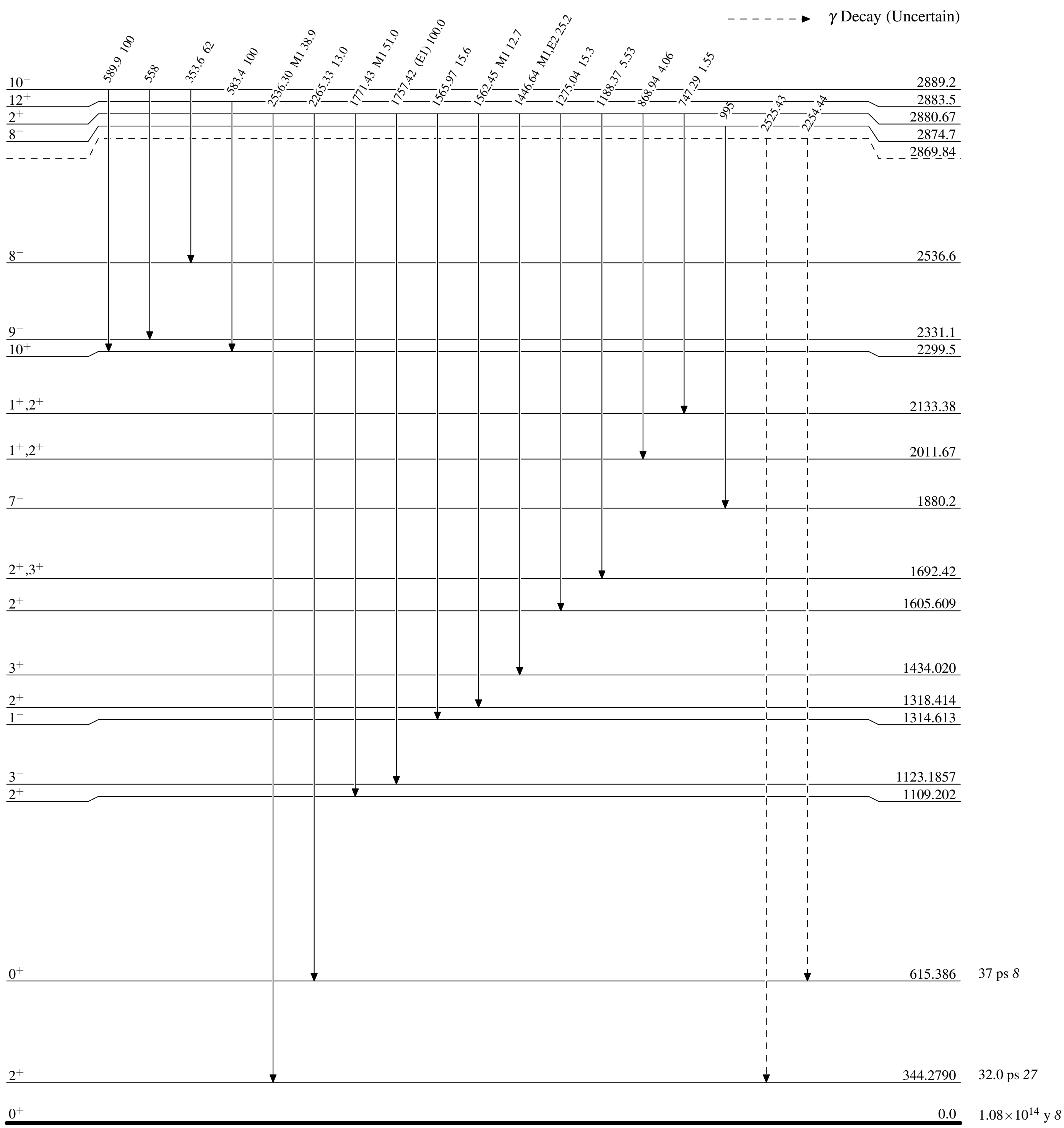
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

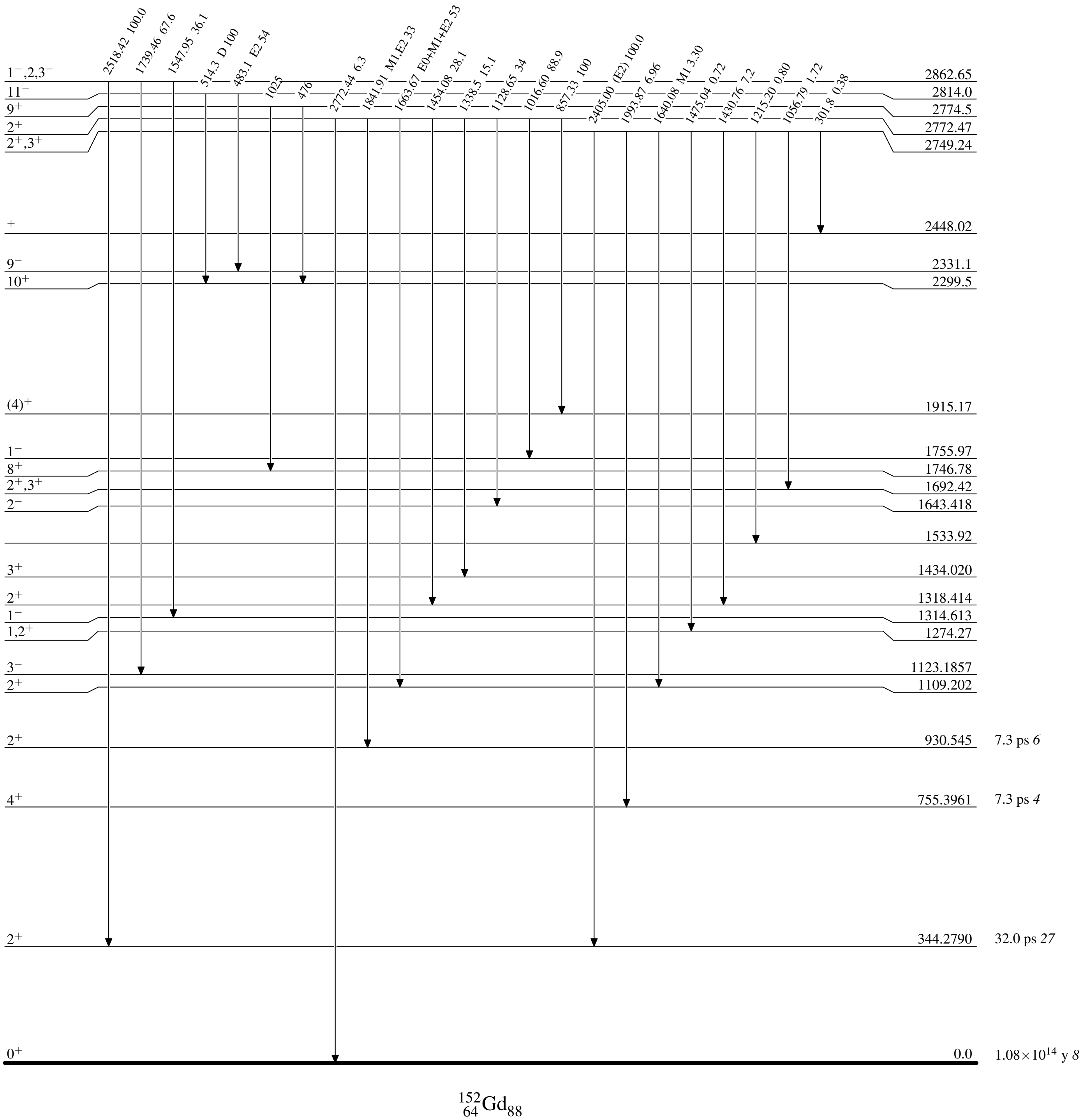


$^{152}_{64}Gd_{88}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

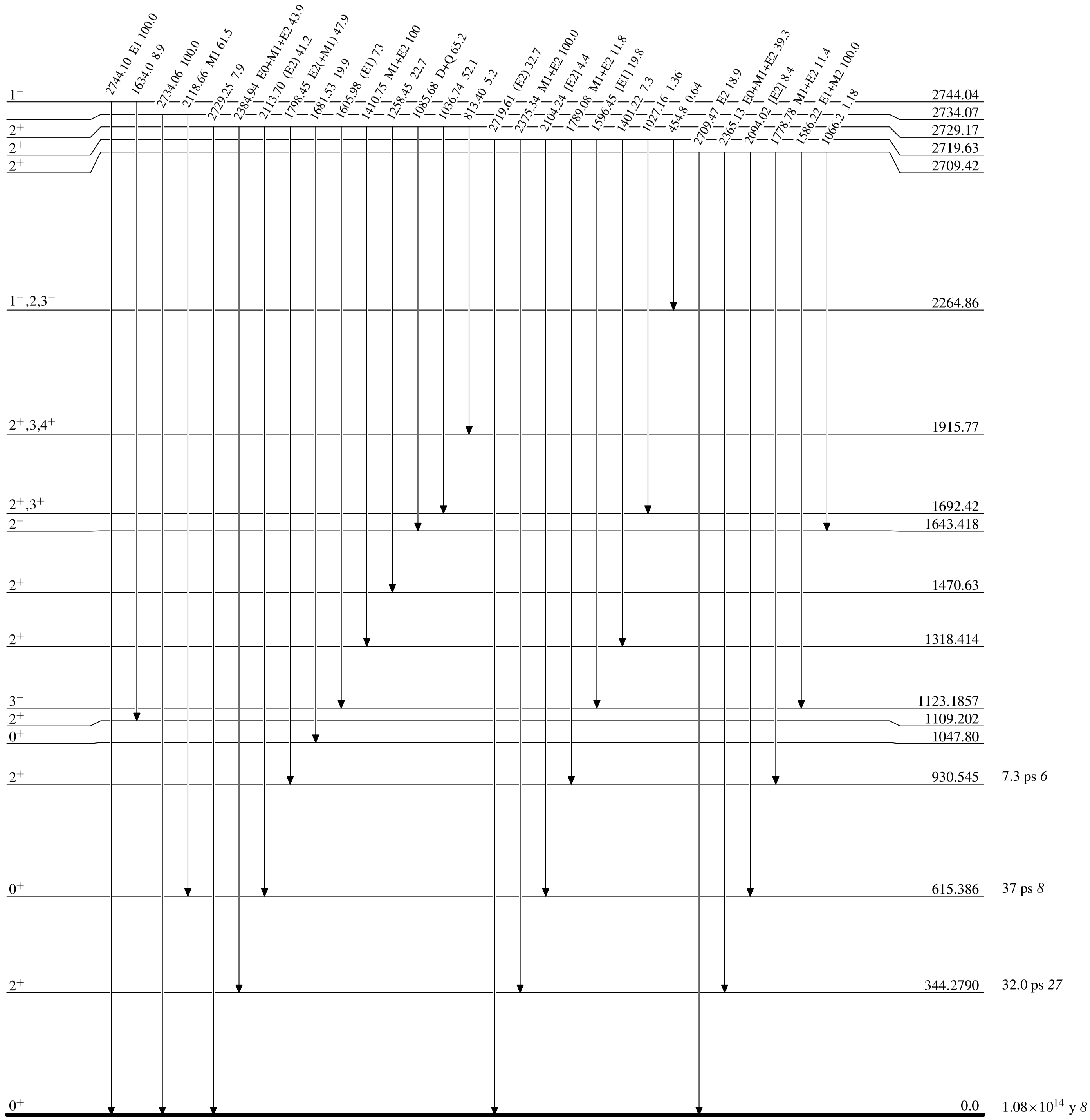


$^{152}_{64}Gd_{88}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

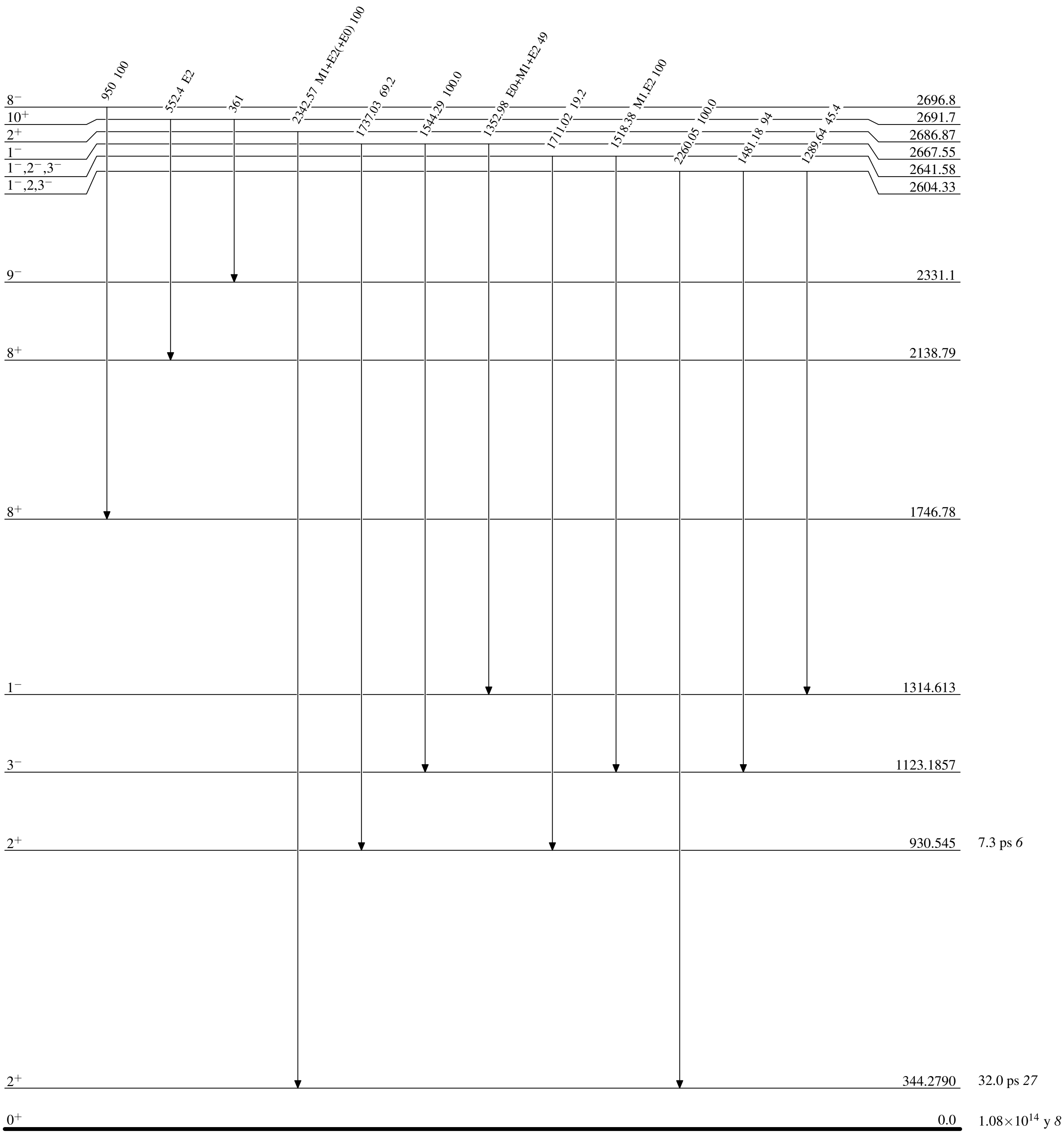


$^{152}_{64}Gd_{88}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

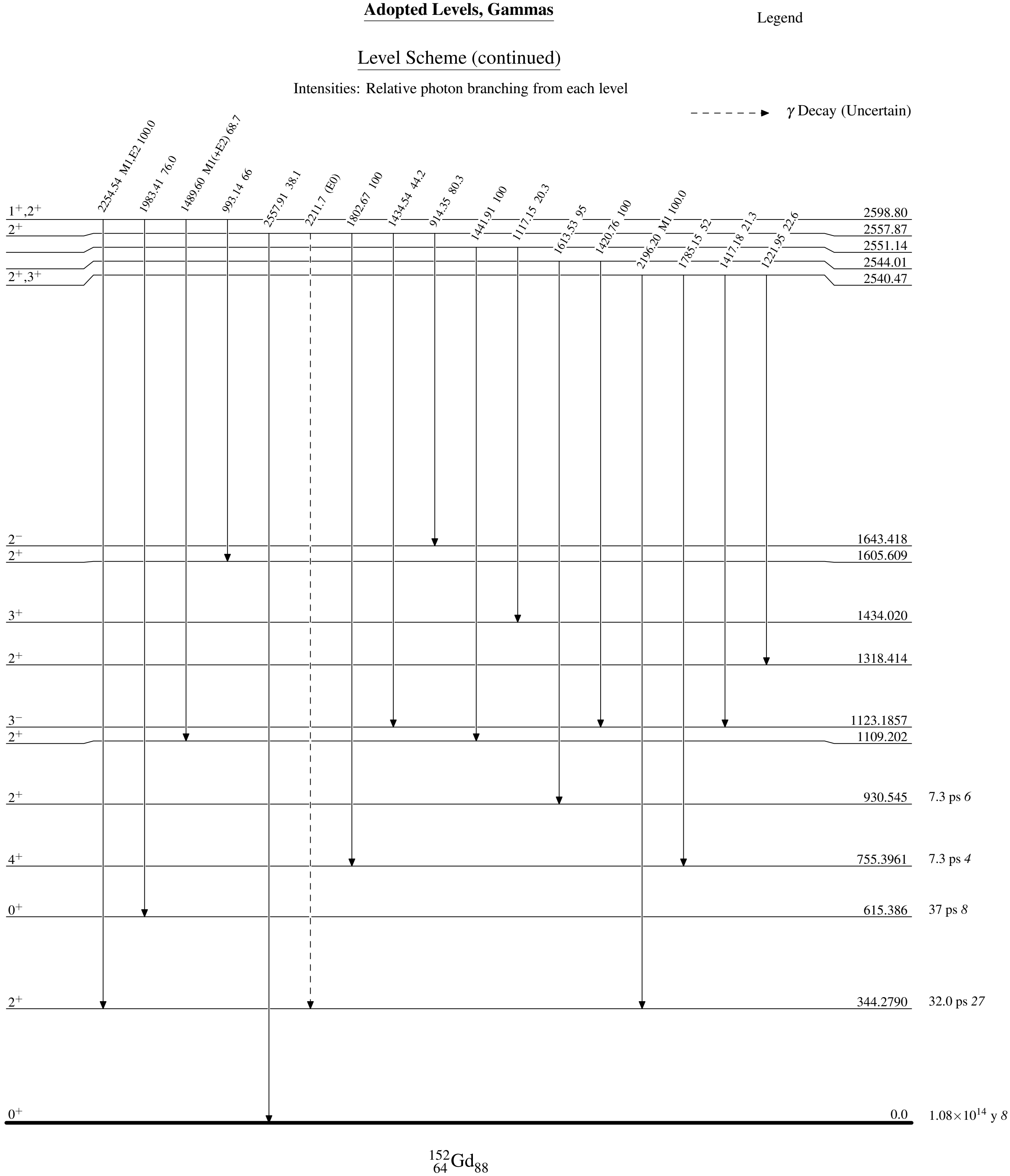


$^{152}_{64}Gd_{88}$

Adopted Levels, Gammas

Level Scheme (continued)

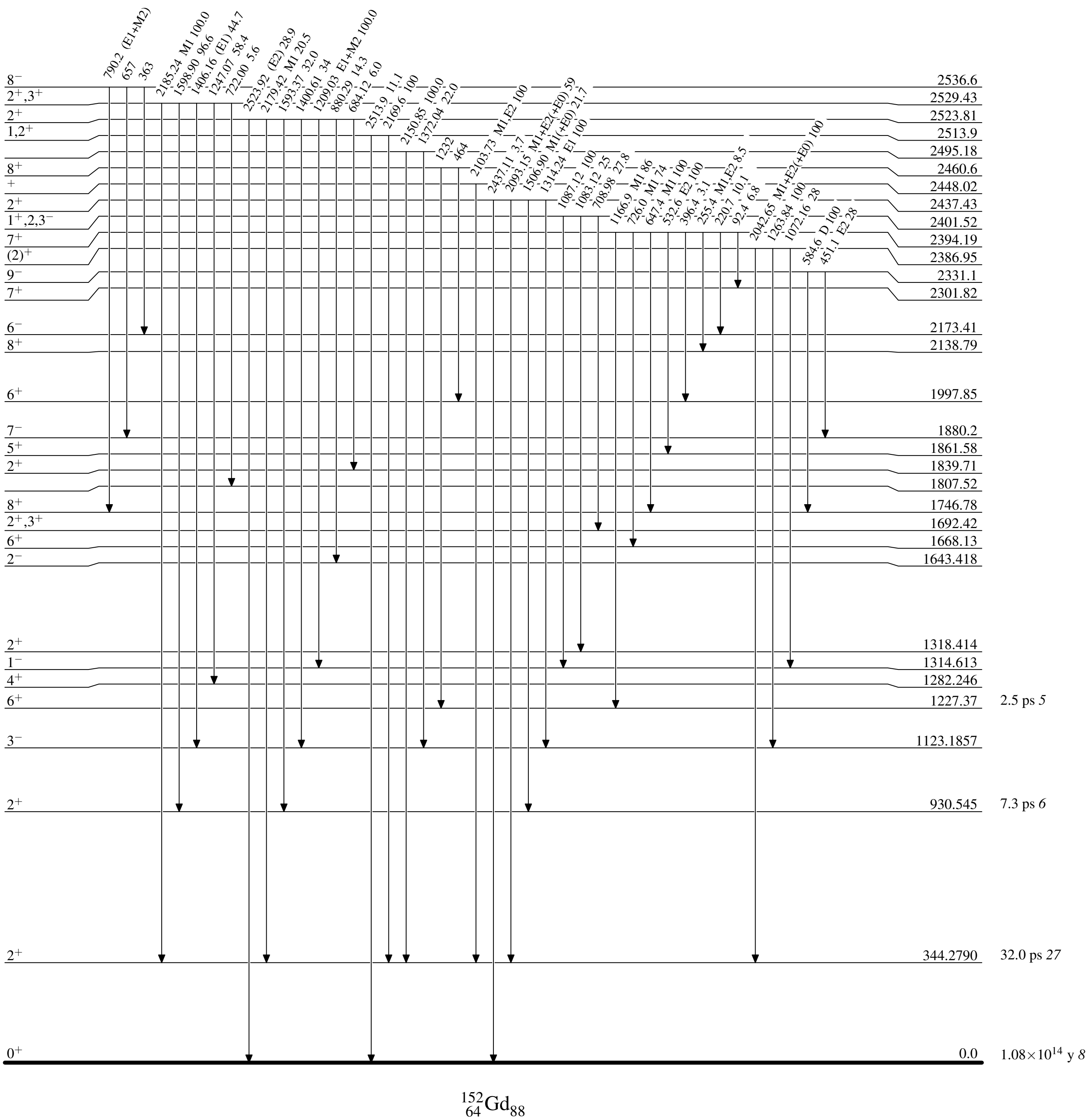
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

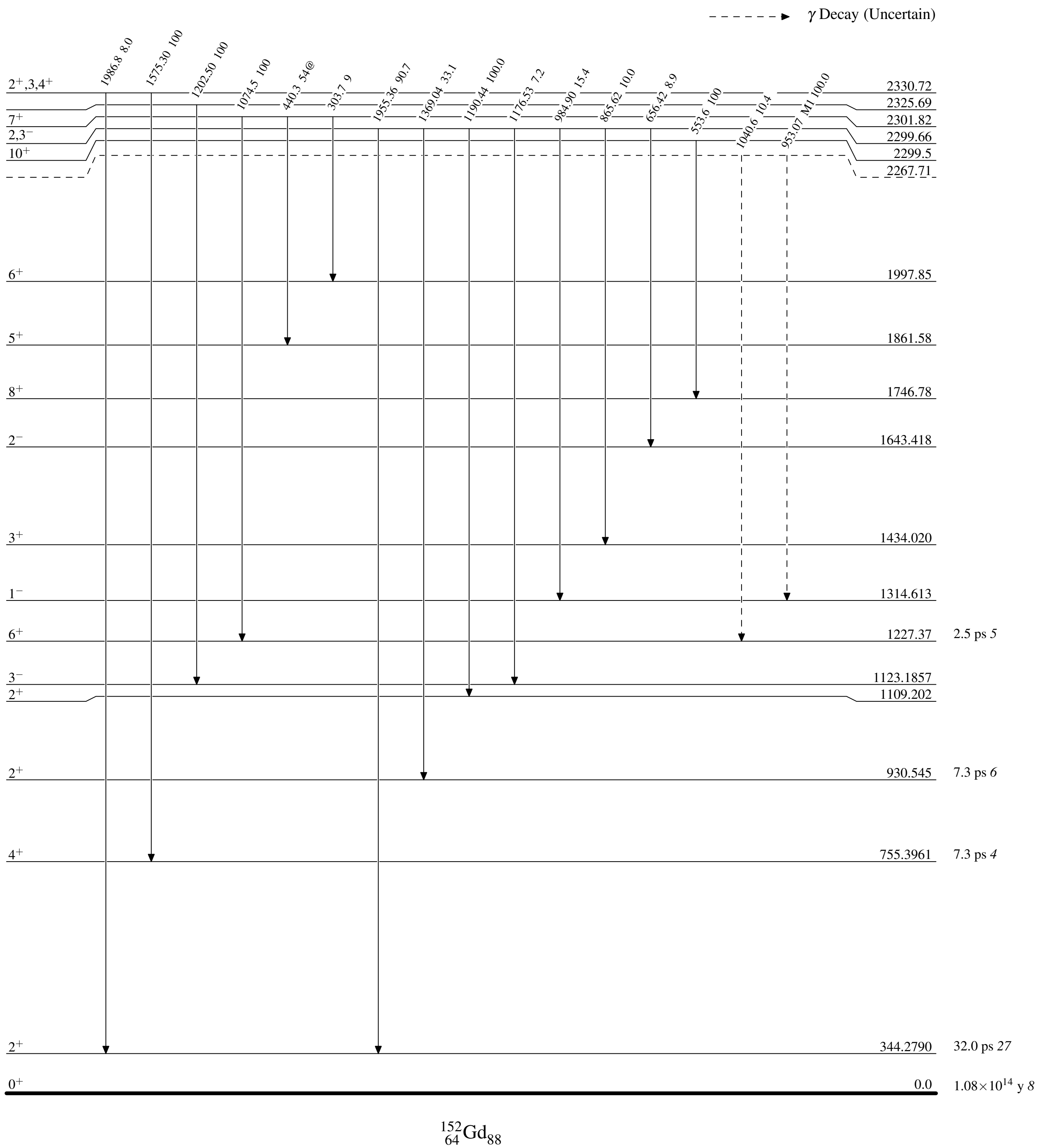
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

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

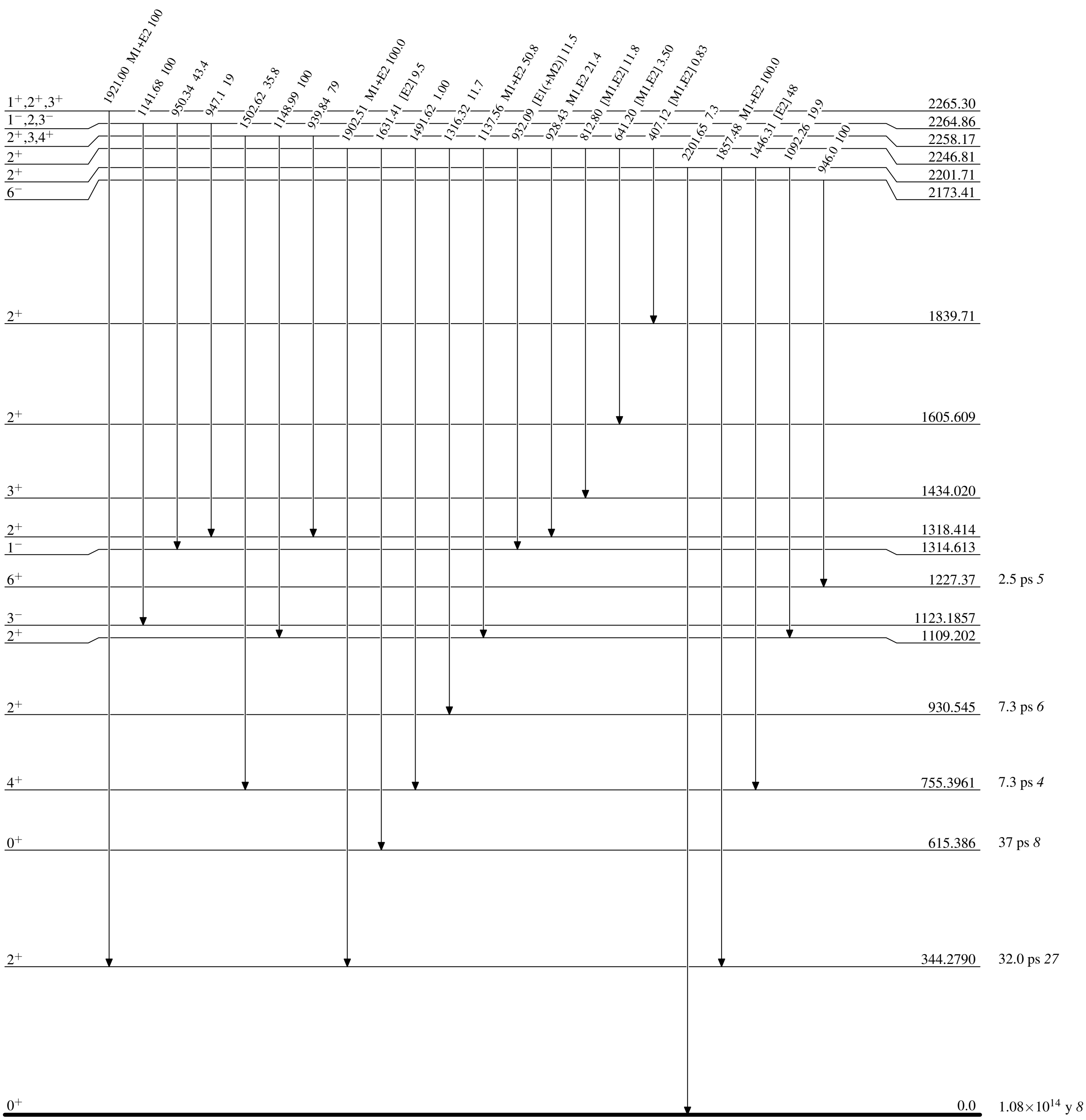


Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

@ Multiply placed: intensity suitably divided

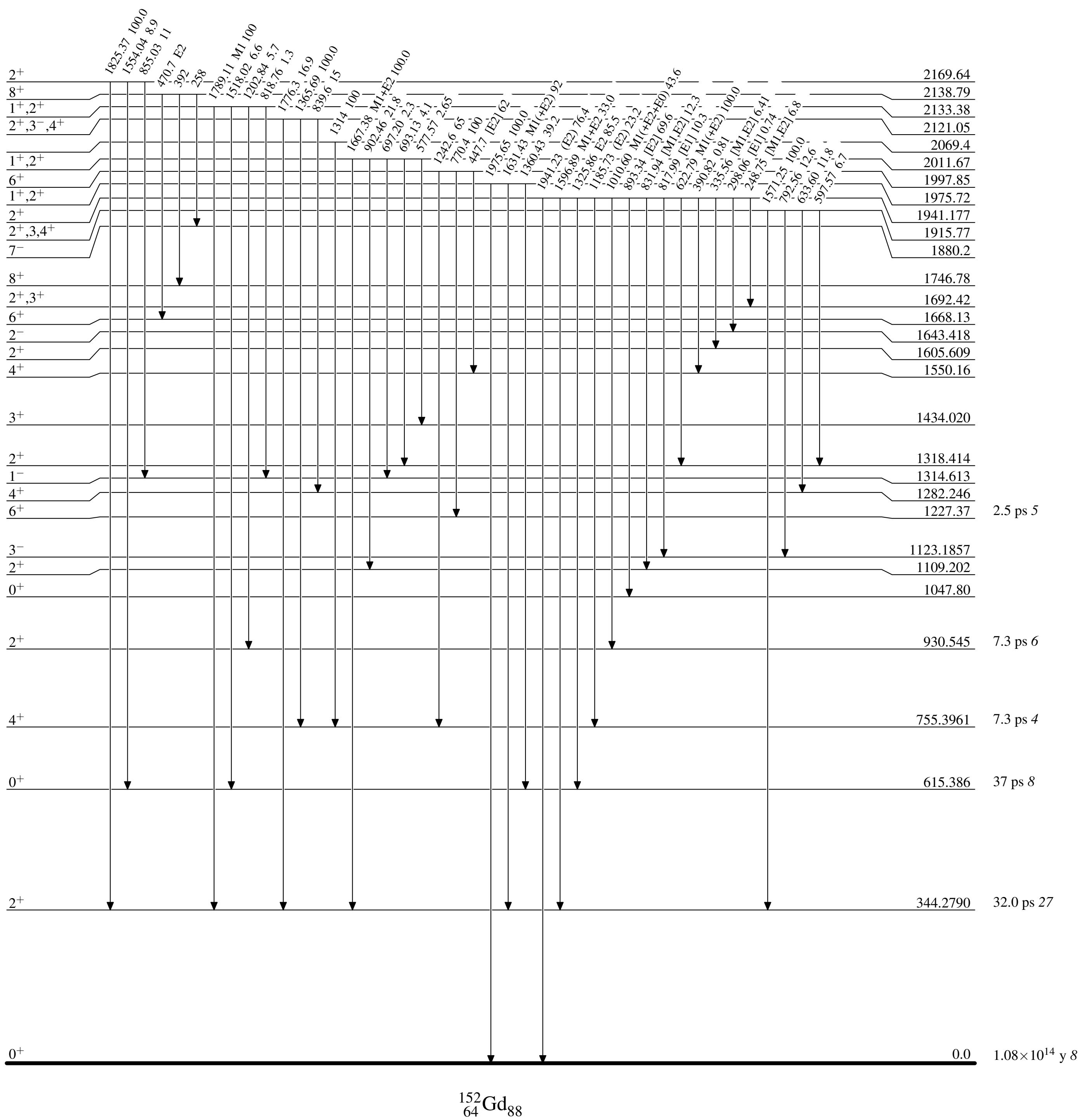


$^{152}_{64}Gd_{88}$

Adopted Levels, Gammas

Level Scheme (continued)

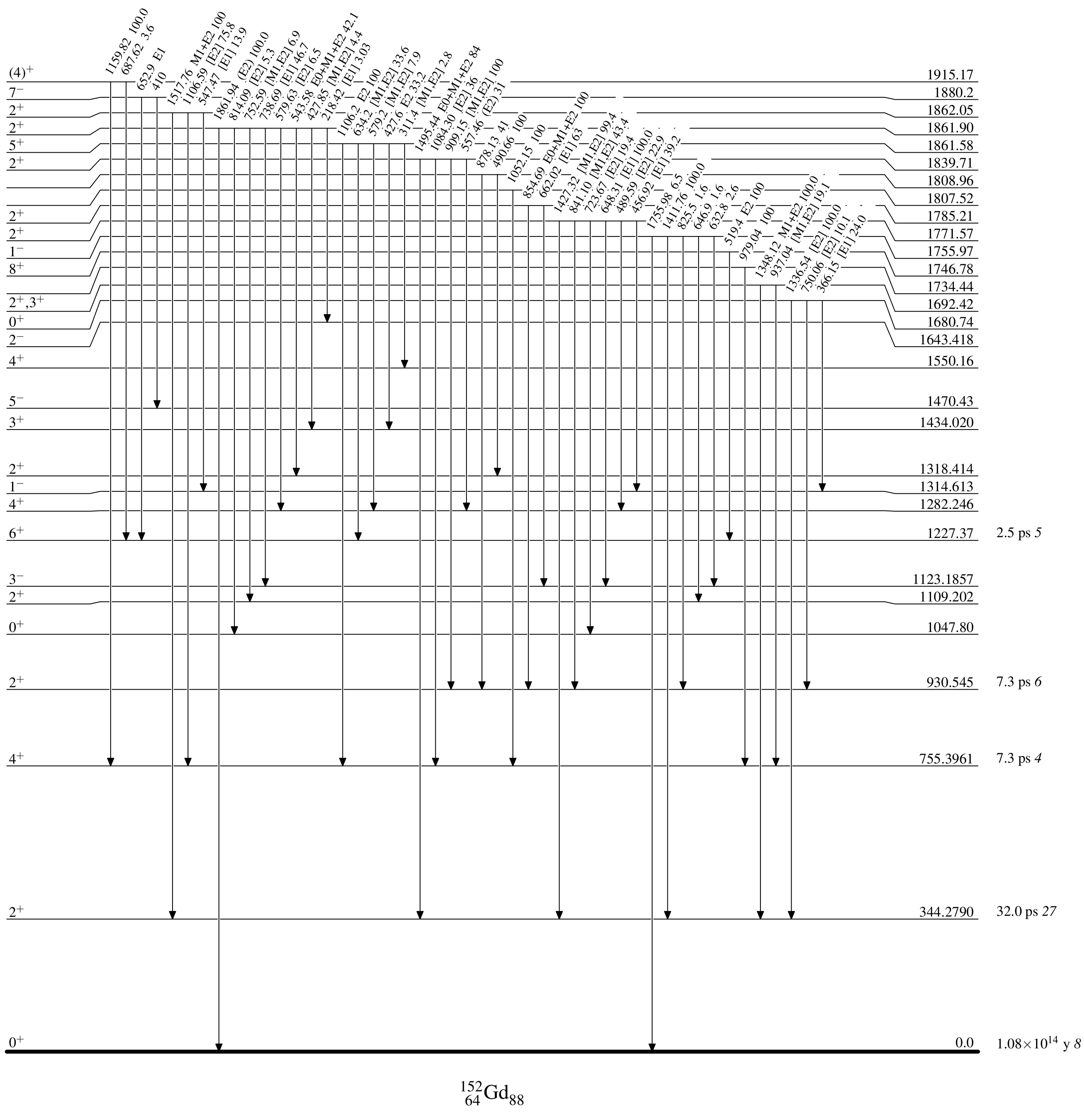
Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided



Adopted Levels, Gammas

Level Scheme (continued)

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



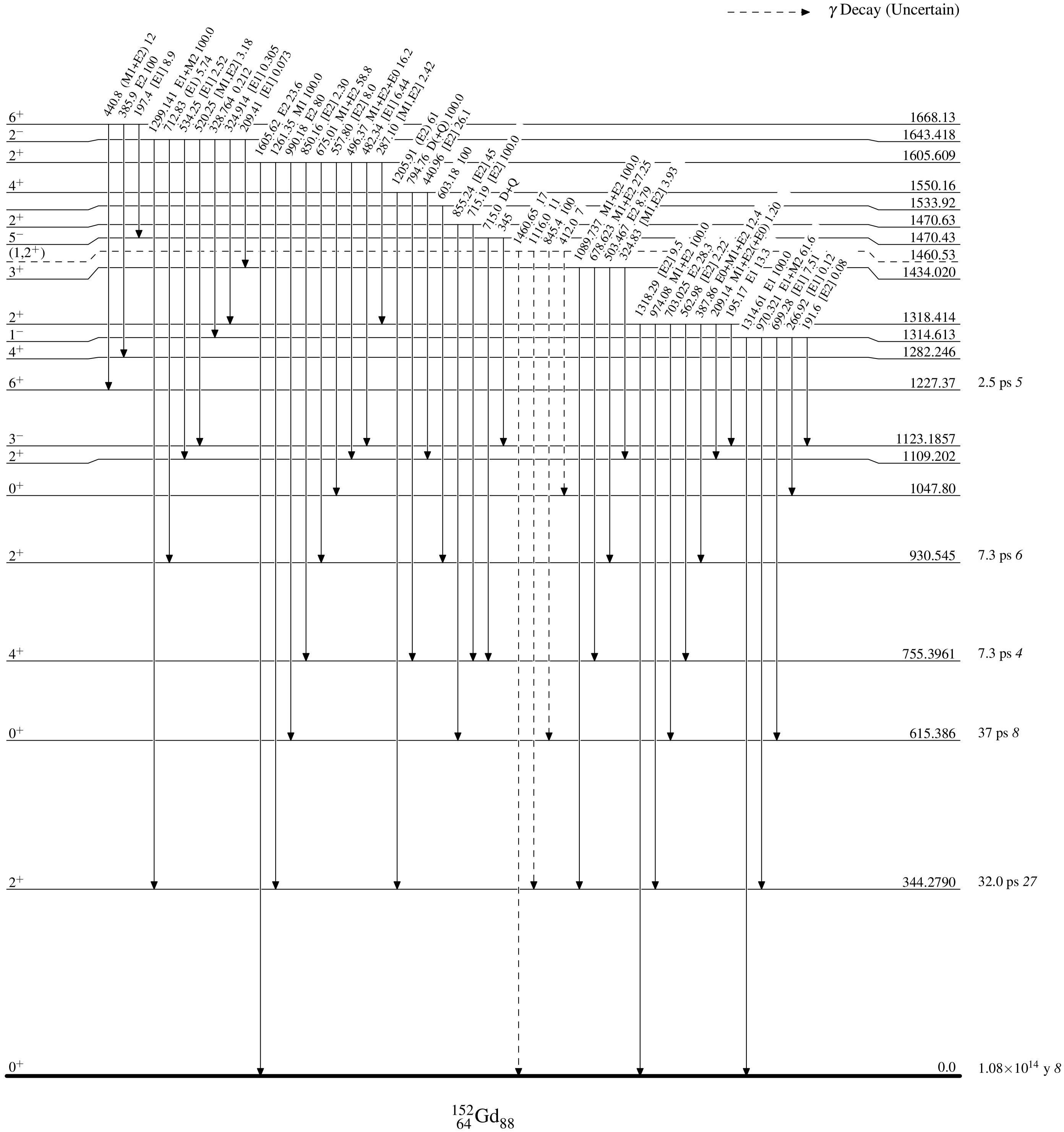
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

@ Multiply placed: intensity suitably divided

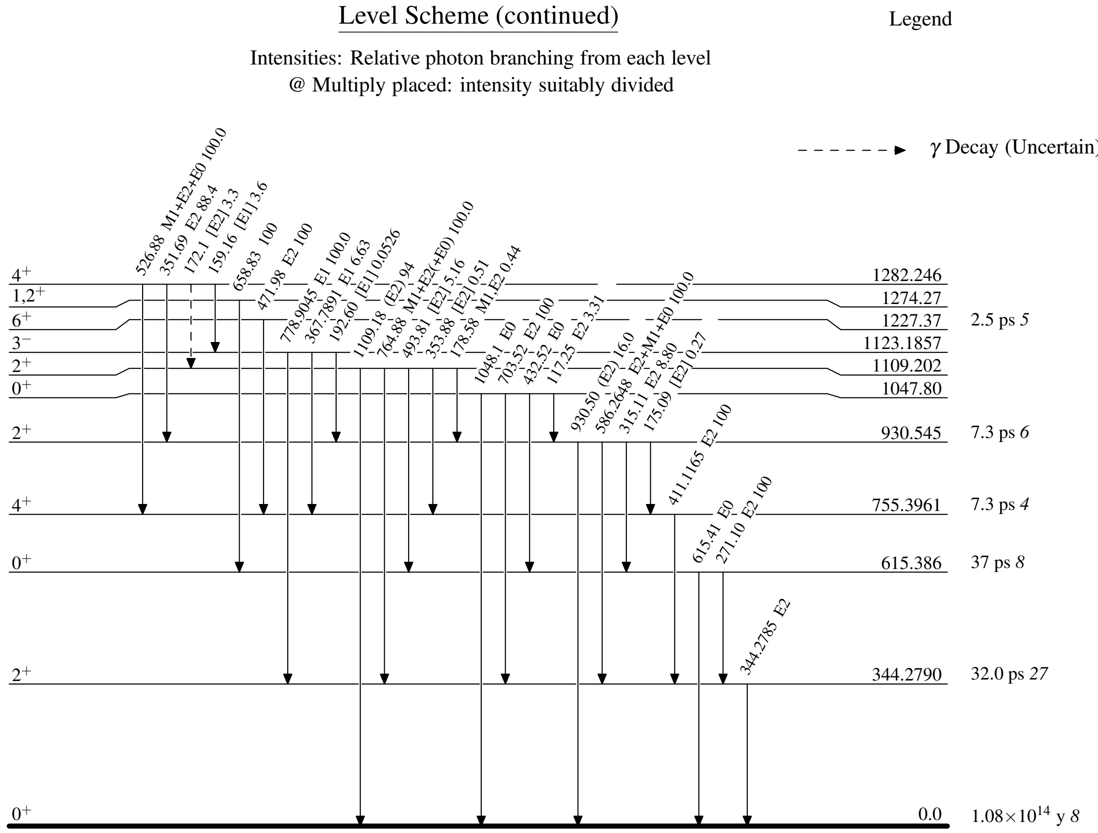


$^{152}_{64}Gd_{88}$

Adopted Levels, Gammas

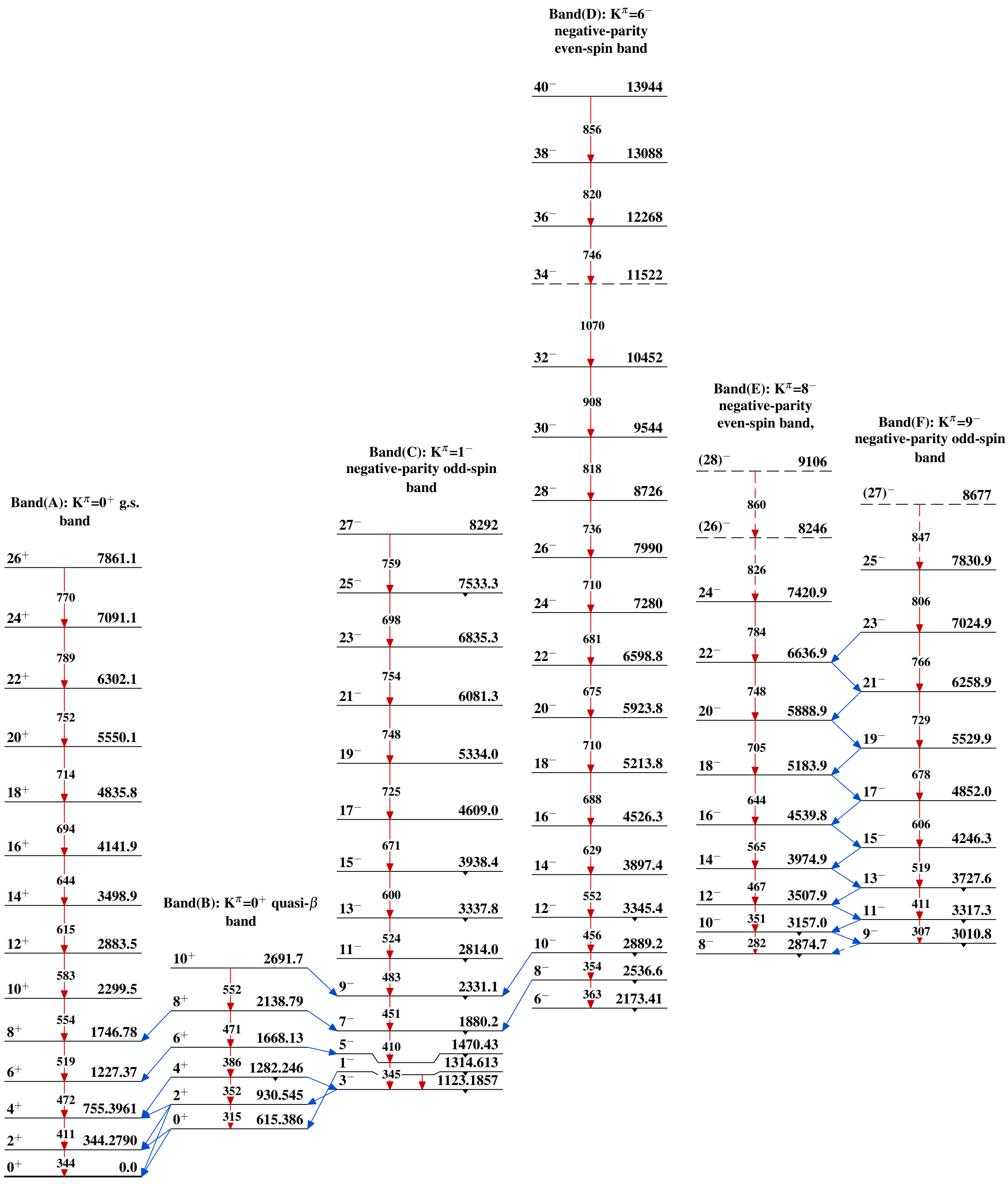
Level Scheme (continued)

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



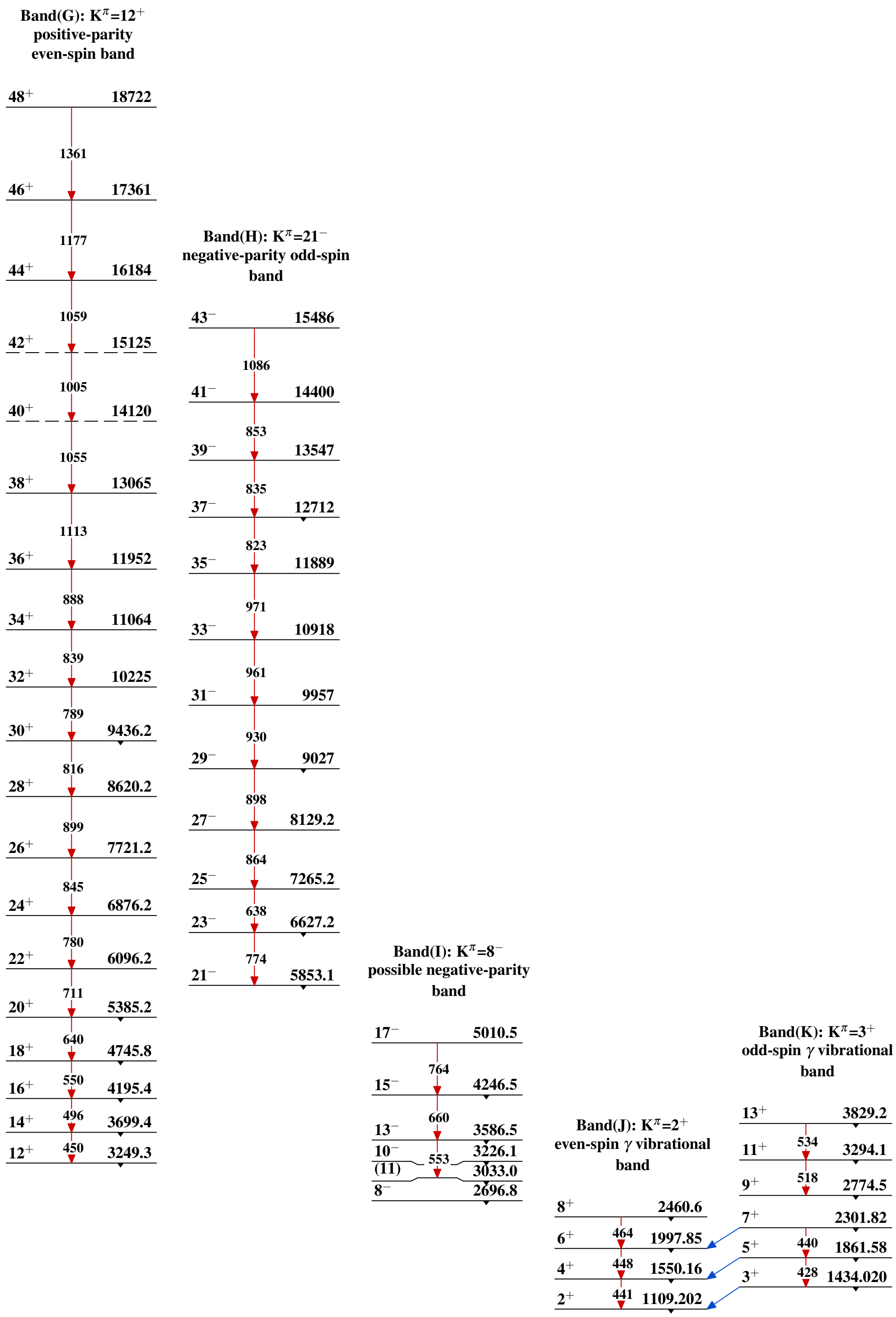
$^{152}_{64}Gd_{88}$

Adopted Levels, Gammas



$^{152}_{64}Gd_{88}$

Adopted Levels, Gammas (continued)



$^{152}_{64}Gd_{88}$

Adopted Levels, Gammas (continued)

$^{152}_{64}Gd_{88}$

Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	C. W. Reich	NDS 110, 2257 (2009)	1-May-2008

Q(β^-)=−3.55×10^3 *5*; S(n)=8894.72 *17*; S(p)=7627.7 *7*; Q(α)=920.3 *7* 2017Wa10
S(2n)=15141.67 *17*; S(2p)=13521.3 *7* 2017Wa10
Additional information 1.

Data are from ^{153}Gd(n,γ), ^{154}Eu β^- decay, ^{154}Tb ε decay (21.5 h, 9.4 h, and 22.7 h), ^{150}Nd(^{9}Be,5nγ) and Sm(α,xnγ) reactions, Coulomb excitation, ^{156}Gd(p,t), ^{152}Gd(t,p), ^{154}Gd(e,e′), ^{154}Gd(d,d′), and ^{154}Gd(p,p′) reactions.

In a study of the β^- decay of ^{154}Eu, 2004Ku13 do not confirm the existence of the following levels, previously reported in thermal-neutron capture: 1276.99; 1294.19; 1295.09; 1698.51; 1702.04; 1838.61; and 1861.55. These levels and their associated γ′s are not included here. See the comments in the ^{154}Eu β^- decay and ^{153}Gd(n,γ) E=th data sets.

^{154}Gd Levels

From the compilation of 1973Mu14 there are 48 n resonances below 1 keV in ^{154}Gd; the related measurements are given in 1974Ra23. See 1987Ma13 for data on 134 resonances from 0.48 to 2.76 keV. For a recent publication of n resonances for this, and other nuclides, see 2006MuZX.

For the labeling used to identify the cranked shell-model configurations, see the (^{9}Be,5nγ) data set. For a discussion of the various band crossings in the cranked shell-model, see 1989Mo20 (^{9}Be,5nγ).

Cross Reference (XREF) Flags

A	^{153}Gd(n,γ) E=th	F	^{154}Tb ε decay (22.7 h)	K	^{153}Eu(^{3}He,d),^{153}Eu(α,t)
B	^{150}Nd(^{9}Be,5nγ)	G	Coulomb excitation	L	^{154}Gd(d,d′),^{154}Gd(p,p′)
C	^{154}Eu β^- decay	H	^{152}Sm(α,2nγ),^{154}Sm(α,4nγ)	M	^{154}Gd(e,e′)
D	^{154}Tb ε decay (21.5 h)	I	^{156}Gd(p,t)		
E	^{154}Tb ε decay (9.4 h)	J	^{152}Gd(t,p)		

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$	XREF	Comments
0.0[#]	0$^+$	stable	ABCDEFGHIJKLM	The isotope shift has been deduced from optical spectroscopy and muonic atom x-ray energies. These results include, all in fm^2, Δ<r^2>(^{152}Gd−^{154}Gd)=0.412 *21* (1990Wa25), 0.43 *2* (1987Bo58) and 0.48 (1988Al40, read from graph by evaluators); λ(^{152}Gd-^{154}Gd)=0.425 *13* (2000Bl10), 0.43 *5* (1990Du08); λ(^{154}Gd-^{155}Gd)=0.099 *2* (2000Bl10), 0.112 *24* (1974Bo60); Δ<r^2>(^{154}Gd−^{156}Gd)=0.183 *9* (1990Wa25), 0.216 *25* (1983La08), 0.188 *10* (1987Bo58), and 0.21 (1988Al40, read from graph by evaluators); and λ(^{154}Gd-^{156}Gd)=0.203 *23* (1974Bo60) and 0.197 *9* (1990Du08). See 1990Wa25 for Δ<r^4> and Δ<r^6> values. In an evaluation of nuclear rms charge radii, 2004An14 report <r^2>$^{1/2}$=5.1253 fm *17*.
123.0709[#] *9*	2$^+$	1.184 ns *5*	ABCDEFGHIJKLM	μ=+0.91 *4*; Q= −1.82 *4* J$^\pi$: From E2 γ to 0$^+$ level. T$_{1/2}$: From 1995Ma03, ^{154}Eu β^- decay. Others: 1.19 ns *10* (1955Su64); 1.18 ns *3* (1961St04); 1.16 ns *5* (1963Bu03); 1.21 ns *4* (1968Ku03); 1.18 ns *4* (1972Aw04); 1.15 ns *3* (1961Na06); and 1.18 ns *3* (1963Fo02), all from ^{154}Eu β^- decay; and 1.183 ns *12*, from Coul. ex. μ: Weighted average of +0.96 *6* and +0.86 *6*, both from the evaluation of 1989Ra17. The former value is from the data of 1974Ar23 and 1970Be36. The latter is based on a g-factor ratio from 1970Wa26, and g-factor=0.45 *5* (1970Be36), 0.367 *30* (1962Ba38), 0.36 *6* (1961St04),

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{154}Gd Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$	XREF	Comments
				0.4 *5* (1960Ma38), and 0.215 (1960De16). Q: From 1989Ra17 evaluation and based on a muonic atom study (1983La08). Other: 1962Ju06. The isomer shift has been deduced from muonic atom studies to be 0.020 *4* fm^2 (1983La08) and $\Delta<r^2>/<r^2>=+0.00059$ *8* (1968Be24) and from Mossbauer studies $\Delta<r^2>/<r^2>=+0.00075$ *23* (1969Re05) and 0.00005 *7* (1968Ga09).
370.9998[#] *11*	4^+	45.6 ps *8*	ABCDEFGHIJKLM	B(E4)↑=0.146 *12* Jπ: From E2 γ to 2^+ level, L=4 in ^{156}Gd(p,t), and expected structure of 0^+ ground-state band. $T_{1/2}$: From Coul. ex. Others: 39 ps *5* (1963Bu03), 41 ps *7* (1972Aw04) and 61 ps *4* (1972PlZW), all from ^{154}Eu β^- decay. From β(E2,2+→4^+)=1.43 (1964Al25), $T_{1/2}$=68 ps. B(E4)↑: From (e,e′). Other: 0.33 *6*, from Coulomb excitation.
680.6673[@] *18*	0^+	4.56 ps *27*	A CDE GHIJ LM	Jπ: From E0 γ to 0^+ level and L=0 in ^{156}Gd(p,t). $T_{1/2}$: From Coul. ex. From B(E2) (2+→0^+)=0.043 *+13−14* (1977Wo03), $T_{1/2}$=4.8 ps *15*, in excellent agreement.
717.662[#] *4*	6^+	8.26 ps *25*	ABCDEFGHI KLM	B(E6)↑=0.0034 *7* Jπ: From E2 γ to 4^+ level and expected structure of 0^+ ground-state band. $T_{1/2}$: From Coul. ex. Other: also from Coul. ex., 7.9 ps *11* (1975Wa15 and 1977Si18). B(E6)↑: From (e,e′).
815.4917[@] *15*	2^+	6.4 ps *4*	ABCDEFGHIJKLM	Jπ: From E0 component in γ to 2^+ and E2 γ to 0^+. $T_{1/2}$: Weighted average of 6.4 ps *5*, from B(E2)↑=0.0216 *16* in (e,e′), and 6.4 ps *7*, from recoil-distance Doppler shift in Coul. ex. Other: 0.020 *3* from B(E2) in Coul. ex. (1970RiZY,1977Ro08,1977Wo03).
996.2568[a] *16*	2^+	0.95 ps *7*	A CDEFGHI KLM	μ=+0.83 *+7−9* μ: Computed by the evaluators from the g-factor deduced by 1996Al31 (see the comment on this level in the ^{154}Eu β^- decay data set). Jπ: From E0 γ component to 2^+ level and E2 to 0^+. $T_{1/2}$: From B(E2)↑=0.140 *8*, an average of 0.147 *5* from Coulomb excitation (1970RiZY,1977Ro08,1977Wo03) and 0.132 *5* from (e,e′).
1047.592[@] *3*	4^+	7.6 ps *4*	ABCDEF HIJKL	Jπ: From E0 γ component to 4^+ level and E2 γ′s to 2^+ and 6^+. $T_{1/2}$: From Coul. ex.
1127.8018[a] *2*	3^+		A CDEF H K	Jπ: From M1 γ′s to 2^+ and 4^+ levels.
1144.44[#] *6*	8^+	2.57 ps *10*	B FGH	Jπ: From γ to 6^+ level and expected structure of 0^+ ground-state band. $T_{1/2}$: From Coul. ex.
1182.091[c] *4*	0^+		A C IJ	Jπ: From E0 γ to 0^+ level.
1241.291[b] *4*	1^-	1.54 fs	A CDE GH L	B(E1)↑=0.00243 Jπ: From E1 γ′s to 2^+ and 0^+ levels. $T_{1/2}$: From B(E1)↑ (1993Su16, Coulomb excitation) and the adopted γ branching. B(E1)↑: From 1993Su16, Coulomb excitation.
1251.641[b] *4*	3^-		A CDE GH J L	B(E3)↑=0.21 *5* Jπ: From E1 γ′s to 2^+ and 4^+ levels. B(E3)↑: From Coulomb excitation.
1263.778[a] *4*	4^+		A CDEF HI KL	Jπ: From E0 component in γ to 4^+ and E2 to 2^+.
1352.9 *3*	0^+		I	
1365.878[@] *8*	6^+		AB F H L	E(level): Assigned in (d,d′) as the 5^- member of the $K^\pi=0^-$ octupole band, but that state is now assigned to the 1404 level. Jπ: From E0 γ component to 6^+ level and γ′s to 4^+ levels.
1397.515[d] *4*	2^-		A CDE	Jπ: From E1 γ′s to 2^+ levels, populated by primary γ in (n,γ), and

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{154}Gd Levels (continued)

E(level)[†]	J^{π}[‡]	$T_{1/2}$	XREF	Comments
				band assignment.
1404.16[b] 3	(5^-)		A C H	J^π: From (E1) γ to 4^+ level and band assignment.
1414.426[d] 15	1^-		A CD	J^π: From E1 γ's to 2^+ and 0^+ levels.
1418.160[c] 3	2^+		A CDE J	J^π: From E0 γ components to 2^+ levels and E2 to 0^+.
1432.588[a] 6	5^+		A C EF H	J^π: from M1 γ to 4^+ level, γ to 6^+, and expected structure of 2^+ band.
1497.7 3	0^+		I	
1531.305[e] 3	2^+		A CDE HI KL	XREF: L(1534). J^π: From E2 γ to 0^+ level and (E0) γ components to 2^+ levels.
1559.92[d] 3	(4^-)		A CDE K	XREF: K(1556). J^π: From γ's to 4^+ and 2^- levels and band assignment.
1573.974[h] 7	0^+		A IJ	J^π: From E0 γ's to 0^+ levels.
1606.55[a] 8	6^+		F H	J^π: From M1+E2 γ to 6^+ level, γ to 4^+, and expected structure of 2^+ band.
1617.125[d] 3	3^-		A C E G L	B(E3)↑=0.030 The Eγ values of all the γ's deexciting this level are from the ^{154}Eu β^- decay data. J^π: From E1 γ's to 4^+ and 2^+ levels. B(E3)↑: From 1993Su16 (Coul. ex.).
1637.05[#] 10	10^+	1.11 ps 14	B GH	J^π: From E2 γ to 8^+ level, Coul. ex., and expected structure of 0^+ ground-state band. $T_{1/2}$: From Coulomb excitation (1975Wa15 and 1977Si18).
1645.814[g] 6	4^+		A C EF H K	J^π: From M1 γ's to 3^+ and 4^+ levels and γ to 6^+.
1650.34[i] 3	0^+		A I	J^π: From E0's to 0^+ levels.
1660.903[e] 6	3^+		A C E H	J^π: From E2 γ to 2^+ level, M2 γ to 1^-, γ to 4^+, and band assignment.
1674.1[b]	(7^-)		H	J^π: From (E1) γ to 6^+ level and assumed band structure.
1701.39[c] 7	4^+		E L	J^π: γ's to 2^+ and 6^+ levels and expected band structure.
1716.050[h] 6	2^+		A	J^π: From E2 γ to 3^+ level and γ's to 0^+ and 4^+ levels.
1719.5593[f] 18	2^-		A C E	J^π: From E1 γ's to 2^+ and 3^+ levels and band assignment.
1731.7 6	(7^-)		B	J^π: From γ from $8^{(-)}$ and assumed J^π sequence in in-beam scheme.
1756.46[@] 9	8^+		B H	J^π: From E0 γ component to 8^+ level.
1770.187[g] 6	5^+		A EF H K	J^π: From (E0) component in γ to 5^+ level and band assignment.
1775.429[i] 14	2^+		A	J^π: From E2 γ to 0^+ level, (E0) component to 2^+, and γ to 4^+.
1789.17[e] 6	(4^+)		C	J^π: From γ's to 4^+ and 6^+ levels. Possible 4^+ member of the second excited 2^+ band (2004Ku13, ^{154}Eu β^- decay).
1796.960[f] 9	3^-		A C E L	J^π: From E1 γ's to 2^+ and 3^+ levels, γ to 5^-, and band assignment.
1810.21[a] 6	7^+		H	J^π: From γ's to 5^+ and 8^+ levels and band assignment.
1826 2			K	
1836.61 12	0^+		A I	J^π: E0 transition to 0^+ and L=0 in (p,t). Note, however, that a γ to the g.s. suggests that J^π may not be 0^+.
1899.3 4	0^+		I	
1900.34 12	(2^+)		A	J^π: From E2 γ to 4^+ and populated by primary γ in (n,γ).
1911.544[g] 24	6^+		A F H K	J^π: From M1 γ to 5^+ level, γ's to 4^+ and 6^+, and band assignment.
1912.08 15	(0,1,2)		A	J^π: From γ's to 2^+ levels and populated by primary γ in (n,γ).
1942.9 4	0^+		I	
1943.95 3	$(1,2^+)$		A	J^π: From γ's to 0^+ and 2^+ levels and population by primary γ in (n,γ).
1948.559 10	(5^-)		A L	J^π: Gammas to the 3^- members of the three lowest-lying octupole bands and to the 4^+ member of the g.s. band indicate that J^π can be 2^+, 3±, 4± or 5^-. From this decay pattern and the position of this

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{154}Gd Levels (continued)

E(level)[†]	J^{π}[‡]	$T_{1/2}$	XREF	Comments
				state in the level scheme, 1996SpZZ assign this as the 5^- member of either the $K^{\pi}=1^-$ or the $K^{\pi}=2^-$ octupole band.
1964.05 *12*	$(2)^+$		A	J^{π}: From M1,E2 γ to 4^+ level, γ's to 0^+ and 2^+, and populated by γ in (n,γ).
1973.07 *17*	2^+		A	J^{π}: From γ's to 0^+ and 4^+ levels; populated by primary γ in (n,γ).
2023.82 *11*	$1,2^+$		A E K	XREF: K(2024?). J^{π}: From γ's to 0^+ and 2^+ levels and populated by primary γ in (n,γ).
2039.8 *4*	0^+		I	
2040.5[b] *3*	(9^-)		B H	J^{π}: From γ to 8^+ level and assumed band structure.
2041.07 *11*	$(1,2)^+$		A	J^{π}: From M1 γ to 2^+, γ to 0^+, and population by primary γ in (n,γ).
2073.30[g] *4*	(7^+)		H	J^{π}: From γ's to 5^+ and 6^+ levels and assumed band structure.
2080.230[h] *20*	4^+		A de	J^{π}: From M1,E2 γ to 3^+ level and γ's to 2^+ and 6^+.
2080.791 *10*	3^-		A de	J^{π}: From M1 γ to 2^- level and γ's to 2^+, 3^-, 4^+, and 4^-.
2088 *2*			K	
2101.6 *3*	(1,2)		A L	J^{π}: From γ to 0^+ level and population by primary γ in (n,γ).
2113.74 *3*	2^+		A	J^{π}: From γ's to 0^+ and 4^+ levels.
2116.9			H	
2119.55 *5*	$1^+,2^+$		A D K	XREF: K(2117). J^{π}: From M1 γ to 2^+ level, E1 to 1^-, and populated by primary γ in (n,γ).
2128 *2*			K	
2137.48[j] *4*	7^-	68 ns	B F H	J^{π}: From E1 γ's to 6^+ and 8^+ levels. J^{π}: From (α,2nγ) study.
2148.81 *6*	$(1,2)^+$		A K	XREF: K(2150). J^{π}: From M1,E2 γ to 2^+ level, γ to 0^+, and populated by primary γ in (n,γ).
2168 *2*			K	
2176.03[k] *3*	(1^+)		A K	XREF: K(2179). J^{π}: From M1 γ to (2^+) level, γ to 0^+, populated by primary γ in (n,γ), and band assignment.
2183.19[n] *19*	$8^{(-)}$		B H	J^{π}: From γ's to 8^+ and (7^-) levels.
2184.69[#] *13*	12^+		B H	J^{π}: From γ decay to 10^+ level and expected band structure.
2185.869 *13*	4^-		A DE	J^{π}: From E1 γ's to 4^+ and 5^+ levels and γ to 3^+.
2187.01[l] *3*	1^+		A D K	XREF: K(2184). J^{π}: From M1 γ's to 0^+ and 2^+ levels. populated by primary γ in (n,γ), and band assignment.
2194.13[@] *12*	10^+		B H	J^{π}: From γ's to 8^+ and 10^+ levels and expected band structure.
2215.3	$(6^+,7,8^+)$		H	J^{π}: From γ's to 6^+ and 8^+ levels.
2222.48[k] *3*	(2^+)		A k	XREF: k(2224). J^{π}: From γ's to 0^+, 2^+, and 4^+ levels.
2229.77[l] *3*	(2^+)		A k	XREF: k(2224). J^{π}: From γ to 0^+ level and band assignment.
2230.08 *18*	$2^+,3,4^+$		E k	XREF: k(2224). E(level): Level present because evaluators assume this level is not the same as the 2229 level in (n,γ). J^{π}: From γ's to 2^+ and 4^+ levels.
2245.29 *6*			H	
2249 *2*			k	XREF: k(2249?).
2249.02 *3*	(3)		A kL	XREF: k(2249?). J^{π}: From γ's to 1^-, 2^+, and 4^+ levels.
2251.3[p] *3*	$9^{(-)}$		B H	J^{π}: From 1989Mo20, (^{9}Be,5nγ). Also shown as $9^{(-)}$ on the level scheme of 1994Wu01 (α,2nγ), but no reasons were given in support of it.
2254.12[g] *5*	(8^+)		H	J^{π}: From γ's to 6^+ and 8^+ levels and assumed band structure.
2265.35 *6*	$2^+,3,4^+$		A E	J^{π}: From ε from 3^- parent and γ's to 2^+ and 4^+ levels.
2272.3	$(8^+,9^+)$		H	J^{π}: From γ's to (7^+) and 10^+ levels.

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Adopted Levels, Gammas (continued)

^{154}Gd Levels (continued)

E(level)[†]	J^{π}[‡]	XREF	Comments
2277.13 *9*	3	A E	J^{π}: From ε from 3^- parent, γ's to 2^+ and 4^+ levels, and $\gamma(\theta)$ from oriented nuclei (1981Fe01).
2293.50[k] *3*	$(3)^+$	A k	XREF: k(2302). J^{π}: From M1 γ to 2^+ level, γ to 4^+ level, population by primary γ in (n,γ), and band assignment.
2299.39 *17*	(1,2)	A k	XREF: k(2302). J^{π}: From γ's to 0^+ and 2^+ levels and population by primary γ from (n,γ).
2299.9? *5*	0^+	I	
2302.28 *24*	(1,2)	A k	XREF: k(2302). J^{π}: From γ's to 2^+ levels and population by primary γ in (n,γ).
2305.78[l] *3*	3^+	A DE k	XREF: k(2302). J^{π}: From ε from 3^- parent, M1 γ to 2^+, γ's to 4^+ levels, and band assignment.
2309.47[j] *6*	(8^-)	B F H	J^{π}: From γ's to 7^- and 6^+ and assumed band structure.
2309.53 *15*	$(2)^+$	A k	XREF: k(2302). J^{π}: From M1 γ to 2^+ level, γ to 4^+, and population by primary γ from (n,γ).
2324.3		H	
2336.02 *5*	3^-	A E	J^{π}: From ε from 3^- parent, γ's to 1^- and 4^+, and $\gamma(\theta)$ from oriented nuclei (1981Fe01).
2342 *2*		K	
2342.53 *21*	$1,2^+$	A D	J^{π}: From γ's to 0^+, 2^+, and 2^- levels and population by primary γ from (n,γ).
2356 *2*		K	
2368.87 *17*	$2^+,3,4^+$	A DE K	XREF: A(2369)K(2367). J^{π}: From ε from 3^- parent and γ's to 2^+ and 4^+ levels.
2378 *2*		K	
2381.46 *4*	$0^+,1,2$	A	J^{π}: From γ to 2^+ level and population by primary γ in (n,γ).
2386.00 *3*	4^+	A	J^{π}: From γ's to 2^+ and 6^+ levels.
2401.34 *17*	$1,2^+$	A D k	XREF: k(2406). J^{π}: From γ's to 0^+ and 2^+ levels and population by primary γ from (n,γ).
2403.1[k] *3*	(4^+)	A k	XREF: k(2406). J^{π}: From γ's to 4^+ levels and band assignment.
2403.8[m]	(7^+)	H	J^{π}: From γ's to (8^+), (7^+), and 7^- levels; $J^{\pi}=6^+$, 7^-, 8^+, and and 8^- also allowed.
2406.19 *25*	2^+	A E k	XREF: k(2406). J^{π}: From ε from 3^- parent and γ's to 0^+ and 4^+ levels.
2410.85[l] *3*	4^+	A k	XREF: k(2406). J^{π}: From γ's to 2^+ and 6^+ levels.
2416.22 *8*	4^+	E	J^{π}: From ε from 3^- parent, γ's to 2^+ and 5^+ levels, and $\gamma(\theta)$ from oriented nuclei (1981Fe01).
2418[o] *2*	(6^-)	K	
2430.58 *6*	$1,2^+$	A D	J^{π}: From γ's to 0^+ and 2^+ levels.
2433.78 *4*	$0^+,1,2$	A K	XREF: K(2430). J^{π}: From γ's to 1^- and 2^+ levels and populated by primary γ in (n,γ).
2440.7		H	
2441.70 *16*	(1,2)	A	J^{π}: From γ's to 0^+ and 2^+ levels and population by primary γ in (n,γ).
2449.2 *3*	(1,2)	A K	XREF: K(2455). J^{π}: From γ's to 0^+ levels and populated by primary γ in (n,γ).
2453.29[g] *7*	(9^+)	H	J^{π}: Gammas to levels interpreted as the 7^+ and 8^+ members of the $K^{\pi}=4^+$ band. Probable 9^+ member of that band.
2459.4 *4*	$6^+,7,8^+$	F	J^{π}: From γ's to 6^+ and 8^+ levels.
2459.74 *22*	2^+	A	J^{π}: From γ's to 0^+ and 4^+ levels and populated by primary γ in (n,γ).
2468.45 *4*	$1,2^+$	A D	J^{π}: From γ's to 0^+ and 2^+ levels, including (M1) to (2^+).
2469 *2*		K	
2475.27[j] *11*	(9^-)	B H	J^{π}: From γ's to (8^-) and (8^+) levels and assumed band structure. For this J^{π} the 1109 γ must be E3, or else it is misplaced.
2482.02 *21*	2^+	A	J^{π}: From γ's to 0^+ and 4^+ levels and populated by primary γ from (n,γ).
2482.29[b] *24*	(11^-)	B H	J^{π}: From γ's to (9^-) and 10^+ levels and band assignment.

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Adopted Levels, Gammas (continued)

^{154}Gd Levels (continued)

E(level)[†]	J^{π}[‡]	XREF	Comments
2485.1 *5*	0^+	I	
2486.42 *11*	$1,2^+$	A D	J^{π}: From γ's to 0^+ and 2^+ levels and populated by primary γ in (n,γ).
2495.76 *4*	$1,2^+$	A E	J^{π}: From γ's to 0^+ and 2^+ levels.
2499.3 *3*	2^+	A D	J^{π}: From γ's to 0^+, 2^+, and 4^+ levels and population by primary γ in (n,γ).
2502.58 *17*	$1,2^+$	A	J^{π}: From γ's to 0^+ and 2^+ and population by primary γ in (n,γ).
2511.52 *9*	2	A	J^{π}: From γ's to 2^+ and 4^+ levels and populated by primary γ in (n,γ).
2512 *2*		K	
2514.8 *3*	$1,2^+$	A	J^{π}: From γ's to 0^+ and 2^+ levels and populated by primary γ in (n,γ).
2533.74 *16*	$0^+,1,2$	A	J^{π}: From γ to 2^+ level and populated by primary γ in (n,γ).
2538 *2*		K	
2561.3 *4*	$2,3^-$	A	J^{π}: From γ's to 2^+ and 4^+ levels and populated by primary γ in (n,γ).
2568[o] *2*	(7^-)	K	
2569.00 *16*	2	A	J^{π}: From γ's to 2^+ and 4^+ levels and populated by primary γ in (n,γ).
2579.62[p] *19*	$10^{(-)}$	B H	J^{π}: From γ's to $9^{(-)}$ and 10^+ levels and band assignment.
2585.5 *4*	0^+	A I	J^{π}: L=0 in (p,t).
2590.34 *5*	$(1,2)^+$	A D	J^{π}: From M1 γ to 1^+ level and γ's to 0^+ and 2^+.
2592 *2*		K	
2616.08[j] *19*	$10^{(-)}$	B	
2619.53[n] *15*	$10^{(-)}$	B H	J^{π}: From γ's to $8^{(-)}$ and 10^+ levels and assumed band structure.
2620 *2*		K	
2621.80[&] *19*	12^+	B H	J^{π}: From γ's to 10^+ and 12^+ levels and assumed band structure.
2633.17 *24*	$1,2^+$	A	J^{π}: From γ's to 0^+ and 2^+ levels.
2637.48 *21*	$(2)^-$	A	J^{π}: From E1 γ to 3^+ level, γ's to 2^+, and populated by primary γ in (n,γ).
2645 *2*		K	
2655.04 *11*	2^+	A DE K	XREF: K(2658). J^{π}: From γ's to 0^+ and 4^+ levels.
2668.4		H	
2686.7 *3*	2	A	J^{π}: From γ's to 2^+ and 4^+ and populated by primary γ in (n,γ).
2695.5		H	
2699.4 *4*	$0^+,1,2$	A	J^{π}: From γ to 2^+ level and populated by primary γ from (n,γ).
2710.5 *4*	$1,2^+$	A	J^{π}: From γ's to 0^+ and 2^+ levels and populated by primary γ in (n,γ).
2721.5		H	
2722.35 *13*	$1,2^+$	A D	J^{π}: From γ's to 0^+ and 2^+ levels and populated by primary γ in (n,γ).
2729 *2*		K	
2734.30 *21*	$1^+,2^+$	A D	J^{π}: From γ's to 0^+, 2^+, and 3^+ levels.
2735.9		H	
2741.5 *3*	$2^+,3^-$	A	J^{π}: From γ's to 2^+ and 4^+ levels and populated by primary γ in (n,γ).
≈2743		K	
2744.1 *4*	0^+	A I	J^{π}: L=0 in (p,t) (tentative assignment). γ to 2^+, and populated by primary γ in (n,γ).
2773 *2*		K	
2775.38[j] *10*	$11^{(-)}$	B H	J^{π}: From γ's to $9^{(-)}$ and $10^{(-)}$ levels and band assignment.
2777.32[#] *15*	14^+	B H	J^{π}: From γ to 12^+ level and band assignment.
2779.9		H	
2785 *2*		K	
2787.1		H	
2788.46 *6*	$1,2^+$	A D	J^{π}: From γ's to 0^+, 2^-, and 2^+ levels.
2850.3 *3*	2^+	A D	J^{π}: From γ's to 0^+ and 4^+ levels.
2855.0? *2*	0^+	I	
2860	1^+	M	E(level): Estimated by evaluators from figure (1989Ha20). J^{π}: From M1 excitation.
2872.39 *24*	2^+	A D	J^{π}: From γ's 0^+ and 4^+ levels.
2934.2 *6*	1^+	A DE M	J^{π}: From γ's to 0^+ and 2^+ levels, M1 excitation, and populated by primary γ in (n,γ).
2949.28 *4*	2^+	A D	J^{π}: From γ's to 0^+ and 4^+ levels.
2950.66[p] *20*	$12^{(-)}$	B H	J^{π}: From γ's to $10^{(-)}$ and 12^+ levels and band assignment.
2955.69[n] *10*	$12^{(-)}$	B H	J^{π}: From γ's to $10^{(-)}$ and $11^{(-)}$ levels and band assignment.

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Adopted Levels, Gammas (continued)

^{154}Gd Levels (continued)

E(level)[†]	Jπ[‡]	XREF	Comments
2981.28[b] 19	$13^{(-)}$	B H	Jπ: From γ's to (11^-) and 12^+ levels and band assignment.
2989.89 15	$1,2^+$	A D	Jπ: From γ's to 0^+ and 2^+ levels, possible γ to 3^-, and populated by primary γ in (n,γ).
3009.7 4	$1,2^+$	D	Jπ: From γ's to 0^+ and 2^+ levels.
3022.73 15	2^+	A D	Jπ: From γ's to 0^+ and 4^+ levels; populated by primary γ in (n,γ).
3027.26[&] 20	14^+	B H	Jπ: From γ's to 12^+ level and band assignment.
3031.5 3	$1,2^+$	A DE	Jπ: From γ's to 0^+ and 2^+ levels.
3080	(1^+)	M	E(level): Estimated by evaluators from figure (1989Ha20). Jπ: From (M1) mode of excitation.
3090.6 9	$1,2^+$	D	Jπ: From γ's to 0^+ and 2^+ levels.
3122.55 24	(1^+)	A D M	Jπ: From γ's to 0^+ and 2^+ levels and (M1) excitation.
3153.1		H	
3154.8[q] 4		B	
3158.73[j] 19	$13^{(-)}$	B H	Jπ: From γ's to $11^{(-)}$ and $12^{(-)}$ levels and band assignment.
3162.7 12	$1,2^+$	D	Jπ: From γ's to 0^+ and 2^+ levels.
3184.06 18	$1,2^+$	A D	Jπ: From γ's to 0^+, 2^+, and 2^- levels.
3264.42 21	$1,2^+$	A D	Jπ: From γ's to 0^+ and 2^+ levels and populated by primary γ in (n,γ).
3294.2 7	$1,2^+$	D	Jπ: From γ's to 0^+ and 2^+ levels.
3327.32 20	$1,2^+$	A D	Jπ: From γ's to 0^+ and 2^+ levels and populated by primary γ in (n,γ).
3345.9 10	$1,2^+$	D	Jπ: From γ's to 0^+ and 2^+ levels.
3350.7 9	$1,2^+$	D	Jπ: From γ's to 0^+ and 2^+ levels.
3363.6 4	(2^+)	E	Jπ: From γ's to 0^+ and 2^+ levels.
3384.00[n] 25	$14^{(-)}$	B	Jπ: From γ's to $12^{(-)}$ and $13^{(-)}$ levels and band assignment.
3404.45[#] 18	16^+	B H	Jπ: From γ to 14^+ level and band assignment.
3414.76 20	$1,2^+$	A D	Jπ: From γ's to 0^+ and 2^+ levels and populated by primary γ in (n,γ).
3428.1[p] 3	$14^{(-)}$	B H	Jπ: From γ to $12^{(-)}$ level and band assignment.
3490.83[&] 19	16^+	B H	Jπ: From γ's to 14^+ levels and band assignment.
3517.18 16	$(3^+,4^+)$	E	Jπ: From γ's to 2^+, 3^+, 4^+, and 5^+ levels.
3519.09[b] 20	$15^{(-)}$	B H	Jπ: From γ's to $13^{(-)}$ and 14^+ levels and band assignment.
3550.3 3	$2^+,3,4^+$	A E	Jπ: From ε from 3^- parent and γ's to 2^+ and 3^+ levels.
3599.2[q] 6		B	
3629.43[j] 21	$15^{(-)}$	B H	Jπ: From γ's to $13^{(-)}$ and $14^{(-)}$ levels and band assignment.
3894.34[n] 23	$16^{(-)}$	B	Jπ: From γ's to 14 (−) and $15^{(-)}$ levels and band assignment.
3987.4[p] 4	$16^{(-)}$	B	Jπ: From γ to $14^{(-)}$ level and band assignment.
4016.09[&] 20	18^+	B H	Jπ: From γ's to 16^+ levels and band assignment.
4087.15[#] 24	18^+	B H	Jπ: From γ's to 16^+ levels and band assignment.
4099.3[q] 6		B	
4102.0[b] 3	$17^{(-)}$	B	Jπ: From γ to $15^{(-)}$ level and band assignment.
4176.3[j] 3	$17^{(-)}$	B	Jπ: From γ's to $15^{(-)}$ and $16^{(-)}$ levels and band assignment.
4474.9[n] 3	$18^{(-)}$	B	Jπ: From γ's to $16^{(-)}$ and $17^{(-)}$ levels and band assignment.
4595.2[p] 4	$18^{(-)}$	B	Jπ: From γ to $16^{(-)}$ level and band assignment.
4646.29[&] 22	20^+	B	Jπ: From γ to 18^+ level and band assignment.
4656.0[q] 8		B	
4735.5[b] 4	$19^{(-)}$	B	Jπ: From γ to $17^{(-)}$ level and band assignment.
4782.3[#] 3	20^+	B	Jπ: From γ to 18^+ level and band assignment.
4788.6[j] 3	$19^{(-)}$	B	Jπ: From γ's to $17^{(-)}$ and $18^{(-)}$ levels and band assignment.
5116.4[n] 4	$20^{(-)}$	B	Jπ: From γ's to $18^{(-)}$ and $19^{(-)}$ levels and band assignment.
5209.3[p] 8	$20^{(-)}$	B	Jπ: From γ to $18^{(-)}$ level and band assignment.
5254.3[q] 10		B	
5349.9[&] 3	22^+	B	Jπ: From γ to 20^+ level and band assignment.
5415.8[b] 5	$21^{(-)}$	B	Jπ: From γ to $19^{(-)}$ level and band assignment.

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Adopted Levels, Gammas (continued)

^{154}Gd Levels (continued)

E(level)[†]	Jπ[‡]	XREF	Comments
5457.5[j] 4	21$^{(-)}$	B	Jπ: From γ's to 19$^{(-)}$ and 20$^{(-)}$ levels and band assignment.
5519.5[#] 4	22^{+}	B	Jπ: From γ to 20^{+} level and band assignment.
5810.9[n] 4	(22^{-})	B	Jπ: From γ to 20$^{(-)}$ and band assignment.
5848.5[p] 8	(22^{-})	B	Jπ: From γ to 20$^{(-)}$ and band assignment.
5889.4?[q] 11		B	
6121.6[&] 4	24^{+}	B	Jπ: From γ to 22^{+} and band assignment.
6136.2[b] 6	(23^{-})	B	Jπ: From γ to 21$^{(-)}$ and band assignment.
6178.0[j] 5	(23^{-})	B	Jπ: From γ to 21$^{(-)}$ and band assignment.
6294.2[#] 5	24^{+}	B	Jπ: From γ to 22^{+} and band assignment.
6535.6[p] 9	(24^{-})	B	Jπ: From γ to (22^{-}) and band assignment.
6555.4[n] 5	(24^{-})	B	Jπ: From γ to (22^{-}) and band assignment.
6883.3?[b] 7	(25^{-})	B	Jπ: From γ to (23^{-}) and band assignment.
6946.1?[j] 7	(25^{-})	B	Jπ: From γ to (23^{-}) and band assignment.
6955.0[&] 6	(26^{+})	B	Jπ: From γ to 24^{+} and band assignment.
7055.6[#] 6	26^{+}	B	Jπ: From γ to 24^{+} and band assignment.
7274.0?[p] 10	(26^{-})	B	Jπ: From γ to (24^{-}) and band assignment.
7353.1?[n] 7	(26^{-})	B	Jπ: From γ to (24^{-}) and band assignment.

[†] Computed from a least-squares fit to the listed γ-ray energies. The multiply placed gammas were not included in this fit. γ-ray energies for which no uncertainties are given were assigned an uncertainty of 1 keV.

[‡] 1996SpZZ, in (n,γ), give detailed a discussion of many of the band assignments.

[#] Band(A): Kπ=0^{+} ground-state band. α=21.35, β=−0.14 (from 0^{+}, 2^{+} and 4^{+} levels). The large B value suggests that the usual expansion in powers of J(J+1) does not give a good description of the band structure.

[@] Band(B): First excited Kπ=0^{+} band. Probable β-vibrational band. α=24.24, β=−0.30 (from 0^{+}, 2^{+} and 4^{+} levels). Assignment as a β band based on deduced ρ^2(E0) value (2001Ga02). The large B value suggests that the usual expansion in powers of J(J+1) does not give a good description of the level energies.

[&] Band(b): Aligned two-neutron-quasiparticle band. configuration=AB. crosses the g.s. band at ħω=0.31 MeV (near the 18^{+} level).

[a] Band(C): Kπ=2^{+} γ-vibrational band. α=23.63, β=−0.222, A_4=−0.0216 (from 2^{+}, 3^{+}, 4^{+}, and 5^{+} levels). The large values of B and A_4 suggest that the usual rotational formula does not a good description of the level energies.

[b] Band(D): Kπ=0^{-} octupole-vibrational band. At higher spins, it can be ascribed to the cranked shell-model configuration AE.

[c] Band(E): Second excited Kπ=0^{+} band. Intruder band. band is associated with a smaller deformation (2003Ku19). Proposed by these authors as a “pairing isomer”.

[d] Band(F): Kπ=1^{-} octupole-vibrational band.

[e] Band(G): Second excited Kπ=2^{+} band. Proposed as the βγ-vibrational band by 1996SpZZ.

[f] Band(H): Kπ=2^{-} octupole-vibrational band.

[g] Band(I): Kπ=4^{+} band. Dominant Configuration=(π 3/2[411])+(π 5/2[413]). α=12.98, β=−0.030 (from 4^{+}, 5^{+} and 6^{+} levels). from single-nucleon-transfer studies, 2001Bu17 interpret this band as being a hexadecapole vibration (or a g boson excitation). 1994Wu01 (see also 1993Wu03 and 1993ApZZ), however, propose that IT is a Kπ=4^{+} γγ vibrational band. The dominant two-quasiparticle make-up of this band argues against this latter interpretation.

[h] Band(J): Excited Kπ=0^{+} band.

[i] Band(K): Excited Kπ=0^{+} band Proposed as the three-phonon β band by 1996SpZZ.

[j] Band(L): Kπ=7^{-} band. Configuration=(ν 3/2[651])+(ν 11/2[505]). at higher spins, it can be ascribed to the two-neutron-quasiparticle configuration AX. α=10.72.

[k] Band(M): Kπ=1^{+} band. Strongly mixed with the other Kπ=1^{+} band. contains a significant component of Configuration=(π 5/2[413])-(π 3/2[411]).

[l] Band(N): Kπ=1^{+} band. Strongly mixed with the other Kπ=1^{+} band. contains a significant component of Configuration=(π

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Adopted Levels, Gammas (continued)

^{154}Gd Levels (continued)

5/2[413])-(π 3/2[411]).

[m] Band(O): $K^{\pi}=7^{+}$ bandhead. Configuration=(ν 3/2[521])+(ν 11/2[505]).

[n] Band(P): Two-quasineutron band. configuration=AY.

[o] Band(Q): $K^{\pi}=(5^{-})$ band, dominant Configuration=(π 5/2[413])+(π 5/2[532]). strong Coriolis mixing is expected to bring in admixtures of other π $h_{11/2}$-related orbitals.

[p] Band(R): Two-quasineutron band. configuration=AF band crossed by the configuration BC near $\hbar\omega$=0.30 MeV, with configuration becoming AFBC.

[q] Band(S): Level sequence.

$\gamma(^{154}Gd)$

Unplaced γ's are not included here; see ^{154}Tb ε decays (21.5 h, 9.4 h, and 22.7 h), ^{154}Eu β^- decay, and ^{152}Sm(α,2nγ).

E_i(level)	J_i^π	E_γ [†]	I_γ [‡#]	E_f	J_f^π	Mult. [@&]	δ [@a]	α [c]	$I_{(\gamma+ce)}$	Comments
123.0709	2^+	123.0706 *9*	100	0.0	0^+	E2		1.197 *14*		B(E2)(W.u.)=157 *1* E_γ: From ^{154}Eu β^- decay. α: weighted average of the measured values 1.194 *19* (1995Ma03) and 1.200 *20* (1962Lu03), both from ^{154}Eu β^- decay. See the comment on the α(exp) value in the ^{154}Eu β^- decay data set. B(E2)(W.u.) value computed from the measured B(E2)↑=3.86 *3*. δ: δ(M3/E2)=0.0 *10* (1978We08).
370.9998	4^+	247.9288 *7*	100	123.0709	2^+	E2		0.1098		B(E2)(W.u.)=245 *9* E_γ: From ^{154}Eu β^- decay. Mult.: α(K)exp=0.091 *6* (1972Na21,1968Ng01). Others: 1974Go30, 1996SpZZ. δ: δ(M3/E2)=−0.009 *+22−26* (1978We08).
680.6673	0^+	557.581 *7*	100.0 *9*	123.0709	2^+	E2		0.01053		B(E2)(W.u.)=52 *8* Mult.: α(K)exp=0.0087 *5* (1977Ya04), 0.009 *1* (1996SpZZ), and 0.0075 *30* (1972Na21). Others: 1972Vy04, 1968Br20.
		680.652 *7*		0.0	0^+	E0			2.1 *2*	Mult.: α(K)exp>3.0 (1996SpZZ). Others: 1968Br20, 1969An01, 1972Na21, and 1977Ya04. $I_{(\gamma+ce)}$: From ^{153}Gd(n,γ) and ^{154}Eu β^- decay. Others: 1.2 *6* from ^{154}Tb ε decay.
717.662	6^+	346.643 *5*	100	370.9998	4^+	E2		0.0389		B(E2)(W.u.)=285 *15* Mult.: α(K)exp=0.031 *1* (1971Ri08,1974Go30,1972Vy04,1996SpZZ). δ: δ(M3/E2)=−0.009 *+11−12* (1978We08).
815.4917	2^+	134.8236 *12*	0.45 *6*	680.6673	0^+	E2		0.859		B(E2)(W.u.)=97 *10* I_γ: From ^{154}Eu β^- decay; from ^{153}Gd(n,γ), Iγ=0.75 *2*. Mult.: α(K)exp=0.48 *9* (1996SpZZ).
		444.4924 *19*	30.78 *27*	370.9998	4^+	E2		0.0191		B(E2)(W.u.)=19.6 *16* E_γ: From ^{154}Eu β^- decay. Mult.: α(K)exp=0.0155 *11* (1971Ri08,1977Ya04,1972Na21,1996SpZZ). Other: 1968Br20. δ: δ(M3/E2)=+0.001 *1* (1969Ha36) and +0.010 *20* (1977Gu10). Others: 1983Gi07 and 1989Ki10. δ(E2/M1)<−22 (1969HaZJ).
		692.4205 *18*	100.0 *8*	123.0709	2^+	E2+M1+E0	7.5 *4*	0.046 *3*		B(M1)(W.u.)=0.000109 *15*; B(E2)(W.u.)=6.7 *6*

From ENSDF

Adopted Levels, Gammas (continued)

γ(^{154}Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡#]	E_f	J^π_f	Mult.[@&]	δ[@a]	α[c]	Comments
									E_γ: From ^{154}Eu β^- decay. Mult.: α(K)exp=0.040 *3* (1968Br20,1971Ma65,1971Ru05,1972Na21,1972Vy04, 1977Ya04, and 1996SpZZ). Others: 1964Ha47 and 1968Ng01. δ: δ(E2/M1) from 1977Gu10, 1983Gi07, and 1989Ki10. Others: 1969Ha01, 1969HaZJ, 1971Wh01 and 1992Ak03. Additional information 2. α: Based on α(K)exp, for comparison α(M1+E2)=0.00635.
815.4917	2$^+$	815.509 *9*	28.76 *16*	0.0	0$^+$	E2		0.00427	B(E2)(W.u.)=0.86 *7* Mult.: α(K)exp=0.0039 *2* (1971Ru05,1972Na21,1977Ya04,1996SpZZ). Others: 1968Br20 and 1972Vy04.
996.2568	2$^+$	180.72 *7*	0.043 *6*	815.4917	2$^+$	[M1,E2]		0.35 *4*	
		315.64 *7*	0.0732 *9*	680.6673	0$^+$	[E2]		0.0516	B(E2)(W.u.)=1.21 *25*
		625.2556 *24*	2.61 *3*	370.9998	4$^+$	E2		0.00792	B(E2)(W.u.)=1.72 *14* E_γ: From ^{154}Eu β^- decay. Mult.: α(K)exp=0.0080 *15* (1971Ru05,1996SpZZ). Others: 1968Br20 and 1972Vy04. δ: δ(M3/E2)=+0.02 *2* (1969Ha36,1977Gu10,1983Gi07,1989Ki10).
		873.1834[d] *23*	100.0[d] *7*	123.0709	2$^+$	E2+M1+E0	−9.4 *4*	0.00371	B(M1)(W.u.)=0.000203 *23*; B(E2)(W.u.)=12.3 *10* E_γ: From ^{154}Eu β^- decay. Mult.: α(K)exp=0.00346 *10* (1968Br20,1968Ng01,1971Ru05,1972Na21,1972Vy04, 1977Ya04,1996SpZZ). Penetration parameter: 70<λ<190 (1983Gi07). δ: unweighted average of −8.0 *10* (1970Ru09), −10.2 *10* (1971La11), −9.5 *+6−8* (1977Gu10), −9.7 *10* (1983Gi07), −10.2 *8* (1983Le19), −8.1 *5* (1989Ki10) and −10.1 *+9−12* (1992Ak03). Others: 1960De16, 1969BoZK,1969Ha01,1969Ha36,1969HaZJ,1969Va09, 1971Wh01, 1972Go35, and 1973Ob01. Additional information 3.
		996.264 *8*	86.8 *6*	0.0	0$^+$	E2		0.00277	B(E2)(W.u.)=5.7 *5* Mult.: α(K)exp=0.00245 *10* (1968Br20,1968Ng01,1972Na21,1972Vy04,1977Ya04,1996SpZZ). δ: δ(M3/E2)=0.0 *9* (1978We08).
1047.592	4$^+$	232.101 *3*	13.06 *25*	815.4917	2$^+$	E2		0.1359	Mult.: α(K)exp=0.089 *8* (1971Ri08,1977Ya04,1996SpZZ). δ: δ(M3/E2)=−0.13 *+13−14* (1978We08).
		329.920 *4*	5.6 *6*	717.662	6$^+$	E2		0.0451	Mult.: α(K)exp=0.034 *3* (1996SpZZ,1972Vy04).
		676.593 *6*	100.0 *8*	370.9998	4$^+$	E0+M1+E2	+2.9 *4*	0.053 *3*	Mult.: α(K)exp=0.044 *3* (1971Ru05,1972Na21,1974Go30,1977Ya04,1996SpZZ). Others: 1968Br20,1968Ha28,1969An01. δ: unweighted average of +2.2 *9* (1977Gu10), +2.9 *+21−9*

Adopted Levels, Gammas (continued)

$\gamma(^{154}$Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡#]	E_f	J^π_f	Mult.[@&]	δ[@a]	α[c]	$I_{(\gamma+ce)}$	Comments
										(1978We08), and +3.5 *+10−8* (1982Da12). Others: 1969HaZJ, 1971Ru05, 1971Wh01. Additional information 4. α: Value based on α(K)exp, for comparison α(M1+E2)=0.0071 *2* for the mixed multipole with the listed value of δ and neglecting the presence of an E0 admixture.
1047.592	4⁺	924.55 *3*	38.8 *5*	123.0709	2⁺	E2		0.00325		Mult.: α(K)exp=0.0030 *2* (1977Ya04,1996SpZZ). δ: δ(M3/E2)=−0.2 *+13−27* (1978We08).
1127.8018	3⁺	80.4	0.016 *8*	1047.592	4⁺	[M1,E2]		4.7 *10*		
		131.544 *5*	0.073 *2*	996.2568	2⁺	E2+M1	−4.3 *+21−94*	0.937		
		312.32 *7*	0.101 *2*	815.4917	2⁺	[M1,E2]		0.070 *17*		E_γ: From ^{154}Eu β^- decay. γ not reported in (n,γ).
		756.8020 *23*	25.11 *17*	370.9998	4⁺	E2+M1	−6.1 *3*	0.00516		E_γ: From ^{154}Eu β^- decay. I_γ: From ^{154}Eu β^- decay. Others: 24.3 *14*, 28.9 *11*, and 29.1 *15*. Mult.: α(K)exp=0.00425 *15* (1971Ru05,1996SpZZ). Others: 1968Br20, 1968Ng01, 1972Na21, and 1972Vy04. δ: unweighted average of −5.7 *3* (1971Wh01), −5.9 *6* (1970Ru09), −4.9 *+8−18* (1972Go35), −6.1 *2* (1977Gu10), −7.0 *+10−8* (1983Gi07), −7.6 *4* (1989Ki10) and −5.8 *+13−18* (1992Ak03). Others: 1969Ha36, 1969HaZJ, 1969Va09, and 1978We08.
		1004.729 *12*	100.0 *8*	123.0709	2⁺	E2+M1	−7.4 *4*	0.00276		Mult.: α(K)exp=0.00235 *10* (1968Br20,1968Ng01,1971Ri08,1972Na21, 1996SpZZ); other: 1972Vy04. δ: unweighted average of −8.5 *10* (1970Ru09), −6.6 *7* (1971La11), −7.8 *+3−2* (1977Gu10), −6.0 *+11−16* (1978We08), −7.1 *+5−4* (1983Gi07), −8.7 *4* (1989Ki10) and −7.1 *+26−30* (1992Ak03); others: 1960De16, 1969Ha36, 1969HaZJ, 1969Va09, 1971Wh01, 1972Go35, 1973Ob01, and 1982Da12.
1144.44	8⁺	426.78 *7*	100	717.662	6⁺	[E2]		0.0214		B(E2)(W.u.)=312 *17* Mult.: α(K)exp=0.017 *2* (1971Ri08,1974Go30,1972Vy04) which implies E2 character, but peak is a doublet. δ: δ(M3/E2)=−0.004 *11*, but peak is a doublet.
1182.091	0⁺	366.581 *6*	21 *5*	815.4917	2⁺	E2		0.0330		Mult.: α(K)exp=0.019 *2* (1996SpZZ) compared to α(K)(E2)=0.026.
		501.419 *8*		680.6673	0⁺	E0			1.0	Mult.: α(K)exp>1.2 (1996SpZZ).
		1059.033 *12*	100 *19*	123.0709	2⁺	E2		0.00244		Mult.: α(K)exp=0.0021 *1* (1996SpZZ).
		1182.07 *2*		0.0	0⁺	E0			0.25	Mult.: α(K)exp>0.05 (1996SpZZ).

$\gamma(^{154}Gd)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡#]	E_f	J^π_f	Mult.[@&]	δ[@a]	α[c]	Comments
1241.291	1⁻	245.07 *13*	0.37 *6*	996.2568	2⁺	[E1]		0.0267	E_γ,I_γ: From ^{154}Eu β^- decay only.
		425.777 *13*	0.65 *11*	815.4917	2⁺	[E1]		0.00681	B(E1)(W.u.)=0.0064
		560.83 *10*	0.51 *14*	680.6673	0⁺	[E1]		0.00365	B(E1)(W.u.)=0.0057
		1118.237 *16*	92 *3*	123.0709	2⁺	E1		9.28×10^{-4}	B(E1)(W.u.)=0.0485 Mult.: α(K)exp=0.0009 *1* (1996SpZZ). δ: δ(M2/E1)=0.16 *+31−18* (1977Gu10).
		1241.304 *14*	100.0 *11*	0.0	0⁺	E1		8.10×10^{-4}	B(E1)(W.u.)=0.0436 Mult.: α(K)exp=0.0007 (1996SpZZ).
1251.641	3⁻	255.80 *10*	0.9 *3*	996.2568	2⁺	[E1]		0.0239	E_γ,I_γ: From ^{154}Eu β^- decay only.
		436.20 *11*	1.05 *19*	815.4917	2⁺	[E1]		0.00644	E_γ,I_γ: From ^{154}Eu β^- decay only.
		880.640 *10*	28.0 *19*	370.9998	4⁺	E1+M2	+0.07 *3*	0.00152 *8*	I_γ: From ^{154}Eu β^- decay. Others: 31.8 *10* from ^{153}Gd(n,γ) and 19.8 *25* from ^{154}Tb ε decay (9.0 h). Mult.: α(K)exp=0.0020 *1* compared to α(K)(E1)=0.0012. δ: From −0.01 *+8−6* (1971Wh01) and +0.08 *3* (1977Gu10).
		1128.552 *7*	100.0 *11*	123.0709	2⁺	E1		9.14×10^{-4}	E_γ: From ^{154}Eu β^- decay. Mult.: α(K)exp=0.0009 (1996SpZZ). δ: δ(M2/E1)=+0.04 *3* (1977Gu10,1982Da12).
1263.778	4⁺	267.499[d] *16*	1.4[d] *3*	996.2568	2⁺	[E2]		0.0862	Mult.: α(K)exp=0.067 *23* (1996SpZZ), which implies E2.
		448.45 *19*	0.49 *7*	815.4917	2⁺	[E2]		0.0187	E_γ: From ^{154}Eu β^- decay only.
		546.083 *14*	1.68 *13*	717.662	6⁺	[E2]		0.01110	I_γ: From ^{154}Eu β^- decay. Other: 4.2 *4* from ^{153}Gd(n,γ) where γ is multiply placed. Mult.: α(K)exp=0.024 *2* (1996SpZZ) which implies E2, but γ is doubly placed.
		892.775 *6*	100.0 *8*	370.9998	4⁺	E0+M1+E2	−3.8 *3*	0.00367	E_γ: From ^{154}Eu β^- decay. Mult.: α(K)exp=0.0039 *3* (1971Ru05,1977Ya04,1996SpZZ). Others: 1972Na21 and 1972Vy04. δ: unweighted average of −4.4 *5* (1971Wh01), −3.0 *10* (1969Va09), −4.0 *+3−4* (1977Gu10), −3.8 *3* (1989Ki10). Others: 1969Ha36, 1969HaZJ, 1978We08, and 1983Gi07.
		1140.702 *6*	45.6 *6*	123.0709	2⁺	E2		0.00210	E_γ: From ^{154}Eu β^- decay. Mult.: α(K)exp=0.0020 *2* (1977Ya04,1996SpZZ). δ: δ(M3/E2)=0.05 *7* (1977Gu10).
1365.878	6⁺	318.306 *11*	40.3 *21*	1047.592	4⁺				I_γ: From Sm(α,xnγ); from ^{153}Gd(n,γ) Iγ(318)>Iγ(648) but with large uncertainty. δ: δ(O/Q)=−0.00 *7* (1978We08); γ is assumed to be E2.
		648.3 *3*	100 *5*	717.662	6⁺	E0+M1+E2	+1.30 *20*	0.045 *8*	Mult.: α(K)exp=0.039 *7* (1974Go30).

$^{154}_{64}Gd_{90}$-13

γ(^{154}Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡#]	E_f	J^π_f	Mult.[@&]	δ[@a]	α[c]	Comments
									δ: From 1978We08. Others: 3.5 +25−20 and 1.8 +3−2 quoted in 1974Go30. Additional information 5. α: Based on α(K)exp, for comparison α(M1+E2)=0.0095 5.
1365.878	6^+	994.9 3	31.2 17	370.9998	4^+				δ: δ(O/Q)=+0.04 +21−23 (1978We08); γ is assumed to be E2.
1397.515	2^-	146.01 7	0.0205 10	1251.641	3^-	[M1,E2]		0.668 21	E_γ: From ^{154}Eu β^- decay.
		156.28 8	0.0247 25	1241.291	1^-	[M1,E2]		0.54 3	E_γ: From ^{154}Eu β^- decay.
		269.65 8	0.0330 15	1127.8018	3^+	[E1]		0.0209	E_γ: From ^{154}Eu β^- decay.
		401.258 14	0.541 8	996.2568	2^+	(E1,M2,E3)		0.070 6	Mult.: α(K)exp=0.058 5 (1996SpZZ) which can be E1+M2 or E1+M2+E3. α: Based on α(K)exp.
		582.097 12	2.563 18	815.4917	2^+	E1		0.00337	Mult.: α(K)exp=0.0035 9 (1968Ng01,1996SpZZ). δ: δ(M2,E1)=0.01 4 (1983Gi07).
		1274.429 4	100.0 7	123.0709	2^+	E1+M2	+0.035 9	7.97×10^{-4}	E_γ: From ^{154}Eu β^- decay. Mult.: α(K)exp=0.000635 15 (1968Br20,1968Ng01,1971Ru05,1972Na21, 1996SpZZ). δ: unweighted average of +0.047 5 (1969Va09), +0.015 12 (1970Ru09), +0.054 10 (1972Go35), and +0.025 20 (1983Gi07). Others: 1960De16, 1964Ca12, 1989Ki10 and 1992Ak03.
1404.16	(5^-)	1033.11[e] 3	100[e]	370.9998	4^+	[E1]		1.07×10^{-3}	Mult.: α(K)exp=0.0050 (1972Vy04), but γ is multiply placed. δ: δ(Q/D)=0.012 +33−12 (1982Da12); γ is assumed to be E1.
1414.426	1^-	598.96 4	3.5 2	815.4917	2^+	[E1]		0.00317	I_γ: From 1996SpZZ (n,γ). In ^{154}Eu β^- decay, Iγ=1.6 7.
		1291.332 17	100 4	123.0709	2^+	E1		7.82×10^{-4}	I_γ: From 1996SpZZ (n,γ). In ^{154}Eu β^- decay, Iγ=100 35. Mult.: α(K)exp=0.0006 1 (1975So03,1996SpZZ).
		1414.50 5	28 3	0.0	0^+	E1		7.54×10^{-4}	I_γ: From 1996SpZZ (n,γ). In ^{154}Eu β^- decay, Iγ=24 9. Mult.: α(K)exp=0.0004 1 (1996SpZZ).
1418.160	2^+	166.520 3	1.7 2	1251.641	3^-	[E1]		0.0739	
		176.868 3	1.1 2	1241.291	1^-	[E1]		0.0629	
		236.064 3	2.8 5	1182.091	0^+	[E2]		0.1287	
		290.365 6	2.8 1	1127.8018	3^+	[E2+M1]		0.085 19	
		370.568 19	6.88 23	1047.592	4^+	E2		0.0320	Mult.: α(K)exp=0.025 5 (1996SpZZ).
		421.893 13	2.2 16	996.2568	2^+	E0+(E2,M1)		0.135 19	Mult.: α(K)exp=0.114 16 (1996SpZZ). α: Based on α(K)exp. For comparison α(M1,E2)=0.031.
		602.688 9	47.7 17	815.4917	2^+	E0,E2,M1		0.038 8	I_γ: From ^{154}Eu β^- decay). Others: 45.0 9 from

$^{154}_{64}Gd_{90}$-14

$\gamma(^{154}$Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡#]	E_f	J^π_f	Mult.[@&]	δ[@a]	α[c]	Comments
									(n,γ) and 27 *4* from ^{154}Tb ε decay (21.5 h). Mult.: α(K)exp=0.033 *8* (1977Ya04,1996SpZZ). Additional information 6. α: Based on α(K)exp. For comparison, α(E2,M1)=0.012 *4*.
1418.160	2^+	737.49 *14*	3.7 *3*	680.6673	0^+	[E2]		0.00536	
		1047.181 *13*	100.0 *23*	370.9998	4^+	E2		0.00250	Mult.: α(K)exp=0.0022 *2* (1996SpZZ).
		1295.08 *13*	18.9 *10*	123.0709	2^+	E2		0.00165	Mult.: α(K)exp≈0.009 (1996SpZZ), but γ is multiply placed.
		1417.89 *11*	13.6 *17*	0.0	0^+	E2		0.00141	Mult.: α(K)exp=0.0011 *2* (1996SpZZ).
1432.588	5^+	168.810 *4*	≤5.0[b]	1263.778	4^+				Mult.: α(K)exp=0.30 *6* (1996SpZZ) which implies M1,E2, but γ is doubly placed. γ not reported in ^{154}Eu β^- decay.
		304.75 *15*		1127.8018	3^+				E_γ: from (α,2nγ). γ not reported in ^{154}Eu β^- decay.
		714.94 *5*	25.5 *20*	717.662	6^+	E2,M1		0.0080 *23*	I_γ: from ^{154}Eu, β^- decay. Others: 19 *5* from ^{154}Tb ε decay (22.7 h); 35 *2*, from Sm(α,xnγ); and>18 from ^{153}Gd(n,γ). Mult.: α(K)exp=0.0054 *16* (1996SpZZ).
		1061.39 *9*	100 *3*	370.9998	4^+	E2+M1	−4.3 *+12−26*	0.00251 *8*	Mult.: α(K)exp=0.0029 (1972Vy04). δ: from 1978We08.
1531.305	2^+	267.499[d] *16*	1.58[d] *4*	1263.778	4^+	[E2]		0.0862	Mult.: α(K)exp=0.067 *23* (1996SpZZ) which implies E2.
		279.640 *15*	1.32 *4*	1251.641	3^-	[E1]		0.0190	
		289.99 *22*	0.59 *3*	1241.291	1^-	[E1]		0.01735	E_γ: From ^{154}Eu β^- decay.
		349.24 *7*	2.96 *22*	1182.091	0^+	[E2]		0.0381	E_γ: From ^{154}Eu β^- decay.
		403.506 *5*	9.2 *7*	1127.8018	3^+	[M1,E2]		0.034 *10*	
		483.68 *2*	3.86 *7*	1047.592	4^+	[E2]		0.01523	I_γ: Other: 6.6 *10* from ^{153}Gd(n,γ).
		535.050 *11*	7.0 *3*	996.2568	2^+	[E0+M1+E2]		0.016 *5*	I_γ: from ^{154}Eu β^- decay. Other: 21.5 *9* from ^{153}Gd(n,γ), where most of the intensity must be from another level. Mult.: α(K)exp=0.093 *11* (1996SpZZ) which implies E0,M1,E2, but this is for another placement.
		715.819 *9*	76.9 *22*	815.4917	2^+	E0,M1,E2		0.013 *4*	Mult.: α(K)exp=0.011 *4* (1971Ru05,1972Vy04). α: Based on α(K)exp, for comparison, α(M1,E2)=0.0080 *23*.
		850.64 *3*	100.0 *9*	680.6673	0^+	E2		0.00389	Mult.: α(K)exp=0.0036 *2* (1996SpZZ).
		1160.5 *3*	19.0 *2*	370.9998	4^+	[E2]		0.00203	δ: δ(O/Q)=0.00 *8* or +0.26 *+24−15* (1977Gu10); γ is assumed to be E2.
		1408.2 *2*	10.2 *4*	123.0709	2^+	E0,M1,E2		0.0037 *14*	I_γ: From ^{154}Eu β^- decay. Other: 30 *12* from ^{153}Gd(n,γ). Mult.: α(K)exp=0.0032 *12* (1996SpZZ). α: Based on α(K)exp, for comparison α(M1,E2)=0.0018 *4*.

Adopted Levels, Gammas (continued)

$\gamma(^{154}Gd)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡#]	E_f	J^π_f	Mult.[@&]	δ[@a]	α[c]	$I_{(\gamma+ce)}$	Comments
1531.305	2^+	1531.6 *3*	2.64 *9*	0.0	0^+	[E2]		1.26×10^{-3}		I_γ: Other: 11.6 *27* from ^{153}Gd(n,γ).
1559.92	(4^-)	295.7	0.40 *8*	1263.778	4^+	[E1]		0.01652		
		307.7 *3*	0.44 *11*	1251.641	3^-	[E2+M1]		0.073 *17*		
		511.60 *8*	3.6 *3*	1047.592	4^+	[E1]		0.00448		
		1188.90 *12*	100.0 *7*	370.9998	4^+					δ: δ(Q/D)=−0.18 *+15−18* (1971Wh01,1977Gu10), 0.20 *20* (1992Ak03); γ is assumed to be E1.
1573.974	0^+	332.692 *8*	56.8 *21*	1241.291	1^-					
		391.85 *4*		1182.091	0^+	E0			0.5	Mult.: α(K)exp>0.10 (1996SpZZ).
		577.704 *12*	85.3 *16*	996.2568	2^+					
		758.462 *14*	100 *5*	815.4917	2^+					
		1451.7[d] *5*	27[d] *8*	123.0709	2^+					
		1574.04 *5*		0.0	0^+	E0			0.5	Mult.: α(K)exp>0.01 (1996SpZZ).
1606.55	6^+	343.0 *2*		1263.778	4^+					
		888.69 *13*	100 *15*	717.662	6^+	E2+M1	>1.8	0.0038 *3*		Mult.: α(K)exp=0.0033 *2* (1977Ya04). δ: <−1.8 or>+7 (1978We08).
		1235.11 *19*	43 *6*	370.9998	4^+					
1617.125	3^-	199.20 *8*	0.118 *16*	1418.160	2^+	[E1]		0.0459		
		203.40 *29*	0.061 *8*	1414.426	1^-	[E2]		0.210		
		213.06 *11*	0.049 *8*	1404.16	(5^-)	[E2]		0.180		
		218.71 *26*	0.094 *16*	1397.515	2^-	[M1,E2]		0.19 *3*		
		352.85 *20*	0.154 *16*	1263.778	4^+	[E1]		0.01066		
		365.47 *15*	0.118 *16*	1251.641	3^-	[E2+M1]		0.045 *12*		
		569.50 *7*	1.6 *2*	1047.592	4^+	[E1]		0.00353		
		621.6 *5*	0.49 *20*	996.2568	2^+	[E1]		0.00293		
		801.69 *11*	0.72 *7*	815.4917	2^+	[E1]		1.74×10^{-3}		
		1246.121 *4*	100.0 *10*	370.9998	4^+	E1		8.07×10^{-4}		Mult.: α(K)exp=0.0006 (1996SpZZ). δ: δ(M2/E1)=0.00 *2* (1971Wh01,1977Gu10,1983Gi07,1989Ki10). Others: 1969Ha36 and 1969HaZJ.
		1494.048 *4*	81.55 *7*	123.0709	2^+	E1		7.56×10^{-4}		I_γ: Other: 99 *7* from ^{153}Gd(n,γ). Mult.: α(K)exp=0.0004 *1* (1996SpZZ).
1637.05	10^+	492.6 *1*	100	1144.44	8^+	E2		0.01451		B(E2)(W.u.)=3.6×10^2 *4* Mult.: α(K)exp=0.0124 *21* (1974Go30). δ: δ(M3/E2)=0.00 *22* (1978We08).
1645.814	4^+	241.20 *9*	1.4 *2*	1404.16	(5^-)	[E1]		0.0278		E_γ: From ^{154}Eu β^- decay. I_γ: from ^{154}Eu β^- decay. In (n,γ) Iγ=8.1 *11*, but peak is a doublet.
		382.025 *7*	10.8 *4*	1263.778	4^+	E2+M1		0.040 *11*		I_γ: from ^{154}Eu β^- decay. From ^{153}Gd(n,γ), Iγ=10.9 *16*. Other: 9.5 *7*, from ^{154}Tb ε decay (9.0 h). Mult.: α(K)exp=0.029 *4* (1971Ri08,1996SpZZ).
		518.012 *16*	57.0 *16*	1127.8018	3^+	E2+M1	−7 *3*	0.0129 *5*		Mult.: α(K)exp=0.0113 *9* (1971Ri08,1972Vy04). δ: From 1978We08.

$^{154}_{64}Gd_{90}$-16

$\gamma(^{154}Gd)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡#]	E_f	J^π_f	Mult.[@&]	δ[@a]	α[c]	$I_{(\gamma+ce)}$	Comments
1645.814	4+	598.22 *2*	12.0 *16*	1047.592	4+	M1+E2	0.65 *20*	0.0139 *10*		Mult.: α(K)exp=0.0123 *4* (1977Ya04). Others: 1971Ri08, 1972Vy04, and 1996SpZZ.
		649.565 *11*	100.0 *20*	996.2568	2+	E2		0.00722		Mult.: α(K)exp=0.0061 *5* (1971Ri08,1996SpZZ). Other: 1972Vy04.
		830.49 *9*	7.1 *6*	815.4917	2+	[E2]		0.00410		Mult.: α(K)exp=0.0041 (1972Vy04); Jπ's require E2.
		928.21 *8*	3.4 *2*	717.662	6+	[E2]		0.00322		E_γ: from ^{154}Eu β^- decay.
		1275.66 *12*	2 *2*	370.9998	4+	[E2+M1]		0.0021 *5*		E_γ: from ^{154}Eu β^- decay.
		1522.8	1.0 *2*	123.0709	2+	[E2]		0.00127		E_γ: From ^{154}Tb ε decay (9.4 h). From ^{154}Eu β^- decay, Eγ=1522.19 *16*, but this leads to a poor energy fit. I_γ: From ^{154}Tb ε decay, Iγ=3.0 *14*.
1650.34	0+	834.88 *5*	17 *5*	815.4917	2+					
		969.67 *9*		680.6673	0+	E0			0.7	Mult.: α(K)exp>0.027 (1996SpZZ).
		1527.1 *3*	100 *4*	123.0709	2+					Mult.: α(K)exp=0.0007 *2* (1996SpZZ), which implies E1 or E2: Jπ's require E2.
		1650.31 *4*		0.0	0+	E0			0.3	Mult.: α(K)exp>0.01 (1996SpZZ).
1660.903	3+	129.60 *13*	0.28 *4*	1531.305	2+	[M1,E2]		0.975 *20*		E_γ: From ^{154}Eu β^- decay.
		228.23 *9*	0.36 *2*	1432.588	5+	[E2]		0.1436		E_γ: From ^{154}Eu β^- decay.
		242.86 *6*	0.72 *6*	1418.160	2+	[E2+M1]		0.14 *3*		E_γ: From ^{154}Eu β^- decay.
		263.50 *16*	0.18 *2*	1397.515	2−	[E1]		0.0221		E_γ: From ^{154}Eu β^- decay.
		397.07 *7*	4.86 *11*	1263.778	4+	[M1,E2]		0.036 *10*		E_γ: From ^{154}Eu β^- decay.
		409.19 *8*	0.9 *3*	1251.641	3−	[E1]		0.00748		E_γ: From ^{154}Eu β^- decay.
		533.03 *8*	3.25 *18*	1127.8018	3+	[E0+M1+E2]		0.017 *5*		E_γ: From ^{154}Eu β^- decay. Mult.: α(K)exp=0.167 *22* in (n,γ) (1996SpZZ) and>1.4 in decay (1968Br20), both of which imply an E0 component, but note that in those studies, there are two closely spaced "533" γ's. Others: 1969An01 and 1972Na21.
		613.289 *10*	16.40 *18*	1047.592	4+	E2,M1		0.012 *4*		Mult.: α(K)exp=0.008 *1* (1996SpZZ).
		664.68 *5*	4.60 *18*	996.2568	2+	[M1,E2]		0.010 *3*		
		845.416 *7*	100.0 *18*	815.4917	2+	E2		0.00395		E_γ: From ^{154}Eu β^- decay. Mult.: α(K)exp=0.0032 *1* (1996SpZZ).
		1289.88 *11*	3.70 *13*	370.9998	4+	[M1,E2]		0.0021 *5*		E_γ: From ^{154}Eu β^- decay.
		1537.82 *3*	10.12 *18*	123.0709	2+	[M1,E2]		0.0015 *3*		I_γ: From ^{154}Eu β^- decay. Other: 17.5 *18* from ^{153}Gd(n,γ).
1674.1	(7−)	956.4	100	717.662	6+					δ: δ(Q/D)=−0.04 +*8*−*5* (1978We08); γ assumed to be E1.
1701.39	4+	283.0 *2*	17	1418.160	2+	[E2]		0.0722		
		573.5 *2*	12	1127.8018	3+					
		653.7 *2*	100	1047.592	4+					
		705.1 *2*	<2.2	996.2568	2+	[E2]		0.00595		
		885.8 *2*	8.9	815.4917	2+	[E2]		0.00356		

$^{154}_{64}Gd_{90}$-17

Adopted Levels, Gammas (continued)

γ(^{154}Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡#]	E_f	J^π_f	Mult.[@&]	δ[@a]	α[c]	Comments
1701.39	4^+	983.7 *2*	92	717.662	6^+				
		1330.3 *2*	75	370.9998	4^+				
		1578.2 *2*	9.2	123.0709	2^+	[E2]		1.22×10^{-3}	
1716.050	2^+	464.391 *13*	22.5 *17*	1251.641	3^-				
		474.753 *13*	31.8 *25*	1241.291	1^-				
		588.254 *7*	73 *3*	1127.8018	3^+	E2		0.00920	Mult.: α(K)exp=0.008 *1* (1996SpZZ).
		719.80 *3*	45 *6*	996.2568	2^+				
		1345.0 *5*	100 *25*	370.9998	4^+				
		1593.4[d] *5*	75[d] *33*	123.0709	2^+				
		1715.7 *6*	60 *22*	0.0	0^+				I_γ: Reported Iγ=63 *22* divided by evaluators, based on calculation of Iγ(1716.9) from 1838 level in (n,γ) from ^{154}Eu β^- decay data for 1838 level.
1719.5593	2^-	58.4	0.019 *2*	1660.903	3^+				E_γ: From ^{154}Eu β^- decay.
		188.254 *4*	1.196 *9*	1531.305	2^+				
		301.38 *7*	0.0616 *17*	1418.160	2^+	[E1]		0.01575	E_γ: From ^{154}Eu β^- decay.
		305.14	0.1021 *19*	1414.426	1^-	[M1,E2]		0.074 *18*	
		322.01 *5*	0.309 *3*	1397.515	2^-	[M1,E2]		0.064 *16*	
		467.84 *5*	0.312 *4*	1251.641	3^-	[M1,E2]		0.023 *7*	
		478.27 *4*	1.122 *9*	1241.291	1^-	E2		0.01570	Mult.: α(K)exp=0.0124 *21* (1971Ri08,1972Na21).
		591.755 *3*	24.67 *17*	1127.8018	3^+	E1(+M2)	+0.02 *3*	0.00327 *11*	E_γ: From ^{154}Eu β^- decay. Mult.: α(K)exp=0.0030 *5* (1968Br20,1972Na21) or 0.062 *11* (1968Ng01,1996SpZZ); the δ value agrees with the smaller value. δ: unweighted average of +0.10 *10* (1972Go35), +0.06 *3* (1977Gu10), +0.02 *3* and −0.10 *8* (1983Gi07) and 0.01 *7* (1992Ak03). Other: 1973Ob01.
		723.3014 *22*	100.0 *7*	996.2568	2^+	E1+M2	+0.022 *13*	0.00215 *4*	E_γ: From ^{154}Eu β^- decay. Mult.: α(K)exp=0.0019 *1* (1968Br20,1968Ng01,1971Ru05,1972Na21, 1972Vy04,1996SpZZ). δ: unweighted average of +0.040 *11* (1969Va09), +0.015 *15* (1970Ru09), −0.04 *4* (1972Go35), +0.04 *+2−4* (1973Ob01), +0.05 *4* (1977Gu10), +0.05 *4* (1983Gi07), and 0.00 *4* (1983Le19). Other: 1960De16.
		904.064 *3*	4.43 *3*	815.4917	2^+	E1(+M2)		0.008 *7*	E_γ: From ^{154}Eu β^- decay. Mult.: α(K)exp=0.0013 *5* (1972Na21). δ: δ(M2/E1)=0.07 *17* (1983Gi07), 0.18 *15* (1992Ak03), both from ^{154}Eu β^- decay. α: value for a pure E1 transition.
		1596.4804 *28*	8.96 *10*	123.0709	2^+	E1(+M2)		0.0021 *14*	E_γ: From ^{154}Eu β^- decay.

Adopted Levels, Gammas (continued)

γ(^{154}Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡#]	E_f	J^π_f	Mult.[@&]	δ[@a]	α[c]	Comments
									I_γ: From ^{154}Eu β^- decay. Other: 22.8 18 from ^{153}Gd(n,γ). Mult.: α(K)exp=0.00037 10 (1972Na21). δ: δ(M2/E1)=0.000 10 (1977Gu10,1983Gi07,1989Ki10), 0.20 7 (1992Ak03), both from ^{154}Eu β^- decay. Others: 1960De16, 1971Wh01, and 1972Go35. α: value for a pure E1 transition.
1756.46	8^+	390.6 1	100 5	1365.878	6^+				δ: δ(O/Q)=0.00 5 (1978We08); γ is assumed to be E2.
		612.1 2	33.0 20	1144.44	8^+	E0+M1+E2	−0.69 14	0.061 8	Mult.: α(K)exp=0.053 7 (1974Go30). δ: From −0.69 +12−14 (1978We08). Others: 1.0 +7−6 and 1.2 +4−3 quoted in 1974Go30. Additional information 7. α: Based on α(K)exp, compared to α(M1+E2)=0.0130 7.
		1038.9 5	74 4	717.662	6^+				I_γ: From Sm(α,xnγ). Other: 9.8 from ^{150}Nd(^{9}Be,5nγ). δ: δ(O/Q)=+0.06 +15−13 (1978We08); γ is assumed to be E2.
1770.187	5^+	124.371 3	21 1	1645.814	4^+				
		337.35 9	35 10	1432.588	5^+	(E0+M1+E2)		0.12	E_γ: From 1994Wu01 (α,2nγ). Mult.: α(K)exp=0.10 (1972Vy04). δ: δ(E2/M1)=−0.004 (1978We08). Additional information 8. α: Based on α(K)exp, compared to α(M1,E2)=0.056 14.
		404.321 9	29[b] 3	1365.878	6^+				I_γ: Reported only in ^{153}Gd(n,γ).
		506.44 4	93 12	1263.778	4^+	E2		0.01349	I_γ: From ^{154}Tb ε decay (9.0 h and 22.7 h). Others: 21 5 from ^{153}Gd(n,γ), 139 22 from ^{154}Eu β^- decay and 68 10 from (α,2nγ). Mult.: α(K)exp=0.0100 11 (1971Ri08,1972Vy04).
		642.40 2	100 7	1127.8018	3^+	M1,E2		0.010 3	Mult.: α(K)exp=0.0086 8 (1996SpZZ). Other: 0.0054 (1972Vy04).
		722.59 8	26 8	1047.592	4^+				I_γ: From ^{153}Gd(n,γ) and ^{154}Tb ε decay (22.7 h). Others: 54 14 from ^{154}Tb ε decay (9.0 h) and not observed in ^{154}Eu β^- decay.
		774.4	185	996.2568	2^+				I_γ: Reported as strongest γ from level in ^{154}Eu β^- decay, but not reported in other studies, so assignment is doubtful.
		1399.7[d] 3	11[d] 3	370.9998	4^+				I_γ: From ^{154}Tb ε decay (9.0 h and 22.7 h). Others: 109 10 from ^{153}Gd(n,γ) and 70 13 from ^{154}Eu β^- decay.
1775.429	2^+	647.7 2	3.0 12	1127.8018	3^+				I_γ: In (n,γ) this placed from this level and 1912 level.
		727.821 16	15.2[b] 8	1047.592	4^+				
		960.05 9	9 3	815.4917	2^+				
		1094.91 8	21 4	680.6673	0^+	E2		0.00228	Mult.: α(K)exp=0.0018 7 (1996SpZZ).
		1404.6[d] 3	40[d] 4	370.9998	4^+				Mult.: α(K)exp=0.0017 3 (1996SpZZ), but γ is doubly placed.
		1652.36 3	100 11	123.0709	2^+	E0,E2,M1			Mult.: α(K)exp=0.0021 3 (1996SpZZ). α(M1,E2)=0.00136.
		1775.7 3	46 3	0.0	0^+				

$\gamma(^{154}Gd)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡#]	E_f	J^π_f	Mult.[@&]	δ[@a]	α[c]	Comments
1789.17	(4+)	740.91 *16*	19 *4*	1047.592	4+	[E0+M1+E2]		0.0074 *21*	α: Value does not include contribution for an E0 component.
		1071.17 *24*	4.6 *6*	717.662	6+	[E2]		0.00239	
		1417.88 *9*	100 *6*	370.9998	4+	[M1,E2]		0.0017 *4*	
		1665.83 *12*	38 *2*	123.0709	2+	[E2]		1.14×10^{-3}	
1796.960	3−	378.90 *27*	1.8 *3*	1418.160	2+	[E1]		0.00898	E_γ: From ^{154}Eu β^- decay.
		382.46 *27*	1.0 *3*	1414.426	1−	[E2]		0.0292	E_γ: From ^{154}Eu β^- decay.
		533.11 *7*	38.4 *23*	1263.778	4+				E_γ: From ^{154}Eu β^- decay. Mult.: α(K)exp=0.167 *22* in (n,γ) (1996SpZZ) and>1.4 in decay (1968Br20), both of which imply an E0 component, but note that in those studies, there are two closely spaced “533” γ′s. Others: 1969An01 and 1972Na21.
		545.20 *14*	6.4 *8*	1251.641	3−	[E2+M1]		0.016 *5*	E_γ: From ^{154}Eu β^- decay.
		669.154 *16*	75 *4*	1127.8018	3+	E1		0.00251	I_γ: From ^{154}Eu β^- decay. Others: 120 *40* from ^{154}Tb ε decay (9.0 h) and 82 *4* from ^{153}Gd(n,γ). Mult.: α(K)exp=0.0021 *7* (1996SpZZ).
		749.48 *9*	35.2 *21*	1047.592	4+	[E1]		0.00199	E_γ: From ^{154}Eu β^- decay.
		800.731 *15*	100 *5*	996.2568	2+	E1		0.00174	Mult.: α(K)exp=0.0018 *2* (1996SpZZ).
		981.59 *6*	41 *7*	815.4917	2+				I_γ: From ^{154}Eu β^- decay. Other: 62 *10* from ^{153}Gd(n,γ).
		1426.03 *27*	2.0 *3*	370.9998	4+				E_γ: From ^{154}Eu β^- decay. I_γ: From ^{154}Eu β^- decay. Other: 44 *4* from ^{153}Gd(n,γ).
		1673.93 *8*	9.5 *5*	123.0709	2+				E_γ: From ^{154}Eu β^- decay. I_γ: From ^{154}Eu β^- decay. Other: 560 *41* from ^{154}Tb ε decay (9.0 h).
1810.21	7+	378.4 *2*	25.9 *14*	1432.588	5+				δ: δ(O/Q)=−0.03 *+5−4* (1978We08); γ is assumed to be E2.
		665.86 *14*	22.6 *12*	1144.44	8+				δ: δ=−3.2 *+7−10* (1978We08); γ is assumed to be M1+E2.
		1092.46 *6*	100 *5*	717.662	6+				δ: δ=−2.7 *+5−6* (1978We08); γ is assumed to be M1+E2.
1836.61	0+	595.070[f] *13*	74.2 *16*	1241.291	1−	E1		0.00321	Mult.: α(K)exp=0.003 (1996SpZZ).
		1155.75[f] *7*		680.6673	0+	E0			Mult.: α(K)exp>0.008 (1996SpZZ).
		1713.4 *3*	100 *4*	123.0709	2+				
		1836.8 *3*	40 *13*	0.0	0+				
1900.34	(2+)	63.732[d] *2*	4.3[d] *14*	1836.61	0+				
		1529.6 *3*	100 *9*	370.9998	4+	E2		0.00127	Mult.: α(K)exp=0.0009 *2* (1996SpZZ).
1911.544	6+	141.33 *3*	100 *5*	1770.187	5+	E2+M1	7 *+6−3*	0.729	Mult.: α(K)exp=0.95 *11* (1975So03), 0.73 (1972Vy04), and<0.52 *7* (1996SpZZ). δ: From 1978We08 (α,2nγ).

$^{154}_{64}Gd_{90}$-20

$\gamma(^{154}$Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡#]	E_f	J^π_f	Mult.[@&]	α[c]	Comments
1911.544	6^+	265.83 6	54 5	1645.814	4^+			I_γ: From ^{154}Tb ε decay (22.7 h). Other: 40 4 from (α,xnγ).
		304.75 12	19.5 5	1606.55	6^+	E2	0.0574	I_γ: From ^{154}Tb ε decay (22.7 h). Other: 39 4 from (α,2nγ). Mult.: α(K)exp=0.042 6 (1975So03).
		479.18 11	52 5	1432.588	5^+			I_γ: From ^{154}Tb ε decay (22.7 h). Other: 46 7 from (α,2nγ).
		545.7	8 3	1365.878	6^+			
		647.57 23	71 6	1263.778	4^+			E_γ,I_γ: From 1994Wu01 (α,2nγ). This γ is not reported in the ε decay of 22.7 h ^{154}Tb, where, based on relative-intensity considerations, it should have been observed. In (n,γ) γ of 647.7 2 placed here and 1775 level.
		1193.34 24	41 6	717.662	6^+			I_γ: From ^{154}Tb ε decay (22.7 h). Other: 33 5 from (α,2nγ).
		1541.2 4	5.7	370.9998	4^+			
1912.08	(0,1,2)	1096.62 17	14 3	815.4917	2^+			
		1788.9 3	100 2	123.0709	2^+			
1943.95	$(1,2^+)$	761.86 3	301[b] 15	1182.091	0^+			Mult.: α(K)exp=0.0024 2 (1996SpZZ), but γ is doubly placed.
		1820.3 6	100 20	123.0709	2^+			
1948.559	(5^-)	151.614 10	5 1	1796.960	3^-			
		331.47 2	12 2	1617.125	3^-			
		696.82 3	27 3	1251.641	3^-			
		1577.7 3	100 8	370.9998	4^+			
1964.05	$(2)^+$	127.439 4	1.00 17	1836.61	0^+	(E2,E1)	1.04 2	Mult.: α(K)exp<0.45 13 (1996SpZZ).
		1592.8 2	100 15	370.9998	4^+	M1,E2	0.00143 23	Mult.: α(K)exp=0.0012 2 (1996SpZZ).
		1840.8 3	53.3 17	123.0709	2^+			
		1964.7 4	33 5	0.0	0^+			
1973.07	2^+	1602.06 19	100 6	370.9998	4^+			
		1849.8 7	29 11	123.0709	2^+			
		1973.1[d] 4	19[d] 3	0.0	0^+			
2023.82	$1,2^+$	1900.72 11		123.0709	2^+			
		2024.4 6		0.0	0^+			I_γ: Values disagree; Iγ(1900)/Iγ(2024)=10 3 from ^{153}Gd(n,γ) and 0.35 17 from ^{154}Tb ε decay (9.0 h).
2040.5	(9^-)	896.0 3	100	1144.44	8^+			
2041.07	$(1,2)^+$	1044.90 12	77 11	996.2568	2^+	M1	0.00412	Mult.: α(K)exp=0.0051 8 (1996SpZZ).
		1917.4 3	100 7	123.0709	2^+			
		2041.1[d] 3	140[d] 8	0.0	0^+			
2073.30	(7^+)	161.78 4	100 14	1911.544	6^+			
		303.22 9	62 11	1770.187	5^+			
2080.230	4^+	364.32 6	3.2 9	1716.050	2^+			
		419.28 3	9 5	1660.903	3^+	(M1)	0.0397	Mult.: α(K)exp=0.065 33 (1996SpZZ).
		434.42 4	6.9 23	1645.814	4^+			
		952.39 4	100 7	1127.8018	3^+	M1,E2	0.0041 11	Mult.: α(K)exp=0.0037 4 (1996SpZZ).
		1084.29[d] 12	75[d] 11	996.2568	2^+			
		1363.1[d] 3	71[d] 6	717.662	6^+			
		1709.7[d] 4	47[d] 7	370.9998	4^+			

$^{154}_{64}$Gd$_{90}$-21

$\gamma(^{154}$Gd) (continued)

E_i(level)	J_i^π	E_γ [†]	I_γ [‡#]	E_f	J_f^π	Mult. [@&]	δ [@a]	α [c]	Comments
2080.791	3^-	132.235 *4*	11 *2*	1948.559	(5^-)				
		463.80 *4*	21 *5*	1617.125	3^-				
		520.76 *3*	41 *5*	1559.92	(4^-)				
		683.13 *4*	100 *7*	1397.515	2^-	M1		0.01156	Mult.: α(K)exp=0.0126 *21* (1996SpZZ).
		817.05 *7*	$\leq$93	1263.778	4^+				I_γ: Value represents an upper limit, since the peak contains α contribution from a transition in ^{153}Gd.
		1033.11[e] *3*	45×10^{1}[e] *10*	1047.592	4^+				I_γ: Division for doubly placed γ in (n,γ) based on evaluators′ estimate of limit for Iγ(1033)/Iγ(683) in ^{154}Tb ε decay (9.4 h).
		1084.29[d] *12*	289[d] *43*	996.2568	2^+				
		1399.7[d] *3*	188[d] *16*	680.6673	0^+				
		1709.7[d] *4*	182[d] *27*	370.9998	4^+				
2101.6	(1,2)	2101.6 *3*	100	0.0	0^+				
2113.74	2^+	872.46 *5*	73 *9*	1241.291	1^-				
		986.21 *16*	14 *4*	1127.8018	3^+				
		1432.9[d] *4*	38[d] *11*	680.6673	0^+				
		1742.7 *3*	24.8 *20*	370.9998	4^+				
		1990.4 *2*	100.0 *20*	123.0709	2^+				
		2114.0 *5*	16 *3*	0.0	0^+				
2116.9		205.4	100	1911.544	6^+				
2119.55	$1^+,2^+$	587.8 *5*	5.8 *6*	1531.305	2^+				
		701.2 *6*	6.4 *7*	1418.160	2^+	M1		0.01083	Mult.: α(K)exp=0.011 *4* (1977Ya04).
		704.90 *11*	62 *4*	1414.426	1^-	E1		0.00225	Mult.: α(K)exp=0.00195 *20* (1977Ya04).
		722.12 *8*	100 *6*	1397.515	2^-				
		878.3 *2*	36.6 *22*	1241.291	1^-				
		1123.09[d] *16*	74[d] *5*	996.2568	2^+	E2,M1		0.0028 *7*	I_γ: From ^{154}Tb ε decay (21.5 h). Other: 152 *24* from ^{153}Gd(n,γ). Mult.: α(K)exp=0.0020 *7* (1975So03,1996SpZZ).
		1996.61 *9*	97 *6*	123.0709	2^+	E2+M1		0.00112 *13*	I_γ: From ^{154}Tb ε decay (21.5 h). Other: 248 *72* from ^{153}Gd(n,γ). Mult.: α(K)exp=0.00061 *25* (1975So03).
		2119.68 *15*	55 *4*	0.0	0^+	M1,E2		0.00109 *11*	Mult.: α(K)exp=0.00077 *31* (1975So03) which implies M1,E2; J^π′s require M1.
2137.48	7^-	225.94 *3*	100 *5*	1911.544	6^+	E1		0.0329	B(E1)(W.u.)=1.30×10^{-7} Mult.: α(K)exp=0.0241 *25* (1971Ri08). δ: δ(M2/E1)=+0.024 *48* (1978We08).
		992.92 *12*	78 *5*	1144.44	8^+	E1(+M2)	−0.16 *+16−23*	0.00116	B(E1)(W.u.)=1.16×10^{-9} I_γ: From Sm(α,xnγ). Other: 61 *5* from ^{154}Tb ε decay (22.7 h). Mult.: α(K)exp<0.00092 (1971Ri08). Other: 0.0063 (1972Vy04). δ: from 1978We08 (α,2nγ).

$^{154}_{64}$Gd$_{90}$-22

γ(^{154}Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡#]	E_f	J^π_f	Mult.[@&]	δ[@a]	α[c]	Comments
2137.48	7$^-$	1419.81 *8*	50 *3*	717.662	6$^+$	E1		7.54×10^{-4}	B(E1)(W.u.)=2.61×10^{-10} I$_\gamma$: From Sm(α,xnγ). Other: 172 *11* from ^{154}Tb ε decay (22.7 h). Mult.: α(K)exp=0.00059 *13* (1971Ri08).
2148.81	(1,2)$^+$	730.71 *6*	8 *3*	1418.160	2$^+$	M1,E2		0.0076 *22*	Mult.: α(K)exp=0.0053 *23* (1996SpZZ).
		1332.4 *3*	44 *6*	815.4917	2$^+$				
		2025.1 *4*	74 *25*	123.0709	2$^+$				
		2148.6 *3*	100 *6*	0.0	0$^+$				
2176.03	(1$^+$)	62.2937 *18*	14 *3*	2113.74	2$^+$	M1+E2	1.1 *4*	12.0 *17*	Mult.: α(L3)exp=2.4 *8* (1996SpZZ). δ: From α(L3)exp by evaluators.
		1359.9 *2*	109[b] *12*	815.4917	2$^+$	(M1)		0.00225	Mult.: α(K)exp=0.0020 *5* (1996SpZZ), but γ is doubly placed.
		1496.6 *6*	100 *33*	680.6673	0$^+$				
		2176.2[d] *2*	567[d] *78*	0.0	0$^+$				
2183.19	8$^{(-)}$	451.5 *5*		1731.7	(7$^-$)				
		1039.0 *4*		1144.44	8$^+$				
2184.69	12$^+$	547.6 *1*	100	1637.05	10$^+$				Mult.: α(K)exp=0.0091 *16* (1974Go30).
2185.869	4$^-$	105.071[d] *8*	21[d] *4*	2080.791	3$^-$				
		415.85 *6*	10.8 *7*	1770.187	5$^+$	E1		0.00720	Mult.: α(K)exp=0.0064 *8* (1971Ri08). δ: δ(M2/E1)=−0.061 +*12*−*13* (1981Fe01).
		484.74 *21*	0.8 *1*	1701.39	4$^+$	[E1]		0.00505	
		540.18 *6*	100 *5*	1645.814	4$^+$	E1		0.00397	Mult.: α(K)exp=0.0039 *3* (1971Ri08). Other: 0.034 (1972Vy04).
		753.1 *9*	1.2 *6*	1432.588	5$^+$				
		922.1[d] *9*	2.0[d] *6*	1263.778	4$^+$				δ: δ(M2/E1)=−0.02 *17* (1981Fe01) which assumes γ is E1.
		1058.34 *18*	1.4 *2*	1127.8018	3$^+$				
		1814.9 *3*	0.7 *2*	370.9998	4$^+$				
2187.01	1$^+$	945.8[e] *4*	3.6[e] *9*	1241.291	1$^-$				I$_\gamma$: Evaluators' division of doublet with Iγ=4.1 *4*, based on failure to report 945 γ from 2342 level in (n,γ).
		1191.2[d] *8*	9[d] *3*	996.2568	2$^+$				
		1371.6 *5*	7.8 *21*	815.4917	2$^+$				
		1506.4 *4*	25 *3*	680.6673	0$^+$				Mult.: α(K)exp=0.0007 *3* (1996SpZZ) which is interpreted as E1 or E2; this conflict with J$^\pi$ assignments.
		2064.11 *10*	72 *4*	123.0709	2$^+$	M1,E2		0.00111 *12*	Mult.: α(K)exp=0.00064 *26* (1975So03).
		2187.10 *16*	100 *6*	0.0	0$^+$	E2,M1		0.00108 *10*	Mult.: α(K)exp=0.00050 *21* (1975So03) which implies E2+M1, but J$^\pi$'s require pure M1.
2194.13	10$^+$	437.7 *1*	100 *5*	1756.46	8$^+$				Mult.: α(K)exp=0.022 (1974Go30) which is interpreted as (E2), but γ is doubly placed. δ: δ(M3/E2)=+0.02 *8* (1978We08), which assumes γ is E2, but γ is doubly placed.

γ(^{154}Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡#]	E_f	J^π_f	Mult.[@&]	δ[@a]	α[c]	Comments
2194.13	10+	557.1 *2*	9 *3*	1637.05	10+	E0,M1+E2	1.1 *+5−3*	0.053 *14*	Mult.: α(K)exp=0.046 *12* (1974Go30). δ: From 1974Go30. α: Based on α(K)exp, for comparison α(M1+E2)=0.0145 *15*.
		1049.8[f] *5*	5.9 *6*	1144.44	8+				
2215.3	(6+,7,8+)	459.5		1756.46	8+				
		608.0		1606.55	6+				
2222.48	(2+)	46.4499 *8*	6.4 *6*	2176.03	(1+)				
		1541.5 *3*	61 *3*	680.6673	0+				Mult.: α(K)exp=0.0007 *1* (1996SpZZ), which is interpreted as E1 or E2.
		1851.0 *4*	54 *15*	370.9998	4+				
		2099.1 *3*	100 *4*	123.0709	2+				
		2222.2 *4*	52 *9*	0.0	0+				
2229.77	(2+)	42.7605 *16*	2.0 *6*	2187.01	1+				
		1102.00 *15*	45 *7*	1127.8018	3+				
		1233.5 *4*	94 *18*	996.2568	2+				
		1548.8 *5*	60 *15*	680.6673	0+				
		2229.6 *8*	100 *38*	0.0	0+				
2230.08	2+,3,4+	1102.43 *20*	100 *14*	1127.8018	3+				
		1234.0 *9*	43 *21*	996.2568	2+				
		1858.4 *4*	79 *7*	370.9998	4+				
		2106.9	57 *7*	123.0709	2+				
2245.29		171.99 *4*	100	2073.30	(7+)				
2249.02	(3)	135.271 *6*	0.9 *3*	2113.74	2+				
		985.43 *13*	26 *7*	1263.778	4+				
		1006.9 *4*	64 *15*	1241.291	1−				
		1120.6 *5*	45 *15*	1127.8018	3+				
		1201.0 *5*	21 *5*	1047.592	4+				
		1432.9[d] *4*	52[d] *15*	815.4917	2+				
		1877.8 *3*	52 *3*	370.9998	4+				
		2126.1 *2*	100 *21*	123.0709	2+				
2251.3	9(−)	1107.4 *8*		1144.44	8+				
2254.12	(8+)	180.87 *4*	53 *19*	2073.30	(7+)				
		342.44 *7*	100 *35*	1911.544	6+				
		886.5[f]		1365.878	6+				
		1110.0		1144.44	8+				
2265.35	2+,3,4+	564.9	12	1701.39	4+				E_γ: Value is from 2001KuZS, ^{154}Tb ε decay (9.4 h). Placement and Iγ value are from J.L. Wood (priv. COMM., April, 2008).
		1218.58 *11*	174[b] *12*	1047.592	4+				Mult.: α(K)exp=0.0022 *3* (1996SpZZ), which implies M1, but γ is doubly placed.
		1451.7[d] *5*	35[d] *10*	815.4917	2+				I_γ: From ^{153}Gd(n,γ). Other: 82 *9* from ^{154}Tb ε decay (9.4 h).

$^{154}_{64}$Gd$_{90}$-24

Adopted Levels, Gammas (continued)

$\gamma(^{154}Gd)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡#]	E_f	J^π_f	Mult.[@&]	α[c]	Comments
2265.35	$2^+,3,4^+$	1894.5 *3*	100 *11*	370.9998	4^+			
		2142.9 *3*	129 *12*	123.0709	2^+			I_γ: From ^{154}Tb ε decay (9.4 h); not reported in $^{153}Gd(n,\gamma)$.
2272.3	$(8^+,9^+)$	199.3		2073.30	(7^+)			
		635.0		1637.05	10^+			
2277.13	3	1012.9 *3*	10 *2*	1263.778	4^+			
		1149.66 *13*	98 *16*	1127.8018	3^+			
		1229.42 *20*	59 *10*	1047.592	4^+			
		1280.8 *5*	18 *10*	996.2568	2^+			
		1905.0 *12*	16 *2*	370.9998	4^+			
		2153.81 *15*	100 *6*	123.0709	2^+			
2293.50	$(3)^+$	44.4819 *14*	13 *4*	2249.02	(3)			
		63.732[d] *2*	6.4[d] *21*	2229.77	(2^+)			
		71.029 *5*	21.4 *21*	2222.48	(2^+)			
		1297.32 *10*	64 *29*	996.2568	2^+	M1	0.00249	Mult.: α(K)exp=0.0027 *12* (1996SpZZ).
		1922.8 *3*	100 *15*	370.9998	4^+			
2299.39	(1,2)	2176.2[d] *2*	177[d] *24*	123.0709	2^+			
		2299.6 *3*	100 *7*	0.0	0^+			
2302.28	(1,2)	1486.4 *4*	39 *5*	815.4917	2^+			
		2179.4 *3*	100 *3*	123.0709	2^+			
2305.78	3^+	76.015 *4*	10[b] *2*	2229.77	(2^+)	M1	4.43	I_γ: From $^{153}Gd(n,\gamma)$. Mult.: α(M1)exp=0.23 *5* (1996SpZZ), which is interpreted as M1, but γ is doubly placed.
		1041.9 *2*	13.2 *12*	1263.778	4^+			
		1053.9[d] *7*	13[d] *4*	1251.641	3^-			
		1177.71 *19*	18.1 *24*	1127.8018	3^+			
		1258.17 *14*	100 *7*	1047.592	4^+			
		1309.05 *22*	7.2 *12*	996.2568	2^+			
		1490.37 *22*	64 *5*	815.4917	2^+			I_γ: From ^{154}Tb ε decay. Other: 25 *6* relative to $I\gamma$(1934) from $^{153}Gd(n,\gamma)$ where 1490 is multiply placed.
		1934.71 *14*	45 *4*	370.9998	4^+			
		2182.6 *5*	10.8 *24*	123.0709	2^+			
2309.47	(8^-)	171.99 *4*		2137.48	7^-	(D)		
		943.0		1365.878	6^+			
2309.53	$(2)^+$	1262.0 *3*	89 *10*	1047.592	4^+			
		1313.25 *17*	100 *22*	996.2568	2^+	M1	0.00242	Mult.: α(K)exp=0.0020 *5* (1996SpZZ).
2324.3		412.8	100	1911.544	6^+			
2336.02	3^-	922.1[df] *9*	<56[d]	1414.426	1^-			I_γ: From ^{154}Tb ε decay (9.4 h) where it is doubly placed; in (n,γ) $I\gamma$=62 *8* but is only placed from 1294 level.
		1072.37 *13*	35 *10*	1263.778	4^+			I_γ: $I\gamma$=42 *5* from ^{154}Tb ε decay (9.4 h) and<32 in (n,γ) from evaluators′ estimate of the intensity limit for unreported G.
		1084.29[d] *14*	<55[d]	1251.641	3^-			I_γ: From ^{154}Tb ε decay (9.4 h) where it is doubly placed; in (n,γ) γ is placed only from two other levels.

$^{154}_{64}Gd_{90}$-25

$\gamma(^{154}$Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡#]	E_f	J^π_f	Comments
2336.02	3^-	1208.06 *14*	90 *30*	1127.8018	3^+	I_γ: Average of 63 *5* from ^{154}Tb ε decay (9.4 h) and 120 *12* from (n,γ).
		1288.39[d] *14*	≤200[d]	1047.592	4^+	I_γ: Reported in ^{154}Tb ε decay (9.4 h) as doubly placed, and not reported in (n,γ).
		1339.53 *23*	30 *10*	996.2568	2^+	I_γ: From 36 *5* from ^{154}Tb ε decay (9.4 h) and<32 from evaluators′ estimate of intensity limit for unreported γ from (n,γ).
		1520.69 *19*	85 *20*	815.4917	2^+	I_γ: Average of values from ^{154}Tb ε decay (9.4 h) and (n,γ).
		1965.03 *7*	≤253	370.9998	4^+	I_γ: From ^{154}Tb ε decay (9.4 h), but in (n,γ) level is seen but γ is placed from 1964 level.
		2212.92 *15*	100 *4*	123.0709	2^+	I_γ: From ^{154}Tb ε decay (9.4 h). Other: 22 *2* relative to $I\gamma$(1208) from ^{153}Gd(n,γ).
2342.53	$1,2^+$	945.8[e] *4*	≤8[e]	1397.515	2^-	I_γ: Evaluators′ estimate, based on lack of reported 945 in (n,γ).
		2219.2 *4*	46 *6*	123.0709	2^+	
		2342.2 *3*	100 *7*	0.0	0^+	
2368.87	$2^+,3,4^+$	1105.8 *8*	13 *9*	1263.778	4^+	
		1553.6 *6*	52 *9*	815.4917	2^+	
		1997.8 *7*	83 *22*	370.9998	4^+	
		2245.7 *2*	100 *9*	123.0709	2^+	
2381.46	$0^+,1,2$	2257.7 *4*	100	123.0709	2^+	
2386.00	4^+	136.979 *10*	0.8 *3*	2249.02	(3)	
		1020.26 *17*	19 *6*	1365.878	6^+	
		1133.5 *4*	38 *8*	1251.641	3^-	
		1389.6 *4*	34 *6*	996.2568	2^+	
		1569.8 *4*	21 *3*	815.4917	2^+	
		2014.9 *2*	100 *4*	370.9998	4^+	
		2263.3 *3*	59 *5*	123.0709	2^+	
2401.34	$1,2^+$	1404.6[d] *3*	67[d] *7*	996.2568	2^+	Mult.: α(K)exp=0.0017 *3* (1996SpZZ), which is interpreted as E2, but γ is doubly placed.
		2278.4 *2*	100 *6*	123.0709	2^+	
		2402.0 *7*	76 *4*	0.0	0^+	
2403.1	(4^+)	1355.6 *4*	60 *15*	1047.592	4^+	
		2032.0 *4*	100 *10*	370.9998	4^+	
2403.8	(7^+)	150.6		2254.12	(8^+)	
		158.0		2245.29		
		266.0		2137.48	7^-	
2406.19	2^+	2035.0 *8*	28 *4*	370.9998	4^+	
		2283.0 *3*	100 *6*	123.0709	2^+	
		2406.5 *5*	35 *8*	0.0	0^+	
2410.85	4^+	105.071[d] *8*	10.0[d] *19*	2305.78	3^+	
		1363.1[d] *3*	96[d] *8*	1047.592	4^+	
		1693.7 *4*	58 *13*	717.662	6^+	
		2287.3 *3*	100 *8*	123.0709	2^+	
2416.22	4^+	984.3 *4*	21 *3*	1432.588	5^+	
		1152.42 *9*	100 *14*	1263.778	4^+	
		1288.39[d] *14*	64[d] *5*	1127.8018	3^+	
		1419.4 *7*	33 *6*	996.2568	2^+	
2430.58	$1,2^+$	1016.0 *4*	19 *3*	1414.426	1^-	

$^{154}_{64}$Gd$_{90}$-26

$\gamma(^{154}Gd)$ (continued)

E_i(level)	J^π_i	E_γ [†]	I_γ [‡#]	E_f	J^π_f	Mult. [@&]	α [c]	Comments
2430.58	1,2$^+$	1033.11[e] *9*	20[e] *3*	1397.515	2$^-$			
		2307.49 *15*	67 *4*	123.0709	2$^+$			
		2430.50 *10*	100 *6*	0.0	0$^+$			
2433.78	0$^+$,1,2	52.322 *2*	5.9 *20*	2381.46	0$^+$,1,2			
		257.751 *18*	2.8 *8*	2176.03	(1$^+$)			
		2311.3 *3*	100 *10*	123.0709	2$^+$			
2440.7		131.6		2309.47	(8$^-$)			
		302.8		2137.48	7$^-$			
2441.70	(1,2)	2318.8 *3*	100 *9*	123.0709	2$^+$			
		2442.3[d] *3*	71[d] *3*	0.0	0$^+$			
2449.2	(1,2)	1769.4 *5*	100 *19*	680.6673	0$^+$			
		2448.9[d] *3*	326[d] *90*	0.0	0$^+$			
2453.29	(9$^+$)	199.18 *8*	65 *10*	2254.12	(8$^+$)			
		379.98 *8*	100 *15*	2073.30	(7$^+$)			
2459.4	6$^+$,7,8$^+$	1093.6 *7*	≈62	1365.878	6$^+$			
		1315.1 *7*	≈62	1144.44	8$^+$			
		1741.6 *6*	100 *9*	717.662	6$^+$			
2459.74	2$^+$	2089.0 *3*	52 *6*	370.9998	4$^+$			
		2336.4 *5*	100 *23*	123.0709	2$^+$			
		2459.4 *4*	38 *4*	0.0	0$^+$			
2468.45	1,2$^+$	245.97 *2*	6.7 *7*	2222.48	(2$^+$)	(M1)	0.1628	Mult.: α(K)exp=0.27 (1996SpZZ).
		1053.9[d] *7*	9[d] *4*	1414.426	1$^-$			
		2345.2 *3*	100 *7*	123.0709	2$^+$			
		2467.8 *3*	53 *12*	0.0	0$^+$			
2475.27	(9$^-$)	165.8 *1*		2309.47	(8$^-$)			
		219.6		2254.12	(8$^+$)			
		1109.0[f]		1365.878	6$^+$			
2482.02	2$^+$	2111.3 *3*	82 *7*	370.9998	4$^+$			
		2358.4 *4*	100 *13*	123.0709	2$^+$			
		2482.0 *4*	78 *8*	0.0	0$^+$			
2482.29	(11$^-$)	441.3	25.9 *23*	2040.5	(9$^-$)			δ: δ(O/Q)=+0.08 *+31−21* (1978We08); γ is assumed to be E2.
		845.2 *3*	100 *6*	1637.05	10$^+$			δ: δ(Q/D)=+0.05 *5* or −0.02 *4* (1978We08); γ is assumed to be E1.
2486.42	1,2$^+$	2363.4 *2*	30 *3*	123.0709	2$^+$			
		2486.25 *15*	100 *6*	0.0	0$^+$			
2495.76	1,2$^+$	61.9796 *12*	4.1 *4*	2433.78	0$^+$,1,2			
		964.9 *3*	100 *12*	1531.305	2$^+$			
		2372.4 *4*	39 *4*	123.0709	2$^+$			
		2496.3 *8*	29 *12*	0.0	0$^+$			
2499.3	2$^+$	2128.1 *3*	45 *7*	370.9998	4$^+$			
		2377.0 *7*	77 *5*	123.0709	2$^+$			
		2499.8 *8*	100 *4*	0.0	0$^+$			
2502.58	1,2$^+$	2379.3 *2*	100 *4*	123.0709	2$^+$			

γ(^{154}Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡#]	E_f	J^π_f	Mult.[@&]	α[c]	Comments
2502.58	1,2$^+$	2503.0[d] 3	52[d] 4	0.0	0$^+$			
2511.52	2	809.99 7	6.1 17	1701.39	4$^+$			
		2141.8 3	57 6	370.9998	4$^+$			
		2388.82 18	100 4	123.0709	2$^+$			
2514.8	1,2$^+$	2391.5 4	100 11	123.0709	2$^+$			
		2515.0[d] 4	117[d] 12	0.0	0$^+$			
2533.74	0$^+$,1,2	92.039 4	4.2 17	2441.70	(1,2)			
		2410.0 6	100 25	123.0709	2$^+$			
2561.3	2,3$^-$	2190.3 4	100 11	370.9998	4$^+$			
		2438.0 8	39 17	123.0709	2$^+$			
2569.00	2	127.305 3	2.1 3	2441.70	(1,2)	(E2,E1)		Mult.: α(K)exp<0.45 13 (1996SpZZ).
		2197.5 3	100 21	370.9998	4$^+$			
		2445.1 6	52 15	123.0709	2$^+$			
2579.62	10$^{(-)}$	328.4 2	42	2251.3	9$^{(-)}$			
		942.6 2	100	1637.05	10$^+$			
2585.5	0$^+$	2462.4 4	100	123.0709	2$^+$			
2590.34	(1,2)$^+$	470.793 7	22.8 9	2119.55	1$^+$,2$^+$	M1	0.0295	I_γ: From ^{153}Gd(n,γ). Other: 31 3 from ^{154}Tb ε decay (21.5 h). Mult.: α(K)exp=0.030 1 (1996SpZZ).
		1593.4[d] 3	46[d] 5	996.2568	2$^+$			
		1774.4 8	22 3	815.4917	2$^+$			
		1909.3 3	100 8	680.6673	0$^+$			
		2466.9	38 11	123.0709	2$^+$			
		2590.5 15	7.0 22	0.0	0$^+$			
2616.08	10$^{(-)}$	433.0 2	73	2183.19	8$^{(-)}$			
		979.5 3	100	1637.05	10$^+$			
2619.53	10$^{(-)}$	144.0 2	18	2475.27	(9$^-$)			
		436.3 2	79	2183.19	8$^{(-)}$			
		982.4 2	100	1637.05	10$^+$			
2621.80	12$^+$	427.8 2	625	2194.13	10$^+$			Mult.: α(K)exp=0.016 2 (1971Ri08,1972Vy04,1974Go30), which is interpreted as E2, but γ is doubly placed.
		437[f]		2184.69	12$^+$			
		984.7[f] 3	100	1637.05	10$^+$			
2633.17	1,2$^+$	99.005	2.2	2533.74	0$^+$,1,2			
		2509.7 4	73 7	123.0709	2$^+$			
		2633.4 3	100 28	0.0	0$^+$			
2637.48	(2)$^-$	1509.2 3	100 4	1127.8018	3$^+$	E1	7.58×10^{-4}	Mult.: α(K)exp=0.0004 2 (1996SpZZ).
		1822.2 4	37 10	815.4917	2$^+$			
		2515.0[d] 4	76[d] 8	123.0709	2$^+$			
2655.04	2$^+$	1123.09[d] 16	15×10^1[d] 15	1531.305	2$^+$			
		1391.2 3	206 18	1263.778	4$^+$			

$^{154}_{64}$Gd$_{90}$-28

Adopted Levels, Gammas (continued)

$\gamma(^{154}Gd)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡#]	E_f	J_f^π	Comments
2655.04	2^+	1527.2 4	82 18	1127.8018	3^+	
		1607.0[d] 5	56[d] 21	1047.592	4^+	
		1974.3	59 29	680.6673	0^+	
		2532.2 3	56 9	123.0709	2^+	I_γ: From ^{154}Tb ε decay (21.5 h). Other: 84 5 from ^{153}Gd(n,γ).
		2656.0 2	100 12	0.0	0^+	
2668.4		414.9		2251.3	$9^{(-)}$	
		756.2		1911.544	6^+	
2686.7	2	1871.5 3	98 7	815.4917	2^+	
		2314.3 7	100 33	370.9998	4^+	
2695.5		221.0		2475.27	(9^-)	
		886.5[f]		1810.21	7^+	
		1088.1		1606.55	6^+	
2699.4	0^+,1,2	1703.1 4	100	996.2568	2^+	
2710.5	1,2^+	2587.2 4	100 8	123.0709	2^+	
		2710.7 5	31 5	0.0	0^+	
2721.5		246.2	100	2475.27	(9^-)	
2722.35	1,2^+	602.67 24	13 2	2119.55	1^+,2^+	
		1191.2[df] 8	47[d] 15	1531.305	2^+	
		1324.9 4	59 4	1397.515	2^-	
		1675.1 3	47 5	1047.592	4^+	I_γ: From ^{153}Gd(n,γ) relative to Iγ(1907), but not reported from ^{154}Tb ε decay.
		1907.0 3	68 5	815.4917	2^+	
		2041.1[d] 3	100[d] 5	680.6673	0^+	
		2599.1[d] 6	13[d] 2	123.0709	2^+	
		2722.8 4	6.2 5	0.0	0^+	I_γ: From ^{154}Tb ε decay (21.5 h). Other: 32 4 from ^{153}Gd(n,γ) relative to Iγ(1907).
2734.30	1^+,2^+	1607.0[d] 5	21[d] 8	1127.8018	3^+	I_γ: From ^{154}Tb ε decay (21.5 h). Other: 75 27 from ^{153}Gd(n,γ).
		1737.9 4	100 3	996.2568	2^+	
		2611.0 3	15 7	123.0709	2^+	I_γ: From ^{154}Tb ε decay (21.5 h). Other: 88 4 from ^{153}Gd(n,γ).
		2734.7 6	4.4 22	0.0	0^+	I_γ: From ^{154}Tb ε decay (21.5 h). Other: 63 7 from ^{153}Gd(n,γ).
2735.9		260.6		2475.27	(9^-)	
		695.5		2040.5	(9^-)	
2741.5	2^+,3^-	2370.5 4	100 13	370.9998	4^+	
		2618.3 4	77 6	123.0709	2^+	
2744.1	0^+	2621.0 4	100	123.0709	2^+	
2775.38	$11^{(-)}$	155.6 2	100	2619.53	$10^{(-)}$	
		159.6 2	34	2616.08	$10^{(-)}$	
		300.4 4	21	2475.27	(9^-)	
2777.32	14^+	592.6 1	100	2184.69	12^+	
2779.9		469.9		2309.47	(8^-)	
		525.4		2254.12	(8^+)	
		707.5		2073.30	(7^+)	
2787.1		314.2		2475.27	(9^-)	

$\gamma(^{154}Gd)$ (continued)

E_i(level)	J^π_i	E_γ [†]	I_γ [‡#]	E_f	J^π_f	Comments
2787.1		873.1834[d] *23*	≤206[d]	1911.544	6^+	I_γ: Most of this intensity is for γ from 996 level.
		1421.3	100 *6*	1365.878	6^+	
2788.46	$1,2^+$	1068.78 *7*	35 *12*	1719.5593	2^-	I_γ: From ^{153}Gd(n,γ); not reported in ^{154}Tb ε decay (21.5 h).
		1374.2 *3*	74 *6*	1414.426	1^-	I_γ: From ^{154}Tb ε decay (21.5 h). Other: 26 *4* from ^{153}Gd(n,γ).
		1391.04 *11*	57 *5*	1397.515	2^-	I_γ: From ^{153}Gd(n,γ). Other: 72 *6* for doublet from ^{154}Tb ε decay (21.5 h).
		1792.6 *3*	24 *3*	996.2568	2^+	
		1973.1[d] *4*	16[d] *3*	815.4917	2^+	
		2108.3 *3*	46 *4*	680.6673	0^+	
		2666.0 *5*	60 *5*	123.0709	2^+	
		2788.7 *5*	100 *7*	0.0	0^+	
2850.3	2^+	1802.5 *3*	62 *6*	1047.592	4^+	
		2727.8 *9*	94 *6*	123.0709	2^+	I_γ: From ^{153}Gd(n,γ). Other: 50 *17* from ^{154}Tb ε decay (21.5 h).
		2851.2 *9*	100 *17*	0.0	0^+	
2872.39	2^+	1631.2 *3*	48 *5*	1241.291	1^-	
		1824.7 *6*	38 *17*	1047.592	4^+	
		2499.8 *8*	433 *89*	370.9998	4^+	I_γ: Includes contribution from 2499 γ from 2499 level.
		2750 *1*	100 *33*	123.0709	2^+	
		2873.1 *10*	73 *5*	0.0	0^+	
2934.2	1^+	2811.3 *10*	25 *8*	123.0709	2^+	E_γ: From ^{153}Gd(n,γ), $E\gamma$=2809.8 *4*, but this is not in agreement with $E\gamma$ to the ground state. I_γ: From ^{154}Tb ε decay (21.5 h). Other: 87 *7* from ^{153}Gd(n,γ).
		2934.1 *6*	100 *10*	0.0	0^+	
2949.28	2^+	835.54 *3*	69[b] *4*	2113.74	2^+	Mult.: α(K)exp=0.0026 *3* (1996SpZZ), which is interpreted as M1, but γ is doubly placed.
		2578.5 *5*	39 *7*	370.9998	4^+	
		2826.0 *6*	47 *4*	123.0709	2^+	I_γ: From ^{153}Gd(n,γ). Other: 128 *8* from ^{154}Tb ε decay (21.5 h).
		2949.5 *5*	100 *4*	0.0	0^+	
2950.66	$12^{(-)}$	371.1 *2*	100	2579.62	$10^{(-)}$	
		765.9 *2*	27	2184.69	12^+	
2955.69	$12^{(-)}$	180.3 *1*	100	2775.38	$11^{(-)}$	
		336.0 *2*	40	2619.53	$10^{(-)}$	
		339.7 *4*	28	2616.08	$10^{(-)}$	
2981.28	$13^{(-)}$	498.9 *3*		2482.29	(11^-)	
		796.6 *2*		2184.69	12^+	
2989.89	$1,2^+$	653.8[d] *5*	6[d] *3*	2336.02	3^-	
		1458.4 *2*	100 *6*	1531.305	2^+	
		1808.0 *3*	157 *9*	1182.091	0^+	I_γ: From ^{153}Gd(n,γ); not reported in ^{154}Tb ε decay (21.5 h).
		2175 *1*	0.9 *5*	815.4917	2^+	
		2866.8 *7*	18.3 *14*	123.0709	2^+	I_γ: From ^{154}Tb ε decay (21.5 h). Other: 53 *13* from ^{153}Gd(n,γ).
		2990.3 *5*	30.3 *18*	0.0	0^+	I_γ: From ^{154}Tb ε decay (21.5 h). Other: 183 *13* from ^{153}Gd(n,γ).
3009.7	$1,2^+$	2887.1 *8*	27 *6*	123.0709	2^+	
		3009.6 *4*	100 *6*	0.0	0^+	
3022.73	2^+	536.11 *21*	168 *23*	2486.42	$1,2^+$	

$^{154}_{64}Gd_{90}$-30

$\gamma(^{154}Gd)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡#]	E_f	J^π_f	Comments
3022.73	2^+	653.8[d] *5*	12[d] *2*	2368.87	$2^+,3,4^+$	
		1771.7 *5*	32 *6*	1251.641	3^-	
		1781.4 *3*	48 *4*	1241.291	1^-	
		2651.0 *7*	36 *14*	370.9998	4^+	
		2900.4 *6*	56 *8*	123.0709	2^+	
		3023.0 *4*	100 *4*	0.0	0^+	
3027.26	14^+	405.6 *2*	100	2621.80	12^+	
		842.6		2184.69	12^+	I_γ: 25 *3* and<12 from Sm(α,xnγ).
3031.5	$1,2^+$	2908.2 *3*	48 *12*	123.0709	2^+	
		3032.1 *5*	100 *10*	0.0	0^+	
3090.6	$1,2^+$	2967.6 *15*	33 *13*	123.0709	2^+	
		3090.5 *10*	100 *13*	0.0	0^+	
3122.55	(1^+)	2442.3[d] *3*	88[d] *4*	680.6673	0^+	
		2998.7 *4*	100 *10*	123.0709	2^+	
		3122.2 *15*	53 *18*	0.0	0^+	
3153.1		712.4		2440.7		
		843.6		2309.47	(8^-)	
3154.8		845.3 *4*	100	2309.47	(8^-)	
3158.73	$13^{(-)}$	203.0 *1*		2955.69	$12^{(-)}$	
		383.4 *1*		2775.38	$11^{(-)}$	
3162.7	$1,2^+$	3039.4 *15*	100 *40*	123.0709	2^+	
		3163 *2*	100 *60*	0.0	0^+	
3184.06	$1,2^+$	1786.5 *3*	84 *7*	1397.515	2^-	
		2503.0[d] *3*	106[d] *8*	680.6673	0^+	
		2813.5 *4*	100 *7*	370.9998	4^+	
		3061.3 *7*	44 *6*	123.0709	2^+	
		3185.0 *10*	17 *3*	0.0	0^+	I_γ: From Iγ(3185)/Iγ(3061) from ^{154}Tb ε decay (21.5 h).
3264.42	$1,2^+$	2082.4 *3*	249 *15*	1182.091	0^+	I_γ: From ^{153}Gd(n,γ).
		2448.9[d] *3*	154[d] *43*	815.4917	2^+	I_γ: From ^{153}Gd(n,γ).
		3141.0 *10*	150 *30*	123.0709	2^+	I_γ: From ^{154}Tb ε decay (21.5 h).
		3263.8 *10*	100 *10*	0.0	0^+	
3294.2	$1,2^+$	3170.8 *10*	92 *15*	123.0709	2^+	
		3294.4 *10*	100 *20*	0.0	0^+	
3327.32	$1,2^+$	2646.6 *2*	100 *9*	680.6673	0^+	
		3205 *2*	1.9 *9*	123.0709	2^+	
		3328.3 *15*	6 *4*	0.0	0^+	
3345.9	$1,2^+$	3222.9 *15*	53 *21*	123.0709	2^+	
		3345.8 *13*	100 *19*	0.0	0^+	
3350.7	$1,2^+$	3227.6 *10*	100 *18*	123.0709	2^+	
		3350.7 *15*	50 *13*	0.0	0^+	
3363.6	(2^+)	2546.9 *8*	44 *22*	815.4917	2^+	
		2683.4 *5*	100 *9*	680.6673	0^+	

$^{154}_{64}Gd_{90}$-31

$\gamma(^{154}Gd)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡#]	E_f	J^π_f	Mult.[@&]	α[c]	Comments
3363.6	(2^+)	3240.4 *15*	28 *9*	123.0709	2^+			
3384.00	$14^{(-)}$	225.3 *2*		3158.73	$13^{(-)}$			
		428.2 *5*		2955.69	$12^{(-)}$			
3404.45	16^+	627.1 *1*	100	2777.32	14^+	E2	0.00786	Mult.: α(K)exp=0.006 *2* (1974Go30).
3414.76	$1,2^+$	2232.9 *4*	89 *13*	1182.091	0^+			
		2599.1[d] *4*	306[d] *99*	815.4917	2^+			
		2734.2[d] *8*	44[d] *22*	680.6673	0^+			
		3291.6 *3*	100 *14*	123.0709	2^+			
		3414.5 *9*	99 *15*	0.0	0^+			
3428.1	$14^{(-)}$	477.4 *2*	100	2950.66	$12^{(-)}$			
3490.83	16^+	463.6 *1*	100	3027.26	14^+			
		713.5 *2*	≈40	2777.32	14^+			I_γ: 31 *3* and 71 *16* from Sm(α,xnγ).
3517.18	($3^+,4^+$)	1330.8 *6*	30 *10*	2185.869	4^-			
		2084.7 *3*	63 *6*	1432.588	5^+			
		2251.8 *7*	40 *20*	1263.778	4^+			
		2389.5 *2*	100 *10*	1127.8018	3^+			
		2520.8 *10*	10 *5*	996.2568	2^+			
3519.09	$15^{(-)}$	537.8 *1*	65	2981.28	$13^{(-)}$			
		741.8 *2*	100	2777.32	14^+			
3550.3	$2^+,3,4^+$	2422.6 *4*	73 *5*	1127.8018	3^+			
		2553.8 *4*	100 *5*	996.2568	2^+			
3599.2		444.4 *4*	100	3154.8				
3629.43	$15^{(-)}$	245.4 *4*		3384.00	$14^{(-)}$			
		470.7 *1*		3158.73	$13^{(-)}$			
3894.34	$16^{(-)}$	264.9 *1*	52	3629.43	$15^{(-)}$			
		510.5 *6*	100	3384.00	$14^{(-)}$			
3987.4	$16^{(-)}$	559.3 *2*	100	3428.1	$14^{(-)}$			
4016.09	18^+	525.3 *1*	71	3490.83	16^+			I_γ: From ^{150}Nd(^{9}Be,5nγ); Iγ=83 from Sm(α,xnγ).
		611.5 *2*	100	3404.45	16^+			
4087.15	18^+	596.3 *3*	32	3490.83	16^+			
		682.7 *2*	100	3404.45	16^+			
4099.3		500.1 *2*		3599.2				
4102.0	$17^{(-)}$	582.9 *2*	100	3519.09	$15^{(-)}$			
4176.3	$17^{(-)}$	282.0 *2*	46	3894.34	$16^{(-)}$			
		547.1 *6*	100	3629.43	$15^{(-)}$			
4474.9	$18^{(-)}$	298.6 *3*	43	4176.3	$17^{(-)}$			
		580.5 *2*	100	3894.34	$16^{(-)}$			
4595.2	$18^{(-)}$	607.8 *2*	100	3987.4	$16^{(-)}$			
4646.29	20^+	630.2 *1*	100	4016.09	18^+			
4656.0		556.7 *5*		4099.3				
4735.5	$19^{(-)}$	633.5 *2*	100	4102.0	$17^{(-)}$			

Adopted Levels, Gammas (continued)

γ(^{154}Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡#]	E_f	J^π_f
4782.3	20^+	695.2 *2*	100	4087.15	18^+
4788.6	$19^{(-)}$	313.7 *2*	39	4474.9	$18^{(-)}$
		612.2 *2*	100	4176.3	$17^{(-)}$
5116.4	$20^{(-)}$	327.9 *3*		4788.6	$19^{(-)}$
		641.5 *2*		4474.9	$18^{(-)}$
5209.3	$20^{(-)}$	614.1 *6*	100	4595.2	$18^{(-)}$
5254.3		598.3 *5*		4656.0	
5349.9	22^+	703.6 *2*	100	4646.29	20^+
5415.8	$21^{(-)}$	680.3 *3*	100	4735.5	$19^{(-)}$
5457.5	$21^{(-)}$	341.2[f] *3*		5116.4	$20^{(-)}$
		668.9 *3*		4788.6	$19^{(-)}$
5519.5	22^+	737.2 *1*	100	4782.3	20^+
5810.9	(22^-)	694.5 *2*	100	5116.4	$20^{(-)}$
5848.5	(22^-)	639.2 *3*	100	5209.3	$20^{(-)}$
5889.4?		635.1[f] *5*		5254.3	
6121.6	24^+	771.7 *2*	100	5349.9	22^+
6136.2	(23^-)	720.4 *3*	100	5415.8	$21^{(-)}$
6178.0	(23^-)	720.5 *3*		5457.5	$21^{(-)}$
6294.2	24^+	774.6 *3*	100	5519.5	22^+
6535.6	(24^-)	687.1 *4*	100	5848.5	(22^-)
6555.4	(24^-)	744.5 *3*		5810.9	(22^-)
6883.3?	(25^-)	747.1[f] *3*		6136.2	(23^-)
6946.1?	(25^-)	768.1[f] *4*		6178.0	(23^-)
6955.0	(26^+)	833.4 *4*	100	6121.6	24^+
7055.6	26^+	761.4 *3*	100	6294.2	24^+
7274.0?	(26^-)	738.4[f] *4*		6535.6	(24^-)
7353.1?	(26^-)	797.7[f] *4*		6555.4	(24^-)

† Where the γ is seen in both the ^{154}Eu β^- decay and the ^{153}Gd(n,γ) reaction, the Eγ value is generally taken from the latter study, unless noted otherwise. In other cases, the values are from a combination of all available values. ^{154}Eu is a commonly used source for calibration of γ-ray detectors. A careful analysis and evaluation of the available Eγ data on the prominent γ's from the Eu β^- decay has been carried out by 2000He14. Where available, these data are adopted in this evaluation.

‡ Where the γ is seen in the ^{154}Eu decay, the Iγ values are generally taken from those data. In other cases, they are from the combination of all available values. The uncertainties in those from the ^{153}Gd(n,γ) study include only the statistical component. Significant differences between values from the various reactions and decays are noted.

For some of the Iγ values from ^{153}Gd(n,γ), which are marked as "multiply placed – intensity undivided", the second placement is in another isotope.

@ Values include the results from all types of experiments. Multipolarities and mixing ratios have been obtained from $\gamma\gamma(\theta)$ and $\gamma(\theta)$ measurements in ^{152}Sm(α,2nγ) (1978We08) and β^- decay of ^{154}Eu (1960De16,1969Ha01,1969Ha36,1969Va09,1970Ru09, 1971La11,1971Wh01,1972Go35,1973Ob01,1977Gu10,1983Gi07,1983Le19,1992Ak03 ,1996Al31) as well as from α values obtained from the γ intensities and the relative ce intensities in the ^{154}Sm(α,4nγ) reaction (1974Go30), ^{154}Tb ε decay (1971Ri08,1972Vy04,1977Ya04), ^{154}Eu β^- decay (1968Br20,1968Ha28,1968Ng01,1969An01,1971Ru05,1972Na21), and ^{153}Gd(n,γ) (1996SpZZ).

& See ^{150}Nd(^{9}Be,5nγ) for additional multipolarity assignments, deduced by evaluators, but not adopted.

a Although several of these references do not state the convention used for the sign of δ, the evaluators have tried to convert them all to the Nuclear Data Sheets convention. The signs were not changed for 1973Ob01, 1977Gu10, 1978We08, 1989Ki10; the signs were changed for 1969Ha01, 1969Ha36, 1969HaZJ, 1969Va09, 1970Ru09, 1971La11, 1971Wh01, 1972Go35, and 1982Da11.

b Value is from (n,γ) and includes contribution from ^{153}Gd.

c 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.

d Multiply placed with undivided intensity.

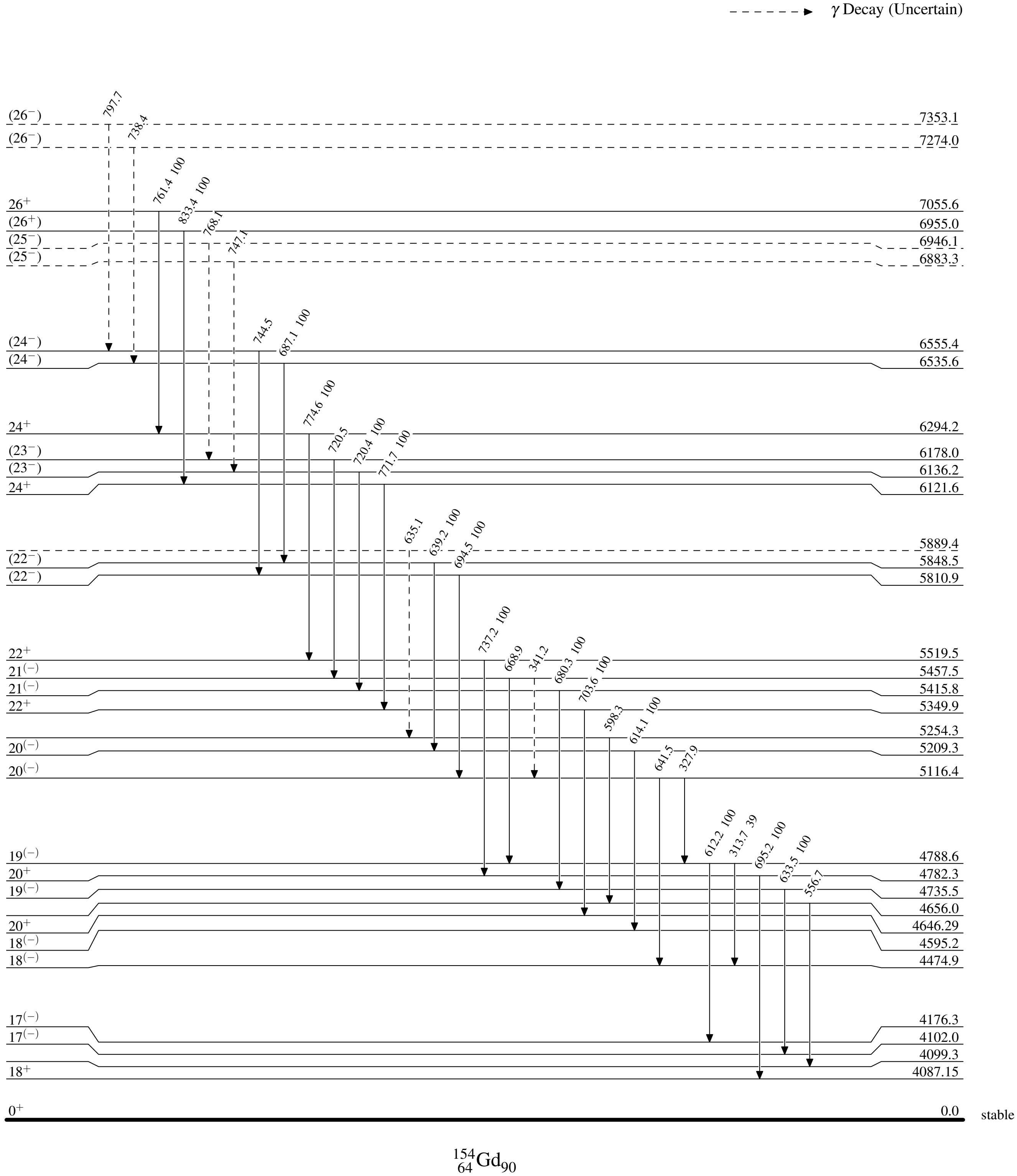
e Multiply placed with intensity suitably divided.

f Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Level Scheme

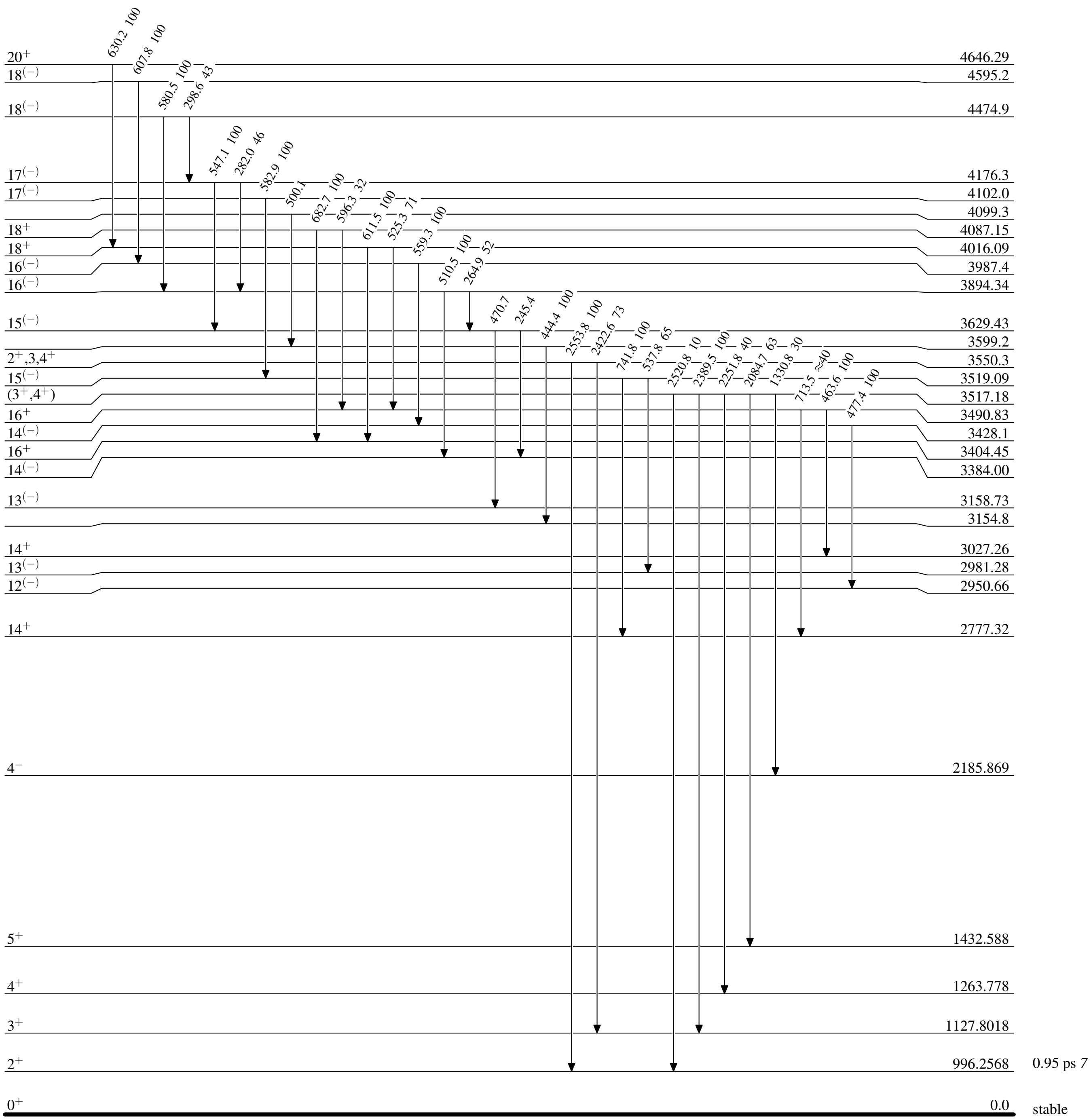
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

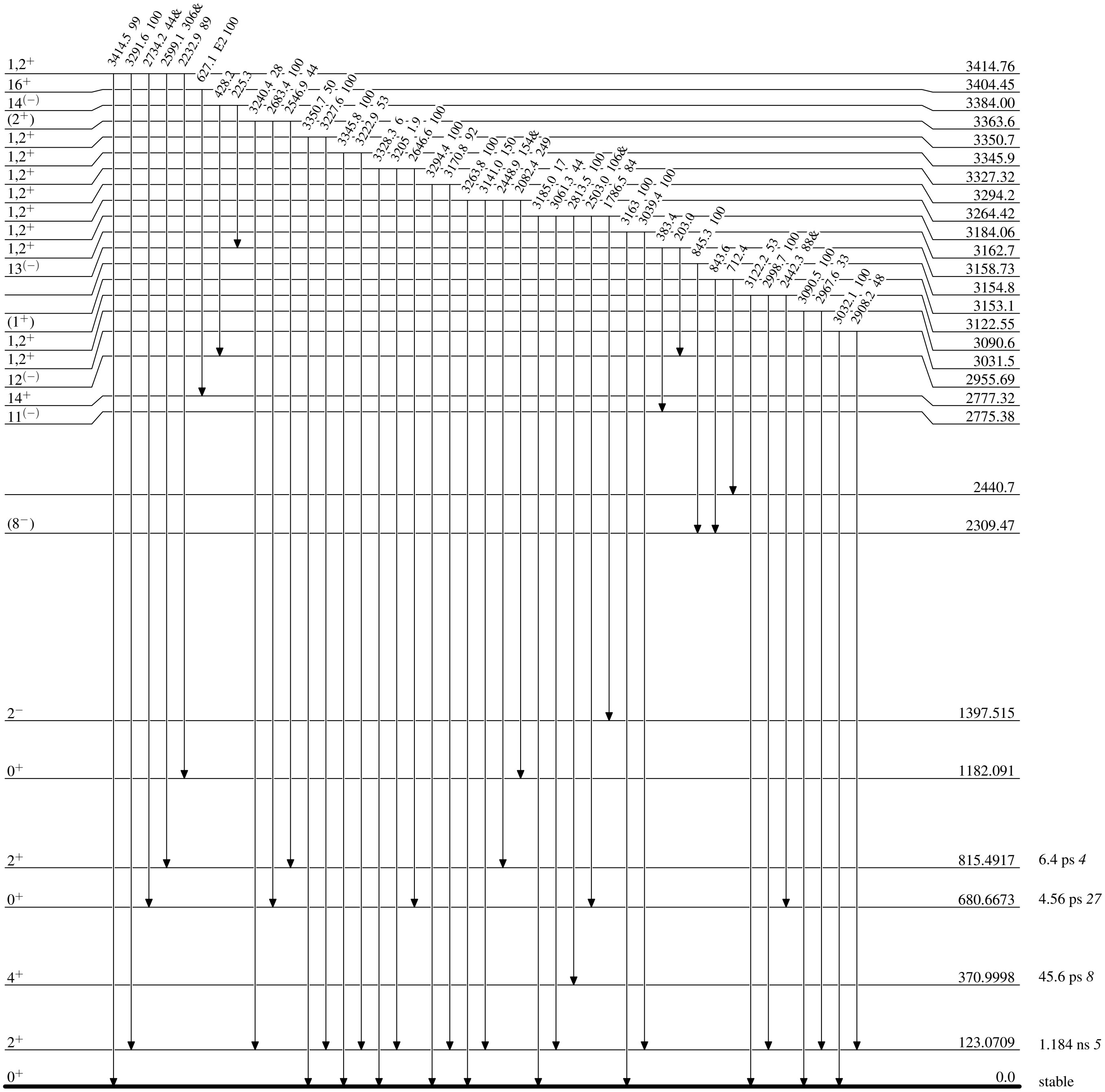


$^{154}_{64}Gd_{90}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

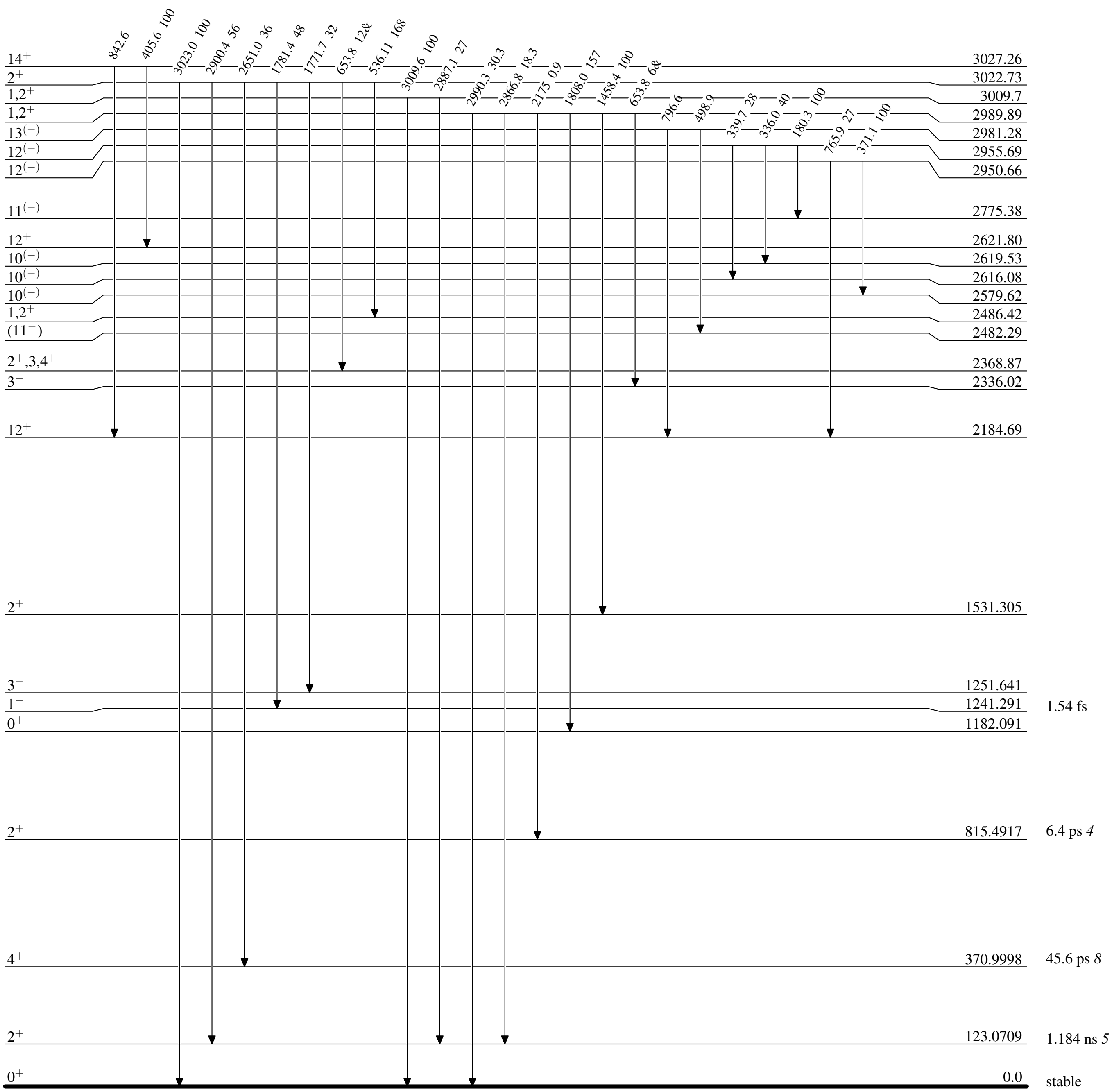


$^{154}_{64}Gd_{90}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

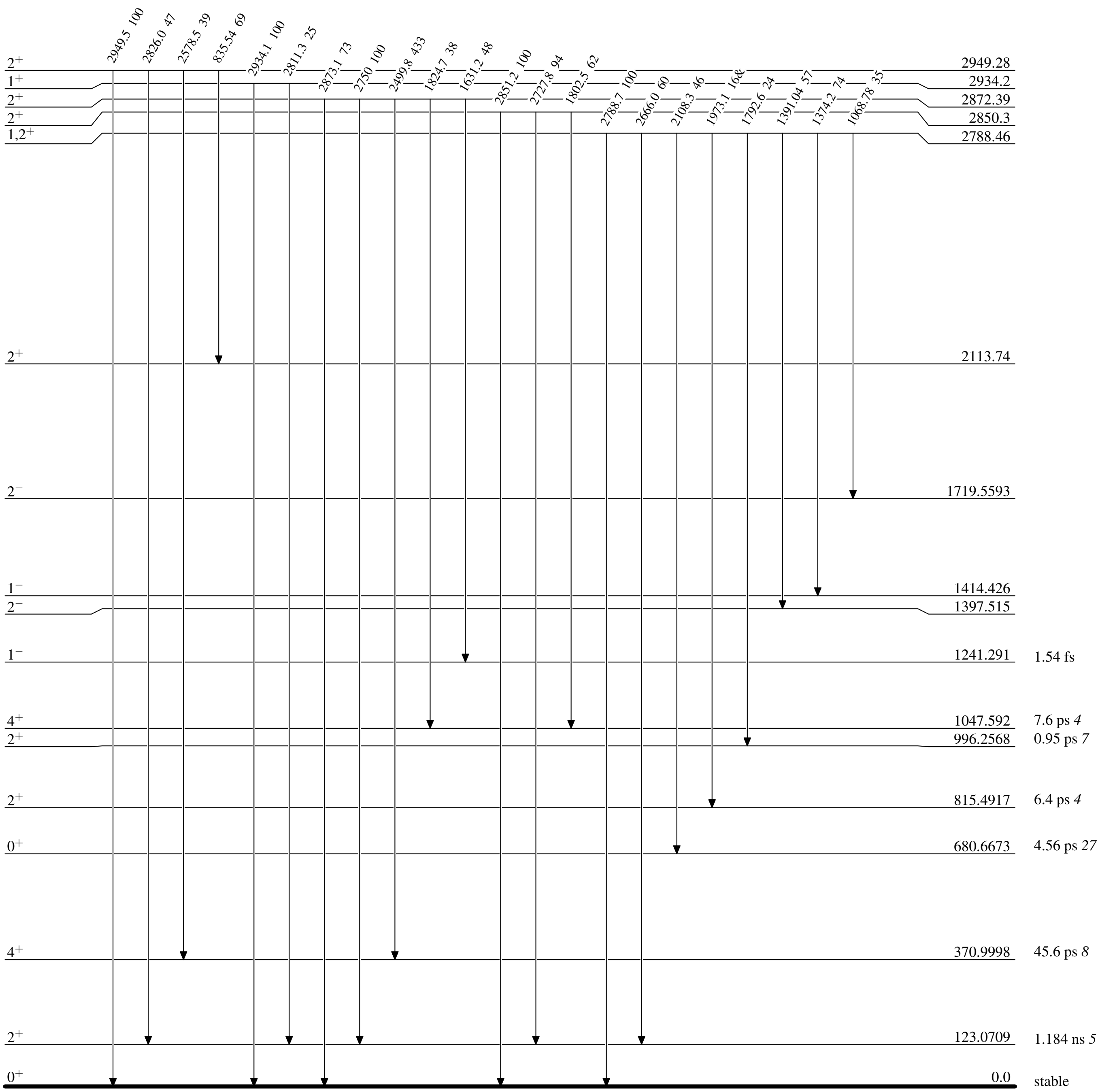


$^{154}_{64}Gd_{90}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

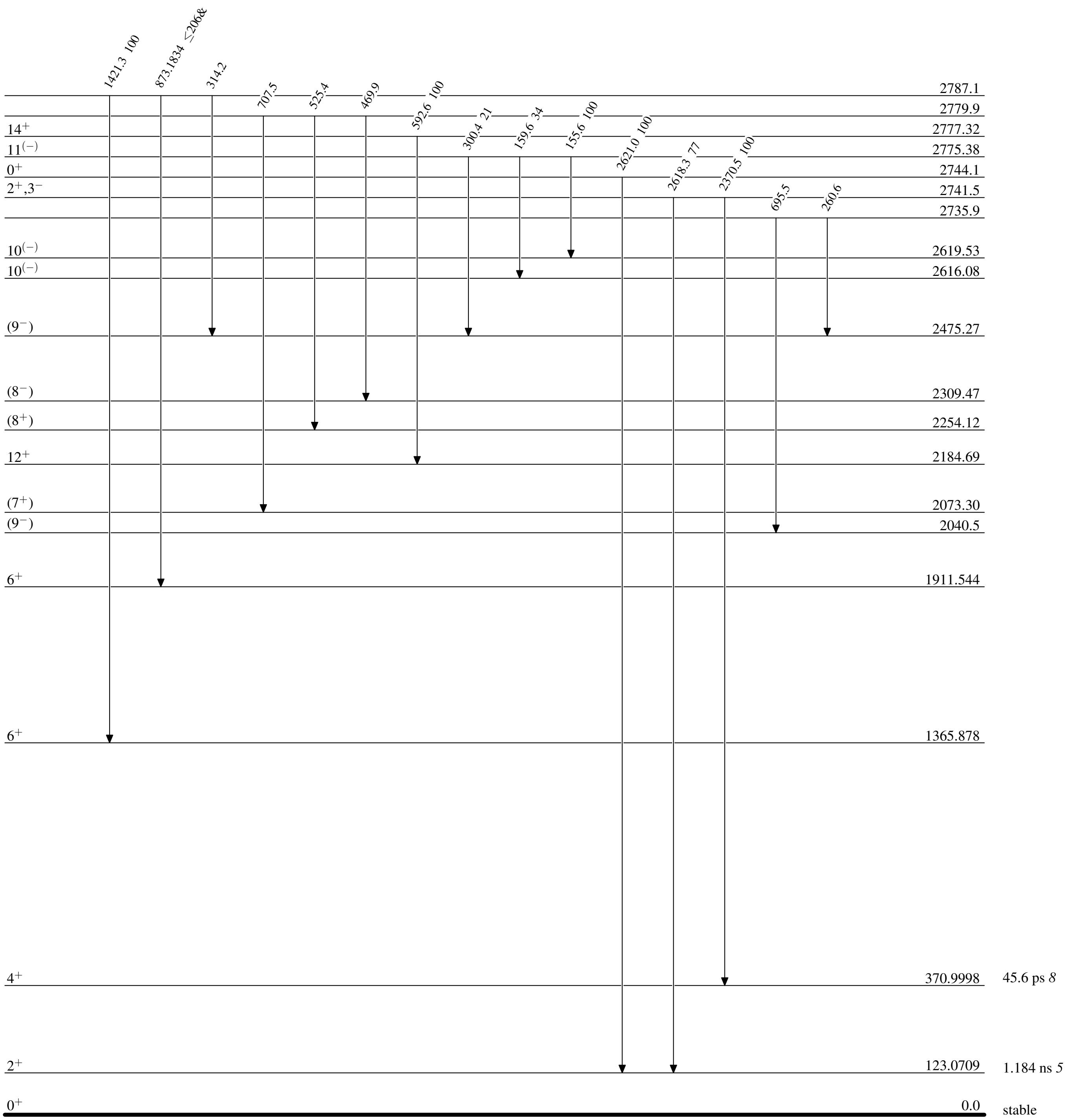


$^{154}_{64}Gd_{90}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given



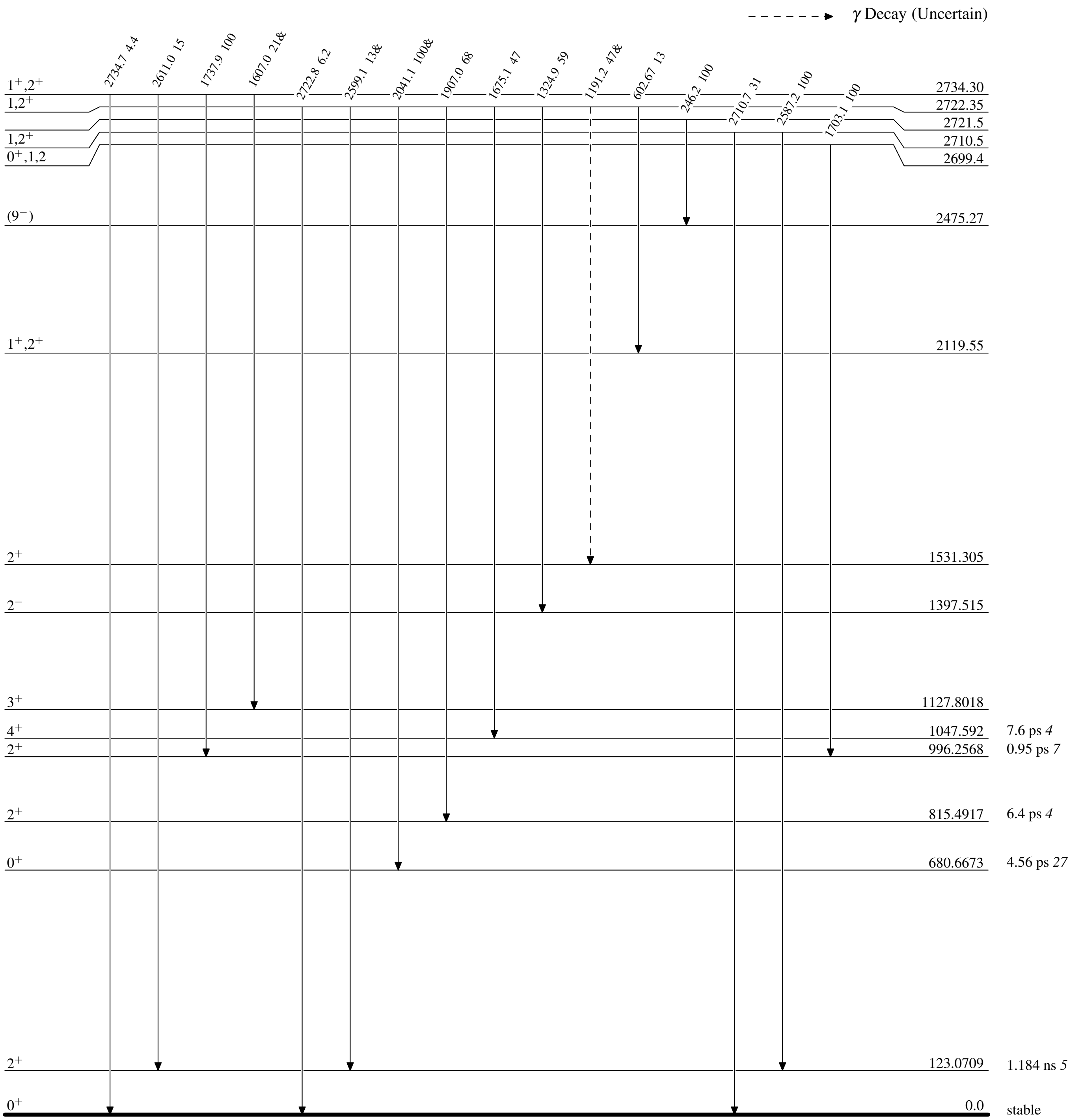
$^{154}_{64}Gd_{90}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

Legend

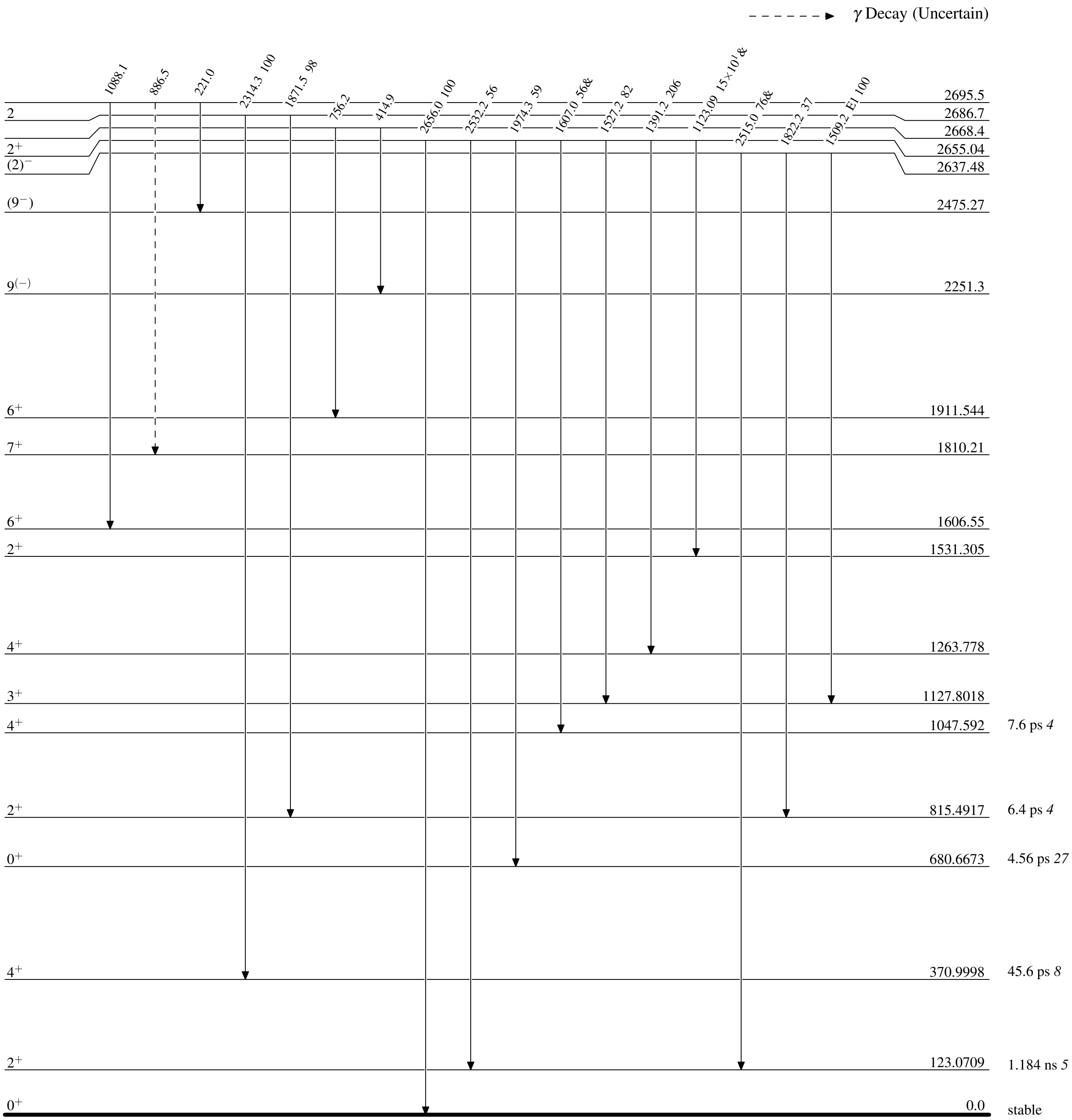


$^{154}_{64}Gd_{90}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given



$^{154}_{64}Gd_{90}$

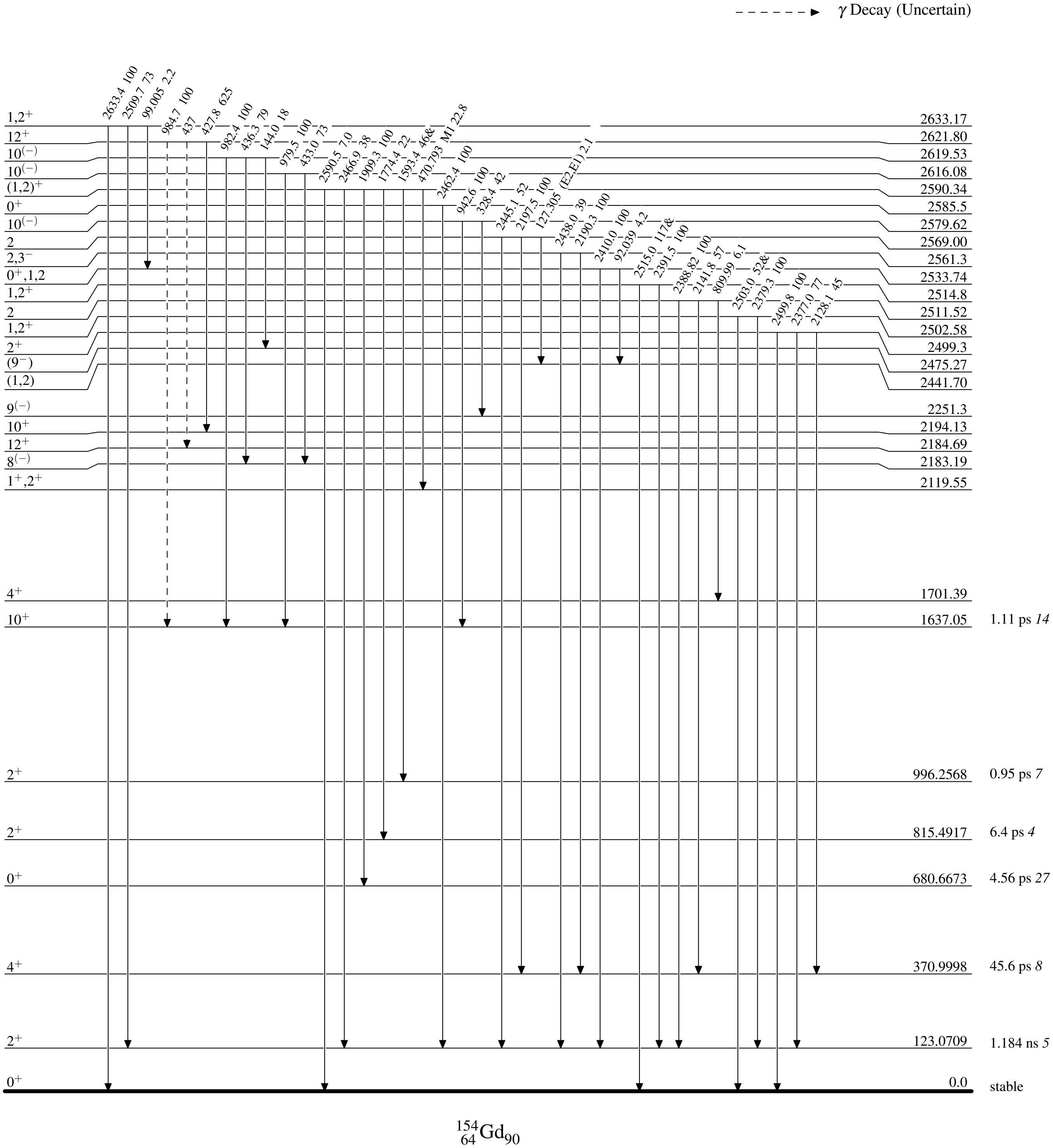
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

& Multiply placed: undivided intensity given



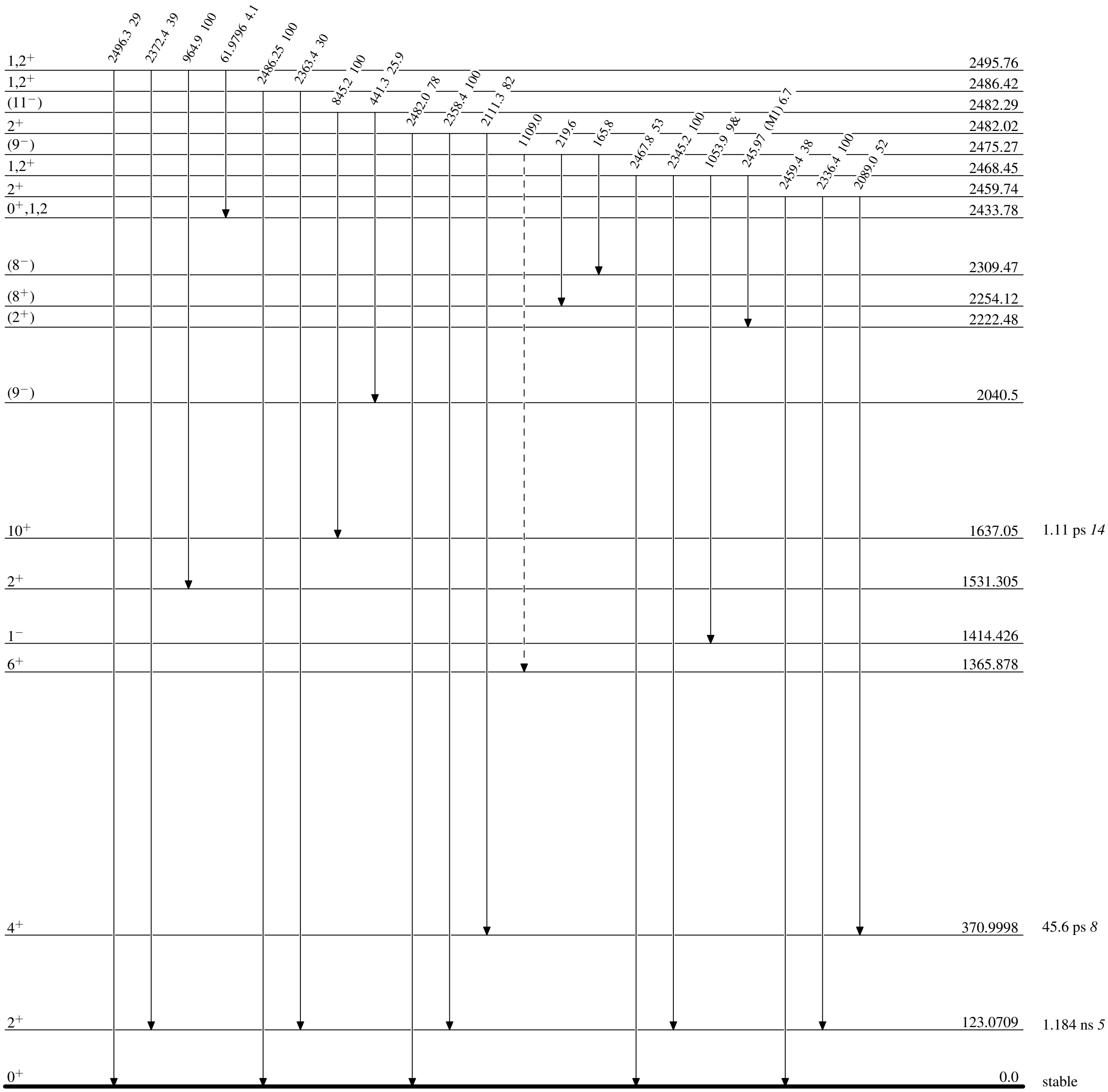
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

γ Decay (Uncertain)

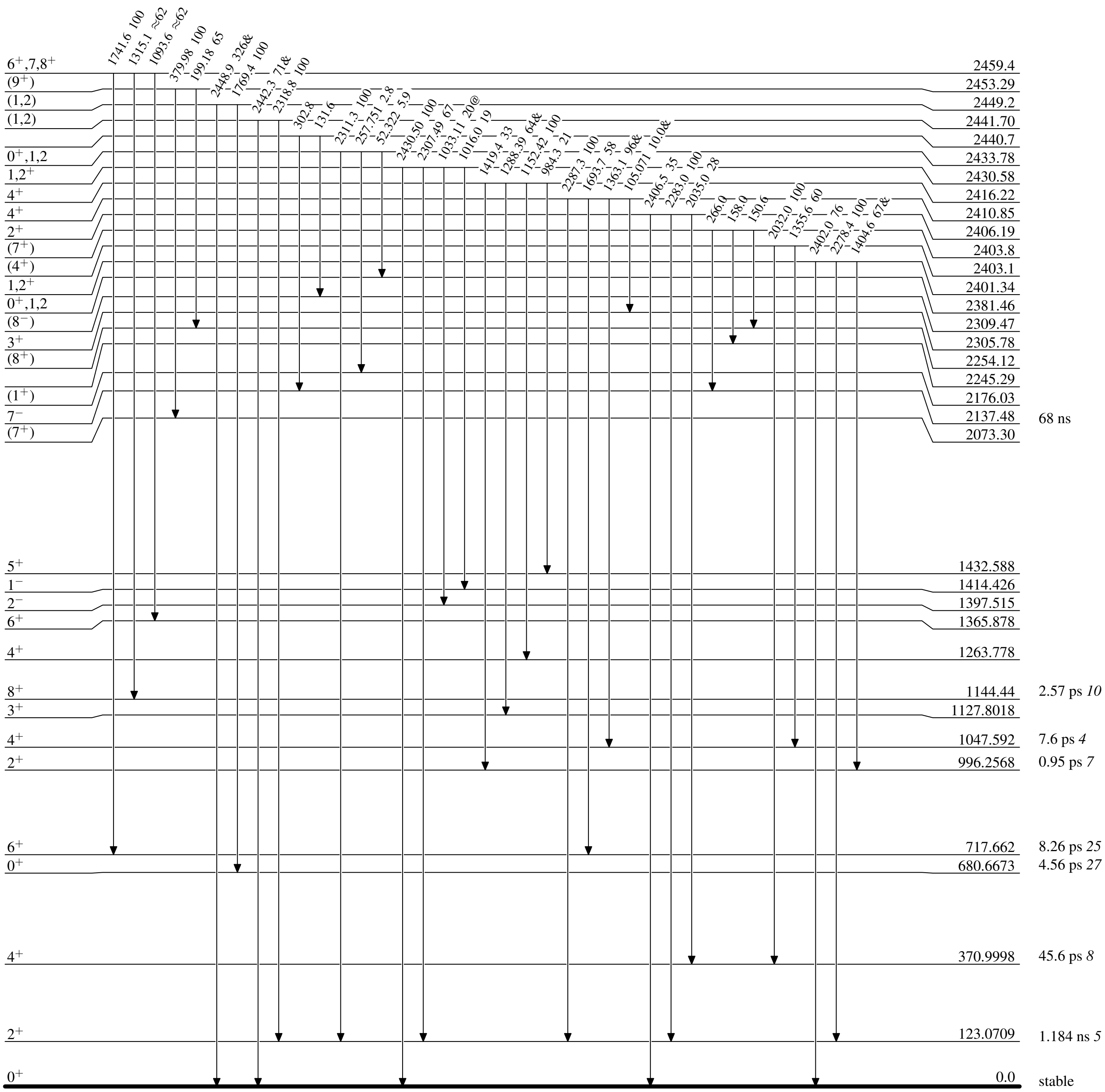


$^{154}_{64}Gd_{90}$

Adopted Levels, Gammas

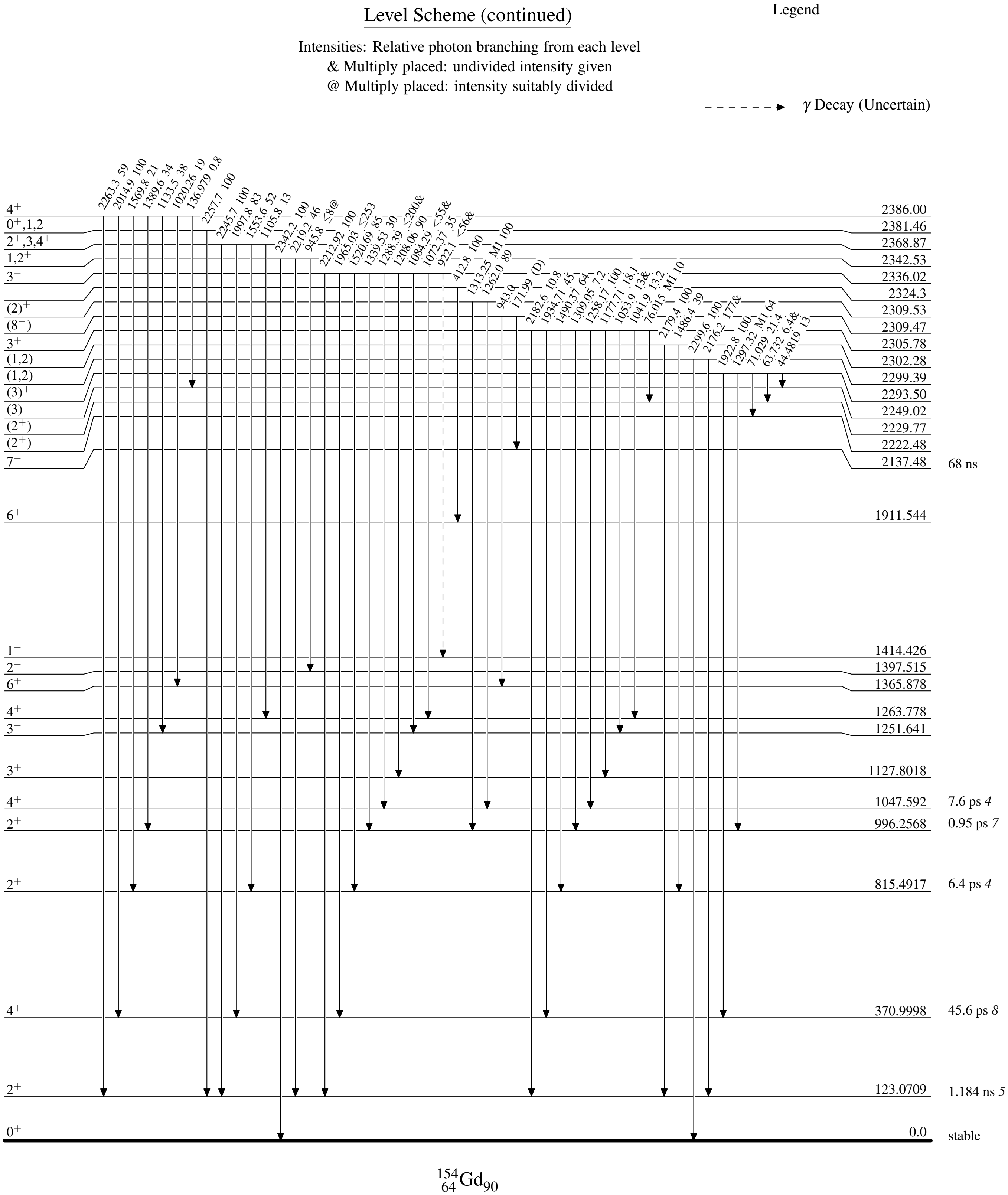
Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided



$^{154}_{64}Gd_{90}$

Adopted Levels, Gammas

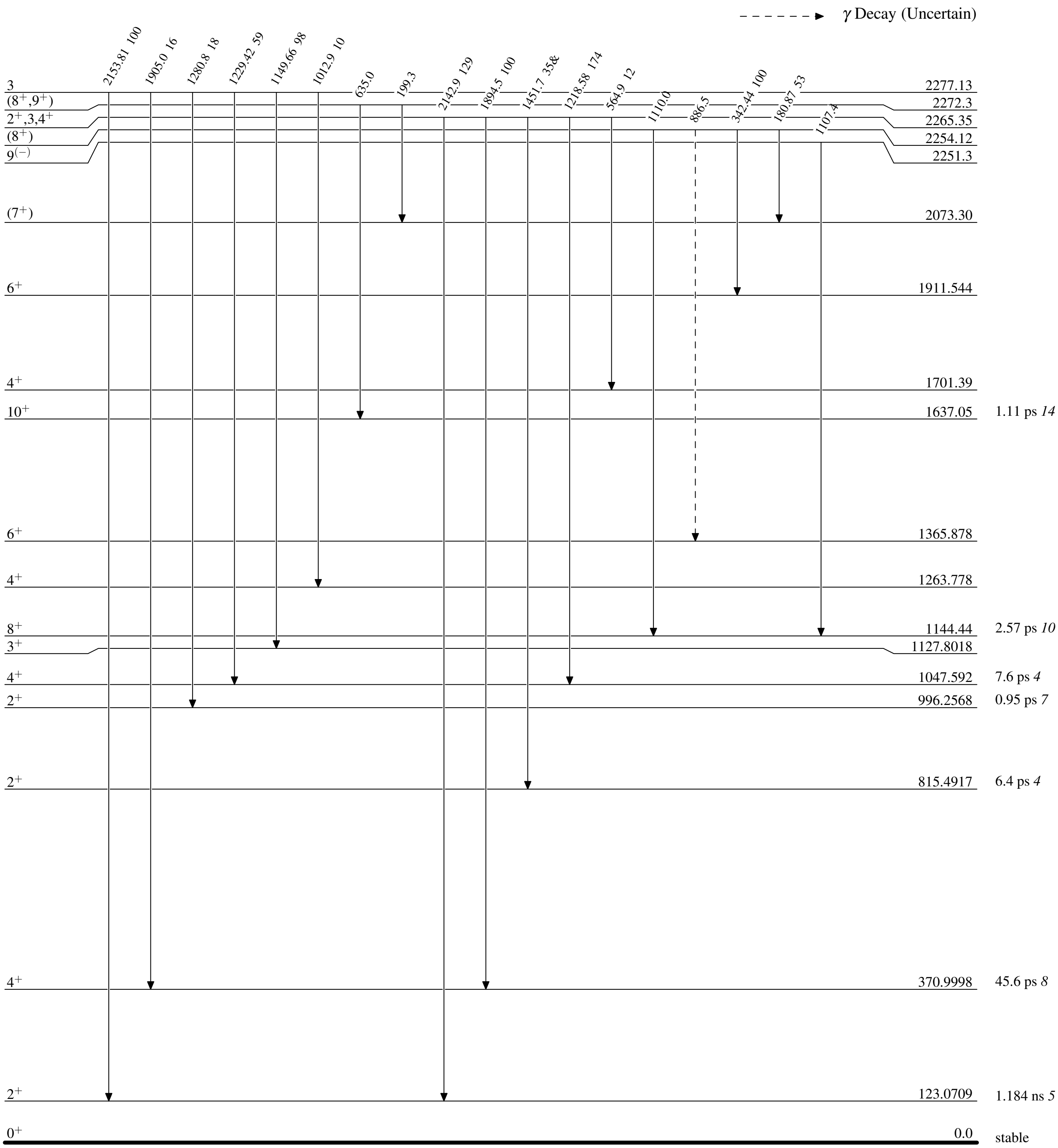


Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

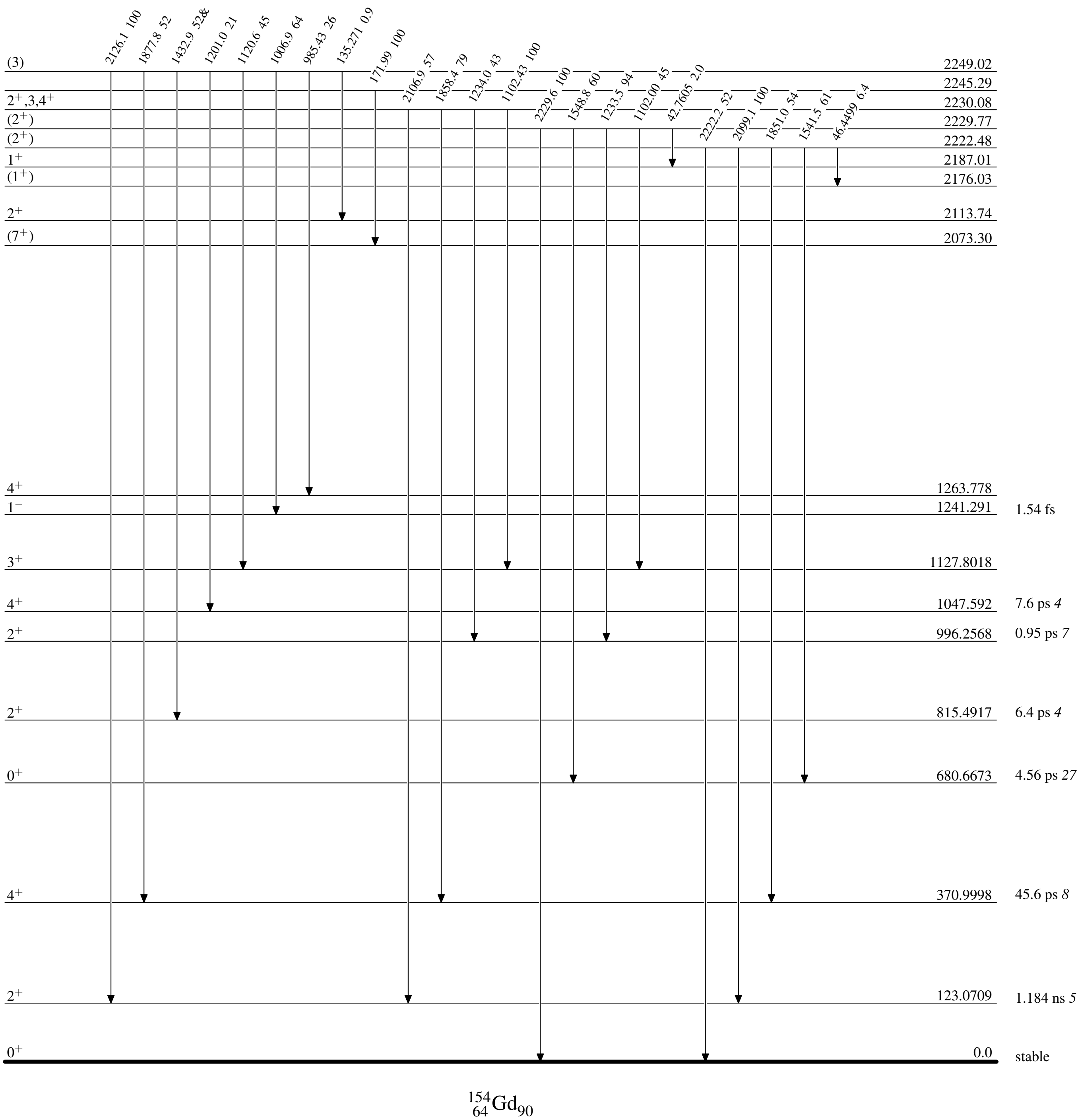
Legend



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

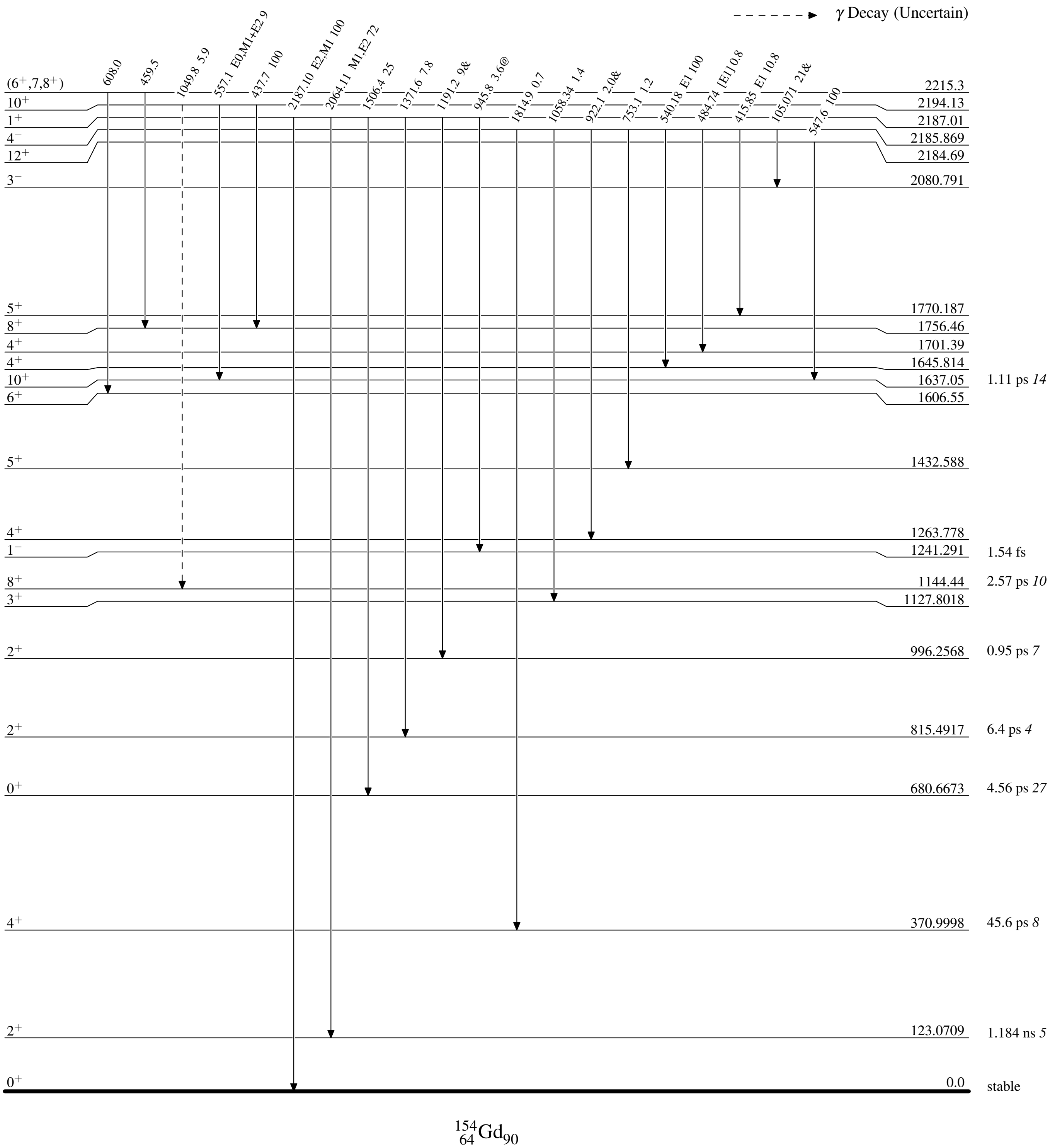


Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

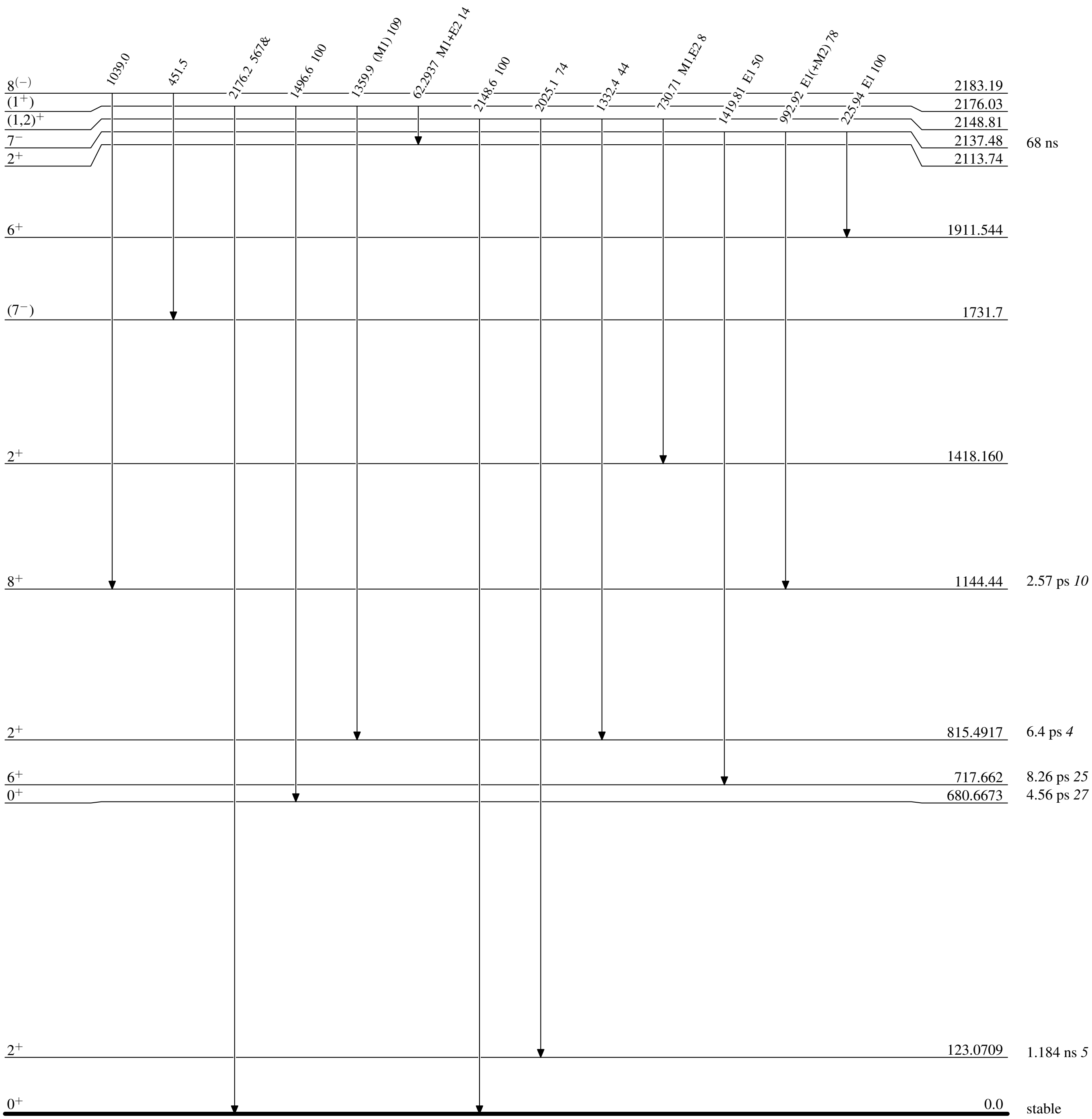
Legend



Adopted Levels, Gammas

Level Scheme (continued)

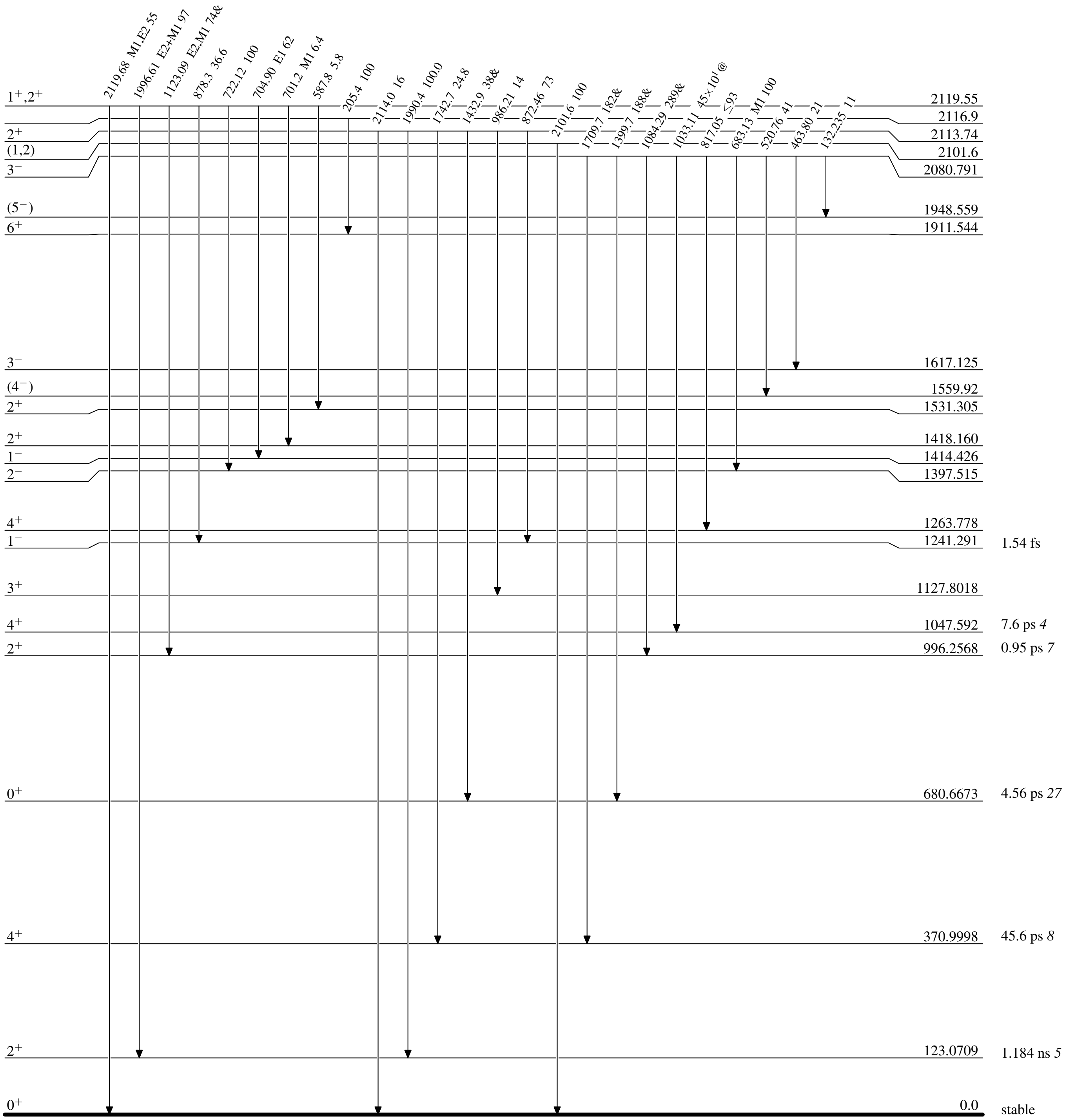
Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided



Adopted Levels, Gammas

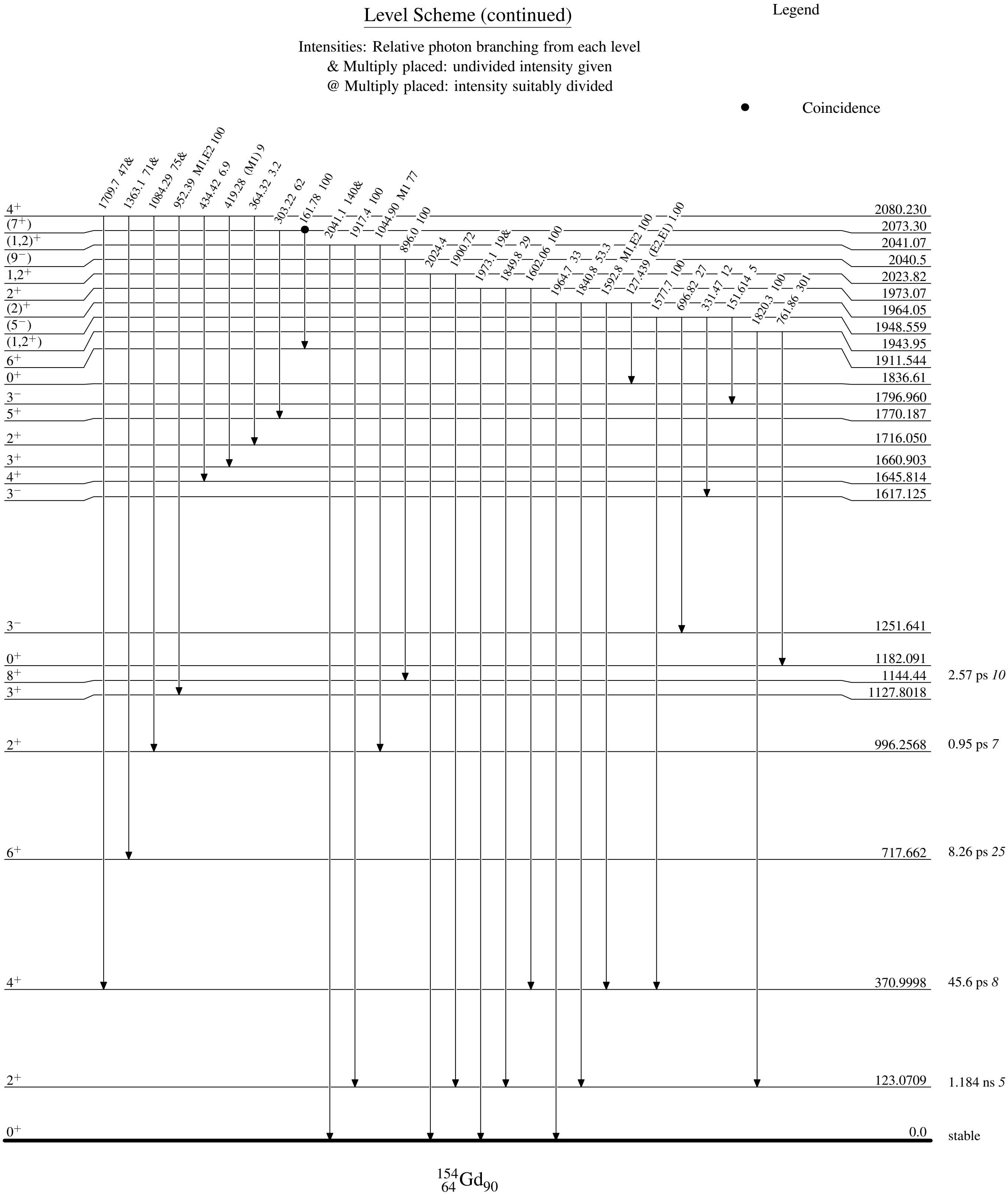
Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided



$^{154}_{64}Gd_{90}$

Adopted Levels, Gammas



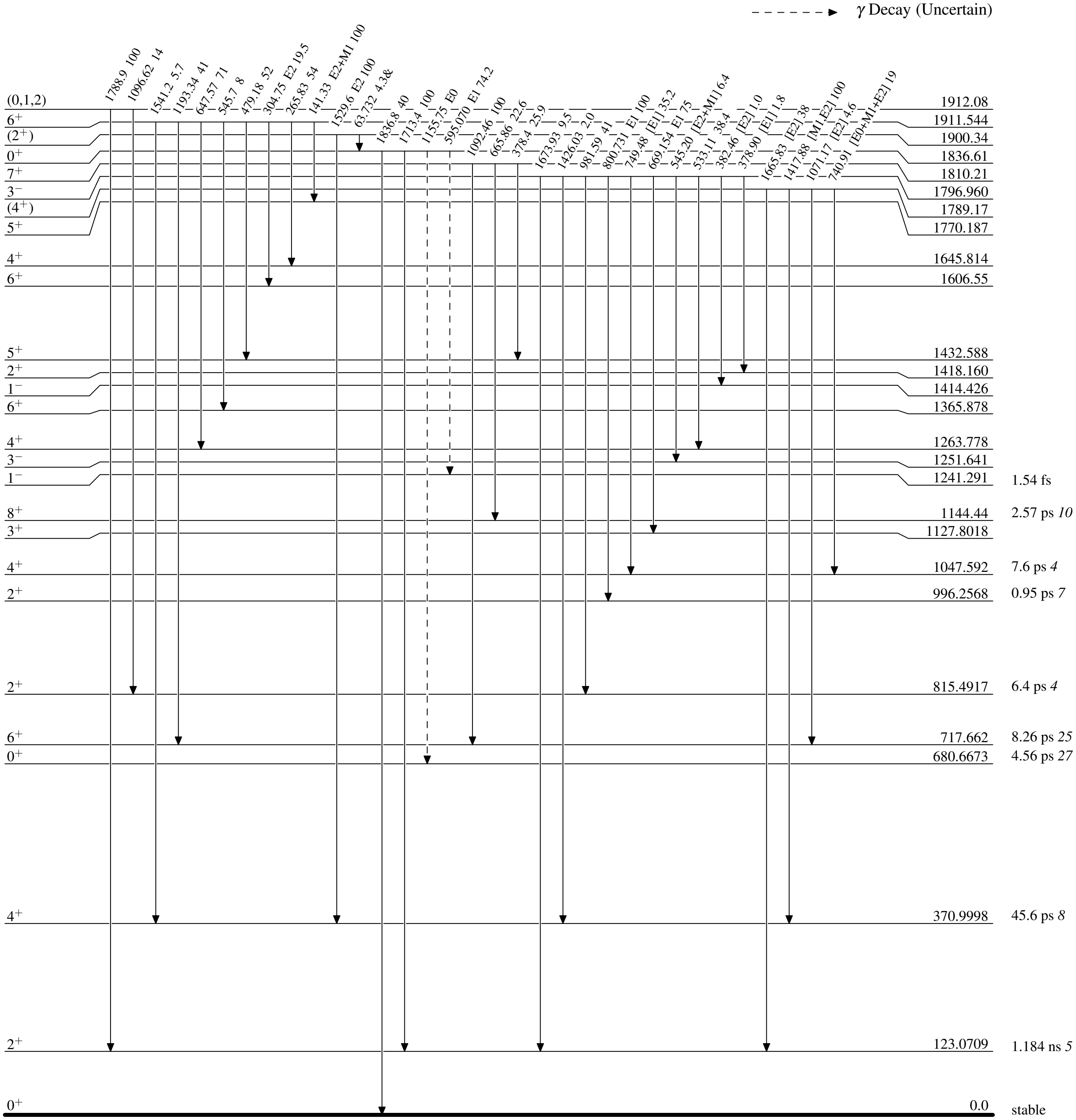
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend

γ Decay (Uncertain)

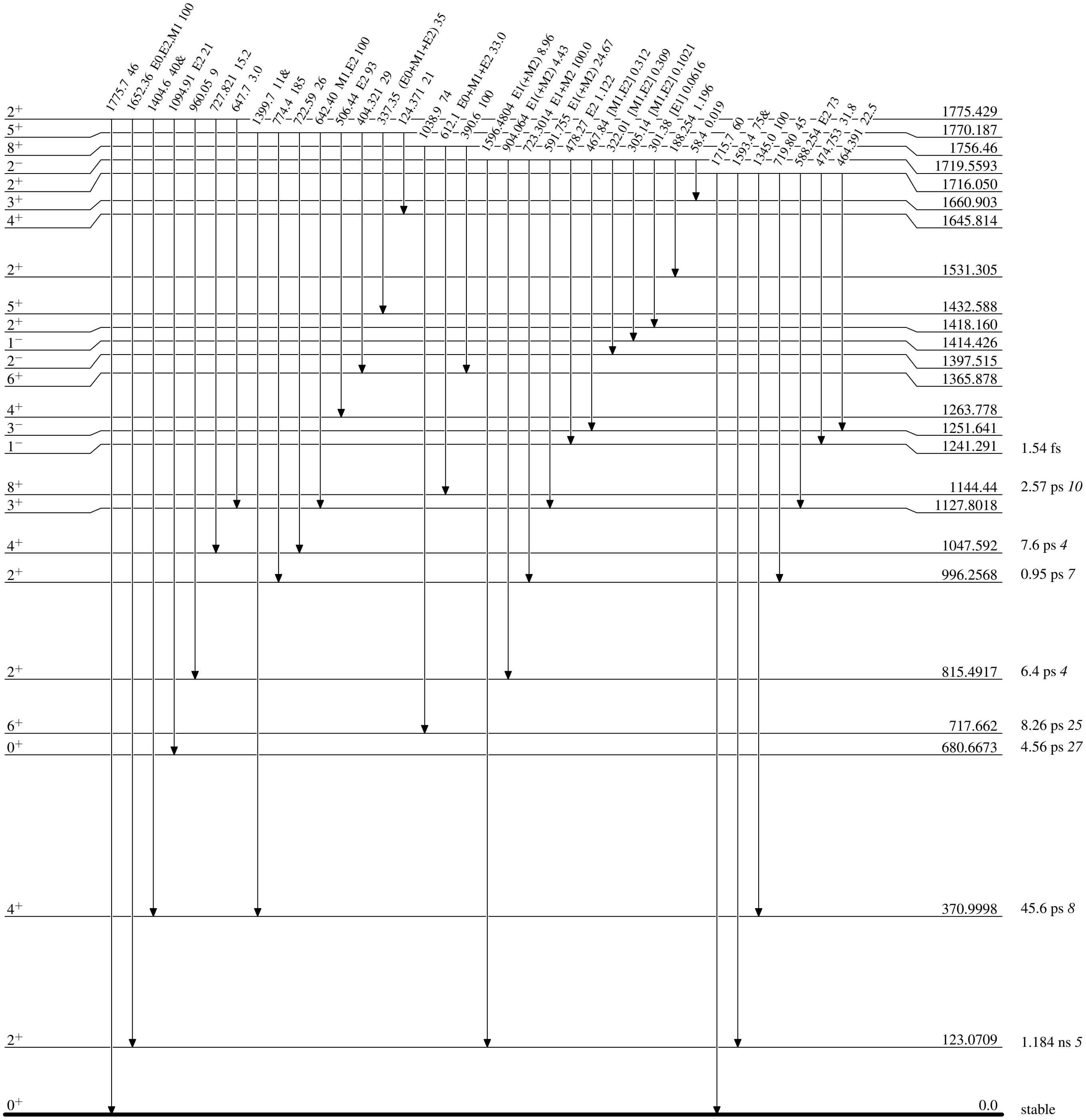


$^{154}_{64}Gd_{90}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

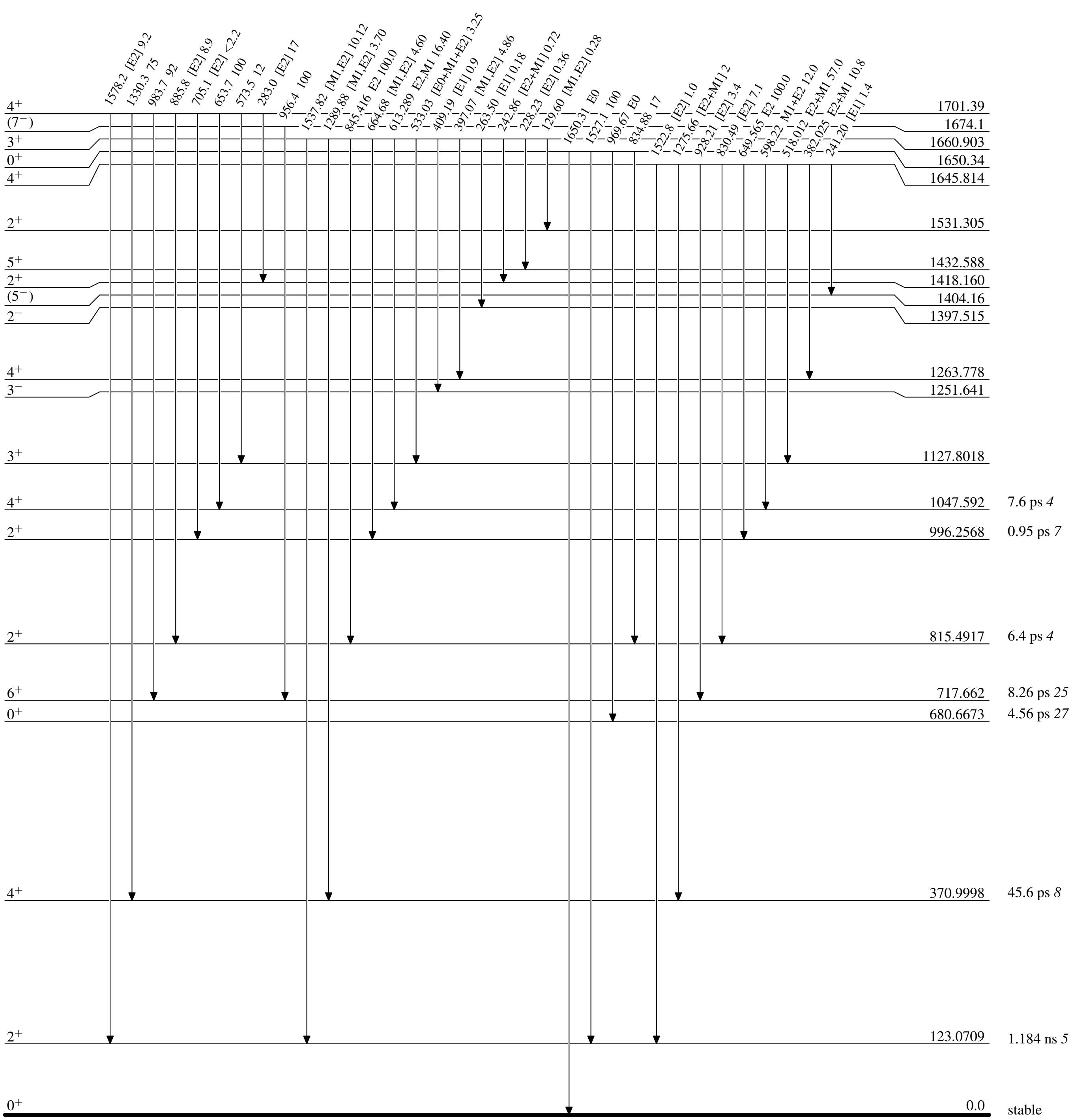


$^{154}_{64}Gd_{90}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

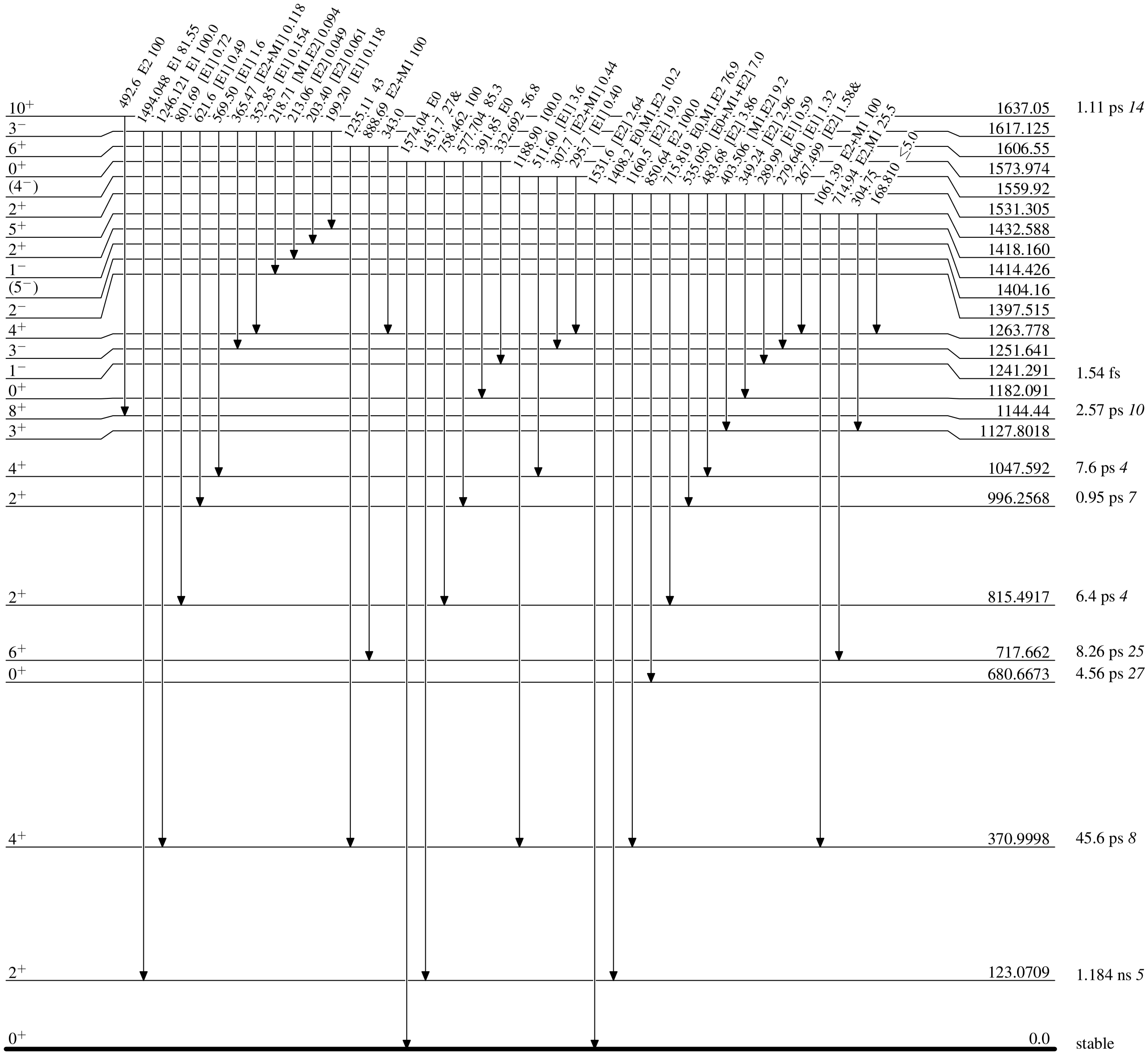


$^{154}_{64}Gd_{90}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

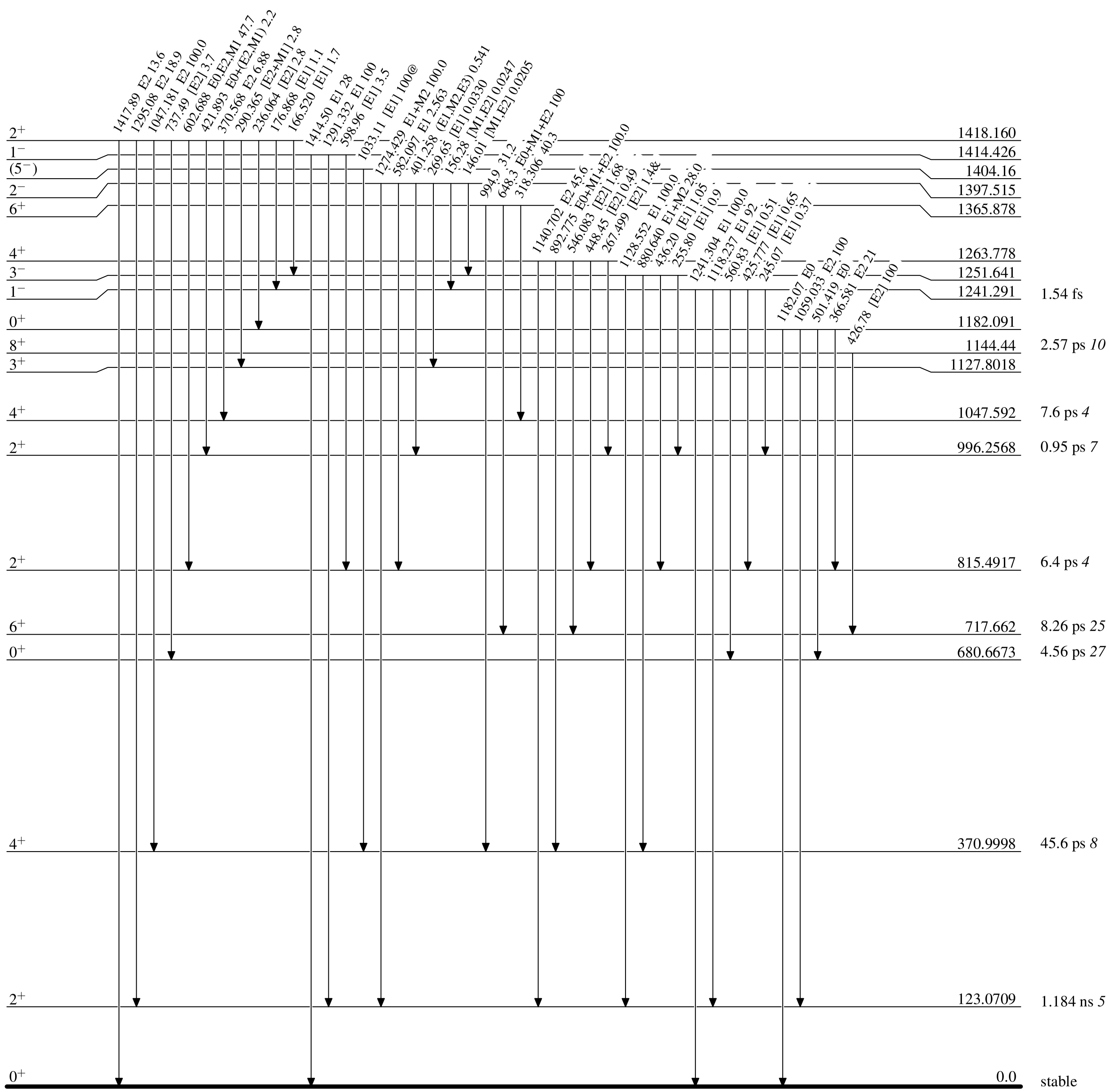


$^{154}_{64}Gd_{90}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

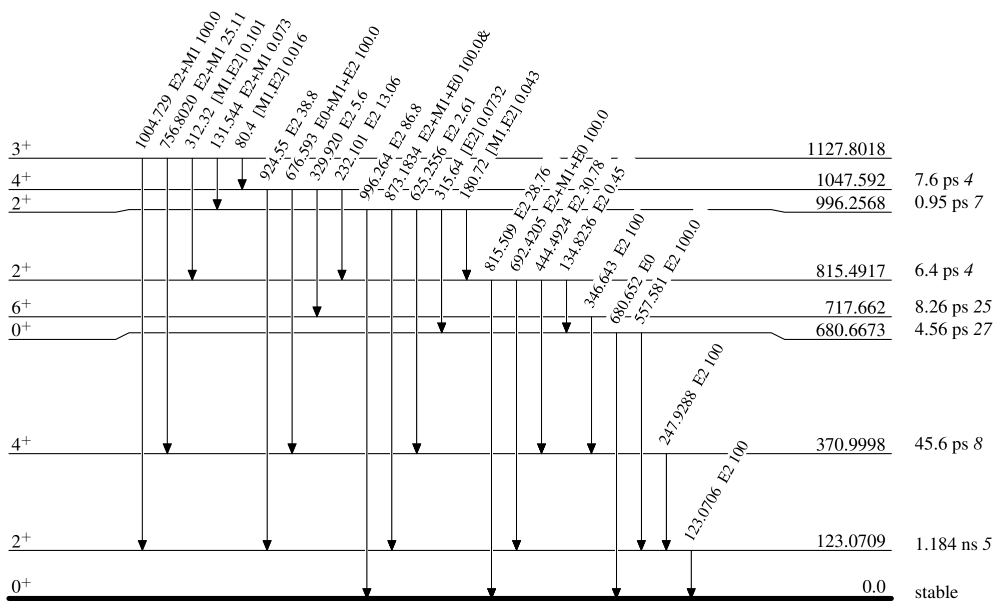


$^{154}_{64}Gd_{90}$

Adopted Levels, Gammas

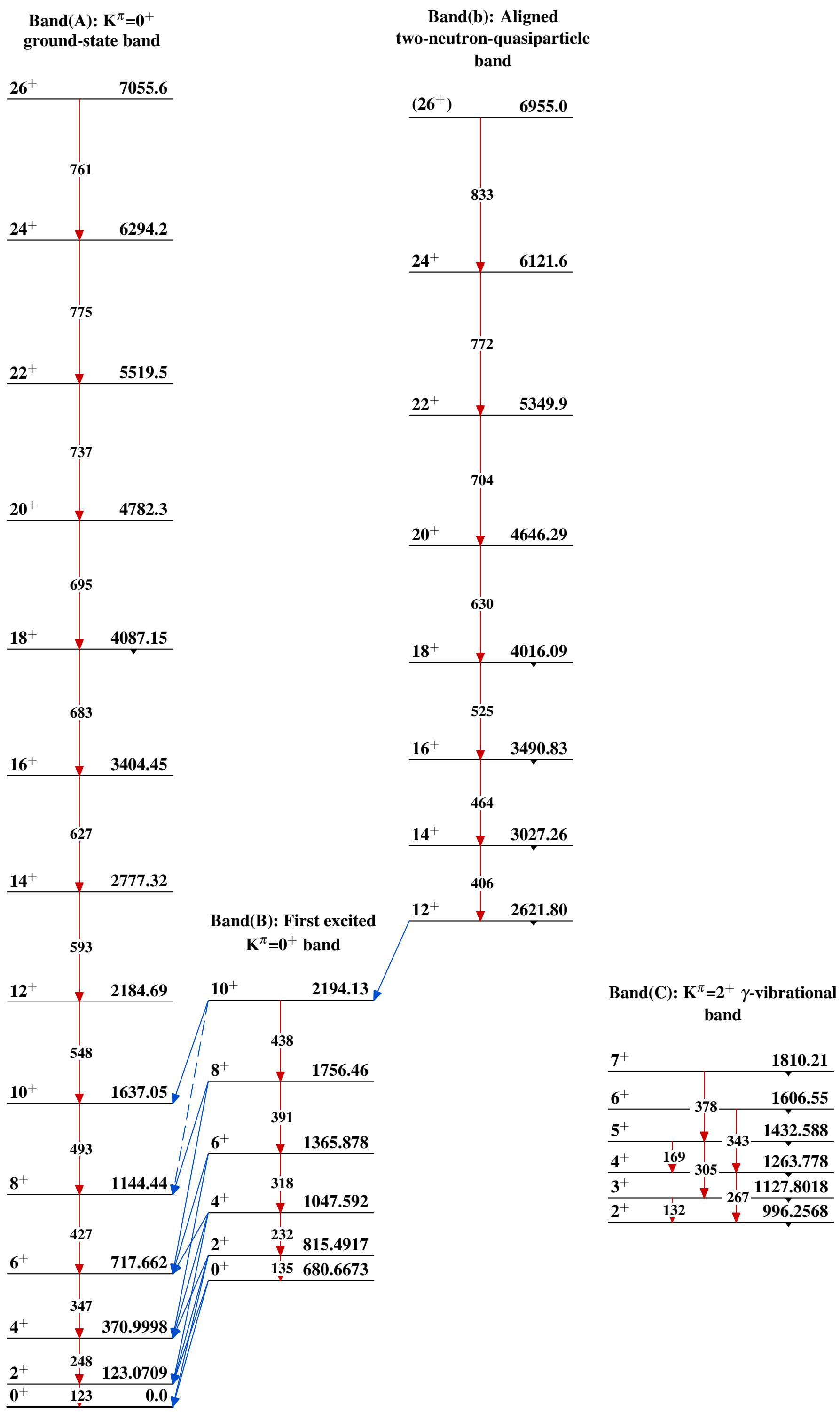
Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided



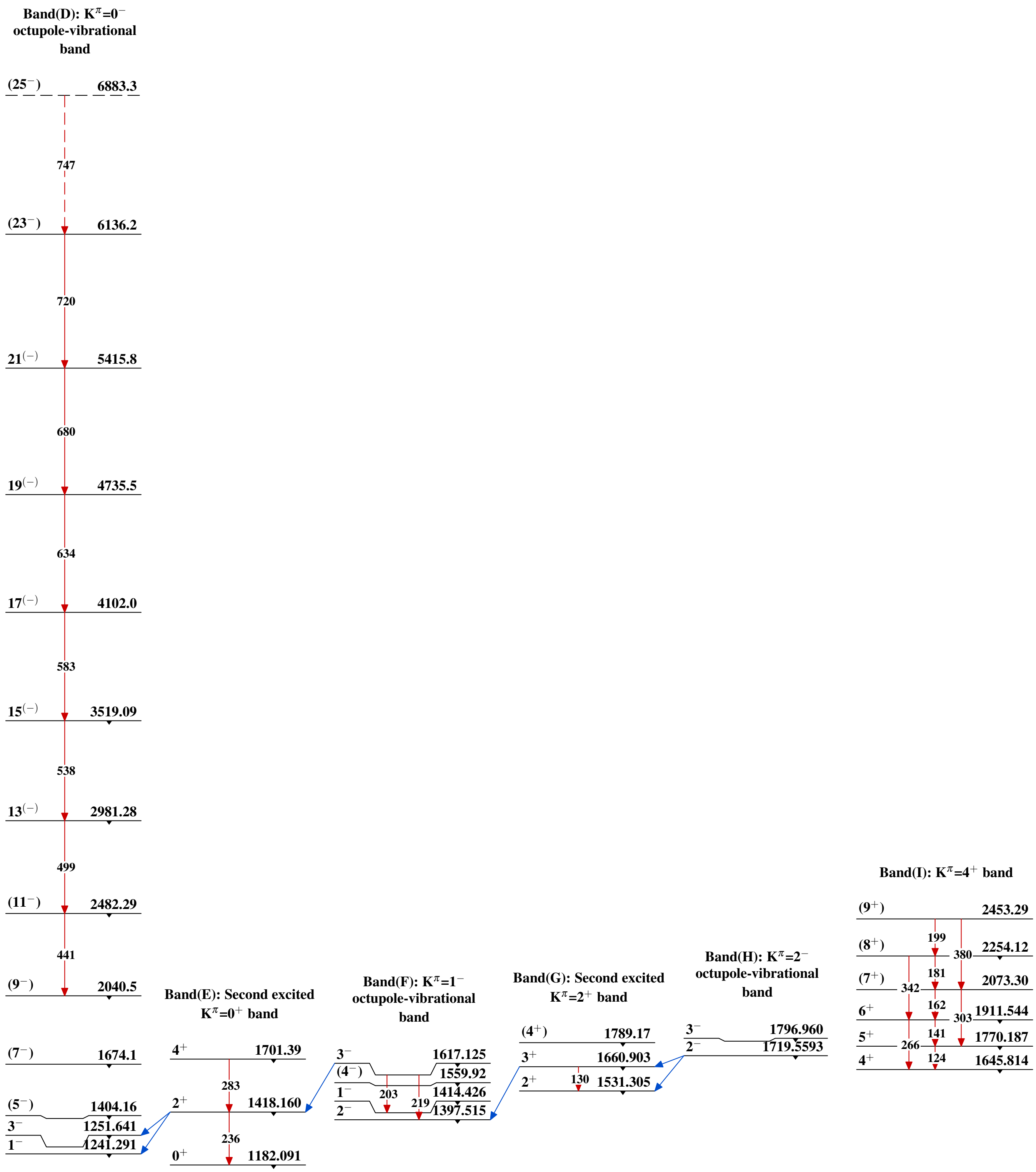
$^{154}_{64}Gd_{90}$

Adopted Levels, Gammas



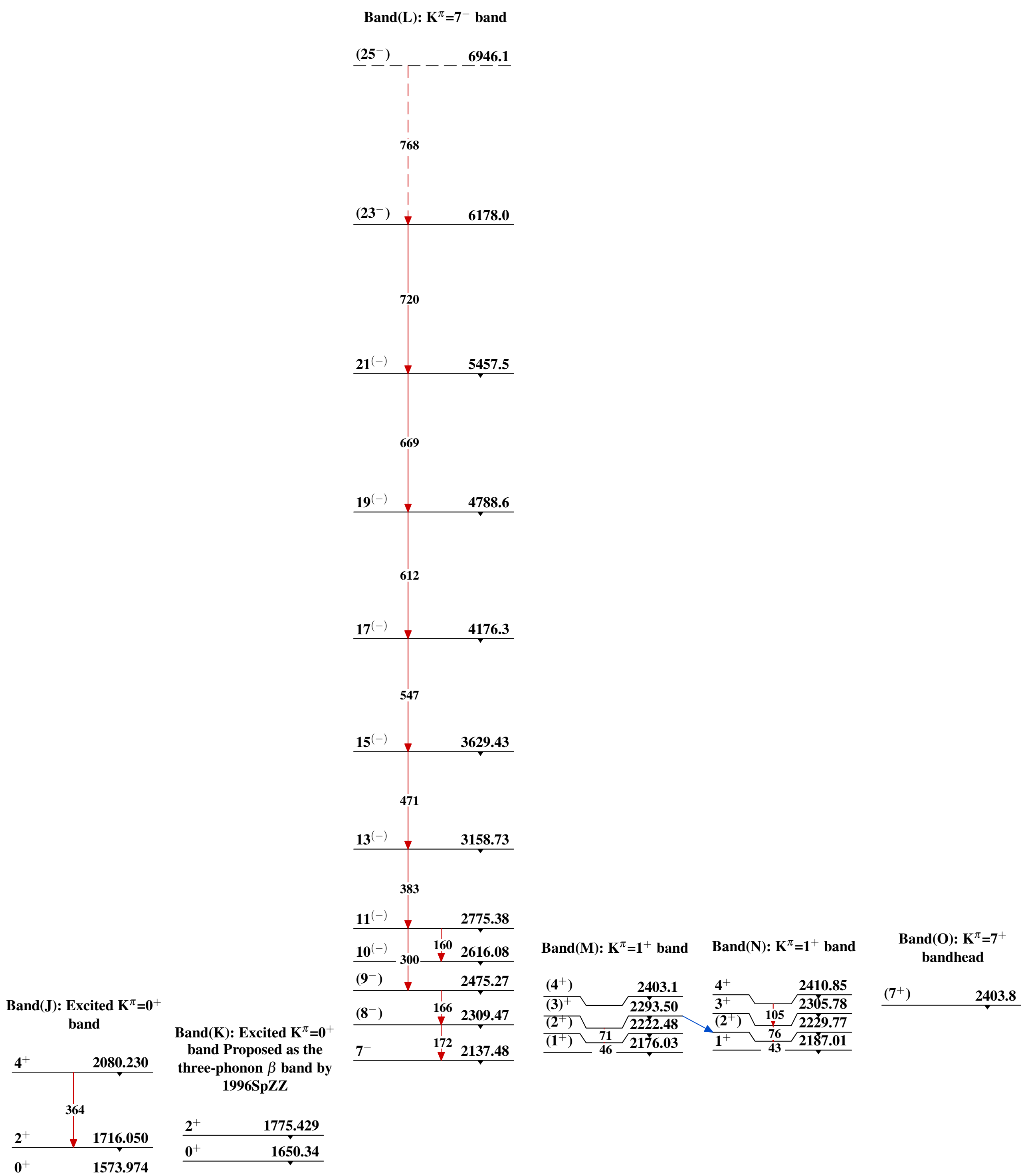
$^{154}_{64}Gd_{90}$

Adopted Levels, Gammas (continued)



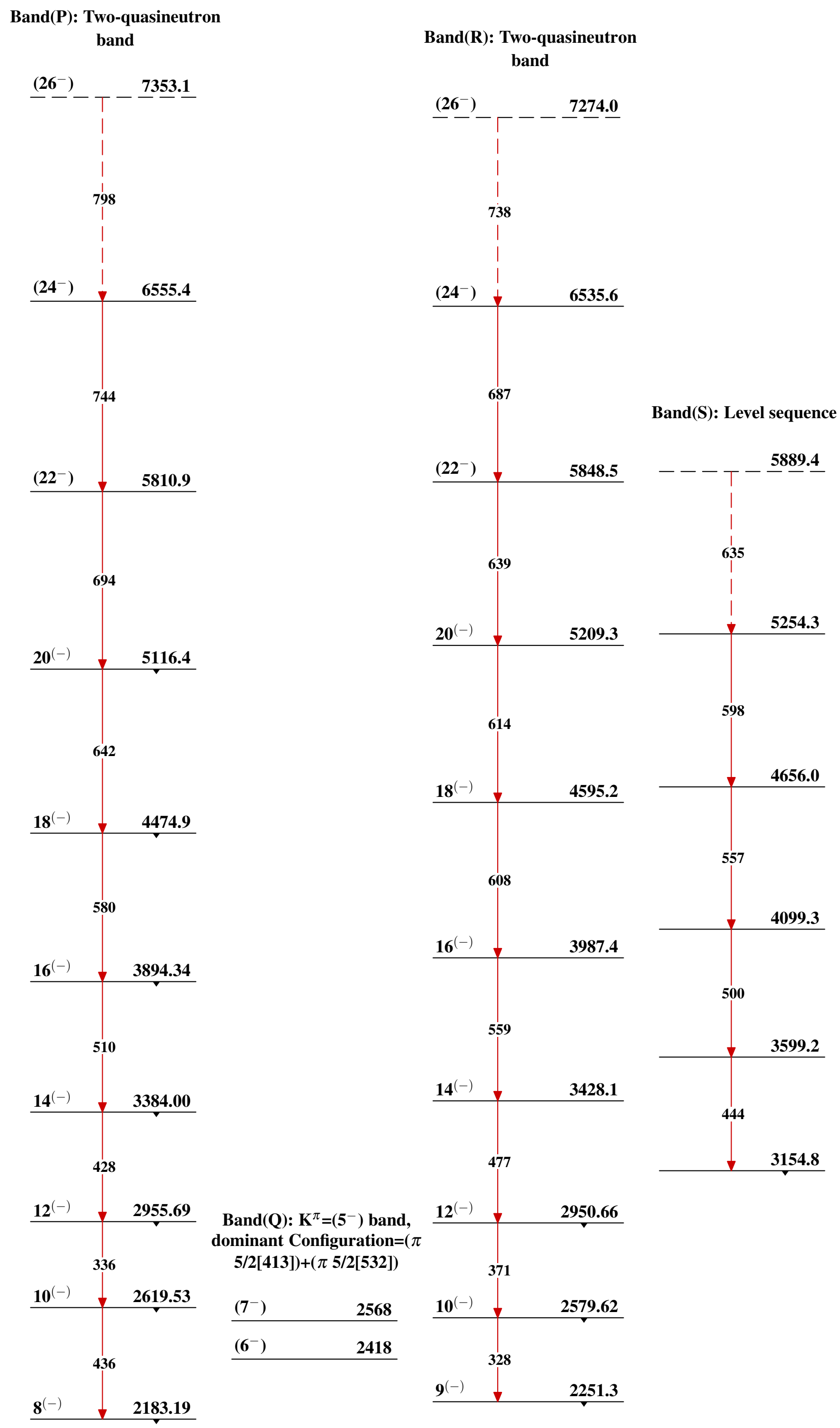
$^{154}_{64}Gd_{90}$

Adopted Levels, Gammas (continued)



$^{154}_{64}Gd_{90}$

Adopted Levels, Gammas (continued)



$^{154}_{64}Gd_{90}$

Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	C. W. Reich	NDS 113, 2537 (2012)	1-Mar-2012

Q(β^-)=−2444 *4*; S(n)=8536.35 *7*; S(p)=8005.8 *9*; Q(α)=−197.2 *3* 2017Wa10
S(2n)=14971.59 *7*; S(2p)=14657.7 *9* 2017Wa10
Additional information 1.

The data summarized here are from 15 different excitation modes: ^{156}Eu β^- decay; ^{156}Tb ε+β^+ decay (5.35 d); ^{155}Gd(n,γ), with E_n=th, 1.9 keV and 58 keV; in-beam spectroscopy (^{154}Sm(α,2nγ)); ^{156}Gd(n,n′γ); (p,t); (t,p); (d,t); (d,p); Coul. ex.; ^{156}Gd(p,p′) and (d,d′); and ^{156}Gd(γ,γ′) and (e,e′). Other excitation modes given in this evaluation, but which did not yield data used here include: ^{156}Gd(μ,γ); and ^{156}Tb ε+β^+ decay (5 h). Since these latter studies have no reported levels, they are not included in the Cross References. In addition, experimental and theoretical studies of the double-β decay of ^{156}Dy have recently appeared. These are referred to here, although they yield no new information regarding the ^{156}Gd levels.

^{156}Gd has been suggested to be an example of a proposed tetrahedral ($Y_3^{\pm2}$) symmetry. 2010Je02, in (n,γ), find a 131.983 transition corresponding to energy difference between 5$^-$ and 3$^-$ levels, within uncertainty (as per an e-mail correspondence to the editors from Dominique Curien, co-author of 2010Je02), in the K$^\pi$=1$^-$ octupole band, suggesting that this is evidence against such a symmetry. 2010Do13 call this conclusion into question, citing studies suggesting that other effects might be present which could account for this transition.

Because of the way in which the (n,n′γ) and (e,e′) data are shown in the respective studies, a number of levels that are actually populated there may not be included in the appropriate Cross Reference listing. See the comments in these two data sets.

^{156}Gd Levels

Levels populated by primary γ-ray transitions following thermal-neutron capture for which no other data are available are not included here. For information on these levels, see the ^{155}Gd(n,γ) E=th Data Set.

Model discussions of possible interest include:

Calculation of level energies, configurations, B(E2), or B(E3)(W.u.): 1967Su01, 1975Bi13, 1980De34, 1984SoZU, 1985So02, 1986No12, 1988Ba17, 1988De36, 1988Va20, 1990Ch18, 1990Ha22, 1990Se16, 1993So20, 1994So02, 1996So19, 1997So26.

Empirical formula for ground-state band level energies: 1988Ab07.

Calculation of deformation and Q: 1989BlZX.

Separation of p and n deformation: 1986ElZW.

E4 strength distribution: 1988Wu01.

Fragmentation of E3 strength: 1990Co26.

M1 strength distribution and decay of 1$^+$ levels: 1987HeZQ, 1989De42, 1990Fa09, 1990Vl01, 1990Za08, 1990Za13, 1990Zi05, 1991Ra03.

Cross Reference (XREF) Flags

A	^{156}Dy 2ε decay	G	^{150}Nd(^{13}C,α3nγ)	M	^{158}Gd(p,t)
B	^{155}Gd(n,γ) E=th	H	Coulomb excitation	N	^{154}Gd(t,p)
C	^{155}Gd(n,γ) E=1.9 keV	I	^{155}Gd(d,p)	O	^{156}Eu β^- decay
D	^{155}Gd(n,γ) E=58 keV	J	^{157}Gd(d,t)	P	^{156}Tb ε decay (5.35 d)
E	^{156}Gd(n,n′γ)	K	^{156}Gd(p,p′),(d,d′)		
F	^{154}Sm(α,2nγ)	L	^{156}Gd(γ,γ′),(e,e′)		

E(level)†	J$^\pi$‡	$T_{1/2}$	XREF	Comments
0.0@	0$^+$	stable	ABCDEFGHIJKLMNOP	The change in the charge radius, Δ<r^2>, between various Gd isotopes has been deduced from isotope-shift data. These data are from shifts in K x-ray energies (1969Bh02), muonic atom x-ray energies (1983La08), and optical wavelengths (evaluation of 1974He28, and 1987Bo58, 1988Al40 in plot only, 1988Kr15, 1990Du08, 1990Wa25). 1995Fr22 report an analysis of Δ<r^2> values from

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Adopted Levels, Gammas (continued)

^{156}Gd Levels (continued)

E(level)†	J$^{\pi}$‡	$T_{1/2}$	XREF	Comments
				optical, muonic-atom, and electromagnetic interactions for a number of Gd isotope pairs involving ^{156}Gd. These values are as follows: $\Delta<r^2>$= 0.218 fm^2 *23* for (156-154); 0.111 fm^2 *12* for (156-155); 0.034 fm^2 *4* for (157-156); 0.165 fm^2 *17* for (158-156); and 0.335 fm^2 *35* for (160-156). Some results from individual studies are as follows. For (158-156), $\Delta<r^2>$= 0.144 fm^2 *10* (1969Bh02); 0.169 fm^2 *19* (1983La08); 0.135 fm^2 *20* (1974He28); 0.143 fm^2 *8* (1987Bo58); 0.150 fm^2 *5* (1990Du08); and 0.137 fm^2 *7* (1990Wa25). For (156-154), $\Delta<r^2>$= 0.203 fm^2 *23* (1969Bh02); 0.216 fm^2 *25* (1983La08); 0.174 fm^2 *24* (1974He28); 0.188 fm^2 *10* (1987Bo58); 0.197 fm^2 *9* (1990Du08); and 0.183 fm^2 *9* (1990Wa25). Other: see also the compilation of 1987Au06. From an evaluation of data on nuclear rms charge radii, 2004An14 report $<r^2>^{1/2}$=5.1458 fm *14*.
88.970@ *1*	2+	2.21 ns *2*	ABCDEFGHIJKLMNOP	μ=+0.774 *8*; Q=−1.93 *4* The change in the charge radius, $\Delta<r^2>$, between the 88- and 0-keV levels has been deduced to be +0.0024 fm^2 *10* (1965Fi03) and +0.0026 fm^2 *8* (1968He23), from Mossbauer measurements, and 0.0043 fm^2 *37* (1983La08), from muonic atom x-ray energies. J$^{\pi}$: E2 γ to 0+ level. $T_{1/2}$: Weighted average of 2.19 ns *7* (1959Be57), 2.16 ns *6* (1963Fo02), 2.21 ns *6* (1968Ku03), and 2.25 ns *5* (1968Wa08) from ^{156}Tb ε decay; 2.22 ns *6* (1962Ba38), 2.17 ns *5* (1965Me08), and 2.22 ns *8* (1966Mc07) from ^{156}Eu β^- decay; and 2.05 ns *10* (1959Bi10) and 2.28 ns *6* (1967Wo06) from Coul. ex. Other: 1.9 ns *1* (1958Na01). $T_{1/2}$: From B(E2)=4.62 *2* (Coul. ex.), $T_{1/2}$=2.26 ns *5*. μ: From the evaluation of 1989Ra17 and based on the data of 1974Ar23. See also 2005St24. Others: 1961Ba38, 1962Ba38, 1967Wo06, 1968Pe05, 1970Be36, and 1970Wa26. Q: From the evaluation of 1989Ra17 and based on the data of 1983La08. The other value quoted in 1989Ra17 (−1.96 *4*) is based on data from 1974Ar23. See also 2005St24. Others: 1967St17 and 1968To16.
288.187@ *1*	4+	111.9 ps *17*	B DEFGHIJK MNOP	μ=+1.24 *8*; B(E4)↑=0.23 *3* J$^{\pi}$: L=4 in (p,t), E2 γ to 2+. $T_{1/2}$: Weighted average of 100 ps *20* (1959Of11), 118 ps *7* (1968Ku03), 115 ps *3* (1968Wa08), and 108 ps *2* (1990Sc10) from ^{156}Tb ε decay and 114 ps *2* (1972Wa29) from Coul. ex. Others: <200 ps (1959Be57) from ^{156}Tb ε decay and 114 ps (1962Af01) from Coul. ex. $T_{1/2}$: From B(E2)(2+→4+)=2.6 *5* from Coul. ex., $T_{1/2}$= 103 ps *21*. μ: From the evaluation of 1989Ra17 and based on data of 1988Al33. Some of the same authors (1990Sc10) have recalculated this value to be 1.31 *8*. 1991St01 give 1.56 *16*, measured relative to the value for the 2+ level. See also 2005St24. Others: 1967Bo32; 1968We17; 1975Kh03. B(E4)↑: From Coul. ex.
584.715@ *3*	6+	15.8 ps *4*	B EFGH JK MN P	μ=+1.5 *13* J$^{\pi}$: L=6 in (p,t), E2 γ to 4+. $T_{1/2}$: From Coul. ex. μ: From the evaluation of 1989Ra17 and based on data of 1988Al33. See also 2005St24. 1991St01 give 2.2 *4*, measured relative to the value for the 2+ level.

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Adopted Levels, Gammas (continued)

^{156}Gd Levels (continued)

E(level)[†]	J^{π}[‡]	$T_{1/2}$	XREF	Comments
965.134[@] 6	8^+	4.32 ps 23	B FGH J	J^{π}: E2 γ to 6^+ member of the g.s. band, population in Coul. ex. and expected band structure. $T_{1/2}$: From Coul. ex.
1049.487[&] 2	0^+	1.8 ps +19−6	ABCDEF H K MNO	E(level): E=1052 in Coul. ex. J^{π}: E0 to 0^+ g.s., L=0 in (p,t) and (t,p), $\gamma\gamma(\theta)$ for 0→2→0 cascade. $T_{1/2}$: From 1993Kl03, (n,γ).
1129.437[&] 2	2^+	1.59 ps 11	ABCDEF H JKLM OP	J^{π}: E2 γ to 0^+, L=2 in (p,t). $T_{1/2}$: Computed from B(E2)=0.0158 9 (Coul. ex.). Other: 1.3 ps +5−4, from (n,γ).
1154.152[a] 2	2^+	0.568 ps 19	ABCD F HIJKLMNOP	J^{π}: E2 γ to 0^+ g.s., L=2 in (p,t). $T_{1/2}$: Computed from B(E2)=0.117 4, from Coul. ex. Others: $T_{1/2}$<0.35 ns, from β^- decay; 0.78 ps +11−9, from (n,γ).
1168.186[c] 7	0^+	5 ps +5−3	ABCDEF IJ MNO	XREF: M(1172). J^{π}: E0 transition to 0^+, L=0 in (p,t) and (t,p), $\gamma\gamma(\theta)$ for 0→2→0 cascade. $T_{1/2}$: From 2000ApZZ, (n,γ).
1242.480[e] 4	1^-	31 fs +22−9	BCDEF H JKL OP	J^{π}: E1 γ's to 0^+ and 2^+ levels. $T_{1/2}$: From width data in (γ,γ'). Other: 110 fs +13−11 (1993Kl03), (n,γ).
1248.006[b] 2	3^+	0.58 ps 11	BCDEF I m P	XREF: m(1251). J^{π}: M1 components in γ's to 2^+ and 4^+ levels. $T_{1/2}$: From 2000ApZZ, (n,γ).
1258.075[c] 3	2^+	1.54 ps 15	BCDEF HIJ LmNOP	XREF: m(1251). J^{π}: E2 γ's to 0^+ and 4^+ levels. $T_{1/2}$: Computed from B(E2)=0.0077 7 from Coul. ex. Other: 2.4 ps +11−8, from 2000ApZZ in (n,γ).
1276.138[e] 2	3^-	0.098 ps 20	BCDEF HIJK MNOP	B(E3)↑=0.171 7 B(E3)↑: From Coul. ex. J^{π}: E1 γ's to 2^+ and 4^+ levels. $T_{1/2}$: Average of 0.121 ps +11−10 from (n,γ) and 0.075 ps 15 from Coul. ex.
1297.822[&] 2	4^+	1.6 ps +8−5	BCDEFGHIJK MN P	J^{π}: From E2 γ's to 2^+ and 6^+ levels, L=4 in (p,t), and E0 component in γ to 4^+ level. $T_{1/2}$: From 2000ApZZ, (n,γ).
1319.658[f] 2	2^-	>3.9 ps	BCD F JK OP	XREF: K(1324?). J^{π}: E1 γ to 2^+, feeding in resonance-averaged n capture, and proposed band structure. $T_{1/2}$: From 1993Kl03, (n,γ).
1355.422[a] 2	4^+	0.54 ps +15−12	B F HIJK Mn P	XREF: n(1360). J^{π}: L=4 in (p,t), E2 γ to 2^+ level. $T_{1/2}$: From 2000ApZZ, (n,γ).
1366.529[i] 4	1^-	17 fs 6	BCDEF IJ L nOP	XREF: n(1360). J^{π}: E1 γ's to 0^+ and 2^+ levels. $T_{1/2}$: Average of: 24 fs +6−2, (1993Kl03), (n,γ); and 11 fs +6−3, from width data in (γ,γ').
1408.133[e] 5	5^-	0.15 ps +12−2	B EF HIJK MN P	J^{π}: E1 γ's to 4^+ and 6^+ levels.
1416.078[@] 21	10^+	1.90 ps 8	EFGH	μ=+3.4 5 J^{π}: E2 γ to 8^+ level, populated in Coul. ex., and expected band structure. $T_{1/2}$: From Coul. ex. μ: Computed by evaluator from g-factor(10^+)/g-factor(2^+)= 0.89 12 from evaluation of 1989Ra17 and based on data of 1983Ha24.

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Adopted Levels, Gammas (continued)

^{156}Gd Levels (continued)

E(level)†	J^{π}‡	$T_{1/2}$	XREF	Comments
1462.297[c] *3*	4^+		B EF HIJK MN P	XREF: M(1459)N(1465). J^{π}: E2 γ's to 2^+ and 6^+ levels.
1468.506[f] *2*	4^-	>3.5 ps	BCD F P	J^{π}: E1 γ to 4^+ level, E2 γ to 2^-, and expected band structure. $T_{1/2}$: From 1993Kl03, (n,γ).
1506.863[b] *2*	5^+	0.4 ps *+8−3*	B EFG IJ P	J^{π}: E2 γ's to 3^+ and 6^+ levels, and expected band structure. $T_{1/2}$: From 2000ApZZ, (n,γ).
1510.594[g] *2*	4^+	189 ps *5*	B F K M P	μ=+3.24 *11* XREF: M(1505). J^{π}: E2 γ's to 2^+ and 6^+ levels, L=4 in (p,t) (to level at 1505). $T_{1/2}$: Weighted average of 188 ps *10* (1959Be57), 190 ps *11* (1993Kl03), and 190 ps *6* (1968Wa08) from ^{156}Tb ε decay. μ: From the evaluation of 1989Ra17 and based on data of 1988Al33. See also 2005St24. Other: 1968We17 and 1975Kh03.
1538.851[i] *4*	3^-	20 fs *6*	BCDEF HIJ P	B(E3)↑=0.038 B(E3)↑: From 1993Su16, Coul. ex. J^{π}: E1 γ's to 2^+ and 4^+ levels. $T_{1/2}$: From 1993Kl03, (n,γ).
1540.190[&] *10*	6^+		B EF H	J^{π}: E0 component in transition to a 6^+ level, and expected band structure.
1576.87 *24*			J	
1595 *7*			N	
1622.535[g] *2*	5^+		B EF I P	J^{π}: M1 components in γ's to 4^+ and 6^+ levels.
1638.00[e] *5*	7^-		EF HIJ	XREF: H(1633). J^{π}: E1 γ to 6^+ level and expected band structure.
1643.653[a] *6*	6^+		B F H	J^{π}: E2 γ's to 4^+ and 6^+ levels; expected band structure.
1705.799[f] *5*	6^-		B FG IJ	J^{π}: E1 γ to 6^+ level, expected band structure. π=− since γ to 4^- involves no parity change.
1715.211[j] *4*	0^+	2.6 ps *+23−12*	ABCDE MNO	XREF: N(1706). J^{π}: E0 transitions to 0^+ levels. L=0 in (p,t). $T_{1/2}$: From 2000ApZZ, (n,γ).
1753.653[g] *3*	6^+		B EF J N	J^{π}: E2 γ to 4^+ level, M1+E2 γ to 5^+ member of the $K^{\pi}=4^+$ band, and expected band structure.
1765.61[c] *10*	6^+		EF Hij	XREF: i(1767.8)j(1768.5). J^{π}: From expected band structure and γ's to 4^+ and 6^+ levels.
1771.092[j] *4*	2^+	0.42 ps *+14−9*	ABCDE ijK M O	XREF: i(1767.8)j(1768.5). J^{π}: E1 γ's to 1^- and 3^- levels. L=2 in (p,t). $T_{1/2}$: From 1993Kl03, (n,γ).
1780.486[k] *3*	2^-	0.7 ps *+16−3*	BCD J OP	J^{π}: γ's to 2^+, 2^- and 4^- levels. Bandhead of 2^- octupole band. $T_{1/2}$: From 1993Kl03, (n,γ).
1798.717?[i] *10*	(5^-)		B	
1804.0 *7*			J	
1827.841[l] *4*	2^+		ABCD IJK M OP	XREF: J(1831). J^{π}: E0 component in γ to 2^+ level, L=2,3 in (p,t).
1848.33[&] *10*	8^+		EF H	J^{π}: γ's to 6^+ and 8^+ levels, possible E0 component in γ to 8^+ level, and expected band structure.
1849.84[b] *6*	7^+		EFG	J^{π}: γ's to 5^+ and 8^+ levels, expected band structure.
1851.278[m] *7*	0^+		ABCDE j mnO	XREF: j(1851)m(1853)n(1854). J^{π}: E0 transition to 0^+ level.
1851.803[k] *4*	3^-		BCDE jK mn P	XREF: j(1851?)m(1853)n(1854). J^{π}: E1 γ's to 2^+ and 4^+ levels.
1861.067[n] *3*	4^+		B E IJ n P	XREF: n(1854). J^{π}: From M1,E2 γ's to 4^+ and 5^+ levels and expected band

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Adopted Levels, Gammas (continued)

^{156}Gd Levels (continued)

E(level)[†]	J^{π}[‡]	$T_{1/2}$	XREF	Comments
				structure.
1893.390[j] *6*	4^+		B M	$T_{1/2}$: 2000ApZZ report 0.00010 ps < $T_{1/2}$ < 0.31 ps (from (n,γ)). J^{π}: E1 γ to 5^-, M1 γ's to 4^+ levels, and expected band structure.
1909.26[g] *4*	7^+		EF	J^{π}: E2 γ's to 5^+ and 6^+ levels, (M1+E2) γ to 8^+, and expected band structure.
1914.835[m] *5*	2^+		ABCD I MN	XREF: N(1923). J^{π}: E1 γ's to 1^- and 3^- levels. E0 component in transition to 2^+.
1916.449[l] *4*	3^+		BCDE J	J^{π}: E0 component in transition to 3^+ level, and expected band structure.
1924.49[@] *4*	12^+	1.1 ps *1*	FGH N	XREF: N(?). J^{π}: E2 γ to 10^+ level and expected band structure. $T_{1/2}$: From Coul. ex. (1977Ke06).
1934.155[s] *5*	2^-		BCD ij P	XREF: i(1934.6)j(1934.4). J^{π}: E1 γ's to 2^+ and 3^+ levels. Bandhead of $K^{\pi}=2^-$ band.
1934.355 *5*	3^-	0.5 ps *+6−3*	B ij P	XREF: i(1934.6)j(1934.4). J^{π}: E1 γ's to 2^+ and 4^+ levels. $T_{1/2}$: From 1993Kl03, (n,γ).
1946.344 *10*	1^-	30 fs *+11−6*	ABCDE J L O	XREF: J(1944.5). J^{π}: E1 γ's to 2^+ and 0^+ levels. $T_{1/2}$: Deduced from 35 fs *+11−9* (n,γ) and 23 fs *+12−6* (γ,γ').
1952.364[k] *3*	4^-		BCD jk P	XREF: j(1952)k(1952?). J^{π}: E1 γ's to 3^+ and 5^+ levels.
1952.400 *6*	0^-		ABCD jk O	XREF: j(1952)k(1952?). Possible configurations for this level are discussed by 2005Gr21. They propose conf=π5/2[532]-π5/2[413], but indicate that admixtures of two-neutron-quasiparticle configurations cannot be ruled out. Previously, 1993GrZU (one of the authors of 2005Gr21) had proposed the conf ν3/2[651]-ν3/2[521]. J^{π}: M1 γ's to 1^- levels, E2 γ to 2^-, intensity of feeding primary transition in resonance-averaged n capture.
1958.46[e] *9*	9^-		FGH	J^{π}: E1 γ to 8^+ level, γ to 10^+ level, and expected band structure.
1962.047 *12*	1^-		BCD ij NO	XREF: i(1963.6)j(1963.3)N(1963). J^{π}: E1 γ's to 0^+ and 2^+ levels.
1962.064[n] *3*	5^+		B E ij	XREF: i(1963.6)j(1963.3). J^{π}: M1 γ to 6^+ level, M1 component in γ to 4^+.
1965.113 *5*	4^-		BC ij P	XREF: i(1963.6)j(1963.3). J^{π}: E1 γ's to 3^+ and 5^+ levels.
1965.950[o] *4*	1^+		BCDE ij O	XREF: i(1963.6)j(1963.3). J^{π}: M1 γ to 0^+ level.
1970.2 *8*			I	
1988.5[t] *2*	0^+		A CD M O	J^{π}: L=(0) in (p,t); intensity of feeding primary γ in resonance-averaged n capture.
1995.455 *4*	4^-		B IJ	XREF: I(1992.6). J^{π}: E1 γ to 5^+, M1 to 3^- levels.
2003.749[o] *5*	2^+		ABCD J	J^{π}: E1 γ's to 1^- and 3^- levels.
2010.350 *4*	4^+		B JK	J^{π}: E2 γ's to 2^+ and 6^+ levels.
2011.38[a] *7*	8^+		EF H	XREF: H(2010). J^{π}: From expected band structure and E2 γ to 8^+ level.
2011.9	3^-[#]		CD	
2016.952 *8*	5^-		B IJ	J^{π}: E1 γ's to 4^+ and 6^+ levels.
2020.594[l] *5*	4^+		B	J^{π}: E2 γ to 6^+, γ to 2^+ levels.
2024.945[s] *5*	3^-		BCD J MN	XREF: J(2025.5)M(2022?)N(2027?). J^{π}: E2 γ's to 1^- and 5^- levels. The evaluator has tentatively assumed that the 2027 level, L=(0), in (t,p) and the 2022 level, L=0+2, in (p,t) are to be identified with this level.

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Adopted Levels, Gammas (continued)

^{156}Gd Levels (continued)

E(level)[†]	J^{π}[‡]	$T_{1/2}$	XREF	Comments
2026.664[p] *6*	1^+	53 fs *+16−10*	BCD L O	B(M1)↑=0.20 *6* B(M1) is from (γ,γ′). J^{π}: M1 γ′s to 0^+ levels. $T_{1/2}$: Deduced by the evaluator from 65 fs *+19−14*, from (n,γ), and 41 fs *+17−9*, from (γ,γ′).
2027.61[f] *4*	8^-		FG	J^{π}: E2 γ to 6^- level, γ to 8^+ level, and expected band structure.
2029.784 *4*	4^-		BCD IJ P	XREF: J(2033). J^{π}: E1 γ to 5^+, M1 γ to 3^-.
2040 *5*	4^+,(3^-)		K	J^{π}: From L=4,(3) in (p,p′).
2044.944[q] *5*	4^-		BCD P	J^{π}: E1 γ′s to 3^+ and 5^+ levels.
2047.805[t] *6*	2^+		BCDE IJ Mn	XREF: E(2049.0)n(2051). J^{π}: E2 γ to 0^+ g.s.
2054.134[p] *6*	2^+	0.19 ps *+4−3*	BCD J nO	XREF: n(2051). J^{π}: From M1 γ′s to 2^+ levels and γ′s to 0^+ and 4^+ levels. $T_{1/2}$: From 1993Kl03, (n,γ).
2058.0?[j]	(6^+)		E	Reported only in (n,n′γ). Assigned there as the 6^+ member of an excited $K^{\pi}=0^+$ band.
2064.06 *12*			J	Reported only in (d,t). This lies near a 2066.56, (5^-) level tentatively proposed by 1982Ba28, in (n,γ). However, a subsequent (n,γ) study (1993Kl03) did not confirm this level.
2070.290[o] *4*	3^+		BCD I O	J^{π}: E1 γ′s to 2^- and 4^- levels.
2079.42[g] *6*	8^+		F	J^{π}: M1+E2 γ to 7^+ level, E2 to 6^+, interpreted as intraband transitions, and expected band structure.
2082.0[u]	0^+[#]		CD J N	
2103.28 *4*	3^-		BCD JK P	XREF: K(2093). J^{π}: E1 γ′s to 2^+ and 4^+ levels.
2106.645[p] *5*	3^+		BCD I	XREF: I(2109.6). J^{π}: M1 γ′s to 2^+ and 4^+ levels.
2116.454[q] *5*	5^-		B	J^{π}: E1 γ′s to 4^+ and 6^+ levels.
2121.43 *3*	2^-		BCD OP	J^{π}: E1 γ to 2^+, γ to 0^+, and intensity of feeding primary transition in resonance-averaged n capture.
2134.34[c] *10*	(8^+)		EF H	J^{π}: γ to 8^+ level, and expected band structure.
2137.60[h] *5*	7^-	1.3 μs *1*	F	J^{π}: E1 γ to 7^+ level, γ to 6^+ level indicates $J^{\pi}=6^-,7^-$. γ(θ) for 228γ rules out 6^-. $T_{1/2}$: From delayed γ(t) in (α,2nγ).
2139.8	3^+[#]		CD IJ	Probable bandhead of a $K^{\pi}=3^+$ band.
2147.4[u]	2^+[#]		CD	
2155.554[s] *7*	4^-		BCD	J^{π}: M1 γ to 4^- indicates π=−. γ′s to 3^- and 6^- levels, and expected band structure.
2160.7	(3^+)[#]		CDE	
2170.8	1^-[#]		CD n	XREF: n(2170).
2174.338[v] *5*	2^+		BCD ijk Mn	XREF: i(2177.8)j(2175.3)k(2177)n(2170). J^{π}: E1 γ′s to 1^- and 3^- levels, E2 γ to 0^+.
2175.07 *4*	4		CD ij P	XREF: i(2177.8?)j(2175.3?). J^{π}: γ′s to 3^+,3^-,5^+,5^- levels indicate J=4. Negative parity proposed by 1995GrZW from resonance-averaged n capture, presumably from the intensity of the feeding primary transition. Note that “M1” transitions from this level feed both positive- and negative-parity states, so one of the mults must be incorrect.
2181.384 *25*	2^+		B Jk P	XREF: k(2177). J^{π}: γ′s to 0^+ and 4^+ levels.
2186.784[r] *13*	1^+		BCD O	J^{π}: M1 γ′s to 0^+ levels.

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Adopted Levels, Gammas (continued)

^{156}Gd Levels (continued)

E(level)[†]	J^{π}[‡]	XREF	Comments
2190.653 5	2^+	BCD M	J^{π}: γ's to 0^+ and 4^+ levels.
2190.9?[p]	4^+[#]	D	
2199.778 12	2^-	BCD IJ O	J^{π}: E1 γ's to 2^+ levels. Strong population in (d,t) suggests presence of the ν1/2[400] Nilsson orbital in this state. Probable $K^{\pi}=2^-$ bandhead. Conf=ν3/2[521]+ν1/2[400].
2203.5 6	$1^-,2^-$[#]	CD O	J^{π}: γ to 1^- level; feeding in resonance-averaged n capture.
2205.569 6	1^-	BCD O	J^{π}: E1 γ's to 0^+ levels.
2216.614[r] 5	2^+	BCD M	XREF: M(2218). J^{π}: E1 γ to 2^- level indicates π=+; L=2,3 in (p,t).
2220.0[&] 3	10^+	F H	J^{π}: E0 component in γ to 10^+ level, and expected band structure.
2227.625 9	3^-	BCD	J^{π}: E1 γ's to 2^+ and 4^+ levels.
2231.5[v]	3^+[#]	CD	
2232.59 7	4^-[#]	CD P	J^{π}: E1 γ to 3^+ indicates $\pi=-$.
2240.375 4	$2^+,3^+$	BCD IJ	XREF: I(2238)J(2240). J^{π}: E1 γ's to $2^-,3^-$ levels.
2249.65[b] 8	9^+	EFG	J^{π}: E2 γ to 7^+ level, γ to 10^+ level, and expected band structure.
2254.314 4	4^+	B JK Mn	XREF: J(2250)K(2257)M(2255)n(2261). J^{π}: M1 γ to 5^+ level, E2 γ to 2^+ level.
2256.746[r] 4	3^+	BCD I	XREF: I(2258). J^{π}: M1 γ's to 2^+ and 4^+ levels.
2259.88 6	1^-	BCD J nO	XREF: n(2261). J^{π}: γ's to 0^+ and 2^+ levels indicate $J^{\pi}=1,2^+$. log *ft*=8.72 in ^{156}Eu β^- decay ($J^{\pi}=0^+$) rules out 2^+. E1 γ to 2^+ indicates $\pi=-$.
2269.937[w] 23	1^+	BCD O	J^{π}: M1 γ to 2^+ level, log *ft*=6.74 from 0^+ parent.
2274.4 6		B IJ	XREF: B(2273.9)J(2274.9).
2287.5 3		F	
2293.45 12	1^-	CD J O	XREF: J(2292.2). J^{π}: γ's to 0^+ and 2^+ levels indicate $J^{\pi}=1,2^+$. log *ft*=7.22 from 0^+ rules out 2^+. From resonance-averaged n capture, $J^{\pi}=1^-$. If this placement of the 2205 γ and its mult are correct, then 1^- is confirmed.
2300.70[x] 7	1^+	CDe O	XREF: e(2301.8). J^{π}: γ's to 0^+ and 2^+ indicates $J^{\pi}=1,2^+$. log *ft*=8.0 from 0^+ rules out 2^+. Resonance-averaged n capture indicates 1^+.
2302.796[w] 11	2^+[#]	BC e IJ mn	XREF: e(2301.8)I(2303)J(2303)m(2305)n(2305). J^{π}: γ's to 1^- and 2^+ levels. 2^+ is proposed from resonance-averaged n capture. 1993Kl03, in (n,γ), propose 1^-, but show no γ's deexciting this level.
2309 5	4^+	K mn	XREF: m(2305)n(2305). J^{π}: L=4 in (p,p′).
2316.501 7	$1^-,2^-$	BC J	XREF: J(2317). J^{π}: E1 γ's to 2^+ levels indicate $J^{\pi}=1^-,2^-,3^-$. M1 component in transition to 1^- rules out 3^-.
2321.9	3^+[#]	CD	
2322.6 10		F	
2323.217[x] 11	2^+	BC IJ M	XREF: I(2321)J(2324). J^{π}: M1 γ's to 2^+, E1 to 1^- indicate $J^{\pi}=1^+,2^+$. M1 to 3^+ and apparent population in (p,t) eliminates 1^+.
2340.2	(2^-)[#]	CD J	
2344.4 4	1^-[#]	CD O	J^{π}: γ's to 0^+ and 2^+ levels indicate $J^{\pi}=1,2^+$. In resonance-averaged n capture, $J^{\pi}=1^-$ is listed.
2349.637[w] 8	3^+[#]	BCD IJ	XREF: I(2351)J(2350). J^{π}: M1 γ's to 4^+ levels, E2 to 5^+ indicate $J^{\pi}=3^+,4^+,5^+$. In resonance-averaged n capture, $J^{\pi}=3^+$ is listed.
2359.98[e] 10	11^-	FGH	J^{π}: E2 γ to 9^- level, possible E1 γ to 10^+, and expected band structure.

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Adopted Levels, Gammas (continued)

^{156}Gd Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	$T_{1/2}$	XREF	Comments
2360.87[y] *14*	1^{+}[#]		BCD O	XREF: B(?)C(?)D(?). 2000GrZY tentatively propose a 2360.35, 1^{+} level, which is listed in the ^{155}Gd(n,γ) Data Set. However, the proposed γ deexcitation differs from that adopted here. The relation of the proposed level at 2360.35 to that adopted here is not clear. J$^{\pi}$: γ to g.s., γ to 3^{+} level indicate J$^{\pi}$=1^{+},2^{+}. Level is assumed to be the same as the 2360.8 level seen in the resonance-averaged n-capture reactions. If so, then J$^{\pi}$=1^{+}. In these latter data sets, this level is assigned as the bandhead of a K$^{\pi}$=1^{+} band, as it is here.
2367.44 *4*	2^{+}		BCD IJ	XREF: J(2365). J$^{\pi}$: γ's to 0^{+} and 4^{+} levels, and E0 component in γ to 2^{+}.
2375 *5*	4^{+}		K n	XREF: n(2377). J$^{\pi}$: From L=4 in (p,p′).
2382.471[y] *11*	2^{+}[#]		BCD IJ Mn	XREF: J(2383)n(2377). J$^{\pi}$: E1 γ to 3^{-} indicates π=+ and J=2,3,4. M1 components in γ's to 2^{+} and 3^{+} levels rules out 4^{+}. 2^{+} indicated from resonance-averaged n capture.
2391.7	(2^{-})[#]		D J	XREF: J(2392).
2402.7[z]	1^{+}	17 fs *+5−3*	BCD j L	XREF: j(2404.7). E(level): From resonance-averaged n capture. J$^{\pi}$: From $\gamma(\theta)$ in (γ,γ'), J=1. From resonance-averaged n capture, π=+. $T_{1/2}$: From width data in (γ,γ').
2406.1	1^{-},3^{-}[#]		CD j	XREF: j(2404.7).
2415.490[y] *24*	3^{+}[#]		BCD J	J$^{\pi}$: M1 components in γ's to 2^{+} levels indicate J$^{\pi}$=1^{+},2^{+},3^{+}. If γ to 4^{-} is E1, then J$^{\pi}$=1^{+},2^{+} are eliminated.
2423.0	0^{+},3^{+}[#]		CD	
2427.43[f] *8*	10^{-}		FG	J$^{\pi}$: E2 γ to 8^{-} level, γ to 10^{+}, and expected band structure.
2428.37[z] *11*	2^{+}[#]		BCD	
2430.56 *10*			F	
2434.7	1^{+},2^{+}[#]		CD	
2436.95 *10*	(2^{+})[#]		BCDE J Mn	XREF: M(2436)n(2441).
2442.41[a] *10*	10^{+}		FGH	J$^{\pi}$: From γ's to 8^{+} and 10^{+} levels and expected band structure.
2446.16 *3*	2^{+}		BCD J n	XREF: n(2441). J$^{\pi}$: M1 γ's to 2^{+} levels; intensity of feeding primary transitions in resonance-averaged n capture.
2449.7	1^{-}[#]		CD	
2451.5	(2^{+})[#]		CD	
2460.5 *4*			B J	
2467.6[z]	3^{+}[#]		CD	
2475.82[@] *7*	14^{+}		FGH	J$^{\pi}$: E2 γ to 12^{+} level and expected band structure.
2478.6	3^{+}[#]		BCD	XREF: B(2477).
2484	6^{+}		M	J$^{\pi}$: L=6 in (p,t).
2490.57[1] *20*	J		FG	J$^{\pi}$: From (^{13}C,α3nγ), J$^{\pi}$=10^{+},11^{+} is suggested (2001Su06).
2494.1	(1^{-})[#]		CD M	XREF: M(2497).
2502.40 *7*	3^{+}[#]		BCD J	
2506.2	2^{+}[#]		CD	
2511.0 *10*			J	
2517.8	0^{+},3^{+}[#]		CD	
2520.2 *5*	(4^{+},5^{-})		JK M	J$^{\pi}$: L=(4,5) in (p,p′). Also, L=4+6 in (p,t).

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Adopted Levels, Gammas (continued)

^{156}Gd Levels (continued)

E(level)[†]	J^{π}[‡]	$T_{1/2}$	XREF	Comments
2523.02[c] *19*	10^+		F	J^{π}: E0 component in γ to 10^+ level and expected band structure.
2528.9	(3^+)[#]		CD	
2534.7	(3^+)[#]		CD	
2539	1^-	13 fs *+5−3*	L	B(E1)↑=2.7×10^{-5} *7* J^{π}: E1 excitation in (γ,γ') and (e,e′). $T_{1/2}$: From width data in (γ,γ').
2544.7 *5*			J	
2554.4	(1^-)[#]		CD J N	XREF: N(2560?).
2571.9	$1^+,2^+$[#]		CD J	
2581	$1^-,2^-$[#]		CD	
2584.0 *9*			J	
2588.9	$1^+,2^+$[#]		CD j	XREF: j(2591.9).
2594.9 *15*			B j m	XREF: j(2591.9)m(2596).
2598	$1^+,2^+$[#]		J mn	XREF: J(2601)m(2596)n(2602).
2607.9	(1^-)[#]		D n	XREF: n(2602).
2617.2	$1^+,2^+$[#]		CD j M	XREF: j(2619)M(2615).
2622.1	1^- to 3^-[#]		D j	XREF: j(2619).
2629.7 *10*			J	
2640.5	(3^+)[#]		CD	
2647.59 *13*	$1^+,2^+$[#]		BCD M	XREF: M(2649).
2650.7	3^+[#]		CD	
2651.2[&] *4*	(12^+)		H	J^{π}: γ's to 10^+ and 12^+ levels and expected band structure. Populated in Coul. ex.
2652.56 *8*			BCD J MN	XREF: J(2654.8)M(2649)N(2657).
2665.3	$0^+,3^+$[#]		CD	
2668.5 *7*			J	
2676.6			CD	
2684	$1^+,2^+$[#]		CD	
2686.7[b]	11^+		FG	J^{π}: E2 γ to 9^+ level, γ to 10^+, and expected band structure.
2689.5	3^+[#]		CD	
2701.77 *11*	(2^+)[#]		BCD J	
2718.4	$1^+,2^+$[#]		BCD J	XREF: B(2719.8)J(2717.2).
2722 *5*	4^+		K	J^{π}: From L=4 in (p,p′).
2722.9	3^+[#]		CD	E(level): The evaluator has assumed that this level is not the same as the 2722 level seen in the inelastic-scattering reactions.
2727.4 *8*			J	
2738.0	(3^+)[#]		CD	
2740.9 *6*			J	
2745	1^-	4.3 fs *+10−7*	L	B(E1)↑=5.4×10^{-5} *11* J^{π}: E1 excitation in (γ,γ') and (e,e′). $T_{1/2}$: From width data from (γ,γ').
2749.53 *7*	$1^+,2^+$[#]		BCD	XREF: C(2750.6)D(2750.6).
2761 *5*	4^+		K n	XREF: n(2762). J^{π}: L=4 in (p,p′).
2762.46 *8*	$1^+,2^+$[#]		BCD n	XREF: C(2761.7)D(2761.7)n(2762).
2770.5	$0^+,3^+$[#]		CD	
2776.8	$1^+,2^+$[#]		CD	
2785	1^+	15 fs *+4−3*	BCD L	XREF: C(2784.7)D(2784.7).

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Adopted Levels, Gammas (continued)

^{156}Gd Levels (continued)

E(level)[†]	J^{π}[‡]	$T_{1/2}$	XREF	Comments
				J^{π}: From feeding by primary γ's in resonance-averaged n capture, $J^{\pi}=1^+,2^+$. Population via dipole transition in (γ,γ') eliminates 2^+. $T_{1/2}$: From width data from (γ,γ').
2787.8	3^+[#]		BCD	XREF: B(2789.5).
2794.7	$1^+,2^+$[#]		CD	
2804.0 *8*	(2^+)[#]		CD J N	XREF: N(2806).
2816.3	3^-[#]		BCD	XREF: B(2817).
2823.7[1]	J+2		G	J^{π}: E2 γ to spin-J level at 2490, γ to 12^+, and expected band structure. $J^{\pi}=12^+,13^+$ is suggested by 2001Su06 in $(^{13}C,\alpha3n\gamma)$.
2826.7	3^+[#]		CD	
2829.59[e] *10*	13^-		FGH	J^{π}: E2 γ to 11^- level, γ to 12^+ level, and expected band structure.
2831.5 *10*	2^+[#]		BCD J	XREF: B(2830.8).
2839.6	2^+[#]		BCDE	XREF: B(2840.21)E(2838.7).
2846.8	$2^+,3^+$[#]		CD	
2853.9	$1^+,2^+$[#]		CD	
2873.8	(2^+)[#]		BCD	XREF: B(2874.7).
2878.9	$1^+,2^+$[#]		CD	
2894.0	$0^+,3^+$[#]		CD	
2897.86[f] *18*	12^-		FG	J^{π}: E2 γ to 10^- level and expected band structure.
2900	0^+ to 3^+[#]		CD	
2907.4	$1^+,2^+$[#]		CD	
2918.5	$1^+,2^+$[#]		CD	
2922.7[d]	12^+		G	J^{π}: γ's to 10^+ and 12^+ levels, and expected band structure.
2928.78 *10*			BCD	
2931.8	$1^+,2^+$[#]		CD	
2943.2	1^- to 3^-[#]		CD	
2946.7	3^+[#]		BCD	XREF: B(2947.8).
2957[a]	(12^+)		H	J^{π}: γ's to 10^+ and 12^+ levels and expected band structure. Populated in Coul. ex.
2974	1^+	8.7 fs *+13−11*	L	B(M1)↑=0.34 *4* J^{π}: M1 excitation in (γ,γ') and (e,e′). $T_{1/2}$: From (γ,γ').
3010	1^+	32 fs *+12−7*	L	B(M1)↑=0.09 *2* J^{π}: M1 excitation in (γ,γ'), (e,e′). $T_{1/2}$: From (γ,γ').
3024.66 *10*			B M	
3050	1^+	28 fs *+11−6*	B L	B(M1)↑=0.11 *3* J^{π}: Excitation via dipole (assumed M1) transition in (γ,γ'). $T_{1/2}$: From (γ,γ').
3055			M	
3059.5[@] *8*	16^+		FGH	XREF: H(3057). J^{π}: E2 γ to 14^+ level and expected band structure.
3068			M	
3070[2]	1^+	2.13 fs *+19−16*	JKL	B(M1)↑=1.22 *9* J^{π}: M1 excitation in (γ,γ'), (e,e′). Possible state of mixed

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Adopted Levels, Gammas (continued)

^{156}Gd Levels (continued)

E(level)[†]	J^{π}[‡]	$T_{1/2}$	XREF	Comments
				n,p symmetry in the IBM-2 model. $T_{1/2}$: From (γ,γ').
3083.2 *15*			J	
3096.1[2] *7*	2^+		J L	B(E2)↑=0.0040 *6* J^{π}: E2 excitation in (e,e′).
3122	1^+	26 fs *+7−5*	L	B(M1)↑=0.10 *2* J^{π}: M1 excitation in (γ,γ'), (e,e′). $T_{1/2}$: From (γ,γ').
3134.9[&] *4*	(14^+)		H	J^{π}: γ′s to 12^+ and 14^+ levels and expected band structure. Populated in Coul. ex.
3138			M	
3150	(2^+)		J L	XREF: L(3150). J^{π}: Probable E2 excitation in (e,e′).
3158	1^+	7.4 fs *+13−10*	L	B(M1)↑=0.34 *5* J^{π}: M1 excitation in (γ,γ'), (e,e′). $T_{1/2}$: From (γ,γ'). γ branching assumed for $T_{1/2}$ calculation; only one γ is reported.
3165.6 *9*			B J	
3175.2[b]	13^+		G	J^{π}: E2 γ to 11^+ level and expected band structure.
3218	1^+	7.5 fs *+12−10*	L	B(M1)↑=0.33 *4* J^{π}: M1 excitation in (γ,γ'), (e,e′). $T_{1/2}$: From (γ,γ').
3234.9[1]	J+4		G	J^{π}: E2 γ to J+2 level, γ to 14^+, and expected band structure. $J^{\pi}=14^+,15^+$ is suggested by 2001Su06 (^{13}C,α3nγ).
3314	1^-	9 fs *+8−3*	L	B(E1)↑=1.4×10^{-5} *6* J^{π}: E1 excitation in (γ,γ'), (e,e′). $T_{1/2}$: From (γ,γ').
3334.9 *18*			J	
3350.4[e]	15^-		FGH	XREF: H(3346). J^{π}: Dipole γ to 14^+, γ to 13^-, and expected band structure. Populated in Coul. ex.
3400	2^+	≤0.31 ps	L	B(E2)↑≈0.0020 J^{π}: E2 excitation in (e,e′). $T_{1/2}$: Calculated from B(E2) in (e,e′).
3428.0[f] *3*	14^-		FG	J^{π}: E2 γ to 12^- level and expected band structure.
3437.9[d]	14^+		G	J^{π}: E2 γ to 12^+ level and expected band structure.
3470.9 *16*			J	
3487.1 *10*			J	
3520.9 *13*			J	
3552.5 *5*			B J	
3580.7 *13*			J	
3673.3[@] *5*	18^+		FGH	XREF: H(3671). J^{π}: E2 γ to 16^+ and expected band structure.
3715.2[b]	15^+		G	J^{π}: E2 γ to 13^+ level, and expected band structure.
3715.4[1]	J+6		G	J^{π}: E2 γ to J+4, γ to 16^+, and expected band structure. $J^{\pi}=16^+,17^+$ is suggested by 2001Su06 (^{13}C,α3nγ).
3914.3[e]	(17^-)		FG	J^{π}: γ′s to 16^+ and (15^-) levels, and expected band structure.
3995.1[d]	16^+		G	J^{π}: E2 γ to 14^+ and expected band structure.
4004.0[f] *4*	16^-		FG	J^{π}: E2 γ to 14^- level and expected band structure.
4257.9[1]	J+8		G	J^{π}: E2 γ to J+6 level and expected band structure. $J^{\pi}=18^+,19^+$ is suggested by 2001Su06 (^{13}C,α3nγ).
4325.9[@]	20^+		G	J^{π}: E2 γ to 18^+ level and expected band structure.
4523.7[e]	(19^-)		G	J^{π}: γ to 17^- level, dipole γ to 18^+ level, and expected band

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Adopted Levels, Gammas (continued)

^{156}Gd Levels (continued)

E(level)[†]	J^{π}[‡]	XREF	Comments
			structure.
4603.4[f]	(18$^-$)	G	J$^\pi$: γ to 16$^-$ level and expected band structure.
4857.4[l]	(J+10)	G	J$^\pi$: γ to J+8 level and expected band structure. J$^\pi$=20$^+$,21$^+$ is suggested by 2001Su06 (^{13}C,α3nγ).
5026.0[@]	22$^+$	G	J$^\pi$: E2 γ to 20$^+$ level and expected band structure.
5182.6[e]	(21$^-$)	G	J$^\pi$: E2 γ to 19$^-$ and expected band structure.
5778.7[@]	24$^+$	G	J$^\pi$: E2 γ to 22$^+$ level and expected band structure.
6582.6[@]	(26$^+$)	G	J$^\pi$: γ to 24$^+$ and expected band structure.

[†] From a least-squares fit to the γ energies. See the ^{155}Gd(n,γ) E=th Data Set for a discussion of how the γ's from the 1934 doublet and the GAMS4 values were treated in this fit.

[‡] In addition to the explicit argument given for each J^π assignment, several $\gamma\gamma(\theta)$ and $\gamma(\theta)$ studies have been carried out. These measurements have been analyzed to determine mixing ratios for the γ's, but the results also depend on the $J^{\pi\prime}$s assumed and thereby provide supporting evidence for these $J^{\pi\prime}$s. These studies include 1962Lo01, 1967Ke15, 1969Ni11, 1970Ru09, 1972Ha17, 1975Ul01, 1977Co22, and 1979Ri17.

[#] Value as reported by 1999GrZN from intensities of primary capture γ rays following 1.9- and 58-keV n capture. Generally, no γ-decay modes are given for the deexcitation of these states. The evaluator has chosen to list the J$^\pi$ values of these authors without further comment.

[@] Band(A): K$^\pi$=0$^+$, g.s. band. α=15.01 keV, β=−30 eV.

[&] Band(B): First excited K$^\pi$=0$^+$ band. α=13.71 keV, β=−65 eV. Because of the relatively small B(E2)↑ and the magnitude of the ρ^2(E0) values, the evaluator does not believe that this band is, at least predominantly, a β vibration. See the discussion of this point in 2001Ga02. Note, also, that these parameters do not provide a particularly good description of the other band-member energies.

[a] Band(C): γ-vibrational band, α=0 branch. α=15.01 keV, β=−35 eV. There is a sizeable odd-even staggering in the γ-vibrational band, making the extraction of an A_4 value not reasonable. The evaluator has chosen to compute band parameters for each of the two signatures separately. 2000Mi18 discuss odd-even staggering in the γ-vibrational bands in a number of deformed nuclei.

[b] Band(c): γ-vibrational band, α=1 branch. α=15.30 keV, β=−27 eV. See the comment on the even-spin members of the γ-vibrational band.

[c] Band(D): K$^\pi$=0$^+$ band. α=15.10 keV, β=−19.7 eV.

[d] Band(d): Sequence based on 12$^+$.

[e] Band(E): K$^\pi$=1$^-$ octupole-vibrational band, α=1 branch. At the higher spins, these states may be predominantly two-quasiparticle in nature. Band has also been discussed as a possible example of tetrahedral symmetry.

[f] Band(e): K$^\pi$=1$^-$ octupole-vibrational band, α=0 branch. At the higher spins, these states may be predominantly two-quasiparticle in nature.

[g] Band(F): K$^\pi$=4$^+$ band. α=11.41 keV, β=−12.2 eV. Probable hexadecapole-vibrational band. Dominant conf=π5/2[413]+π3/2[411].

[h] Band(G): K$^\pi$=7$^-$ bandhead. Conf=ν3/2[651]+ν11/2[505] and/or conf=ν3/2[402]+ν11/2[505].

[i] Band(H): K$^\pi$=0$^-$ octupole-vibrational band. α=17.24 keV.

[j] Band(I): K$^\pi$=0$^+$ band. α=9.49 keV, β=−29 eV.

[k] Band(J): K$^\pi$=2$^-$ octupole-vibrational band. From the level energies, two band-parameter sets can be deduced: α=11.40 keV, β=+49 eV; and α=12.08 keV, A_4=+8.14 eV.

[l] Band(K): K$^\pi$=2$^+$ band. α=14.27 keV, A_4=−20.7 eV. α=16.00 keV, β=−124 eV can also be deduced, but these appear to be unreasonable.

[m] Band(L): K$^\pi$=0$^+$ band. α=10.60 keV.

[n] Band(M): K$^\pi$=4$^+$ band. α=10.10 keV. Dominant conf=ν5/2[523]+ν3/2[521].

[o] Band(N): K$^\pi$=1$^+$ band. α=10.11 keV, A_2=+0.33 keV. α=8.47 keV, β=+164 eV can also be deduced, but the value of B seems

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{156}Gd Levels (continued)

unreasonable.

[p] Band(O): $K^{\pi}=1^{+}$ band. α=6.04 keV, β=+158 eV, A_2=+61 eV. Note that these parameters, especially B, seem to be unreasonable.

[q] Band(P): $K^{\pi}=4^{-}$ band. Dominant conf=ν3/2[521]+ν5/2[642]. α=7.15 keV.

[r] Band(Q): $K^{\pi}=1^{+}$ band. α=7.15 keV, A_2=−154 eV. A possible fit is also given by α=7.92 keV, β=−77 eV.

[s] Band(R): $K^{\pi}=2^{-}$ band. From the level energies, two band parameter sets can be deduced: α=15.47 keV, A_4=+14.2 eV; and α=14.28 keV, β=+85 eV.

[t] Band(S): $K^{\pi}=0^{+}$ band. α=9.88 keV.

[u] Band(T): $K^{\pi}=0^{+}$ band. α=10.9 keV.

[v] Band(U): $K^{\pi}=2^{+}$ band. α=9.53 keV.

[w] Band(V): $K^{\pi}=1^{+}$ band. α=8.05 keV, A_2=−84 eV. A possible fit is also given by α=8.47 keV, β=−42 eV.

[x] Band(W): $K^{\pi}=1^{+}$ band.

[y] Band(X): $K^{\pi}=1^{+}$ band. α=5.44 keV, A_2=+21 eV. A possible fit is also given by α=5.34 keV, β=+10 eV.

[z] Band(Y): $K^{\pi}=1^{+}$ band. α=6.47 keV, A_2=+24 eV. A possible fit is also given by α=6.34 keV, β=12 eV.

[1] Band(a): Proposed band.

[2] Band(b): Probable mixed n,p symmetry band.

$\gamma(^{156}Gd)$

The primary γ's from the neutron-capture states (thermal, 1.9, and 58 keV) are not given here. The unplaced γ's in $^{155}Gd(n,\gamma)$ and the ^{156}Eu β^- and ^{156}Tb ε decays are also not given. See those data sets for this information.

In the calculation of the ρ^2(E0) values for the E0 transitions, the "electronic" factors, Ω, were taken from the tables of 1970Be87. For the transitions here, the K-to-Total ce ratios are all nearly the same and approximately equal to 1/1.14.

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult. ‡#	δ ‡@	α &	$I_{(\gamma+ce)}$	Comments
88.970	2^+	88.970 *1*	100	0.0	0^+	E2		3.88		B(E2)(W.u.)=189 *3* Mult.: From: α(K)exp=1.6 *+5−3* (1970Fu06, ε decay), 1.43 *4* (1974Kl09, β^- decay), 1.40 *5* (1982Ba28, (n,γ)); α(L1)exp=0.24 *4* (1993Kl03, (n,γ)); L-subshell ratios: (1962Ew01,1964Pe17,1967Ge07,1981Bu24), from β^- decay; (1970Fu06,1970Pe10), from ε decay; and 1981Ko03, from (α,2nγ).
288.187	4^+	199.21900 *1*	100	88.970	2^+	E2		0.225		B(E2)(W.u.)=264 *4* Mult.: From: α(K)exp=0.15 (1970Pe10, ε decay), 0.134 *10* (1974Kl09, β^- decay), 0.20 *4* (1981Ko03, (α,2nγ)), 0.157 *14* (1982Ba28, (n,γ)), 0.147 *14* (1993Kl03, (n,γ)); L-subshell ratios (1962Ew01,1964Pe17) from β^- decay; (1970Fu06,1970Pe10) from ε decay.
584.715	6^+	296.532 *3*	100	288.187	4^+	E2		0.0625		B(E2)(W.u.)=295 *8* Mult.: From: α(K)exp=0.043 (1970Pe10, ε decay), 0.0479 *24* (1982Ba28, (n,γ)) and 0.0472 *23* (1993Kl03,(n,γ)); L-subshell ratios (1970Fu06, ε decay).
965.134	8^+	380.417 *5*	100	584.715	6^+	E2		0.0297		B(E2)(W.u.)=320 *17* Mult.: From: α(K)exp=0.038 *10* (1981Ko03, (α,2nγ)), 0.018 *4* (1982Ba28, (n,γ)) and 0.00221 *19* (1993Kl03, (n,γ)); $\gamma(\theta)$ (1981Ko03, (α,2nγ)).
1049.487	0^+	960.50771 *25*	100	88.970	2^+	E2		0.00300		B(E2)(W.u.)=8 *+4−7* Mult.: α(K)exp=0.0045 *24* from (α,2nγ), where the γ may be a singlet, and 0.00259 *20* from (n,γ) (1993Kl03).
		1049.46 *8*		0.0	0^+	E0			0.60 *2*	ρ^2(E0)$\times10^3$=42 *21*. Mult.: α(K)exp>0.39 (1976Ya11, β^- decay), >0.10 (1982Ba28, (n,γ)), and >0.014 for the 1049+1051 γ's (1981Ko03, (α,2nγ)). $I_{(\gamma+ce)}$: From β^- decay. From (n,γ), I(γ+ce)=0.61 *6*.
1129.437	2^+	79.878 *9*	0.0040 *17*	1049.487	0^+	[E2]		5.83		B(E2)(W.u.)=52 *23*
		841.241 *7*	40.8 *15*	288.187	4^+	E2		0.00399		B(E2)(W.u.)=4.1 *4* Mult.: α(K)exp=0.0029 *+8−4* (1970Fu06) and 0.0033 *8* (1971Mc01), from ε decay; 0.0030 *5* (1976Ya11, β^-

$^{156}_{64}Gd_{92}$-14

γ(^{156}Gd) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡#]	δ[‡@]	α[&]	Comments
									decay); 0.0031 *3* (1982Ba28) and 0.0032 *3* (1993Kl03), from (n,γ).
1129.437	2^+	1040.470 *8*	100 *3*	88.970	2^+	E2+E0+M1	−5.9 *+14−28*	0.0143	B(E2)(W.u.)=3.3 *3* ρ^2(E0)×10^3=54 *4*. Mult.: α(K)exp=0.0118 *13* (1971Mc01) and 0.0124 *8* (1972Ha29), from ε decay; 0.0126 *10* (1974Kl09) and 0.0113 *10* (1976Ya11), from β^- decay; 0.014 *3* (1981Ko03), from (α,2nγ); 0.0119 *8* (1982Ba28) and 0.0110 *7* (1993Kl03), from (n,γ). δ: From $\gamma\gamma(\theta)$ (1972Ha17), β^- decay. Others: δ=11 *+7−3* (1981Mc06), Coul. ex.; δ>200 (1973HaWB) and <−18 (1977Co22), from $\gamma\gamma(\theta)$ in β^- decay. α: From α(K)exp×(α/α(K)).
		1129.419 *9*	27.4 *15*	0.0	0^+	E2		0.00214	B(E2)(W.u.)=0.63 *6* Mult.: α(K)exp=0.0018 *+8−4* (1970Fu06), ε decay 0.00157 *19* (1982Ba28) and 0.00197 *15* (1993Kl03), from (n,γ).
1154.152	2^+	104.55 *4*	7×10^{-4} *4*	1049.487	0^+				
		865.968 *21*	3.78 *12*	288.187	4^+	E2		0.00374	B(E2)(W.u.)=0.77 *4* Mult.: α(K)exp=0.0035 *7* (1971Mc01, ε decay); 0.0037 *7* (1974Kl09) and 0.0040 *13* (1976Ya11), from β^- decay; and 0.00272 *16* (1993Kl03, (n,γ)).
		1065.1781 *2*	100.0 *5*	88.970	2^+	E2+M1	−16 *5*	0.00242	B(M1)(W.u.)=6.E−5 *4*; B(E2)(W.u.)=7.24 *25* Mult.: α(K)exp=0.0026 *9* (1964Pe17), 0.0022 *3* (1966Dz08), 0.00236 *18* (1974Kl09) and 0.0020 *2* (1976Ya11), from β^- decay; 0.0022 *+3−2* (1970Fu06), 0.0019 *3* (1970Pe10), 0.00207 *20* (1971Mc01), from ε decay; 0.0025 *9* (1981Ko03, (α,2nγ)); and 0.00220 *20* (1982Ba28), 0.00219 *13* (1993Kl03), from (n,γ). δ: From $\gamma\gamma(\theta)$: −18 *3* (1972Ha17, β^- decay), −20 *4* (1981Mc06, Coul. ex.). From $\gamma(\theta)$ and $\gamma\gamma(\theta)$ in ε decay: −6.5 *+26−79* (1975Ul01, 1983Li06). Others: +18 *+17−6* (1970Ru09), <−11 (1977Co22), from $\gamma\gamma(\theta)$ in β^- decay; −33 *+27−99* or >4.8 and −7.0 *+16−99* or >+7.9 (1967Ke15), from $\gamma\gamma(\theta)$ in ε decay. Additional information 2.
		1154.1467 *2*	96.2 *6*	0.0	0^+	E2		0.00205	B(E2)(W.u.)=4.68 *16* Mult.: α(K)exp=0.00175 *+23−18* (1970Fu06), 0.0019 *3* (1970Pe10), 0.00165 *16* (1971Mc01), from ε decay; 0.00155 *20* (1976Ya11), from β^- decay; 0.00192 *15* (1993Kl03, (n,γ)).

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$\gamma(^{156}$Gd) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.‡#	δ‡@	α&	$I_{(\gamma+ce)}$	Comments
1168.186	0^+	118.71 *3*		1049.487	0^+	E0			0.18	ρ^2(E0)$\times10^3$=18 *+27−9*.
		1079.226 *8*	100.0 *4*	88.970	2^+	E2		0.00235		B(E2)(W.u.)=1.6 *+23−8* Mult.: α(K)exp=0.0016 *4* (1964Pe17), 0.0017 *2* (1966Dz08), 0.00201 *16* (1974Kl09), 0.00208 *17* (1976Ya11), from β^- decay; 0.0020 *2* (1982Ba28), 0.00215 *17* (1993Kl03), from (n,γ).
		1168.0 *4*		0.0	0^+	E0			0.053 *2*	ρ^2(E0)$\times10^3$=1.2 *+19−6*. Mult.: α(K)exp>0.22 (1976Ya11, β^- decay); ce data from 1982Ba28, (n,γ). $I_{(\gamma+ce)}$: From ^{156}Eu β^- decay. From (n,γ), I(γ+ce)=0.072 *25*.
1242.480	1^-	193.001 *13*	0.07 *2*	1049.487	0^+	[E1]		0.0499		B(E1)(W.u.)=0.00037 *+16−29*
		1153.478 *14*	100.0 *10*	88.970	2^+	E1		8.83×10^{-4}		B(E1)(W.u.)=0.0025 *+8−18* Mult.: α(K)exp=0.00053 *13* (1964Pe17), 0.00088 (1966Dz08), 0.00082 *12* (1976Ya11), from β^- decay. δ: 0.01 *+2−1* (1977Co22), <0.022 (1972Ha17), from $\gamma\gamma(\theta)$ in β^- decay.
		1242.481 *10*	97.1 *5*	0.0	0^+	E1		8.09×10^{-4}		B(E1)(W.u.)=0.0018 *7* B(E1)(W.u.) value computed directly from the empirical B(E1)↑ from (γ,γ'). Mult.: α(K)exp=0.00071 *+6−3* (1970Fu06, ε decay); 0.00063 *5* (1974Kl09), 0.00065 *5* (1976Ya11), from β^- decay; 0.00064 *7* (1982Ba28), 0.00063 *5*, from (n,γ).
1248.006	3^+	118.56^c *4*	<0.004	1129.437	2^+					
		959.820 *9*	27.1 *3*	288.187	4^+	E2+M1	−12 *+3−5*	0.00301		B(M1)(W.u.)=6.E−5 *4*; B(E2)(W.u.)=5.1 *10* Mult.: α(K)exp=0.0030 *+3−2* (1970Fu06), 0.00254 *27* (1971Mc01), from ε decay; 0.0045 *24* (1981Ko03, (α,2nγ)); 0.00265 *23* (1993Kl03, (n,γ)). δ: From $\gamma(\theta)$ and $\gamma\gamma(\theta)$ in ε decay (1975Ul01). Others: 0.26≤δ≤7.44 (1967Ke15) and −19 *19* (1979Ri17), in ε decay.
		1159.031 *8*	100.0 *5*	88.970	2^+	E2+M1	−11.8 *+6−7*	0.00204		B(M1)(W.u.)=0.00014 *3*; B(E2)(W.u.)=7.3 *14* Mult.: α(K)exp=0.0017 *+3−2* (1970Fu06), 0.0022 *9* (1970Pe10), 0.00169 *18* (1971Mc01), from ε decay; 0.0023 *3* (1981Ko03, (α,2nγ)); 0.00171 *15* (1982Ba28), 0.00178 *10* (1993Kl03), from (n,γ). δ: From 1975Ul01, ε decay. Others: −8.6 *+23−48* (1979Ri17) and −8 *+4−62* and +32 *+99−27* or ≤−9.7 (1967Ke15), from ε decay.

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$\gamma(^{156}$Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡#]	δ[‡@]	α[&]	Comments
1258.075	2+	103.89 *2*	0.006 *2*	1154.152	2+				
		208.54[c]	<0.003	1049.487	0+				
		969.865 *8*	100 *2*	288.187	4+	E2		0.00294	B(E2)(W.u.)=4.3 *5* Mult.: α(K)exp=0.0037 *10* (1972Ha29, ε decay); 0.0029 *4* (1976Ya11, β^- decay); and 0.00230 *21* (1982Ba28), 0.00240 *14* (1993Kl03), from (n,γ). δ: From $\gamma\gamma(\theta)$, δ(E2/M1)>8.4.
		1169.087 *10*	71 *1*	88.970	2+	E2+M1(+E0)	+0.38 *6*	0.0031 *8*	B(M1)(W.u.)=0.0078 *+9−7*; B(E2)(W.u.)=0.42 *+5−4* I_γ: See the comment on this γ in the ^{155}Gd(n,γ) E=th data set. α: From α(K)exp×(α/α(K)). Mult.: α(K)exp=0.0017 *4* (1966Dz08), 0.0024 *4* (1976Ya11), from β^- decay; 0.0038 *9* (1972Ha29, ε decay); and 0.0028 *3* (1982Ba28), 0.00272 *19* (1993Kl03, from (n,γ)). α(K)exp values are given in (α,2nγ) and in (n,γ) (1982Ba28) but this γ is reported to be multiply placed in these studies. δ: From $\gamma\gamma(\theta)$ in β^- decay (1977Co22).
		1258.087 *14*	26 *1*	0.0	0+	E2		0.00174	B(E2)(W.u.)=0.31 *4* Mult.: α(K)exp=0.0023 *10* (1972Ha29, ε decay); 0.0015 *8* (1976Ya11, β^- decay); and 0.00148 *23* (1982Ba28), 0.00145 *10* (1993Kl03), from (n,γ).
1276.138	3−	987.9440 *5*	45 *2*	288.187	4+	E1		0.00116	B(E1)(W.u.)=0.00077 *16* Mult.: α(K)exp=0.0008 *3* (1971Mc01, ε decay); and 0.00088 *10* (1982Ba28), 0.00096 *7* (1993Kl03), from (n,γ). Other: 0.0034 *17* (1981Ko03, (α,2nγ)), which implies M1, E2, or a multiplet.
		1187.1631 *2*	100 *2*	88.970	2+	E1		8.50×10^{-4}	B(E1)(W.u.)=0.00098 *21* Mult.: α(K)exp=0.0011 *+7−4* (1970Fu06), 0.00088 *18* (1971Mc01), from ε decay; and 0.00075 *8* (1982Ba28, 1993Kl03), from (n,γ). δ: From $\gamma(\theta)$ δ=−0.08 *3* (1975Ul01), ε decay.
1297.822	4+	143.672[a] *11*	0.09[a] *3*	1154.152	2+				
		168.382 *3*	1.11 *9*	1129.437	2+	E2		0.397	B(E2)(W.u.)=2.8×10^2 *+10−15* Mult.: α(K)exp=0.32 *7* (1982Ba28), α(L1)exp=0.0234 *23* (1993Kl03), from (n,γ).
		713.102 *8*	11.3 *10*	584.715	6+	E2		0.00580	B(E2)(W.u.)=2.1 *+7−11* Mult.: α(K)exp=0.006 *3* (1982Ba28), 0.0044 *4* (1993Kl03), from (n,γ).
		1009.619 *11*	90 *5*	288.187	4+	E0+E2,M1		0.017	ρ^2(E0)×10^3=50 *+25−16*. Mult.: α(K)exp=0.016 *4* (1971Mc01, ε decay); 0.016 *3* (1981Ko03, (α,2nγ)); and 0.0135 *12* (1982Ba28), 0.0168 *16* (1993Kl03), from (n,γ). α: From α(K)exp×(α/α(K)).

From ENSDF

$^{156}_{64}$Gd$_{92}$-17

γ(^{156}Gd) (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.‡#	δ‡@	α&	Comments
1297.822	4+	1208.870 *10*	100 *3*	88.970	2+	E2		0.00187	B(E2)(W.u.)=1.3 *+5−7* Mult.: α(K)exp=0.0016 *3* (1982Ba28), 0.00159 *10* (1993Kl03), from (n,γ). Other: α(K)exp=0.0035 *10* (1981Ko03), in (α,2nγ).
1319.658	2−	190.215 *3*	0.21 *2*	1129.437	2+	E1		0.0518	B(E1)(W.u.)<1.8×10^{-5} Mult.: α(K)exp=0.025 *20* (1993Kl03), (n,γ).
		1230.6857 *3*	100	88.970	2+	E1		8.16×10^{-4}	B(E1)(W.u.)<3.2×10^{-5} Mult.: α(K)exp=0.00049 *8* (1964Pe17), 0.00060 *7* (1966Dz08), 0.00068 *5* (1976Ya11), from β^- decay; 0.00083 *+5−3* (1970Fu06), 0.00050 *12* (1971Mc01), from ε decay; and 0.00060 *5* (1982Ba28), 0.00059 *4* (1993Kl03), from (n,γ). δ: From $\gamma\gamma(\theta)$ δ=0.018 *+10−18* (1972Ha17) and <0.04 (1977Co22), from β^- decay.
1355.422	4+	57.62 *2*	0.003 *2*	1297.822	4+				
		107.41 *1*	0.022 *4*	1248.006	3+				
		201.269 *4*	0.27 *2*	1154.152	2+				
		225.88 *4*	0.017 *4*	1129.437	2+	[E2]		0.1485	B(E2)(W.u.)=4.3 *+14−16* Placement and strength of this transition has implications for assessing E2-transition strengths between γ and β bands. (Comment to the evaluator from J. L. Wood, July, 2011.).
		770.2 *3*	0.9 *3*	584.715	6+				
		1067.2325 *2*	100 *1*	288.187	4+	E2+M1	−4.0 *+9−16*	0.00249 *7*	B(M1)(W.u.)=0.0014 *+7−8*; B(E2)(W.u.)=10.2 *+23−29* Mult.: α(K)exp=0.00185 *+25−18* (1970Fu06), 0.0020 *3* (1971Mc01), from ε decay; 0.0021 *5* (1981Ko03, (α,2nγ)); and 0.00193 *23* (1982Ba28), 0.00206 *14* (1993Kl03), from (n,γ). δ: From $\gamma(\theta)$ and $\gamma\gamma(\theta)$ (1975Ul01,1983Li06), ε decay. Other: from $\gamma\gamma(\theta)$ δ=+10 *+99−7* or <- 5.5 (1967Ke15), ε decay.
		1266.446 *12*	39 *1*	88.970	2+	E2		0.00172	B(E2)(W.u.)=1.8 *+4−5* Mult.: α(K)exp=0.0014 *+3−2* (1970Fu06), 0.0014 *4* (1971Mc01), 0.00172 *12* (1972Ha29), from ε decay; and 0.00137 *23* (1982Ba28), 0.00140 *10* (1993Kl03), from (n,γ). δ: From $\gamma(\theta)$ δ(M3/E2)=−0.12 *+22−28*.
1366.529	1−	237.04 *4*	0.08 *3*	1129.437	2+	[E1]		0.0291	B(E1)(W.u.)=0.0005 *3* Mult.: From α(L1)exp=0.027 *13*, 1993Kl03 list mult=M1?
		1277.482 *10*	100 *1*	88.970	2+	E1		7.89×10^{-4}	B(E1)(W.u.)=0.0043 *15* Mult.: α(K)exp=0.00050 *8* (1966Dz08), 0.00056 *5*

$^{156}_{64}$Gd$_{92}$-18

γ(^{156}Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡#]	α[&]	Comments
								(1974Kl09), 0.00057 *21* (1976Ya11), from β^- decay; and 0.00061 *7* (1982Ba28), 0.00060 *5* (1993Kl03), from (n,γ). δ: From $\gamma\gamma(\theta)$ in β^- decay, δ=−0.01 *1* (1972Ha17) and <0.025 (1977Co22), so transition can be pure E1.
1366.529	1^-	1366.478 *11*	54.5 *3*	0.0	0^+	E1	7.59×10^{-4}	B(E1)(W.u.)=0.0019 *7* Mult.: α(K)exp=0.00053 *11* (1966Dz08), 0.00055 *7* (1974Kl09), 0.0007 *4* (1976Ya11), from β^- decay; and 0.00070 *8* (1982Ba28), 0.00054 *4* (1993Kl03), from (n,γ).
1408.133	5^-	131.983 *12*	0.021 *3*	1276.138	3^-	[E2]	0.926	B(E2)(W.u.)=3.0×10^2 *+7−25*
		823.421 *8*	30.1 *15*	584.715	6^+	E1	0.00165	B(E1)(W.u.)=0.00064 *+10−52* Mult.: α(K)exp=0.0021 *5* (1982Ba28), 0.00146 *9* (1993Kl03), from (n,γ).
		1119.933 *11*	100 *8*	288.187	4^+	E1	9.25×10^{-4}	B(E1)(W.u.)=0.00085 *+15−69* Mult.: α(K)exp=0.00037 *15* (1982Ba28) and 0.00083 *8* (1993Kl03), from (n,γ); and 0.00075 *14*, for the (1119.9+1120.8) doublet (1981Ko03, (α,2nγ)), with both γ's assigned E1.
1416.078	10^+	450.95 *2*	100	965.134	8^+	E2	0.0184	B(E2)(W.u.)=314 *14* Mult.: From ADO ratio in (^{13}C,α3nγ). Used as a calibration line by 1981Ko03, (α,2nγ).
1462.297	4^+	164.469 *6*	0.17 *3*	1297.822	4^+			Mult.: From α(L1)exp=0.033 *5*, 1993Kl03 in (n,γ) list mult=E1?, but placement requires no parity change.
		204.225 *3*	0.79 *8*	1258.075	2^+	E2	0.207	Mult.: From α(K)exp=0.0137 *15* in (n,γ) (1993Kl03).
		332.867 *17*	0.37 *4*	1129.437	2^+	[E2]	0.0439	Mult.: From α(K)exp=0.060 *17* in (n,γ), 1982Ba28 report mult=M1(E2). Placement requires E2.
		877.559 *8*	42 *2*	584.715	6^+	E2	0.00364	Mult.: α(K)exp=0.0026 *3* (1982Ba28), 0.00264 *15* (1993Kl03), from (n,γ).
		1174.188 *11*	100 *9*	288.187	4^+	M1(+E2,E0)	0.0032	Mult.: α(K)exp=0.0032 *5* (1972Ha29, ε decay); 0.0026 *13* (1981Ko03, (α,2nγ)); and 0.0023 *3* (1982Ba28), 0.00250 (22) (1993Kl03), from (n,γ). α: From α(K)exp×(α/α(K)).
		1373.331 *23*	16 *1*	88.970	2^+	E2	0.00149	Mult.: α(K)exp=0.0016 *4* (1982Ba28), 0.00117 *7* (1993Kl03), from (n,γ).
1468.506	4^-	148.846 *2*	0.42 *2*	1319.658	2^-	E2	0.608	B(E2)(W.u.)<1.8×10^2 Mult.: α(K)exp=0.39 *12* (1982Ba28), α(L1)exp=0.0249 *24* (1993Kl03), from (n,γ).
		170.678 *4*	0.14 *2*	1297.822	4^+			
		192.371 *4*	0.43 *3*	1276.138	3^-			
		1180.3119 *15*	100 *8*	288.187	4^+	E1	8.56×10^{-4}	B(E1)(W.u.)<4.0×10^{-5} Mult.: α(K)exp=0.00067 *11* (1982Ba28), 0.00074 *7* (1993Kl03), from (n,γ). Other: 0.0023 *8* (1972Ha29, ε decay), which implies M1,E2 rather than E1.
1506.863	5^+	151.43 *1*	0.08 *2*	1355.422	4^+			
		258.860[a] *4*	1.34[a] *7*	1248.006	3^+	E2	0.0957	B(E2)(W.u.)=1.3×10^2 *13* Mult.: α(K)exp=0.08 *3* (1982Ba28), 0.073 *4* (1993Kl03), from (n,γ). Note: γ is doubly placed.

$^{156}_{64}$Gd$_{92}$-19

$\gamma(^{156}Gd)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡#]	δ[‡@]	α[&]	Comments
1506.863	5^+	922.183 *10*	35.6 *10*	584.715	6^+	E2		0.00327	B(E2)(W.u.)=11 *+34−8* Mult.: α(K)exp=0.0048 *25* (1972Ha29, ε decay); 0.0030 *7* (1981Ko03, (α,2nγ)); and 0.0024 *5* (1982Ba28), 0.00268 *13* (1993Kl03), from (n,γ).
		1218.708 *13*	100 *6*	288.187	4^+	E2		0.00185	B(E2)(W.u.)=8 *+23−5* Mult.: α(K)exp=0.0020 *2* (1981Ko03, (α,2nγ)); and 0.0014 *4* (1982Ba28), 0.00168 *13* (1993Kl03), from (n,γ). δ: From $\gamma\gamma(\theta)$ in (α,2nγ), δ>7 (1981Ko03). The evaluator assumes that this is δ(E2/M1).
1510.594	4^+	155.168 *4*	4.6 *2*	1355.422	4^+	M1+E2	0.48 *2*	0.569	B(M1)(W.u.)=0.00058 *7*; B(E2)(W.u.)=2.9 *4* Mult.: α(K)exp=0.477 *+22−17* (1970Fu06), 0.49 (1970Pe10), from ε decay; and 0.49 *5* (1982Ba28), 0.505 *45* (1993Kl03), from (n,γ). L-subshell ratios in ε decay (1970Fu06,1970Pe10).
		212.771 *13*	0.11 *2*	1297.822	4^+	M1+E2	0.49 *4*	0.230	B(M1)(W.u.)=5.4×10^{-6} *12*; B(E2)(W.u.)=0.015 *4* Mult.: From L-subshell ratios. δ: From L-subshell ratios in ε decay (1970Fu06).
		262.589 *3*	16.4 *6*	1248.006	3^+	E2+M1	+8.4 *10*	0.0920	B(M1)(W.u.)=7.4×10^{-6} *19*; B(E2)(W.u.)=3.9 *4* Mult.: α(K)exp=0.0673 *20* (1970Fu06), 0.068 (1970Pe10), from ε decay; 0.066 *5* (1982Ba28), 0.069 *4* (1993Kl03), from (n,γ). L-subshell ratios in ε decay (1970Fu06,1970Pe10). δ: From $\gamma(\theta)$ and $\gamma\gamma(\theta)$, δ=+9.2 *+7−6* (1975Ul01) and from $\gamma(\theta)$, δ=+7.6 *+6−5* (1979Ri17) in ε decay. Other: from $\gamma\gamma(\theta)$, δ=22 +99-17 or <−12.7 (1967Ke15), in ε decay. From ce data in ε decay, ≥7.0 (1971Fu12).
		356.446[a] *5*	≤35[a]	1154.152	2^+	E2		0.0359	B(E2)(W.u.)=0.9 *9* Mult.: α(K)exp=0.0285 *20* (1970Fu06), 0.022 (1970Pe10), from ε decay; 0.030 *2* (1982Ba28), 0.0252 *17* (1993Kl03), from (n,γ). L-subshell ratios in ε decay (1970Fu06,1970Pe10). δ: From $\gamma(\theta)$ in ε decay, δ(M3/E2)=+0.014 *12* (1975Ul01) and −0.029 *23* (1979Ri17).
		381.155 *5*	1.8 *1*	1129.437	2^+	E2		0.0295	B(E2)(W.u.)=0.067 *8* Mult.: α(K)exp=0.0224 *20* (1970Fu06, ε decay); and 0.021 *5* (1982Ba28), and 0.0241 *21* (1993Kl03), from (n,γ). Also, L-subshell ratios in ε decay (1970Fu06).
		925.917 *11*	11.6 *5*	584.715	6^+	E2		0.00324	B(E2)(W.u.)=0.0051 *6* Mult.: α(K)exp=0.00215 *21* (1970Fu06), 0.0034 *10* (1970Pe10), 0.0025 *3* (1971Mc01), from ε decay; and 0.0027 *6* (1982Ba28), 0.00284 *17* (1993Kl03), from (n,γ). δ: From $\gamma(\theta)$ in ε decay, 1975Ul01 report δ(M3/E2)=+0.068 *6*. However, this value leads to an M3 transition probability that is larger than that allowed by RUL. This δ value is not adopted. Other: from $\gamma(\theta)$ in ε decay, δ=0.10 *9* (1979Ri17).
		1222.427 *10*	100 *1*	288.187	4^+	M1+E2	−1.7 *2*	0.00210 *6*	B(M1)(W.u.)=8.2×10^{-6} *17*; B(E2)(W.u.)=0.0082 *10* Mult.: α(K)exp=0.00187 *20* (1970Fu06), 0.0013 *2* (1970Pe10),

$\gamma(^{156}Gd)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡#]	δ[‡@]	α[&]	Comments
									0.00174 *13* (1971Mc01), 0.00181 *6* (1972Ha29), from ε decay; and 0.00168 *20* (1982Ba28), 0.00191 *15* (1993Kl03), from (n,γ). δ: From L-subshell ratios δ=1.39 *+30−22* (1970Fu06); $\gamma(\theta)$, $\gamma\gamma(\theta)$, and γce(θ) −2.07 *+13−14* (1975Ul01), and $\gamma(\theta)$ −1.70 *+16−21* (1979Ri17). Others: from $\gamma\gamma(\theta)$ −2.3 *+8−27* (1959Of11), 2.1 *4* (1967Ke15), and 1.83 *10* (1968We17).
1510.594	4⁺	1421.594 *15*	43 *3*	88.970	2⁺	E2		0.00141	B(E2)(W.u.)=0.0022 *3* Mult.: α(K)exp=0.0011 (1959Of11), 0.0014 *3* (1970Pe10), 0.00122 *6* (1972Ha29), from ε decay; and 0.00120 *14* (1982Ba28), 0.00117 *11* (1993Kl03), from (n,γ). δ: From $\gamma(\theta)$ in ε decay, δ(M3/E2)=+0.014 *12* (1975Ul01) and +0.002 *26* (1979Ri17), so transition may be pure E2.
1538.851	3⁻	384.702 *20*	0.4 *1*	1154.152	2⁺				
		1250.655 *11*	100 *6*	288.187	4⁺	E1		8.04×10^{-4}	B(E1)(W.u.)=0.0031 *10* Mult.: α(K)exp=0.0010 *7* (1972Ha29, ε decay); and 0.00070 *9* (1982Ba28), 0.00075 *6* (1993Kl03), from (n,γ).
		1449.897 *11*	94 *6*	88.970	2⁺	E1		7.53×10^{-4}	B(E1)(W.u.)=0.0019 *6* Mult.: α(K)exp=0.00054 *6* (1982Ba28), 0.00054 *5* (1993Kl03), from (n,γ).
1540.190	6⁺	242[c]		1297.822	4⁺				E_γ: See the comment on this γ in the Coul. ex. source data set.
		955.57 *9*	41 *7*	584.715	6⁺	E0+E2		0.023 *8*	Mult.: α(K)exp=0.020 *8* (1981Ko03, (α,2nγ)); 0.0084 *15* (1993Kl03), from (n,γ). α(K)exp is larger than that for M1, suggesting an E0 component.
		1252.56 *10*	100 *30*	288.187	4⁺	E2		0.00175	Mult.: α(K)exp=0.0013 *3* (1981Ko03, (α,2nγ)); 0.00077 *23* (1993Kl03), from (n,γ). Note: 1993Kl03 assign mult=E1(E2).
1622.535	5⁺	111.941 *1*	46 *4*	1510.594	4⁺	M1+E2	0.29 *1*	1.474	Mult.: α(K)exp=1.50 *+21−17* (1970Fu06, ε decay) and 1.34 *21* (1982Ba28, (n,γ)). α(L1)exp=0.186 *18* (1993Kl03, (n,γ)). L-subshell ratios in ε decay (1970Fu06,1970Pe10). δ: From ce data, δ=0.297 *6* (1970Fu06, ε decay) and 0.285 (1982Ba28, (n,γ)). From $\gamma\gamma(\theta)$,δ=+0.15 *+10−9* (1975Ul01, ε decay). From $\gamma(\theta)$ in (α,2nγ), δ=0.32 *+13−90* (1981Ko03).
		115.668 *2*	1.8 *1*	1506.863	5⁺	M1+E2	0.22 *2*	1.335	Mult.: From L-subshell ratios (1970Fu06). δ: from L-subshell ratios (1970Fu06).
		267.113 *10*	4.2 *3*	1355.422	4⁺	E2		0.0866	Mult.: α(K)exp=0.06 *4* (1982Ba28), 0.057 *5* (1993Kl03), from (n,γ). Also, L-subshell ratios in ε decay (1970Fu06). δ: From ce data in ε decay, δ>14.4 (1971Fu12).
		374.51 *3*	1.2 *4*	1248.006	3⁺	E2		0.0310	Mult.: In ε decay, α(K)exp=0.028 *6* (1972Ha29).
		1037.812 *24*	41.1 *5*	584.715	6⁺	E2+M1	−7 *+3−21*	0.00258 *8*	Mult.: α(K)exp=0.0020 *+5−3* (1970Fu06), 0.0023 *3* (1971Mc01), and 0.00227 17 (1972Ha29) from ε decay. δ: From $\gamma\gamma(\theta)$ in ε decay (1975Ul01).

From ENSDF

$\gamma(^{156}Gd)$ (continued)

E_i(level)	J_i^π	E_γ [†]	I_γ [†]	E_f	J_f^π	Mult. [‡#]	δ [‡@]	α [&]	$I_{(\gamma+ce)}$	Comments
1622.535	5^+	1334.461 *23*	100 *1*	288.187	4^+	E2+M1	−3.6 *3*	0.00162 *3*		Mult.: α(K)exp=0.0015 +*3*−*2* (1970Fu06, ε decay); 0.0007 *2* (1981Ko03, (α,2nγ)); and 0.015 *3* (1982Ba28), 0.00113 *8* (1993Kl03), from (n,γ). δ: From γ(θ) and γγ(θ) δ=−3.8 *2* (1975Ul01) and −3.4 +5-6 (1979Ri17). Other: from γγ(θ) δ=3.4 +*26*−*13* (1967Ke15). All are from ε decay.
1638.00	7^-	672.9 *1*	≈33	965.134	8^+					
		1053.27 *5*	100 *3*	584.715	6^+	E1		0.00103		δ: From γ(θ) −0.11<δ<+0.11 (1981Ko03) in (α,2nγ).
1643.653	6^+	288.28 *3*	4.0 *9*	1355.422	4^+	E2		0.0682		Mult.: α(K)exp=0.041 *9* (1993Kl03), (n,γ).
		1059.08 *4*	100 *7*	584.715	6^+	E2		0.00244		Mult.: α(K)exp=0.0014 *7* (1981Ko03, (α,2nγ)); 0.0017 *3* (1993Kl03, (n,γ)). δ: From γ(θ), δ<−0.8 or >+2.5 (1981Ko03, (α,2nγ)). Evaluator assumes this is δ(E2/M1).
		1356.4 *2*	93 *8*	288.187	4^+					γ not reported by 1993Kl03, but it should have been seen.
1705.799	6^-	237.283 *5*	6.6 *4*	1468.506	4^-					Mult.: From α(K)exp=0.059 *4*, 1993Kl03 deduce mult=E2. From α(K)exp=0.23 *9*, 1982Ba28 deduce mult=M1. Both are (n,γ) studies.
		297.74 *4*	2.7 *7*	1408.133	5^-					
		1121.11 *8*	100 *30*	584.715	6^+	E1		9.24×10^{-4}		Mult.: α(K)exp=0.00075 *14* for the (1119.9+1120.8) γ peak (1981Ko03, (α,2nγ)) with both γ′s assigned E1; 0.0036 *10* (1993Kl03, (n,γ)), who assign mult=E1?.
1715.211	0^+	348.726 *7*	10.3 *5*	1366.529	1^-	E1		0.01097		B(E1)(W.u.)=0.00015 +*7*−*13* Mult.: α(K)exp=0.0060 *8* (1993Kl03), (n,γ).
		472.699 *5*	100 *5*	1242.480	1^-	E1		0.00535		B(E1)(W.u.)=0.0006 +*3*−*5* Mult.: α(K)exp=0.0048 *10* (1976Ya11, β^- decay); and 0.0057 *10* (1982Ba28), 0.0058 *3* (1993Kl03), from (n,γ).
		547.20 *19*		1168.186	0^+	E0			0.11 *3*	$\rho^2(E0)\times10^3$=7 +*6*−*3*. The uncertainty includes that due to the $T_{1/2}$ value only; it does not take into account a 30% uncertainty in the I(γ+ce) value. Mult.: α(K)exp>0.040 (1982Ba28), (n,γ).
		585.830[b] *15*	4.0[b] *11*	1129.437	2^+	[E2]		0.00930		B(E2)(W.u.)=1.7 +*10*−*16* Mult.: α(K)exp=0.012 *4* (1982Ba28), 0.0112 *9* (1993Kl03), from (n,γ). This implies M1,E2, but the γ is doubly placed. This placement requires E2.
		665.721 *17*		1049.487	0^+	[E0]			0.16 *2*	$\rho^2(E0)\times10^3$=9 +*7*−*4*. Mult.: α(K)exp= >0.023 (1976Ya11, β^- decay);

$^{156}_{64}Gd_{92}$-22

Adopted Levels, Gammas (continued)

$\gamma(^{156}Gd)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡#]	δ[‡@]	α[&]	$I_{(\gamma+ce)}$	Comments
										0.040 *17* (1982Ba28), 0.0292 *20* (1993Kl03) from (n,γ), but γ is doubly placed there. I_γ: Measured value is <4, but γ must be E0. $I_{(\gamma+ce)}$: See the comment in the (n,γ) data set.
1715.211	0^+	1625.19 *21*	33 *4*	88.970	2^+					Mult.: 1993Kl03, in (n,γ), report α(K)exp=0.00080 *16* but show mult as questionable.
		1715.1 *3*		0.0	0^+	E0			0.18 *3*	$\rho^2(E0)\times10^3=3.5$ *+30−16*. Mult.: α(K)exp>0.0020 (1982Ba28), (n,γ).
1753.653	6^+	131.116 *2*	100 *6*	1622.535	5^+	M1+E2	+0.40 *+43−19*	0.933 *14*		Mult.,δ: From $\gamma(\theta)$ in (α,2nγ) (1981Ko03).
		243.047 *13*	31 *3*	1510.594	4^+					
		291.355 *10*	64 *8*	1462.297	4^+	E2		0.0660		Placement is that of 1993Kl03, (n,γ). γ not reported in (α,2nγ). Mult.: α(K)exp=0.061 *7* (1993Kl03), (n,γ).
1765.61	6^+	1180.9 *1*	100	584.715	6^+					
		1477		288.187	4^+					
1771.092	2^+	232.255 *12*	0.11 *1*	1538.851	3^-					Mult.: α(L1)exp=0.043 *5* (1993Kl03), (n,γ). Authors list mult=(M1), but placement requires a parity change.
		404.634 *16*	1.1 *1*	1366.529	1^-	(E1)		0.00768		B(E1)(W.u.)=8.2×10^{-5} *+20−29* Mult.: α(K)exp=0.014 *4* (1982Ba28, (n,γ)). Authors suggest line is a doublet with this part being E1.
		494.941 *6*	7.3 *3*	1276.138	3^-	E1		0.00482		B(E1)(W.u.)=0.00030 *+7−11* Mult.: α(K)exp=0.0057 *20* (1982Ba28), 0.0053 *4* (1993Kl03), from (n,γ).
		513.020 *13*	2.4 *3*	1258.075	2^+	M1		0.0237		B(M1)(W.u.)=0.0083 *+21−30* Mult.: α(K)exp=0.017 *6* (1982Ba28), 0.024 *2* (1993Kl03), from (n,γ).
		528.626 *22*	0.83 *7*	1242.480	1^-	E1		0.00416		B(E1)(W.u.)=2.8×10^{-5} *+7−10* Mult.: α(K)exp=0.0032 *5* (1993Kl03), (n,γ).
		1682.174 *15*	100 *5*	88.970	2^+	M1		0.00152		B(M1)(W.u.)=0.0098 *+22−34* Mult.: α(K)exp=0.0014 *5* (1976Ya11, β^- decay); and 0.00123 *14* (1982Ba28), 0.00103 *6* (1993Kl03), from (n,γ).
1780.486	2^-	312.002 *14*	0.26 *4*	1468.506	4^-					Mult.: α(K)exp=0.084 *42* (1982Ba28), 0.089 *12* (1993Kl03), from (n,γ). Authors report mult=M1, but placement requires E2.
		460.817 *7*	2.1 *2*	1319.658	2^-	M1+E2		0.024 *7*		Mult.: α(K)exp=0.019 *7* (1982Ba28), 0.0201 *14* (1993Kl03), from (n,γ).
		504.301 *15*	1.4 *2*	1276.138	3^-					Mult.: α(K)exp=0.021 *8* (1982Ba28), 0.011 *2* (1993Kl03), from (n,γ). 1993Kl03 deduce mult=E2; 1982Ba28 deduce M1.
		522.351 *11*	3.1 *3*	1258.075	2^+	E1		0.00427		B(E1)(W.u.)=5.0×10^{-5} *+23−12* Mult.: From α(K)exp<0.0062, 1982Ba28 deduce

Adopted Levels, Gammas (continued)

$\gamma(^{156}Gd)$ (continued)

E_i(level)	J^π_i	E_γ [†]	I_γ [†]	E_f	J^π_f	Mult. [‡#]	α [&]	Comments
								mult=E1. From α(K)exp=0.0137 *10*, 1993Kl03 deduce E2(+M1). (Both from (n,γ)).
1780.486	2^-	532.483 *5*	31 *4*	1248.006	3^+	E1	0.00410	B(E1)(W.u.)=0.000476 *+214−11* Mult.: α(K)exp=0.0039 *8* (1982Ba28), 0.00320 *19* (1993Kl03), from (n,γ).
		626.321 *5*	100 *4*	1154.152	2^+	E1	0.00288	B(E1)(W.u.)=0.0009 *+4−9* Mult.: α(K)exp=0.0022 *3* (1972Ha29, ε decay); and 0.00227 *20* (1982Ba28), 0.00237 *9* (1993Kl03), from (n,γ).
		650.978 *12*	5.6 *3*	1129.437	2^+	E1	0.00266	B(E1)(W.u.)=4.7×10^{-5} *+21−11* Mult.: α(K)exp=0.0040 (1982Ba28), 0.00141 *11* (1993Kl03), from (n,γ).
1798.717?	(5^-)	258.4 [c]		1540.190	6^+			
		443.238 [c] *24*	100 *19*	1355.422	4^+			
1827.841	2^+	365.56 *3*	0.98 *11*	1462.297	4^+			Mult.: From α(K)exp=0.0161 *20*, 1993Kl03, in (n,γ), report mult=E1(E2). Placement requires E2.
		569.771 *7*	11 *3*	1258.075	2^+	M1+E2	0.014 *5*	Mult.: α(K)exp=0.006 *4* (1982Ba28), 0.0121 *6* (1993Kl03), from (n,γ).
		579.828 *7*	39.6 *21*	1248.006	3^+	E2(+M1)	0.013 *4*	Mult.: α(K)exp=0.0070 *14* (1982Ba28), 0.0105 *6* (1993Kl03), from (n,γ).
		673.684 *7*	50 *2*	1154.152	2^+	E0(+E2,M1)		Mult.: α(K)exp=0.040 *5* (1982Ba28), 0.0393 *23* (1993Kl03), from (n,γ). other: 0.012 *3* (1972Ha29, ε decay).
		698.407 *7*	72 *4*	1129.437	2^+	E2(+M1)	0.0085 *25*	Mult.: α(K)exp=0.0062 *10* (1982Ba28), 0.0056 *4* (1993Kl03), from (n,γ).
		778.288 *9*	82 *6*	1049.487	0^+	E2	0.00474	Mult.: α(K)exp=0.0034 *4* (1982Ba28), 0.0038 *4* (1993Kl03), from (n,γ).
		1738.94 *3*	100 *8*	88.970	2^+	M1,E2		Mult.: α(K)exp=0.0011 *2* (1982Ba28), 0.00096 *6* (1993Kl03), (n,γ).
1848.33	8^+	883.2 *1*	33 *5*	965.134	8^+	E0+E2		I_γ: From Coul. ex. Mult.: α(K)exp(883.2+884.7) is interpreted by authors as E0+E2 for this γ and E2(+M1) for 884.
		1263.5 *5*	100 *17*	584.715	6^+			
1849.84	7^+	343.3 *1*	78 *33*	1506.863	5^+			
		884.7 *1*	100 *11*	965.134	8^+	E2(+M1)	0.0049 *13*	Mult.: α(K)exp(883.2+884.7) is interpreted by authors as E2(+M1) for this γ and E0+E2 for 883.
		1264.6 *5*	≤420	584.715	6^+			I_γ: Value of 420 is for Iγ(1263.5+1264.6).
1851.278	0^+	484.801 *8*	22.0 *17*	1366.529	1^-	E1	0.00505	Mult.: α(K)exp=0.0033 *17* (1982Ba28), 0.0044 *4* (1993Kl03), from (n,γ).
		608.722 *13*	20.9 *20*	1242.480	1^-	E1	0.00306	Mult.: α(K)exp=0.0015 *14* (1982Ba28), 0.0035 *4* (1993Kl03), from (n,γ).
		697.024 *18*	14.8 *12*	1154.152	2^+	[E2]	0.00611	Mult.: α(K)exp=0.0073 *7* (1993Kl03), from (n,γ). From ce data, mult=E2+M1, but placement requires E2.
		721.739 *22*	9.0 *9*	1129.437	2^+	E2	0.00564	Mult.: α(K)exp=0.0047 *6* (1993Kl03), (n,γ).
		1762.58 *5*	100 *5*	88.970	2^+			Mult.: α(K)exp=0.0009 *3* (1982Ba28), 0.00040 *3* (1993Kl03), from (n,γ). 1982Ba28 report mult=E2,M1. 1993Kl03 report mult=E1. This placement requires mult=E2.
		1851.4 *4*		0.0	0^+	E0		Mult.: α(K)exp>0.002 (1982Ba28).

$^{156}_{64}Gd_{92}$-24

Adopted Levels, Gammas (continued)

$\gamma(^{156}$Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡#]	δ[‡@]	α[&]	$I_{(\gamma+ce)}$	Comments
1851.803	3⁻	443.62 *9*	1.3 *3*	1408.133	5⁻	[E2]		0.0192		Mult.: α(K)exp=0.026 *7* (1993Kl03), in (n,γ). From ce data, mult=M1(+E2), but this placement requires E2.
		496.401 *7*	62 *4*	1355.422	4⁺	E1		0.00479		Mult.: α(K)exp=0.0066 *19* (1972Ha29, ε decay); and 0.0062 *14* (1982Ba28), 0.0044 *3* (1993Kl03), from (n,γ).
		554.003 *9*	4.8 *3*	1297.822	4⁺	E1		0.00375		Mult.: α(K)exp=0.0039 *4* (1993Kl03). Other: 0.009 *6* (1982Ba28). (Both from (n,γ)).
		575.736 *24*	7.4 *7*	1276.138	3⁻	E2(+M1)		0.014 *4*		Mult.: α(K)exp=0.0097 *13* (1993Kl03). Other: 0.008 *5* (1982Ba28). (Both from (n,γ)).
		593.71 *3*	5.7 *7*	1258.075	2⁺	E1		0.00323		Mult.: α(K)exp=0.0032 *3* (1993Kl03), in (n,γ).
		603.801 *6*	91 *6*	1248.006	3⁺	E1		0.00312		Mult.: α(K)exp=0.00319 *15* (1993Kl03). Other: 0.0072 *26* (1972Ha29). (Both from (n,γ)).
		697.651 *8*	100 *7*	1154.152	2⁺	E1		0.00230		Mult.: α(K)exp=0.0027 *4* (1972Ha29, ε decay); and 0.00209 *14* (1993Kl03), 0.0022 *4* (1982Ba28), from (n,γ).
		722.410 *18*	27 *2*	1129.437	2⁺	E1		0.00214		Mult.: α(K)exp=0.00154 *16* (1993Kl03). Other: 0030 *10* (1982Ba28). (Both from (n,γ)).
1861.067	4⁺	238.529 *3*	6.13 *24*	1622.535	5⁺	M1+E2		0.15 *3*		Mult.: α(K)exp=0.122 *6* (1993Kl03). Other: 0.09 *4* (1982Ba28). (Both from (n,γ)).
		350.474 *5*	100 *4*	1510.594	4⁺	M1(+E2)		0.051 *13*		Mult.: α(K)exp=0.052 *3* (1982Ba28), 0.047 *3* (1993Kl03), from (n,γ).
		453.00 *11*	1.0 *3*	1408.133	5⁻					
		585.008 *19*	4.1 *4*	1276.138	3⁻	E1		0.00333		Mult.: α(K)exp=0.0034 *5* (1993Kl03), (n,γ).
		613.07 *6*	2.7 *4*	1248.006	3⁺	E2		0.00831		Mult.: α(K)exp=0.0067 *9* (1993Kl03), (n,γ).
		706.93[b] *4*	1.8[b] *7*	1154.152	2⁺	[E2]		0.00591		Mult.: α(K)exp=0.0084 *15* (1993Kl03), (n,γ). The ce data indicate mult=M1(+E2), but placement requires E2. Note that this γ is multiply placed.
1893.390	4⁺	431.122 *13*	1.0 *1*	1462.297	4⁺	M1		0.0370		Mult.: α(K)exp=0.043 *5* (1993Kl03). Other: 0.05 *3* (1982Ba28), from (n,γ).
		485.273 *11*	4.1 *7*	1408.133	5⁻	E1		0.00504		Mult.: α(K)exp=0.0062 *11* (1993Kl03), (n,γ).
		537.953 *15*	10.2 *5*	1355.422	4⁺	E2+M1		0.016 *5*		Mult.: α(K)exp=0.0142 *12* (1993Kl03), 0.018 *4* (1982Ba28), from (n,γ).
		595.58 *4*	1.16 *14*	1297.822	4⁺	M1		0.01626		
		617.24 *3*	2.4 *5*	1276.138	3⁻					Mult.: α(K)exp=0.0046 *12* (1993Kl03, (n,γ)), but authors show mult=?
		1605.208 *19*	100 *3*	288.187	4⁺	E2+M1		0.00141 *23*		Mult.: α(K)exp=0.00110 *7* (1993Kl03), 0.0014 *2* (1982Ba28), from (n,γ).
1909.26	7⁺	155.70 *6*	30 *4*	1753.653	6⁺	(M1+E2)	+0.29 *11*	0.569 *9*		Mult.: From $\gamma(\theta)$, δ=+0.29 *11* (1981Ko03, (α,2nγ)) but γ is doubly placed. From data from other decay modes, the other γ is M1+E2, with δ=0.477 *18*.
		286.7 *1*	13 *2*	1622.535	5⁺	E2		0.0693		Mult.: α(K)exp=0.028 *11* and $\gamma(\theta)$ (1981Ko03), (α,2nγ).
		943.9 *1*	9	965.134	8⁺					Mult.: α(K)exp(943.9 doublet)=0.0025 *3* (1981Ko03), (α,2nγ); authors assign M1+E2 here and E1 for the other γ.
		1324.8 *1*	100 *7*	584.715	6⁺	E2		0.00158		Mult.: α(K)exp=0.00066 *10*, 1981Ko03, (α,2nγ). δ: From $\gamma(\theta)$ δ>+10 or <−5.

From ENSDF

$^{156}_{64}$Gd$_{92}$-25

Adopted Levels, Gammas (continued)

$\gamma(^{156}Gd)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡#]	α[&]	$I_{(\gamma+ce)}$	Comments
1914.835	2+	375.992 11	0.87 10	1538.851	3−	E1	0.00915		Mult.: α(K)exp=0.0063 11 (1993Kl03), (n,γ).
		548.392[a] 17	4.62[a] 22	1366.529	1−	E1	0.00384		Mult.: α(K)exp=0.0061 7 (1993Kl03), and, for the composite peak, <0.0035 (1982Ba28), both from (n,γ).
		559.72[c] 10	≤2.5	1355.422	4+				γ shown doubly placed by 1982Ba28, one being from this level. 1993Kl03 do not report this γ. Evaluator has shown it as unplaced in the (n,γ) data set.
		638.687 7	12.5 15	1276.138	3−	E1	0.00277		Mult.: α(K)exp=0.0029 4 (1993Kl03), 0.0026 13 (1982Ba28), from (n,γ).
		656.725 17	6.2 3	1258.075	2+	E2+E0,M1	0.018 6		Mult.: α(K)exp=0.0158 9 (1993Kl03), 0.015 4 (1982Ba28), from (n,γ). α: Computed from α(K)exp×(α/α(K)).
		666.834 11	5.6 3	1248.006	3+	E2+M1	0.010 3		Mult.: α(K)exp=0.0077 5 (1993Kl03), 0.008 4 (1982Ba28), from (n,γ).
		672.407 19	5.4 3	1242.480	1−				Mult.: From α(K)exp=0.0049 5 (1993Kl03, (n,γ)), mult=E2. Placement requires E1.
		1826.02 3	100 10	88.970	2+	M1	0.00136		Mult.: α(K)exp=0.00096 7 (1993Kl03), 0.0010 2 (1982Ba28), from (n,γ).
1916.449	3+	409.640 10	1.7 4	1506.863	5+	E2	0.0240		Mult.: α(K)exp=0.017 3 (1993Kl03), from (n,γ).
		561.023 15	11.5 5	1355.422	4+	E2	0.01036		Mult.: α(K)exp=0.0082 7 (1993Kl03), 0.012 5 (1982Ba28), from (n,γ).
		618.632 12	7.4 10	1297.822	4+				Mult.: α(K)exp=0.0034 4 (1993Kl03), 0.006 4 (1982Ba28), from (n,γ). Studies report mult=E2 or E2(M1), but α(K)exp lies between E1 and E2.
		658.400[a] 19	≤14[a]	1258.075	2+	M1	0.01266		Mult.: α(K)exp=0.0107 20 (1982Ba28), 0.0057 5 (1993Kl03), from (n,γ). Note that γ is multiply placed.
		668.391 9	9.0 7	1248.006	3+	E2+E0,M1	0.073 15	9.8 14	Mult.: α(K)exp=0.075 7 (1993Kl03), 0.061 12 (1982Ba28), from (n,γ). α(K)exp is larger that that for M1. α: Computed from α(K)exp×(α/α(K)).
		762.324[a] 8	52[a] 3	1154.152	2+	E2(+M1)	0.0069 20		Mult.: α(K)exp=0.0046 3 (1993Kl03), 0.0047 10 (1982Ba28), from (n,γ).
		787.003[a] 10	≤62[a]	1129.437	2+	E2,E1			Mult.: α(K)exp=0.0030 3 (1993Kl03), 0.0030 5 (1982Ba28), from (n,γ). γ is multiply placed.
		1628.21 4	79 7	288.187	4+	M1,E2			Mult.: α(K)exp=0.00080 6 (1993Kl03), 0.0011 2 (1982Ba28), from (n,γ).
		1827.74 4	100 5	88.970	2+	M1(+E2)			Mult.: α(K)exp=0.00082 6 (1993Kl03), 0.0014 3 (1982Ba28), from (n,γ).
1924.49	12+	508.41 3	100	1416.078	10+	E2	0.01335		B(E2)(W.u.)=3.0×10^2 3 Mult.: From γ(θ) in (α,2nγ), mult=Q. From RUL, M2 is eliminated.
1934.155	2−	465.631 9	1.7 2	1468.506	4−	E2	0.01687		Mult.: α(K)exp=0.0140 18 (1993Kl03), from (n,γ).
		567.692[b] 5	51[b] 2	1366.529	1−	M1	0.0183		Mult.: α(K)exp=0.0125 14 (1982Ba28), 0.0161 8 (1993Kl03), from (n,γ). γ is doubly placed, but most of the intensity is associated with this placement. From α(K)exp=0.0069 21 in ε decay, 1972Ha29 report mult=E2.

From ENSDF

$^{156}_{64}Gd_{92}$-26

$\gamma(^{156}Gd)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡#]	α[&]	Comments
1934.155	2⁻	614.511[b] 9	100[b] 2	1319.658	2⁻	M1	0.01504	Mult.: α(K)exp=0.0082 9, with M1+E2 assignment (1972Ha29, ε decay); and 0.0129 12, 0.0136 5 (1993Kl03), from (n,γ), with an M1 assignment. γ is doubly placed.
		658.400[a] 19	≤11[a]	1276.138	3⁻	M1	0.01266	Mult.: α(K)exp=0.0077 12 (1972Ha29, ε decay); and 0.0107 20 (1982Ba28), 0.0057 5 (1993Kl03), from (n,γ). These latter authors report mult=E2. γ is multiply placed.
		686.313[b] 9	2.3[b] 7	1248.006	3⁺	E1	0.00238	Mult.: α(K)exp=0.0023 3 (1972Ha29), 0.0026 +8−4 (1970Fu06), from ε decay; and 0.00196 19 (1993Kl03), from (n,γ).
		691.832[b] 19	6.4[b] 9	1242.480	1⁻	E2	0.00622	Mult.: α(K)exp=0.0045 6 (1972Ha29, ε decay); and 0.0037 10 (1982Ba28), 0.0054 5 (1993Kl03), from (n,γ).
		780.25[b] 4	53[b] 5	1154.152	2⁺	E1	0.00183	Mult.: α(K)exp=0.00150 20 (1970Fu06), 0.00128 19 (1971Mc01), from ε decay; and 0.0014 3 (1982Ba28), from (n,γ). δ: From γ(θ) δ=−0.024 8 (1975Ul01) and +0.048 21 (1979Ri17), from ε decay.
		805.096[b] 20	3.3[b] 7	1129.437	2⁺	E1	0.00172	Mult.: From α(K)exp=0.00129 14 (1972Ha29), 0.0011 +10−4 (1970Fu06), ε decay.
		1845.474[b] 29	22[b] 7	88.970	2⁺	E1	8.53×10^{-4}	Mult.: See the comment for this γ from the other 1934 level.
1934.355	3⁻	153.882[a] 10	0.40[a] 7	1780.486	2⁻			
		423.777 16	0.86 14	1510.594	4⁺	[E1]	0.00689	B(E1)(W.u.)=1.6×10^{-5} +30−9 Mult.: From α(K)exp=0.029 17, 1982Ba28 assign mult=E2,M1. Placement (from 1993Kl03) requires E1.
		567.692[b] 5	0.57[b] 19	1366.529	1⁻	[E2]	0.01006	B(E2)(W.u.)=0.7 +15−4 Mult.: From α(K)exp=0.0069 21 (1972Ha29, ε decay), where γ is singly placed. From α(K)exp=0.0125 14 (1982Ba28), 0.0161 8 (1993Kl03), (n,γ), mult=M1. However, there it is doubly placed, with most of its intensity coming from the other 1934 level.
		578.934 8	11.8 2	1355.422	4⁺	E1	0.00341	B(E1)(W.u.)=9.E−5 +13−5 Mult.: α(K)exp=0.00249 22 (1972Ha29), 0.0020 +4−3 (1970Fu06), ε decay; and 0.0034 21 (1982Ba28), 0.00310 24 (1993Kl03), from (n,γ). Other: 0.014 2 (1970Pe10, ε decay) which implies M1.
		614.511[b] 9	5.5[b] 2	1319.658	2⁻	M1	0.01504	B(M1)(W.u.)=0.0033 18 Mult.: See the comment for the other placement of this γ.
		658.400[b] 19	4.7[b] 2	1276.138	3⁻	M1	0.01266	B(M1)(W.u.)=0.0023 +33−12 Mult.: See the comment for this γ deexciting the other 1934 level.
		676.220[b] 15	3.9[b] 2	1258.075	2⁺	E1	0.00245	B(E1)(W.u.)=1.8×10^{-5} +29−10 Mult.: From α(K)exp=0.0027 4 (1972Ha29), ε decay. In (n,γ), 1993Kl03 report α(K)exp=0.0022 24 and assign mult=E2(M1). γ is doubly placed, but most of the intensity in the ε decay is associated with this level.
		686.313[b] 9	11.4[b] 2	1248.006	3⁺	E1	0.00238	B(E1)(W.u.)=5.E−5 +8−3 Mult.: See the comment for this γ deexciting the other 1934 level.

$\gamma(^{156}Gd)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡#]	α[&]	Comments
1934.355	3⁻	691.832[b] *19*	5.63[b] *24*	1242.480	1⁻	E2	0.00622	B(E2)(W.u.)=25 *+38−14* Mult.: See the comment for the placement of this γ from the other 1934 level.
		780.25[b] *4*	61.8[b] *4*	1154.152	2⁺	E1	0.00183	B(E1)(W.u.)=1.0×10⁻⁵ *+30−10* Mult.,δ: See the comment for this γ deexciting the other 1934 level.
		805.096[b] *20*	6.1[b] *2*	1129.437	2⁺	E1	0.00172	B(E1)(W.u.)=1.7×10⁻⁵ *+26−9* Mult.: From α(K)exp=0.00129 *14* (1972Ha29), 0.0011 *+10−4* (1970Fu06), ε decay.
		1646.184 *18*	100.0 *6*	288.187	4⁺	E1	7.86×10⁻⁴	B(E1)(W.u.)=3.2×10⁻⁵ *+49−18* Mult.: α(K)exp=0.00044 *+3−2* (1970Fu06), 0.00044 *3* (1972Ha29), from ε decay; and 0.00051 *13* (1982Ba28), 0.000338 *16* (1993Kl03), from (n,γ). δ: From ε decay: $\gamma\gamma(\theta)$ δ=0.03 *8* (1967Ke15) and ≤0.1 (1968We17); and from $\gamma(\theta)$ δ=+0.012 *4* (1975Ul01) and −0.015 *35* (1979Ri17).
		1845.474[b] *24*	108.9[b] *7*	88.970	2⁺	E1	8.53×10⁻⁴	B(E1)(W.u.)=2.5×10⁻⁵ *+38−14* Mult.: α(K)exp=0.00033 *3* (1972Ha29), 0.00032 *+3−2* (1970Fu06), from ε decay; and 0.00040 *9* (1982Ba28), 0.00325 *16* (1993Kl03), from (n,γ). γ is doubly placed, but both placements imply mult=E1. δ: From ε decay: $\gamma(\theta)$ δ=−0.030 *5* (1975Ul01) and −0.008 *25* (1979Ri17); and from $\gamma\gamma(\theta)$ δ=0.02 *13*. Although the latter two values are consistent with pure E1, all three values suggest 0.1% M2. The γ is doubly placed.
1946.344	1⁻	688.231 *24*	4.9 *6*	1258.075	2⁺	E1	0.00237	B(E1)(W.u.)=0.00068 *+16−27* Mult.: α(K)exp=<0.0028 (1982Ba28), 0.0046 *6* (1993Kl03), from (n,γ).
		1857.408 *23*	100 *3*	88.970	2⁺	E1	8.58×10⁻⁴	B(E1)(W.u.)=0.00070 *+15−26* Mult.: α(K)exp=0.00024 *21* (1976Ya11, β^- decay); and 0.000386 *23* (1993Kl03), 0.00056 *12* (1982Ba28), from (n,γ). δ: From $\gamma\gamma(\theta)$ in β^- decay, δ=−0.03 *+3−7* (1972Ha17) and <0.28 (1977Co22), so M2 contribution is ≤1%.
		1946.16 *4*	68 *3*	0.0	0⁺	E1	8.95×10⁻⁴	B(E1)(W.u.)=0.00041 *+9−16* Mult.: α(K)exp=0.000328 *22* (1993Kl03), 0.00044 *14* (1982Ba28), from (n,γ); and 0.0005 *4* (1976Ya11, β^- decay).
1952.364	4⁻	171.870 *11*	0.56 *12*	1780.486	2⁻	E2	0.370	Mult.: α(K)exp=0.22 *5* (1993Kl03).
		246.494 *15*	0.48 *8*	1705.799	6⁻			Mult.: α(L1)exp=0.100 *18* (1993Kl03), (n,γ), but authors show mult as questionable.
		413.540 *14*	1.12 *17*	1538.851	3⁻	M1	0.0412	Mult.: α(K)exp=0.040 *7* (1993Kl03), (n,γ).
		441.790 *12*	2.1 *2*	1510.594	4⁺			Mult.: From α(K)exp=0.0108 *14* in (n,γ), 1993Kl03 report mult=E2, but their placement requires E1.
		445.524[a] *5*	29[a] *1*	1506.863	5⁺	E1	0.00613	Mult.: α(K)exp=0.0053 *20* (1972Ha29, ε decay); and 0.0051 *26* (1982Ba28), 0.0060 *3* (1993Kl03), from (n,γ).

From ENSDF

$^{156}_{64}Gd_{92}$-28

$\gamma(^{156}Gd)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡#]	α[&]	Comments
1952.364	4^-	544.208 *16*	5.2 *6*	1408.133	5^-			Mult.: From α(K)exp=0.0044 *6* in (n,γ), 1993Kl03 report mult=E1, but their placement is not consistent with this.
		596.952 *6*	35 *2*	1355.422	4^+	E1	0.00319	Mult.: α(K)exp=0.0029 *8* (1972Ha29, ε decay); and 0.00313 *18* (1993Kl03), 0.0028 *9* (1982Ba28), from (n,γ).
		632.719[b] *9*	9.3[b] *3*	1319.658	2^-	E2	0.00770	Mult.: α(K)exp=0.0057 *2* (1993Kl03), 0.003 *2* (1982Ba28), from (n,γ). γ is doubly placed, but both placements are consistent with E2.
		676.220[b] *15*	2.8[b] *7*	1276.138	3^-			Mult.: From α(K)exp=0.0027 *4* in ε decay, 1972Ha29 report mult=E1. From α(K)exp=0.0020 *24* in (n,γ), 1993Kl03 report E2(M1). γ is doubly placed.
		704.384 *9*	100 *7*	1248.006	3^+	E1	0.00226	Mult.: α(K)exp=0.0023 *3* (1972Ha29, ε decay); and 0.00201 *22* (1993Kl03), 0.0030 *8* (1982Ba28), from (n,γ).
1952.400	0^-	585.830[b] *15*	6.1[b] *12*	1366.529	1^-	M1	0.01695	Mult.: α(K)exp=0.014 *9* (1974Kl09), 0.014 *6* (1976Ya11), from β^- decay; and 0.012 *4* (1982Ba28), 0.011209 (1993Kl03), from (n,γ). See comment on this γ in the ^{156}Eu β^- Decay data set.
		632.719[b] *9*	4.2[b] *8*	1319.658	2^-	E2	0.00770	Mult.: See the comment on this γ from the other 1952 level.
		709.942 *9*	100.0 *8*	1242.480	1^-	M1	0.01051	Mult.: α(K)exp=0.0079 *28* (1966Dz08), 0.0097 *8* (1974Kl09), 0.0099 *15* (1976Ya11), from β^- decay; and 0.0089 *11* (1982Ba28), 0.0071 *4* (1993Kl03), from (n,γ).
1958.46	9^-	543.0 *3*	7 *3*	1416.078	10^+			
		993.3 *1*	100 *3*	965.134	8^+	E1	0.00115	Mult.: α(K)exp=0.0011 *3* (1981Ko03), (α,2nγ). δ: From $\gamma(\theta)$ δ<0.11 (1981Ko03), (α,2nγ).
1962.047	1^-	246.874 *15*	0.98 *14*	1715.211	0^+			
		793.87 *9*	7.7 *7*	1168.186	0^+	E1	0.00177	Mult.: α(K)exp=0.00115 *21* (1993Kl03),<0.0025 (1982Ba28), (n,γ).
		912.603 *22*	23 *4*	1049.487	0^+	E1	0.00135	Mult.: α(K)exp=0.000998 (1993Kl03), 0.0016 *8* (1982Ba28), (n,γ).
		1872.93 *3*	100 *4*	88.970	2^+	E1	8.64×10^{-4}	Mult.: α(K)exp=0.000330 *19* (1993Kl03), 0.00043 *13* (1982Ba28), (n,γ).
		1961.78 *5*	56 *7*	0.0	0^+	E1	9.02×10^{-4}	Mult.: α(K)exp=0.000284 *19* (1993Kl03), (n,γ).
1962.064	5^+	101.000 *2*	10.3 *12*	1861.067	4^+			
		208.399 *4*	8.1 *7*	1753.653	6^+	M1	0.256	Mult.: α(K)exp=0.28 *3* (1993Kl03), (n,γ).
		339.533 *6*	100 *7*	1622.535	5^+	M1	0.0689	Mult.: α(K)exp=0.155 *12* (1993Kl03), 0.059 *12* (1982Ba28), from (n,γ). Large α(K)exp from 1993Kl03 may indicate an E0 admixture.
		451.483 *6*	51.7 *17*	1510.594	4^+	M1+E2	0.026 *8*	Mult.: α(K)exp=0.021 *5* (1982Ba28), 0.0258 *15* (1993Kl03), from (n,γ).
		664.37 *7*	17.4 *21*	1297.822	4^+	E2	0.00685	Mult.: α(K)exp=0.0056 *8* (1993Kl03), (n,γ).
		714.04 *4*	26 *10*	1248.006	3^+	[E2]	0.00578	Mult.: α(K)exp=0.008 *3* (1993Kl03), (n,γ). The ce data indicate mult=M1, but placement requires E2.
1965.113	4^-	342.57 *3*	0.78 *16*	1622.535	5^+			
		426.231 *18*	2.66 *25*	1538.851	3^-	M1	0.0381	Mult.: α(K)exp=0.038 *4* (1993Kl03), 0.021 *11* (1982Ba28), from (n,γ).
		454.505 *11*	6.56 *25*	1510.594	4^+	E1	0.00585	Mult.: α(K)exp=0.0060 *4* (1993Kl03), 0.014 *5* (1982Ba28), from (n,γ).

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γ(^{156}Gd) (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.‡#	δ‡@	α&	Comments
1965.113	4⁻	458.245 *6*	12.8 *5*	1506.863	5⁺	E1		0.00574	Mult.: α(K)exp=0.0044 *22* (1982Ba28), 0.0050 *3* (1993Kl03), from (n,γ).
		502.884 *12*	4.4 *5*	1462.297	4⁺	E1		0.00465	Mult.: α(K)exp=0.0053 *8* (1993Kl03), (n,γ).
		557.016 *21*	3.1 *8*	1408.133	5⁻	E2+M1		0.015 *5*	Mult.: α(K)exp=0.017 *9* (1982Ba28), 0.0117 *19* (1993Kl03), from (n,γ).
		609.647 *25*	22.8 *13*	1355.422	4⁺	E1		0.00305	Mult.: α(K)exp=0.0039 *24* (1982Ba28), 0.0089 *5* (1993Kl03), from (n,γ).
		688.910 *23*	6.5 *8*	1276.138	3⁻	E2		0.00628	Mult.: α(K)exp=0.0043 *6* (1993Kl03),<0.0028 (1982Ba28), from (n,γ).
		717.09 *2*	100 *4*	1248.006	3⁺	E1		0.00218	Mult.: α(K)exp=0.0022 *4* (1972Ha29, ε decay); and 0.00202 *32* (1982Ba28), 0.00164 *8* (1993Kl03), from (n,γ).
1965.950	1⁺	599.501 *13*	21.49 *11*	1366.529	1⁻	E1		0.00316	Mult.: α(K)exp=0.0035 *11* (1964Pe17), 0.0020 *3* (1966Dz08), 0.0025 *2* (1974Kl09), 0.0030 *4* (1976Ya11), from β^- decay; and 0.0022 *13* (1982Ba28), 0.00327 *19* (1993Kl03), from (n,γ).
		646.293 *10*	64.73 *28*	1319.658	2⁻	E1		0.00270	Mult.: α(K)exp=0.0022 *3* (1966Dz08), 0.00236 *18* (1974Kl09), 0.00219 *16* (1976Ya11), from β^- decay; and 0.00220 *15* (1993Kl03), 0.0025 *6* (1982Ba28), from (n,γ).
		723.482 *9*	55.86 *25*	1242.480	1⁻	E1		0.00214	Mult.: α(K)exp=0.0015 *2* (1964Pe17), 0.0020 *3* (1966Dz08), 0.00196 *15* (1974Kl09), 0.00175 *1* (1976Ya11); and 0.00210 *12* (1993Kl03), 0.0007 *4* (1982Ba28), from (n,γ).
		797.73 *6*	1.12 *5*	1168.186	0⁺				Mult.: α(K)exp=0.0057 *12* (1974Kl09). Authors assign M1+E2, but placement requires M1 (for which α=0.0081).
		811.810 *8*	100.0 *4*	1154.152	2⁺	M1+E2	−0.055 *20*	0.00755	Mult.: α(K)exp=0.0065 *9* (1966Dz08), 0.0067 *5* (1974Kl09), 0.0059 *3* (1976Ya11), from β^- decay; and 0.0057 *3* (1993Kl03), 0.0058 *10* (1982Ba28), from (n,γ). δ: From $\gamma\gamma(\theta)$ 0.050 *11* (1970Ru09) and −0.075 *25* (1977Co22), from β^- decay. Other: from $\gamma\gamma(\theta)$ 0.14 *+6−14* (1962Ba38). Evaluator assumes sign for 1970Ru09 needs to be reversed.
		836.52 *7*	0.84 *5*	1129.437	2⁺				Mult.: α(K)exp=0.0053 *15* (1976Ya11), β^- decay.
		916.4	0.33 *6*	1049.487	0⁺				
		1876.55 *21*	15.59 *12*	88.970	2⁺	M1+E2	+0.36 *6*	1.29×10⁻³ *2*	Mult.: α(K)exp=0.00067 *11* (1964Pe17), 0.00095 *14* (1966Dz08), 0.00085 *8* (1976Ya11), from β^- decay. From (n,γ), 1993Kl03 report α(K)exp=0.00039 *10*, but show mult=?. δ: From $\gamma\gamma(\theta)$ δ=0.40 *5* (1972Ha17) and +0.32 *5* (1977Co22), from β^- decay.
		1965.2 *3*	39.90 *20*	0.0	0⁺	M1		1.26×10⁻³	Mult.: α(K)exp=0.00087 *12* (1966Dz08), 0.00093 *7* (1974Kl09), and 0.00088 *7* (1976Ya11), from β^- decay, where γ is a singlet. From (n,γ), 1982Ba28 show this γ

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$\gamma(^{156}Gd)$ (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.‡#	α&	Comments
								as doubly placed, while 1993Kl03 show a 1965.136 γ, but place it elsewhere in the level scheme. From γ branching considerations, it is likely that most of the intensity of this γ in (n,γ) is associated with this other placement.
1995.455	4⁻	143.672[a] *11*	0.38[a] *13*	1851.803	3⁻			
		372.931 *10*	2.6 *3*	1622.535	5⁺	E1	0.00933	Mult.: α(K)exp=0.00705 (1993Kl03), (n,γ).
		456.603 *6*	18 *2*	1538.851	3⁻	M1	0.0319	Mult.: α(K)exp=0.0336 *20* (1993Kl03), 0.029 *6* (1982Ba28), from (n,γ).
		526.951 *7*	100 *5*	1468.506	4⁻	M1	0.0221	Mult.: α(K)exp=0.0207 *12* (1993Kl03), 0.0168 *18* (1982Ba28), from (n,γ).
		587.24 *3*	8.1 *13*	1408.133	5⁻			
		1707.24 *11*	64 *9*	288.187	4⁺	E1	8.04×10^{-4}	Mult.: α(K)exp=0.00029 *5* (1993Kl03), (n,γ).
2003.749	2⁺	684.049 *14*	18.3 *14*	1319.658	2⁻	E1	0.00240	Mult.: α(K)exp=0.00197 *21* (1993Kl03), 0.0033 *10* (1982Ba28), from (n,γ).
		727.647 *18*	100 *14*	1276.138	3⁻	E1	0.00211	Mult.: α(K)exp=0.00181 *12* (1993Kl03), 0.0021 *6* (1982Ba28), from (n,γ).
		755.779 *13*	43 *3*	1248.006	3⁺	M1+E2	0.0070 *20*	Mult.: α(K)exp=0.0064 *6* (1993Kl03), 0.0065 *14* (1982Ba28), from (n,γ).
		761.275 *8*	83 *4*	1242.480	1⁻	E1	0.00193	Mult.: α(K)exp= 0.00162 *11* (1993Kl03), 0.0013 *5* (1982Ba28), from (n,γ).
		849.563 *9*	37.8 *19*	1154.152	2⁺	M1+E2	0.0053 *15*	Mult.: α(K)exp=0.00411 *24* (1993Kl03), 0.0047 *8* (1982Ba28), from (n,γ).
		874.20 *4*	8.6 *8*	1129.437	2⁺	M1	0.00632	
		1715.1 *5*	9 *5*	288.187	4⁺	[E2]	0.00111	Mult.: α(K)exp=0.012 *7* (1993Kl03), >0.0020 (1982Ba28), from (n,γ). The ce data indicate mult=M1,E2,E0, but placement requires E2. Note that this transition is doubly placed.
2010.350	4⁺	158.533 *7*	1.1 *1*	1851.803	3⁻			
		239.204 *20*	0.58 *14*	1771.092	2⁺			
		366.726 *7*	4.9 *3*	1643.653	6⁺	E2	0.0330	Mult.: α(K)exp=0.0107 *10* (1993Kl03), 0.027 *11* (1982Ba28), from (n,γ).
		387.839 *9*	2.5 *2*	1622.535	5⁺	M1	0.0486	Mult.: α(K)exp=0.058 *6* (1993Kl03), 0.023 *12* (1982Ba28), from (n,γ).
		470.164 *9*	9.1 *9*	1540.190	6⁺	[E2]	0.01643	Mult.: α(K)exp=0.0302 *24* (1993Kl03), 0.022 *7* (1982Ba28), from (n,γ). The ce data indicate mult=M1, but placement requires E2.
		548.030 *21*	4.6 *5*	1462.297	4⁺	M1,E2	0.016 *5*	Mult.: α(K)exp=0.031 *4* (1993Kl03), (n,γ).
		654.915 *9*	25.6 *14*	1355.422	4⁺	M1	0.01283	Mult.: α(K)exp=0.0164 *10* (1993Kl03), (n,γ).
		712.548 *23*	12.1 *14*	1297.822	4⁺	M1+E2	0.0081 *23*	Mult.: α(K)exp=0.0064 *8* (1993Kl03), (n,γ).
		762.324[a] *8*	100[a] *7*	1248.006	3⁺	E2(+M1)	0.0069 *20*	Mult.: α(K)exp=0.0046 *3* (1993Kl03), 0.0047 *10* (1982Ba28), from (n,γ).
		856.161 *18*	39 *7*	1154.152	2⁺	E2	0.00384	Mult.: α(K)exp=0.0032 *3* (1993Kl03), 0.0028 *7* (1982Ba28), from (n,γ).
		880.77 *8*	18 *3*	1129.437	2⁺	E2	0.00361	Mult.: α(K)exp=0.0020 *4* (1993Kl03), (n,γ).
		1722.12 *7*	100 *10*	288.187	4⁺	E2+M1	0.00129 *19*	Mult.: α(K)exp=0.00092 *10* (1993Kl03), (n,γ).
2011.38	8⁺	161.60 *5*	100 *10*	1849.84	7⁺			E_γ: γ not reported in Coul. ex.

Adopted Levels, Gammas (continued)

$\gamma(^{156}Gd)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡#]	δ[‡@]	α[&]	Comments
2011.38	8^+	367	11 2	1643.653	6^+				E_γ: Reported in Coul. ex. only.
		1046.0 1	57 3	965.134	8^+	E2(+M1)		0.0033 8	Mult.: α(K)exp=0.0025 6 (1981Ko03), (α,2nγ). δ: From $\gamma(\theta)$, δ<−0.6 or >+1.6 (1981Ko03).
		1426	23 2	584.715	6^+				
2016.952	5^-	394.433 8	4.9 4	1622.535	5^+	E1		0.00816	Mult.: α(K)exp=0.004 4 (1993Kl03), <0.026.
		548.392[a] 17	18.0[a] 8	1468.506	4^-				
		740.76 4	12 3	1276.138	3^-	E2		0.00531	Mult.: α(K)exp=0.0045 10 (1993Kl03), (n,γ).
		1432.30 5	73 6	584.715	6^+	E1		7.53×10^{-4}	Mult.: α(K)exp=0.00059 6 (1993Kl03), (n,γ).
		1728.56 7	100 8	288.187	4^+	E1		8.10×10^{-4}	Mult.: α(K)exp=0.00027 3 (1993Kl03), (n,γ).
2020.594	4^+	168.804[a] 6	1.0[a] 2	1851.803	3^-				
		221.889 12	0.78 14	1798.717?	(5^-)				
		376.916 7	3.0 2	1643.653	6^+	E2		0.0305	Mult.: α(K)exp=0.011 3 (1993Kl03), (n,γ).
		552.16[a] 3	1.3[a] 3	1468.506	4^-	[E1]		0.00378	Mult.: α(K)exp=0.020 4 for the peak (1993Kl03), (n,γ). The ce data indicate mult=M1, but placement requires E1. Note, γ is doubly placed.
		722.82 3	11 2	1297.822	4^+	E2		0.00562	Mult.: α(K)exp=0.0048 7 (1993Kl03), (n,γ).
		1732.37 6	100 6	288.187	4^+	M1,E2			Mult.: α(K)exp=0.00093 26 (1982Ba28), 0.00099 7 (1993Kl03), from (n,γ).
		1931.97 16	24 4	88.970	2^+	[E2]			Mult.: α(K)exp=0.00077 15 (1993Kl03), (n,γ). The ce data indicate mult=M1,E2, but placement requires E2.
2024.945	3^-	486.093 7	16 1	1538.851	3^-	M1		0.0272	Mult.: α(K)exp=0.0250 17 (1993Kl03), 0.024 5 (1982Ba28), from (n,γ).
		556.440 12	4.3 3	1468.506	4^-	E2		0.01058	Mult.: α(K)exp=0.0101 9 (1993Kl03), 0.017 9 (1982Ba28), from (n,γ).
		616.79[a] 3	≤8.3[a]	1408.133	5^-	E2		0.00819	Mult.: α(K)exp=0.0088 23 (1993Kl03), 0.012 6 (1982Ba28), from (n,γ).
		748.797 9	100 7	1276.138	3^-	M1		0.00922	Mult.: α(K)exp=0.0077 6 (1993Kl03), 0.0062 10 (1982Ba28), from (n,γ).
		766.891 12	22 2	1258.075	2^+	E1		0.00190	Mult.: α(K)exp=0.00161 17 (1993Kl03), 0.0026 12 (1982Ba28), from (n,γ).
		782.461 14	36 6	1242.480	1^-	E2		0.00469	Mult.: α(K)exp=0.0040 4 (1993Kl03), 0.0046 16 (1982Ba28), from (n,γ).
2026.664	1^+	660	0.42 12	1366.529	1^-				
		706.93[b] 4	1.99[b] 15	1319.658	2^-	[E1]		0.00224	B(E1)(W.u.)=0.00014 +3−5
		768.59 3	2.67 12	1258.075	2^+	[M1,E2]		0.0068 19	Mult.: 1993Kl03 report α(K)exp=0.018 3, which is much larger than that for M1. However, γ is doubly placed in (n,γ).
		784.14 10	1.51 12	1242.480	1^-	[E1]		0.00182	B(E1)(W.u.)=7.9×10^{-5} +17−25
		858.51 6	6.26 15	1168.186	0^+	M1		0.00660	B(M1)(W.u.)=0.024 +5−8 Mult.: α(K)exp=0.008 5 (1974Kl09), 0.0074 16 (1976Ya11), from β^- decay.
		872.39[c] 9	1.22 15	1154.152	2^+	[M1,E2]		0.0050 14	
		1937.57 5	59.4 4	88.970	2^+	M1+E2	−0.60 4	1.21×10^{-3} 2	B(M1)(W.u.)=0.014 +3−5; B(E2)(W.u.)=0.71 +15−23

$\gamma(^{156}Gd)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡#]	δ[‡@]	α[&]	Comments
									Mult.: α(K)exp=0.00081 *12* (1966Dz08), 0.00093 *9* (1974Kl09), 0.00087 *12* (1976Ya11), from β^- decay; and 0.00086 *19* (1982Ba28), 0.00064 *5* (1993Kl03), from (n,γ). δ: From $\gamma\gamma(\theta)$, δ=−0.57 *3* (1972Ha17), 0.62 *3* (1977Co22), from β^- decay.
2026.664	1^+	2026.70 *3*	100.0 *5*	0.0	0^+	M1		1.23×10^{-3}	B(M1)(W.u.)=0.037 *11* B(M1)(W.u.) value computed directly from the empirical B(M1)↑ from (γ,γ'). Mult.: α(K)exp=0.0010 *8* (1964Pe17), 0.00076 *10* (1966Dz08), 0.00079 *7* (1974Kl09), 0.00078 12 (1976Ya11), from β^- decay; and 0.00092 *16* (1982Ba28), 0.00080 *6* (1993Kl03), from (n,γ).
2027.61	8^-	321.81 *4*	69 *8*	1705.799	6^-	E2		0.0486	I_γ: From (α,2nγ). From (^{13}C,α3nγ), Iγ(321.81γ)/Iγ(1062.5γ)=1.2 *4*. Mult.: α(K)exp=0.025 *7* and $\gamma(\theta)$ (1981Ko03), (α,2nγ).
		389.6 *3*	14.2 *14*	1638.00	7^-	M1+E2	+0.44 *4*	0.0447 *9*	
		1062.5 *3*	100 *8*	965.134	8^+				Mult.: α(K)exp=0.0013 *8* (1981Ko03), (α,2nγ), which implies E1 or E2; J^π assignments require E1.
2029.784	4^-	168.703 *18*	1.5 *2*	1861.067	4^+				
		230.983 *20*	1.5 *4*	1798.717?	(5^-)				
		249.334 *14*	2.2 *3*	1780.486	2^-				
		407.251 *5*	100 *4*	1622.535	5^+	E1		0.00756	Mult.: α(K)exp=0.0075 *6* (1993Kl03), 0.0065 *16* (1982Ba28), (n,γ).
		490.91 *3*	7.6 *11*	1538.851	3^-	M1		0.0265	Mult.: α(K)exp=0.022 *3* (1993Kl03), 0.011 *6* (1982Ba28), from (n,γ).
		519.162 *13*	22.3 *13*	1510.594	4^+	E1		0.00433	Mult.: α(K)exp=0.0042 *3* (1993Kl03), <0.0046 (1982Ba28), from (n,γ).
		522.918 *11*	41 *3*	1506.863	5^+	E1		0.00426	Mult.: α(K)exp=0.0042 *3* (1993Kl03), <0.0067 (1982Ba28), from (n,γ).
		621.77 *3*	19 *4*	1408.133	5^-	M1		0.01460	Mult.: From α(K)exp=0.0141 *14* (1993Kl03), (n,γ). 1982Ba28 report α(K)exp<0.0041 and assign mult=E1.
		674.358 *8*	96 *5*	1355.422	4^+	E1		0.00247	Mult.: α(K)exp=0.0028 *3* (1993Kl03), 0.0052 *27* (1982Ba28), from (n,γ).
		753.79 *4*	19 *5*	1276.138	3^-	M1		0.00907	Mult.: α(K)exp=0.0082 *20* (1993Kl03), 0.0065 *14* (1982Ba28), (n,γ).
2044.944	4^-	422.411 *5*	11.95 *6*	1622.535	5^+	E1		0.00694	Mult.: α(K)exp=0.008 (1959Of11), 0.0061 (1970Pe10), and L-subshell ratios (1970Fu06), all from ε decay. δ: From $\gamma(\theta)$ δ=−0.009 *4* (1975Ul01), +0.024 *19* (1979Ri17), from ε decay.
		534.349 *7*	100.0 *4*	1510.594	4^+	E1		0.00406	Mult.: α(K)exp=0.00318 *20* (1970Fu06), 0.0034 *3* (1971Mc01), from ε decay; and 0.0031 *6* (1982Ba28), 0.00369 *22* (1993Kl03), from (n,γ). Also L-subshell ratios (1970Fu06), from ε decay.

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Adopted Levels, Gammas (continued)

γ(^{156}Gd) (continued)

E_i(level)	J^{π}_i	E_{γ}[†]	I_{γ}[†]	E_f	J^{π}_f	Mult.[‡#]	α[&]	Comments
								δ: From $\gamma\gamma(\theta)$, δ(M2/E1)=−0.03 *+15−13* (1967Ke15), −0.09 *1* (1968We17), and +0.06 *2* (1975Ul01). Other $\gamma\gamma(\theta)$: δ=0.0 (1962Lo01), 0.21 *4* (1959Of11). All values from ε decay.
2044.944	4^-	537.98 *6*	0.292 *11*	1506.863	5^+			
		582.6	0.087 *11*	1462.297	4^+			
		689.40 *10*	0.252 *14*	1355.422	4^+	E1	0.00236	Mult.: α(K)exp=0.0055 *+10−3* and assigned M1+E2 (1970Fu06) and 0.0020 *5* with E1 assignment (1972Ha29), all from ε decay.
		796.56 *10*	0.025 *9*	1248.006	3^+	E1	0.00176	Mult.: α(K)exp=0.0019 *7* (1972Ha29), ε decay.
2047.805	2^+	276.711 *6*	1.00 *7*	1771.092	2^+	M1	0.1186	Mult.: α(K)exp=0.157 *14* (1993Kl03), (n,γ). α(K)exp is larger than that for pure M1, suggesting an E0 admixture.
		508.94 *3*	1.4 *3*	1538.851	3^-	E1	0.00453	Mult.: α(K)exp=0.0055 *14* (1993Kl03), (n,γ).
		893.57 *7*	4.8 *5*	1154.152	2^+	M1+E2	0.0047 *13*	Mult.: α(K)exp=0.0044 *5* (1993Kl03), (n,γ).
		1958.87 *4*	100 *7*	88.970	2^+	M1	0.00127	Mult.: α(K)exp=0.00084 *5* (1993Kl03), 0.00082 *18* (1982Ba28), from (n,γ).
		2047.90 *12*	29 *7*	0.0	0^+	E2	9.95×10^{-4}	Mult.: α(K)exp=0.00059 *8* (1993Kl03), (n,γ). From α(K)exp<0.00033, 1982Ba28 report mult=E1.
2054.134	2^+	273.635 *20*	0.23 *5*	1780.486	2^-			Mult.: α(K)exp=0.095 *19* (1993Kl03), (n,γ). Report mult=M1, but placement requires a parity change.
		543.541 *7*	3.27 *21*	1510.594	4^+			Mult.: α(K)exp=0.0037 *3* (1993Kl03), 0.0042 *25* (1982Ba28), from (n,γ). Both authors report mult=E1, but placement requires no parity change.
		591.782 *24*	1.04 *11*	1462.297	4^+	[E2]	0.00907	B(E2)(W.u.)=5.8 *+12−14* Mult.: α(K)exp=0.0182 *20* (1993Kl03), <0.0073 (1982Ba28), from (n,γ). 1993Kl03 report mult=M1. 1982Ba28 report E2,E1. Placement requires E2.
		734.435 *21*	3.4 *4*	1319.658	2^-	[E1]	0.00207	B(E1)(W.u.)=7.2×10^{-5} *+15−18* Mult.: α(K)exp=0.0111 *15* (1993Kl03), 0.0033 *14* (1982Ba28), from (n,γ). 1993Kl03 report mult=M1. 1982Ba28 report E2,E1. Placement requires E1.
		756.25 *4*	3.2 *4*	1297.822	4^+			Mult.: α(K)exp=0.0077 *9* (1993Kl03), (n,γ). 1993Kl03 report mult=M1, but placement requires E2.
		796.017 *24*	7.4 *6*	1258.075	2^+	M1	0.00794	B(M1)(W.u.)=0.0116 *+22−27* Mult.: α(K)exp=0.0060 *6* (1993Kl03), 0.0061 *12* (1982Ba28), from (n,γ).
		1765.97 *5*	17.9 *12*	288.187	4^+	[E2]	0.00108	B(E2)(W.u.)=0.43 *+8−10* Mult.: α(K)exp=0.00104 *8* (1993Kl03), 0.00085 *22* (1982Ba28), from (n,γ). Mult may be M1 or E2. Placement requires E2. Mult.: 1993Kl03 report mult=M1, but placement requires E2.
		1965.123 *20*	100 *6*	88.970	2^+	M1	0.00126	B(M1)(W.u.)=0.0104 *+19−24* Mult.: α(K)exp=0.00079 *5* (1993Kl03), 0.00087 *11* (1982Ba28), from (n,γ).
		2054.03 *10*	9.7 *10*	0.0	0^+	E2	9.95×10^{-4}	B(E2)(W.u.)=0.108 *+21−26* Mult.: α(K)exp=0.00049 *6* (1993Kl03), <0.00055 (1982Ba28), from (n,γ).
2070.290	3^+	153.882[a] *10*	0.56[a] *10*	1916.449	3^+			

Adopted Levels, Gammas (continued)

$\gamma(^{156}Gd)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡#]	δ[‡@]	α[&]	Comments
2070.290	3^+	531.4[c]	2.6 *4*	1538.851	3^-				
		601.788 *6*	33.9 *16*	1468.506	4^-	E1		0.00314	Mult.: α(K)exp=0.0028 *17* (1982Ba28), 0.00338 *16* (1993Kl03), from (n,γ).
		714.855 *9*	25 *1*	1355.422	4^+	M1		0.01033	Mult.: α(K)exp=0.0083 *5* (1993Kl03), (n,γ). For the (714.8+715.2) peak, 1982Ba28 report α(K)exp=0.0045 *19*.
		750.608 *10*	51 *4*	1319.658	2^-	E1		0.00198	Mult.: α(K)exp=0.0012 *7* (1982Ba28), 0.00149 *13* (1993Kl03), from (n,γ).
		822.278 *9*	36 *6*	1248.006	3^+	M1		0.00733	Mult.: α(K)exp=0.0055 *18* (1982Ba28), 0.0070 *4* (1993Kl03), from (n,γ).
		1781.96 *6*	56 *10*	288.187	4^+	E2(+M1)		0.00124 *17*	Mult.: α(K)exp=0.0010 *4* (1982Ba28), 0.00075 *7* (1993Kl03), from (n,γ).
		1981.46 *4*	100 *5*	88.970	2^+	E2+M1			Mult.: α(K)exp=0.00066 *17* (1982Ba28), 0.00075 *5* (1993Kl03), from (n,γ).
2079.42	8^+	170.25 *7*	100 *8*	1909.26	7^+	M1+E2	+0.25 *+25−14*	0.443 *11*	Mult.,δ: From $\gamma(\theta)$ in (α,2nγ).
		325.6 *1*	67 *8*	1753.653	6^+	E2		0.0469	Mult.: α(K)exp=0.032 *8* and $\gamma(\theta)$, in (α,2nγ).
		1114.0 *3*	≈117	965.134	8^+				
2103.28	3^-	186.869[a] *14*	≤0.42[a]	1916.449	3^+				
		304.660 *7*	8.8 *6*	1798.717?	(5^-)	[E2]			
		592.60 *10*	2.1 *5*	1510.594	4^+				Mult.: α(K)exp=0.0052 *21* (1972Ha29), from ε decay.
		641.01 *10*	4.4 *5*	1462.297	4^+	E1		0.00274	Mult.: α(K)exp=0.0026 *6* (1972Ha29, ε decay); 0.0045 *7* (1993Kl03, (n,γ)).
		747.82 *10*	16.8 *6*	1355.422	4^+	E1		0.00200	Mult.: α(K)exp=0.0035 *+12−4* (1970Fu06), 0.0024 *3* (1972Ha29), from ε decay; 0.0034 *7* (1982Ba28), from (n,γ). 1982Ba28 report mult=E2,(E1). Placement requires E1.
		783.69 *10*	4.8 *6*	1319.658	2^-	[M1,E2]		0.0065 *18*	
		827.11 *10*	2.5 *8*	1276.138	3^-	M1(+E2)		0.0057 *16*	Mult.: α(K)exp=0.008 *4* (1972Ha29), from ε decay.
		855.24 *10*	17.1 *8*	1248.006	3^+	E1		0.00153	Mult.: α(K)exp=0.0014 *+10−4* (1970Fu06), from ε decay.
		860.88 *10*	13.1 *8*	1242.480	1^-	E2		0.00379	Mult.: α(K)exp=0.0049 *10* (1972Ha29, ε decay); 0.0032 *3* (1993Kl03, (n,γ)).
		949.08 *10*	100.0 *10*	1154.152	2^+	E1		0.00125	Mult.: α(K)exp=0.0011 *+4−3* (1970Fu06), 0.00087 *15* (1971Mc01), from ε decay; 0.0012 *6* (1982Ba28), 0.00098 *7* (1993Kl03), from (n,γ). δ: From $\gamma(\theta)$, δ(M2/E1)=−0.025 *12* (1975Ul01) and −0.027 *31* (1979Ri17), from ε decay.
		974.1 *3*	7.3 *8*	1129.437	2^+				
		1815.04 *19*	26.1 *5*	288.187	4^+	E1		8.41×10^{-4}	Mult.: α(K)exp=0.00028 *+6−3* (1970Fu06, ε decay); and <0.003 (1982Ba28, (n,γ)).

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$\gamma(^{156}$Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡#]	α[&]	Comments
								δ: From $\gamma(\theta)$, δ(M2/E1)=0.00 *10* (1979Ri17), from ε decay.
2103.28	3^-	2014.24 *19*	69.7 *8*	88.970	2^+	E1	9.25×10^{-4}	Mult.: α(K)exp=0.00030 *3* (1970Fu06, ε decay); and 0.00063 *26* (1982Ba28), 0.000266 *21* (1993Kl03), from (n,γ). δ: From $\gamma(\theta)$, δ(M2/E1)=−0.013 *7* (1975Ul01) and −0.02 *5* (1979Ri17). So, ≤0.04% M2 contribution is allowed.
		2103.5 *5*	0.29 *10*	0.0	0^+	[E3]	0.00136	
2106.645	3^+	644.371 *15*	2.6 *6*	1462.297	4^+	M1	0.01336	Mult.: α(K)exp=0.0140 *16* (1993Kl03), (n,γ).
		787.003[a] *10*	≤38[a]	1319.658	2^-	[E1]	0.00180	Mult.: α(K)exp=0.0030 *5* (1982Ba28), 0.0030 *3* (1993Kl03), from (n,γ). α(K)exp implies mult=E1 or E2, but γ is doubly placed. This placement requires E1.
		848.61 *3*	5.1 *9*	1258.075	2^+	M1	0.00679	Mult.: α(K)exp=0.0055 *10* (1993Kl03), (n,γ).
		858.51[b] *6*	2.5[b] *18*	1248.006	3^+	M1	0.00660	Mult.: α(K)exp=0.0038 *11* (1993Kl03), (n,γ). Authors report mult=E2(M1), but γ is multiply placed.
		1818.41 *3*	75 *3*	288.187	4^+	M1(+E2)		Mult.: α(K)exp=0.0011 *2* (1982Ba28), 0.00080 *5* (1993Kl03), from (n,γ).
		2017.73 *3*	100 *3*	88.970	2^+	M1	0.00124	Mult.: α(K)exp=0.00091 *15* (1982Ba28), 0.00074 *4* (1993Kl03), from (n,γ).
2116.454	5^-	362.799[a] *8*	17.3[a] *12*	1753.653	6^+	E1	0.00997	Mult.: α(K)exp=0.0139 *19* (1993Kl03), <0.012 (1982Ba28), from (n,γ). Mult.: γ is doubly placed. This placement requires a parity change.
		493.918 *6*	100 *10*	1622.535	5^+	E1	0.00484	Mult.: α(K)exp=0.0039 *4* (1993Kl03), 0.0038 *17* (1982Ba28), from (n,γ).
		605.862 *14*	75 *4*	1510.594	4^+	E1	0.00309	Mult.: α(K)exp=0.0030 *3* (1993Kl03), 0.0033 *20* (1982Ba28), from (n,γ).
2121.43	2^-	2032.45 *3*	100 *4*	88.970	2^+	E1		Mult.: α(K)exp=0.000317 *22* (1993Kl03), 0.00047 *10* (1982Ba28), from (n,γ).
		2121.3 *4*	3.6 *17*	0.0	0^+			
2134.34	(8^+)	1169.2 *1*	100	965.134	8^+			
2137.60	7^-	228.35 *4*	100 *3*	1909.26	7^+	E1	0.0320	B(E1)(W.u.)=9.9×10^{-9} *9* Mult.: α(K)exp=0.063 *13* (1981Ko03), (α,2nγ). δ: From $\gamma(\theta)$ and ce data −0.6<δ(M2/E1)<+1.7 (1981Ko03).
		383.93 *6*	48 *4*	1753.653	6^+	[E1]	0.00870	B(E1)(W.u.)=1.00×10^{-9} *12* Mult.: α(K)exp=0.030 *13* (1981Ko03), in (α,2nγ), yields E2 or E1+M2.
2155.554	4^-	449.71 *3*	1.8 *5*	1705.799	6^-	[E2]	0.0185	Mult.: α(K)exp=0.035 *9* (1993Kl03), (n,γ). The ce data indicate mult=M1, but placement requires E2.
		616.79[a] *3*	≤25[a]	1538.851	3^-	E2(+M1)	0.012 *4*	Mult.: α(K)exp=0.0088 *23* (1993Kl03), 0.012 *6* (1982Ba28), from (n,γ). γ is doubly placed.
		648.64 *6*	6.8 *16*	1506.863	5^+			Mult.: α(K)exp=0.0050 *13* (1993Kl03), (n,γ). 1993Kl03 report mult=E2,(M1), but placement requires a parity change.
		687.055 *9*	79 *5*	1468.506	4^-	M1	0.01139	Mult.: α(K)exp=0.0169 *13* (1993Kl03), 0.0094 *15* (1982Ba28), from (n,γ).
		747.405 *10*	100 *5*	1408.133	5^-	E2	0.00520	Mult.: α(K)exp=0.0047 *3* (1993Kl03), 0.0034 *7* (1982Ba28), from (n,γ).

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γ(^{156}Gd) (continued)

E_i(level)	J^{π}_i	E_γ[†]	I_γ[†]	E_f	J^{π}_f	Mult.[‡#]	α[&]	Comments
2155.554	4^-	879.42 4	57 11	1276.138	3^-	E2,M1	0.0049 13	Mult.: α(K)exp=0.0029 3 (1993Kl03), 0.0045 14 (1982Ba28), from (n,γ).
2174.338	2^+	147.671[a] 4	1.7[a] 2	2026.664	1^+	M1+E2	0.645 23	Mult.: α(L1)exp=0.050 6 (1993Kl03), α(K)exp<0.36 (1982Ba28), from (n,γ).
		164.006[a] 15	0.76[a] 23	2010.350	4^+			Mult.: α(L2)exp=0.065 20 (1993Kl03), (n,γ). These authors report mult=E2?, but γ is multiply placed.
		322.576 9	5.1 5	1851.803	3^-	E1	0.01329	Mult.: α(K)exp=0.0121 12 (1993Kl03), 0.020 16 (1982Ba28), from (n,γ).
		393.821 10	7.3 6	1780.486	2^-	E1	0.00819	Mult.: α(K)exp=0.0036 4 (1993Kl03), <0.015 (1982Ba28), from (n,γ).
		635.470 17	10.0 8	1538.851	3^-	E1	0.00280	Mult.: α(K)exp=0.0036 4 (1993Kl03), <0.005 (1982Ba28), from (n,γ).
		898.175 12	100 5	1276.138	3^-	E1	0.00139	Mult.: α(K)exp=0.00143 10 (1993Kl03), 0.0022 7 (1982Ba28), from (n,γ).
		916.243 11	99 6	1258.075	2^+	E2+M1	0.0045 12	Mult.: α(K)exp=0.00328 19 (1993Kl03), 0.0027 6 (1982Ba28), from (n,γ).
		931.855 14	81 5	1242.480	1^-	E1	0.00130	Mult.: α(K)exp=0.00131 11 (1993Kl03), 0.0015 8 (1982Ba28),from (n,γ).
		1006.220 18	70 12	1168.186	0^+	[E2]	0.00272	Mult.: α(K)exp=0.00290 20 (1993Kl03), 0.0009 5 (1982Ba28), from (n,γ). 1993Kl03 report mult=E2+M1, 1982Ba28 report E1. Placement requires E2.
		1125.07 5	10 3	1049.487	0^+	E2	0.00216	Mult.: α(K)exp=0.00210 20 (1993Kl03), (n,γ).
2175.07	4	636.31 10		1538.851	3^-			
		668.17 10	15 2	1506.863	5^+	M1+E2	0.009 3	Mult.: α(K)exp=0.0051 13 (1972Ha29), from ε decay.
		706.55 10		1468.506	4^-			
		766.83 10	5.3 20	1408.133	5^-			
		819.72 10	6.6 20	1355.422	4^+			
		877.30[b] 10	10[b] 3	1297.822	4^+			
		898.83 10	6.0 26	1276.138	3^-	M1(+E2)	0.0047 13	Mult.: α(K)exp=0.0045 12 (1972Ha29), ε decay.
		926.98 10	100 6	1248.006	3^+			
		1887.4 3	13.8 7	288.187	4^+			
2181.384	2^+	266.60 3	1.60	1914.835	2^+	E2(+M1)	0.109 22	Mult.: α(K)exp=0.071 5 (1993Kl03), (n,γ).
		330.3[c]	0.5 2	1851.278	0^+			
		466.4[c]	2.8 4	1715.211	0^+			
		826.01 13	54 7	1355.422	4^+	[E2]	0.00415	Mult.: α(K)exp=0.0041 10 (1982Ba28), (n,γ). The ce data indicate mult=E2+M1, but placement requires E2.
		1893.09 8	88 6	288.187	4^+	E2	0.00103	Mult.: α(K)exp=0.00061 7 (1993Kl03),(n,γ).
		2092.28 5	100 5	88.970	2^+			Mult.: α(K)exp=0.00037 3 (1993Kl03), (n,γ). These authors report mult=E1(E2), but placement indicates no parity change.
2186.784	1^+	160.2 2	0.27 3	2026.664	1^+	[M1,E2]	0.50 3	
		335.69 11	0.27 4	1851.278	0^+			
		820.36 7	4.43 13	1366.529	1^-			
		867.139 24	34.9 3	1319.658	2^-	E1	0.00149	Mult.: α(K)exp=0.00150 19 (1974Kl09), 0.00116 21 (1976Ya11), from β^- decay; and 0.00152 12 (1993Kl03), (n,γ). δ: From $\gamma\gamma(\theta)$, δ(M2/E1)<0.28 (1977Co22), β^- decay.
		928.8 4	0.74 13	1258.075	2^+			
		944.305 16	34.94 23	1242.480	1^-	E1	0.00127	Mult.: α(K)exp=0.0008 3 (1976Ya11), β^- decay; and 0.00120 21 (1993Kl03), <0.0018 (1982Ba28), from (n,γ). δ: From $\gamma\gamma(\theta)$, δ(M2/E1)=−0.04 +9−8 (1977Co22), β^- decay.
		1018.50 10	2.22 13	1168.186	0^+	M1	0.00438	Mult.: α(K)exp=0.0060 2 (1974Kl09), from β^- decay.

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Adopted Levels, Gammas (continued)

γ(^{156}Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡#]	δ[‡@]	α[&]	Comments
2186.784	1+	2097.79 4	100.0 5	88.970	2+	M1+E2	−1.1 4	0.00109 5	Mult.: α(K)exp=0.00066 8 (1964Pe17), 0.00060 9 (1966Dz08), 0.00069 5 (1976Ya11), β^- decay; and 0.00082 22 (1982Ba28), 0.00066 5 (1993Kl03), from (n,γ). δ: From γγ(θ), δ=+0.5 1 (1962Ba38), −1.2 2 (1972Ha17), and −1.5 +4−2 (1977Co22), from β^- decay.
		2186.61 6	91.5 5	0.0	0+	M1		0.00118	Mult.: α(K)exp=0.00076 14 (1964Pe17), 0.00069 5 (1976Ya11), from β^- decay; and 0.00088 7 (1993Kl03), 0.00043 14 (1982Ba28), from (n,γ).
2190.653	2+	164.006[a] 15	≤0.46[a]	2026.664	1+				Mult.: From (n,γ), 1993Kl03 report mult=E2?, but γ is multiply placed.
		186.869[a] 14	≤0.43[a]	2003.749	2+				1993Kl03, in (n,γ), report α(K)exp=0.51 12, which is larger than that for M1, suggesting an E0 component. Note, γ is multiply placed.
		224.707 5	0.99 8	1965.950	1+	M1		0.208	Mult.: α(K)exp=0.175 17 (1993Kl03), (n,γ).
		362.799[a] 8	≤3.3[a]	1827.841	2+	E2,E1			Mult.: α(K)exp=0.0139 19 (1993Kl03), <0.0117 (1982Ba28), from (n,γ). These authors report mult=E2,E1 and E1, respectively, but γ is multiply placed. This placement requires no parity change.
		419.597 14	0.85 16	1771.092	2+	M1+E2		0.031 9	Mult.: α(K)exp=0.028 5 (1993Kl03), (n,γ).
		914.60 10	26 6	1276.138	3−				Mult.: α(K)exp=0.0040 16 (1982Ba28), 0.0011 3 (1993Kl03), from (n,γ). These authors report mult=E2,M1 and E1?, respectively. This placement requires E1.
		942.621 12	35.2 19	1248.006	3+	M1		0.00527	Mult.: α(K)exp=0.0043 3 (1993Kl03), 0.0051 16 (1982Ba28), from (n,γ).
		948.19 5	9 3	1242.480	1−				
		1036.527 15	100 6	1154.152	2+	M1,E2		0.0034 9	Mult.: α(K)exp=0.0040 3 (1993Kl03), 0.0019 8 (1982Ba28), from (n,γ).
		1902.67 5	54 3	288.187	4+	[E2]		0.00103	Mult.: α(K)exp=0.00086 23 (1982Ba28), 0.00088 7 (1982Ba28), from (n,γ). 1993Kl03 report mult=M1, 1982Ba28 report mult=M1,E2, but placement requires E2.
		2101.47 10	26 3	88.970	2+	M1		0.00120	Mult.: α(K)exp=0.00068 8 (1993Kl03), (n,γ).
		2190.44 4	65 4	0.0	0+	[E2]		9.84×10^{-4}	Mult.: α(K)exp=0.00054 15 (1982Ba28), 0.00067 5 (1993Kl03), from (n,γ). The ce data indicate mult=M1(+E2), but the placement requires E2.
2199.778	2−	419.287 14	1.3 3	1780.486	2−				Mult.: α(K)exp=0.012 3 (1993Kl03), (n,γ). These authors report mult=E1(E2)(M1).
		833.30 3	26 1	1366.529	1−	E2		0.00407	Mult.: α(K)exp=0.0352 24 (1993Kl03), (n,γ).
		1045.72 3	46 7	1154.152	2+	E1		0.00105	Mult.: α(K)exp=0.00071 12 (1993Kl03), (n,γ).
		2110.66 4	100 6	88.970	2+	E1		9.68×10^{-4}	Mult.: α(K)exp=0.000292 20 (1993Kl03), (n,γ).
2203.5	1−,2−	961.0 6	100	1242.480	1−				
2205.569	1−	290.797 18	4.2 7	1914.835	2+				

From ENSDF

$\gamma(^{156}$Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡#]	α[&]	Comments
2205.569	1^-	434.478 *6*	23.8 *4*	1771.092	2^+	E1	0.00650	Mult.: α(K)exp=0.006 *3* (1976Ya11), β^- decay; and 0.007 *4* (1982Ba28), 0.0073 *4* (1993Kl03), from (n,γ).
		490.366 *8*	18.2 *4*	1715.211	0^+	E1	0.00492	Mult.: α(K)exp=0.0038 *8* (1976Ya11), β^- decay; and 0.0056 *29* (1982Ba28), 0.0064 *6* (1993Kl03), from (n,γ).
		839.0 *2*	3.4 *6*	1366.529	1^-	M1	0.00698	Mult.: α(K)exp=0.010 *4* (1976Ya11), β^- decay.
		947.46 *15*	33.3 *7*	1258.075	2^+			
		1037	6.1 *6*	1168.186	0^+			
		1076	38.5 *8*	1129.437	2^+			
		1156	14.9 *22*	1049.487	0^+			
		2116.49 *13*	13.0 *3*	88.970	2^+			
		2205.23 *8*	100 *8*	0.0	0^+	E1	0.00101	Mult.: α(K)exp=0.00027 *4* (1976Ya11), β^- decay; and 0.00033 *11* (1982Ba28), 0.00026 *3* (1993Kl03), from (n,γ).
2216.614	2^+	168.804[a] *6*	0.55[a] *9*	2047.805	2^+			
		189.960 *15*	0.34 *8*	2026.664	1^+	E2(+M1)	0.30 *4*	Mult.: α(K)exp=0.191 *42* (1993Kl03), (n,γ).
		323.242 *9*	1.66 *15*	1893.390	4^+	(E2)	0.0480	Mult.: α(L1)exp=0.0091 *10* (1993Kl03), (n,γ).
		445.524[a] *5*	17.2[a] *8*	1771.092	2^+			Mult.: α(K)exp=0.0060 *3* (1993Kl03), 0.0051 *25* (1982Ba28), from (n,γ). Mult.: Reported as E1 by 1982Ba28 and 1993Kl03, but γ is multiply placed. This placement requires no parity change.
		897.11 *5*	7.2 *9*	1319.658	2^-	E1	0.00140	Mult.: α(K)exp=0.0014 *3* (1993Kl03), (n,γ).
		968.64 *3*	21 *6*	1248.006	3^+	E2	0.00294	Mult.: α(K)exp=0.0020 *7* (1993Kl03), (n,γ).
		974.091 *15*	44.0 *23*	1242.480	1^-			Mult.: α(K)exp=0.00189 *13* (1993Kl03), 0.0024 *5* (1982Ba28), (n,γ). Mult.: 1982Ba28 and 1993Kl03 report mult=E2, but placement requires a parity change.
		2127.59 *3*	100 *13*	88.970	2^+	E2	9.87×10^{-4}	Mult.: α(K)exp=0.00076 *5* (1993Kl03), 0.00055 *9* (1982Ba28), from (n,γ). Mult.: 1993Kl03 report mult=M1(E2), while 1982Ba28 report E2.
2220.0	10^+	803.9 *3*	100 *5*	1416.078	10^+	E2+E0	0.020 *11*	Mult.: α(K)exp=0.017 *8* (1981Ko03). α: Computed from α(K)exp$\times(\alpha/\alpha$(K)).
		1254.8 *5*	50 *8*	965.134	8^+			I_γ: 1981Ko03 report only an upper limit for this value.
2227.625	3^-	428.972[a] *23*	0.67[a] *17*	1798.717?	(5^-)			
		765.279 *19*	8.6 *6*	1462.297	4^+	E1	0.00191	Mult.: α(K)exp=0.0030 *3* (1993Kl03), (n,γ).
		979.608 *20*	36.9 *22*	1248.006	3^+	E1	0.00118	Mult.: α(K)exp=0.00098 *8* (1993Kl03), 0.0006 *4* (1982Ba28), from (n,γ).
		1073.475 *12*	100 *17*	1154.152	2^+	E1	9.96×10^{-4}	Mult.: α(K)exp=0.00082 *6* (1993Kl03), 0.00043 *18* (1982Ba28), from (n,γ).
2232.59	4^-	877.30[b] *10*	55[b] *6*	1355.422	4^+			Mult.: α(K)exp=0.0040 *14* (1972Ha29), ε decay, but γ is multiply placed. The ce data are consistent with mult=E2, but this placement requires a parity change.
		984.43 *10*	100 *13*	1248.006	3^+	E1	0.00117	Mult.: α(K)exp=0.0011 *3* (1972Ha29), from ε decay.
		1944.8 *4*	24.2 *23*	288.187	4^+			

From ENSDF

$^{156}_{64}$Gd$_{92}$-39

Adopted Levels, Gammas (continued)

γ(^{156}Gd) (continued)

E$_i$(level)	J$^\pi_i$	E$_\gamma$[†]	I$_\gamma$[†]	E$_f$	J$^\pi_f$	Mult.[‡#]	α[&]	Comments
2240.375	2$^+$,3$^+$	219.788 7	0.73 8	2020.594	4$^+$	E2+M1	0.19 3	Mult.: α(K)exp=0.141 21 (1993Kl03), (n,γ).
		244.92 3	0.30 8	1995.455	4$^-$			
		288.031 4	4.80 25	1952.364	4$^-$	E1	0.0165	E$_\gamma$: From energy difference, this γ more likely populates the 4$^-$, rather than the 0$^-$, member of the doublet of 1952.3 levels. If so, then J$^\pi$=3$^+$ for the 2240 level. However, which of these two placements is correct is regarded as uncertain. Mult.: α(K)exp=0.0152 10 (1993Kl03), (n,γ).
		459.843 5	39.3 15	1780.486	2$^-$	E1	0.00570	Mult.: α(K)exp=0.0053 3 (1993Kl03), 0.00549 12 (1982Ba28), from (n,γ).
		701.49 3	7.8 8	1538.851	3$^-$	E1	0.00228	Mult.: α(K)exp=0.0032 4 (1993Kl03), 0.0017 12 (1982Ba28), from (n,γ).
		982.35 4	11.3 13	1258.075	2$^+$			
		992.329 19	30. 3	1248.006	3$^+$	E2	0.00280	Mult.: α(K)exp=0.00199 15 (1993Kl03), 0.0014 5 (1982Ba28), from (n,γ).
		2152.14 13	100 10	88.970	2$^+$			Mult.: α(K)exp=0.00024 6 (1993Kl03), 0.00025 8 (1982Ba28), from (n,γ). Mult=E1 from 1982Ba28, 1993Kl03, (n,γ), but placement requires no parity change.
2249.65	9$^+$	238.5[c] 1	≤115	2011.38	8$^+$			
		399.82[b] 7	18[b] 4	1849.84	7$^+$	E2	0.0257	Mult.: From α(K)exp=0.026 5 (1981Ko03, (α,2nγ)), mult=E2. γ is doubly placed, but both are consistent with E2. ADO ratio in (^{13}C,α3nγ) gives mult=Q.
		833.4[c]	≤254	1416.078	10$^+$			
		1284.6	100 8	965.134	8$^+$	E2(+M1)	0.0021 5	Mult.: α(K)exp=0.0021 5 (1981Ko03), (α,2nγ). δ: From $\gamma(\theta)$, δ<−10 (1981Ko03), (α,2nγ). (1981Ko03 give δ>−10, but the evaluator suspects that <−10 was intended.).
2254.314	4$^+$	147.671[a] 4	≤4.9[a]	2106.645	3$^+$	M1+E2	0.645 23	Mult.: α(L1)exp=0.050 6 (1993Kl03), α(K)exp<0.357 (1982Ba28), from (n,γ). Mult.: α(K)exp=0.095 6 (1993Kl03), 0.29 9 (1982Ba28), from (n,γ).
		243.980 5	13 6	2010.350	4$^+$	M1+E2		Mult.: α(K)exp=0.095 6 (1993Kl03), 0.29 9 (1982Ba28), from (n,γ).
		258.860[a] 4	≤19[a]	1995.455	4$^-$			Mult.: α(K)exp=0.073 4 (1993Kl03), 0.080 3 (1982Ba28), from (n,γ). Mult.: 1982Ba28 and 1993Kl03 report mult=E2, but placement requires a parity change. Note, γ is doubly placed.
		319.961 9	13.2 13	1934.355	3$^-$	E1	0.01356	Mult.: α(K)exp=0.0153 18 (1993Kl03), from (n,γ).
		393.243 10	12.5 16	1861.067	4$^+$	E2(+M1)	0.037 10	Mult.: α(K)exp=0.028 4 (1993Kl03), <0.0244 (1982Ba28), from (n,γ).
		631.79 4	15 3	1622.535	5$^+$	M1	0.01403	Mult.: α(K)exp=0.012 2 (1993Kl03), from (n,γ).
		743.694 13	100 10	1510.594	4$^+$	M1	0.00937	Mult.: α(K)exp=0.0115 11 (1993Kl03), 0.0098 19 (1982Ba28), from (n,γ).
		791.99 5	21 6	1462.297	4$^+$	M1	0.00803	Mult.: α(K)exp=0.0065 21 (1993Kl03), from (n,γ).
		1100.21 5	87 11	1154.152	2$^+$	E2	0.00226	Mult.: α(K)exp=0.00175 24 (1993Kl03), from (n,γ).
2256.746	3$^+$	252.991[a] 17	≤1.9[a]	2003.749	2$^+$	M1	0.1509	Mult.: α(K)exp=0.145 26 (1993Kl03), from (n,γ).
		290.789 12	2.3 4	1965.950	1$^+$	[E2]	0.0664	Mult.: α(K)exp=0.091 17 (1993Kl03), from (n,γ). The ce data indicate mult=M1, but placement requires E2.
		395.642 13	6.6 12	1861.067	4$^+$	E2	0.0265	Mult.: α(K)exp=0.014 2 (1993Kl03), from (n,γ).

$^{156}_{64}$Gd$_{92}$-40

γ(^{156}Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡#]	δ[‡@]	α[&]	Comments
2256.746	3^+	428.972[a] *23*	≤2.1[a]	1827.841	2^+	M1		0.0381	Mult.: α(K)exp=0.067 *10* (1993Kl03), 0.046 *29* (1982Ba28), from (n,γ).
		634.22 *5*	4.7 *9*	1622.535	5^+	[E2]		0.00772	Mult.: α(K)exp=0.010 *2* (1993Kl03), from (n,γ). The ce data allow mult=M1,E2, but the placement requires E2.
		788.35 *4*	16 *2*	1468.506	4^-				Mult.: α(K)exp=0.0024 *5* (1993Kl03), from (n,γ). Placement requires E1.
		794.49 *4*	16 *4*	1462.297	4^+				
		901.39 *3*	44 *3*	1355.422	4^+	M1		0.00587	Mult.: α(K)exp=0.0061 *4* (1993Kl03), from (n,γ).
		937.05 *4*	39 *10*	1319.658	2^-				
		1008.8	107 *14*	1248.006	3^+				
		2167.57 *7*	100 *7*	88.970	2^+	M1,E2			Mult.: α(K)exp=0.00069 *6* (1993Kl03), 0.00040 *13* (1982Ba28), from (n,γ). Placement requires E2.
2259.88	1^-	138.7 *2*	24.4 *27*	2121.43	2^-				
		2170.85 *7*	100 *7*	88.970	2^+	E1		9.95×10^{-4}	Mult.: α(K)exp=0.00029 *3* (1993Kl03), <0.000385 (1982Ba28), from (n,γ).
		2259.91 *13*	36 *4*	0.0	0^+				Mult.: From α(K)exp=0.00088 *13* in (n,γ), 1993Kl03 report mult=M1(E2), but placement requires E1.
2269.937	1^+	317.30 *9*	2.81 *27*	1952.400	0^-	E1		0.01385	From α(K)exp=0.0091 *22* (1993Kl03), (n,γ). From α(K)exp=0.06 *3*, 1982Ba28 deduce mult=E2,M1.
		498.88 *6*	3.08 *18*	1771.092	2^+	M1,E2		0.020 *6*	Mult.: α(K)exp=0.020 (1976Ya11, β^- decay); and 0.030 *4* (1993Kl03), (n,γ).
		903.62 *10*	1.86 *23*	1366.529	1^-				
		1011.87 *5*	14.67 *27*	1258.075	2^+	M1		0.00444	Mult.: α(K)exp=0.0043 *5* (1974Kl09), 0.0047 *11* (1976Ya11), β^- decay.
		1027.39 *8*	5.98 *23*	1242.480	1^-				
		1101.80 *11*	1.95 *27*	1168.186	0^+				
		1115.78 *7*	2.36 *23*	1154.152	2^+				
		1140.51 *5*	13.22 *27*	1129.437	2^+	M1,E2		0.0027 *7*	Mult.: α(K)exp=0.0031 *17* (1976Ya11, β^- decay); and >0.0024 (1982Ba28, (n,γ)). From α(K)exp=0.00058 *6*, 1993Kl03 deduce mult=E1.
		1220.50 *11*	0.91 *23*	1049.487	0^+				
		2180.91 *12*	100.0 *6*	88.970	2^+	M1+E2	−0.65 *+8−6*	0.00112 *2*	Mult.: α(K)exp=0.0008 *3* (1964Pe17), 0.00058 *9* (1966Dz08), 0.00062 *6* (1974Kl09), 0.00064 *5* (1976Ya11), from β^- decay; and 0.00075 *21* (1982Ba28), 0.00062 *5* (1993Kl03), from (n,γ). δ: From $\gamma\gamma(\theta)$ (1977Co22), from β^- decay.
		2269.90 *12*	48.1 *4*	0.0	0^+				Mult.: α(K)exp=0.00051 *29* (1976Ya11, β^- decay). From α(K)exp=0.00021 *3* in (n,γ), 1993Kl03 report mult=E1. Placement requires no parity change.
2287.5		1322.4 *3*	100	965.134	8^+				
2293.45	1^-	1164.2 *3*	100 *9*	1129.437	2^+				
		2205.4[c]		88.970	2^+	E1			

$^{156}_{64}Gd_{92}$-41

γ(^{156}Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡#]	α[&]	Comments
2293.45	1^-	2293.40 *12*	34 *2*	0.0	0^+			
2300.70	1^+	354.20 *9*	14.8 *20*	1946.344	1^-			
		2211.83 *12*	100.0 *24*	88.970	2^+			
		2301.0 *2*	10.6 *9*	0.0	0^+			
2302.796	2^+	255.039 *16*	0.28 *15*	2047.805	2^+			
		356.446[a] *5*	100[a] *3*	1946.344	1^-			
2316.501	$1^-,2^-$	370.213 *16*	2.2 *3*	1946.344	1^-	M1+E2	0.043 *12*	Mult.: α(K)exp=0.037 *5* (1993Kl03), from (n,γ).
		382.337 *11*	3.0 *4*	1934.155	2^-	M1(+E2)	0.040 *11*	Mult.: α(K)exp=0.055 *22* (1993Kl03), 0.034 *14* (1982Ba28), from (n,γ).
		464.86 *4*	8.1 *3*	1851.803	3^-	E2,M1	0.024 *7*	Mult.: α(K)exp=0.021 *6* (1993Kl03), 0.020 *7* (1982Ba28), from (n,γ).
		488.601 *10*	15.0 *13*	1827.841	2^+	E1	0.00496	Mult.: α(K)exp=0.0049 *5* (1993Kl03), 0.0033 *20* (1982Ba28), from (n,γ).
		996.92 *4*	23.2 *21*	1319.658	2^-	M1	0.00461	Mult.: α(K)exp=0.0049 *5* (1993Kl03), from (n,γ).
		1162.42 *9*	17 *9*	1154.152	2^+	E1	8.74×10^{-4}	Mult.: α(K)exp=0.0007 *5* (1993Kl03), from (n,γ).
		2227.86 *5*	100 *6*	88.970	2^+	E1	0.00102	Mult.: α(K)exp=0.000290 *23* (1993Kl03), 0.00036 *12* (1982Ba28), from (n,γ).
2322.6		1357.5 *10*	100	965.134	8^+			
2323.217	2^+	252.991[a] *17*	0.98[a] *17*	2070.290	3^+	M1	0.1509	Mult.: α(K)exp=0.145 *26* (1993Kl03), from (n,γ).
		269.087 *21*	0.93 *17*	2054.134	2^+	M1	0.1278	Mult.: α(K)exp=0.130 *23* (1993Kl03), from (n,γ).
		408.33 *4*	0.71 *22*	1914.835	2^+	M1(+E2)	0.033 *10*	Mult.: α(K)exp=0.036 *12* (1993Kl03), 0.033 *24* (1982Ba28), from (n,γ).
		461.95 *5*	3.1 *5*	1861.067	4^+			Mult.: From α(K)exp=0.0065 *13* in (n,γ), 1993Kl03 report mult=E1(E2). Placement indicates no parity change.
		552.16[a] *3*	1.6[a] *4*	1771.092	2^+	M1	0.0197	Mult.: α(K)exp=0.020 *4* (1993Kl03), from (n,γ).
		1080.60 *4*	56 *11*	1242.480	1^-	E1	9.84×10^{-4}	Mult.: α(K)exp=0.00103 *20* (1993Kl03), from (n,γ).
		1193.80 *4*	36 *4*	1129.437	2^+	E2	0.00192	Mult.: α(K)exp=0.00173 *20* (1993Kl03), from (n,γ).
		1273.85 *7*	53 *9*	1049.487	0^+			
		2234.01 *5*	100 *6*	88.970	2^+	M1	0.00117	Mult.: α(K)exp=0.00067 *5* (1993Kl03), 0.00081 *22* (1982Ba28), from (n,γ).
		2322.88 *16*	24 *4*	0.0	0^+			
2344.4	1^-	2255.5 *5*	100 *18*	88.970	2^+			
		2344.3 *7*	66 *11*	0.0	0^+			
2349.637	3^+	727.111 *8*	100 *6*	1622.535	5^+	E2	0.00554	Mult.: α(K)exp=0.0055 *3* (1993Kl03), 0.0047 *9* (1982Ba28), from (n,γ).
		887.43 *5*	9.0 *7*	1462.297	4^+	M1	0.00609	Mult.: α(K)exp=0.0059 *6* (1993Kl03), from (n,γ).
		1051.63 *3*	37 *4*	1297.822	4^+			
		2061.45 *5*	68 *6*	288.187	4^+	M1	0.00122	Mult.: From α(K)exp=0.00078 *6*, 1993Kl03 report mult=M1. From α(K)exp<=0.00052, 1982Ba28 report mult=E1,E2. Placement requires no parity change.
2359.98	11^-	401.6 *7*	14 *7*	1958.46	9^-	E2	0.0254	E_γ: Eγ=403.5 in (^{13}C,α2nγ). Mult.: From ADO ratio data in (^{13}C,α3nγ).
		436.4 *3*	6.3 *6*	1924.49	12^+			

$\gamma(^{156}$Gd) (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.‡#	α&	Comments
2359.98	11⁻	943.9 *1*	100 *7*	1416.078	10⁺			Mult.: For the 943.9 doublet in (α,2nγ), α(K)exp=0.0025 *3* (1981Ko03). These authors assign E1 for this placement and M1+E2 for the other. Mult=D, from the ADO-ratio data in (^{13}C,α3nγ).
2360.87	1⁺	290.49 *15*	52 *12*	2070.290	3⁺			
		2361.2 *3*	100 *6*	0.0	0⁺			
2367.44	2⁺	1109.27 *6*	45 *6*	1258.075	2⁺	E0+(M1,E2)		Mult.: α(K)exp=0.0109 *15* (1993Kl03,(n,γ)), much larger than that for M1, suggesting an E0 admixture.
		1199.21 *6*	41 *8*	1168.186	0⁺	[E2]	0.00190	Mult.: α(K)exp=0.00070 *14* (1993Kl03,(n,γ)). The ce data indicate mult=E1, but the placement requires E2.
		2079.21 *13*	52 *8*	288.187	4⁺	E2	9.92×10⁻⁴	Mult.: α(K)exp=0.00054 *8* (1993Kl03,(n,γ)).
		2278.47 *8*	94 *8*	88.970	2⁺			
		2367.58 *7*	100 *8*	0.0	0⁺	[E2]	9.89×10⁻⁴	Mult.: From α(K)exp=0.00059 *5* (1993Kl03), (n,γ), mult=M1,E2. Placement requires E2.
2382.471	2⁺	275.957 *21*	0.53 *18*	2106.645	3⁺	M1+E2	0.099 *21*	Mult.: α(K)exp=0.087 *29* (1993Kl03), from (n,γ).
		328.215 *19*	1.2 *3*	2054.134	2⁺	M1(+E2)	0.061 *15*	Mult.: α(K)exp=0.056 *5* (1993Kl03), from (n,γ).
		416.73 *3*	0.70 *22*	1965.950	1⁺	E2	0.0229	Mult.: α(K)exp=0.018 *6* (1993Kl03), from (n,γ).
		1106.292 *19*	79 *13*	1276.138	3⁻	E1	9.54×10⁻⁴	Mult.: α(K)exp=0.00070 *6* (1993Kl03), from (n,γ).
		2293.26 *5*	100 *6*	88.970	2⁺			Mult.: From α(K)exp=0.00062 *4* in (n,γ), 1993Kl03 deduce mult=M1(E2). 1982Ba28, from α(K)exp=0.00030 *7* in (n,γ), deduce E1. Placement requires no parity change.
2402.7	1⁺	2314	53 *11*	88.970	2⁺	[M1]	0.00116	B(M1)(W.u.)=0.036 *+11−14*
		2403	100	0.0	0⁺	[M1]	0.00116	B(M1)(W.u.)=0.061 *+12−19*
2415.490	3⁺	587.55 *4*	10 *2*	1827.841	2⁺	M1(+E2)	0.013 *4*	Mult.: α(K)exp=0.0124 *22* (1993Kl03), from (n,γ).
		947.04 *3*	100 *9*	1468.506	4⁻			Mult.: α(K)exp=0.0034 *3* (1993Kl03), 0.0035 *10* (1982Ba28), from (n,γ). From α(K)exp, mult=M1+E2, but placement requires E1.
		2326.48 *10*	62 *7*	88.970	2⁺	M1	0.00116	Mult.: α(K)exp=0.00084 *9* (1993Kl03), from (n,γ). This value is larger than that for a pure M1.
2427.43	10⁻	399.82[b] *7*	100[b] *6*	2027.61	8⁻	E2	0.0257	I_γ: Value from (^{13}C,α3nγ). Mult.: From α(K)exp=0.026 *5* (1981Ko03, (α,2nγ)), mult=E2. γ is doubly placed, but both are consistent with E2. ADO ratio in (^{13}C,α3nγ) gives mult=Q.
		469.4 *3*	51 *5*	1958.46	9⁻			I_γ: From Iγ(469.4γ)/Iγ(1012γ) in (α,2nγ) and Iγ(1012γ).
		1012 *1*	67 *6*	1416.078	10⁺			I_γ: Value from (^{13}C,α3nγ).
2430.56		1014.5 *1*	100 *11*	1416.078	10⁺			
		1464.6 *6*	≤6	965.134	8⁺			
2442.41	10⁺	192.8 *1*	100	2249.65	9⁺			
		431.7 *2*	75 *12*	2011.38	8⁺			
		1026.5 *2*	88 *12*	1416.078	10⁺			
		1477	77 *15*	965.134	8⁺			I_γ: From Iγ(1477γ)/Iγ(1027γ) in Coul. ex. and Iγ(1026.5γ).
2446.16	2⁺	529.74 *4*	2.8 *4*	1916.449	3⁺	M1(+E2)	0.017 *5*	Mult.: α(K)exp=0.015 *3* (1993Kl03), from (n,γ).
		1291.90 *8*	27 *4*	1154.152	2⁺	(M1)	0.00251	Mult.: α(K)exp=0.0042 *6* (1993Kl03), from (n,γ).

$^{156}_{64}$Gd$_{92}$-43

γ(^{156}Gd) (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.‡#	α&	Comments
2446.16	2^+	2357.16 *5*	100 *6*	88.970	2^+	M1	0.00116	Mult.: α(K)exp=0.00078 *6* (1993Kl03), from (n,γ).
2475.82	14^+	551.33 *6*	100	1924.49	12^+	E2	0.01083	Mult.: From $\gamma(\theta)$ in (α,2nγ); ADO ratio in (^{13}C,α3nγ).
2490.57	J	1074.5 *2*	100	1416.078	10^+			
2523.02	10^+	1107.0 *2*	100 *13*	1416.078	10^+	E0(+E2+M1)	0.007 *2*	Mult.: α(K)exp=0.0060 *17* in (α,2nγ), (1981Ko03). α: Computed from α(K)exp×(α/α(K)).
		1557.5 *5*	38 *13*	965.134	8^+			
2539	1^-	2450	100	88.970	2^+	[E1]		B(E1)(W.u.)=0.00070 *+18−28*
		2539	75 *16*	0.0	0^+	[E1]		B(E1)(W.u.)=0.00048 *12* B(E1)(W.u.) value computed directly from the empirical B(E1)↑ from (γ,γ').
2651.2	(12^+)	726.9 *6*	100 *7*	1924.49	12^+			
		1235.0 *5*	100 *10*	1416.078	10^+			
2686.7	11^+	244[c]		2442.41	10^+			
		436.5	100 *10*	2249.65	9^+	E2	0.0201	Mult.: From ADO ratio data in (^{13}C,α3nγ).
		1271.1	40 *5*	1416.078	10^+	D		E_γ: From (^{13}C,α3nγ). Eγ=1273.1 *2* in (α,2nγ). See the comment in the (α,2nγ) data set regarding the placement of this γ. Mult.: From ADO ratio data in (^{13}C,α3nγ).
2745	1^-	2656	100	88.970	2^+	[E1]		B(E1)(W.u.)=0.0019 *+4−5*
		2745	56 *7*	0.0	0^+	[E1]		B(E1)(W.u.)=0.00096 *20* B(E1)(W.u.) value computed directly from the empirical B(E1)↑ from (γ,γ').
2785	1^+	2696	55 *10*	88.970	2^+	[M1]		B(M1)(W.u.)=0.027 *+8−9*
		2785	100	0.0	0^+	[M1]		B(M1)(W.u.)=0.044 *+10−12*
2823.7	J+2	333.4	100 *9*	2490.57	J	E2	0.0437	Mult.: From ADO ratio data in (^{13}C,α3nγ).
		898.9	86 *9*	1924.49	12^+			
2829.59	13^-	469.6 *2*	16 *4*	2359.98	11^-	E2	0.01649	I_γ: From (^{13}C,α3nγ). Mult.: α(K)exp=0.014 *4* from (α,2nγ) (1981Ko03) gives E2. γ is doubly placed, but both placements accommodate E2, and the other γ is known to be E2.
		905.1 *1*	100 *8*	1924.49	12^+	D		I_γ: From (^{13}C,α3nγ). Mult.: From ADO ratio data in (^{13}C,α3nγ).
2897.86	12^-	470.3 *2*	100 *14*	2427.43	10^-	E2	0.01642	E_γ: From 2010Do13 (α,2nγ). 1981Ko03, in (α,2nγ), report Eγ=469.6 and show it doubly placed, the other placement being from the 2829, 13^- level. Mult.: α(K)exp=0.014 *4*, from (α,2nγ), gives E2 for the doublet. From (^{13}C,α3nγ), mult=E2 for this γ.
		538.0 *3*	7.9 *7*	2359.98	11^-			
2922.7	12^+	479.4	100 *14*	2442.41	10^+			
		999.0	71 *14*	1924.49	12^+			
2957	(12^+)	513	100 *28*	2442.41	10^+			
		1034	100	1924.49	12^+			
2974	1^+	2885	52 *10*	88.970	2^+	[M1]		B(M1)(W.u.)=0.036 *6*
		2974	100	0.0	0^+	[M1]		B(M1)(W.u.)=0.063 *22* B(M1)(W.u.) value computed directly from the empirical B(M1)↑ from (γ,γ').
3010	1^+	2921	55 *20*	88.970	2^+	[M1]		B(M1)(W.u.)=0.010 *+5−6*

γ(^{156}Gd) (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.‡#	α&	Comments
3010	1^+	3010	100	0.0	0^+	[M1]		B(M1)(W.u.)=0.017 *4* B(M1)(W.u.) value computed directly from the empirical B(M1)↑ from (γ,γ').
3050	1^+	2961	36 *16*	88.970	2^+	[M1]		B(M1)(W.u.)=0.008 *+4−5*
		3050	100	0.0	0^+	[M1]		B(M1)(W.u.)=0.020 *6* B(M1)(W.u.) value computed directly from the empirical B(M1)↑ from (γ,γ').
3059.5	16^+	583.5 *10*	100	2475.82	14^+	E2	0.00939	Mult.: From ADO ratio data in (^{13}C,α3nγ).
3070	1^+	2981	57 *5*	88.970	2^+	[M1]		B(M1)(W.u.)=0.142 *+17−19*
		3070	100	0.0	0^+	[M1]		B(M1)(W.u.)=0.227 *17* B(M1)(W.u.) value computed directly from the empirical B(M1)↑ from (γ,γ').
3096.1	2^+	3096	100	0.0	0^+			
3122	1^+	3033	50 *20*	88.970	2^+	[M1]		B(M1)(W.u.)=0.010 *1*
		3122	100	0.0	0^+	[M1]		B(M1)(W.u.)=0.018 *4* B(M1)(W.u.) value computed directly from the empirical B(M1)↑ from (γ,γ').
3134.9	(14^+)	659.0 *4*	100 *10*	2475.82	14^+			
		1211.0 *9*	100 *20*	1924.49	12^+			
3150	(2^+)	3150		0.0	0^+			
3158	1^+	3158		0.0	0^+	[M1]		B(M1)(W.u.)=0.063 *9* B(M1)(W.u.) value computed directly from the empirical B(M1)↑ from (γ,γ').
3175.2	13^+	488.5	100	2686.7	11^+	E2	0.01484	Mult.: From ADO ratio data in (^{13}C,α3nγ).
3218	1^+	3129	44 *10*	88.970	2^+	[M1]		B(M1)(W.u.)=0.029 *+8−9*
		3218	100	0.0	0^+	[M1]		B(M1)(W.u.)=0.061 *7* B(M1)(W.u.) value computed directly from the empirical B(M1)↑ from (γ,γ').
3234.9	J+4	411.1	100 *7*	2823.7	J+2	E2	0.0238	
		759.5	13 *3*	2475.82	14^+			
3314	1^-	3225	100	88.970	2^+	[E1]		B(E1)(W.u.)=0.00051 *+18−46*
		3314	53 *17*	0.0	0^+	[E1]		B(E1)(W.u.)=0.00025 *11* B(E1)(W.u.) value computed directly from the empirical B(E1)↑ from (γ,γ').
3350.4	15^-	521.3 *3*	27 *4*	2829.59	13^-			
		874.4 *3*	100 *11*	2475.82	14^+	D		
3400	2^+	3400		0.0	0^+	[E2]		B(E2)(W.u.)>0.080
3428.0	14^-	530.1 *2*	100	2897.86	12^-	E2	0.01198	Mult.: From ADO ratio data in (^{13}C,α3nγ).
3437.9	14^+	515.3	100	2922.7	12^+	E2	0.01289	Mult.: From ADO ratio data in (^{13}C,α3nγ).
3673.3	18^+	614.0 *3*	100	3059.5	16^+	E2	0.00828	Mult.: From ADO ratio data in (^{13}C,α3nγ).
3715.2	15^+	540.0	100	3175.2	13^+	E2	0.01142	Mult.: From ADO ratio data in (^{13}C,α3nγ).
3715.4	J+6	481.0	100 *9*	3234.9	J+4	E2	0.0146	Mult.: From ADO ratio data in (^{13}C,α3nγ).
		655.5	25 *3*	3059.5	16^+			
3914.3	(17^-)	563.6 *3*	100 *11*	3350.4	15^-			
		854.9 *3*	89 *11*	3059.5	16^+			I_γ: Value from (^{13}C,α3nγ). From (α,2nγ), Iγ(854.9γ)/Iγ(563.6γ)=1.4 *3*.
3995.1	16^+	557.2	100 *1*	3437.9	14^+	E2	0.01055	
4004.0	16^-	576.0 *3*	100	3428.0	14^-	E2	0.00970	Mult.: From ADO ratio data in (^{13}C,α3nγ).
4257.9	J+8	542.5	100	3715.4	J+6	E2	0.01129	Mult.: From ADO ratio data in (^{13}C,α3nγ).
4325.9	20^+	652.4	100	3673.3	18^+	E2	0.00715	Mult.: From ADO ratio data in (^{13}C,α3nγ).
4523.7	(19^-)	609.4	100 *10*	3914.3	(17^-)			

$^{156}_{64}$Gd$_{92}$-45

γ(^{156}Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡#]	α[&]	Comments
4523.7	(19⁻)	850.3	19 *3*	3673.3	18⁺	D		Mult.: From ADO ratio data in (^{13}C,α3nγ).
4603.4	(18⁻)	599.4	100	4004.0	16⁻			
4857.4	(J+10)	599.5	100	4257.9	J+8			
5026.0	22⁺	700.1	100	4325.9	20⁺	E2	0.00605	Mult.: From ADO ratio data in (^{13}C,α3nγ).
5182.6	(21⁻)	658.9	100	4523.7	(19⁻)	E2	0.00698	Mult.: From ADO ratio data in (^{13}C,α3nγ).
5778.7	24⁺	752.7	100	5026.0	22⁺	E2	0.00512	Mult.: From ADO ratio data in (^{13}C,α3nγ).
6582.6	(26⁺)	803.9	100	5778.7	24⁺			

[†] From the experiment giving the best value.

[‡] Assignments and values are from consideration of all available data and come from one or more of the following experiments: ce data from ^{155}Gd(n,γ) studies(1982Ba28,1993Kl03) ce and $\gamma(\theta)$ data from ^{154}Sm(α,2nγ) study (1981Ko03); ce data from ^{156}Eu β^- decay (1962Ew01,1964Pe17,1966Dz08,1967Ha38,1972Ha17,1974Kl09,1976Ya11); $\gamma\gamma(\theta)$ data from ^{156}Eu β^- decay (1961Cl02,1977Co22); ce data from ^{156}Tb ε decay (1959Of11, 1961Ha23,1967Ke15,1970Fu06,1970Pe10,1971Mc01,1972Ha29,1972Em01); $\gamma(\theta)$ data from oriented ^{156}Tb nuclei (1975Ul01,1979Ri17); $\gamma\gamma(\theta)$ data from ^{156}Tb ε decay (1959Of11,1967Ke15,1968We17,1975Ul01); and from Coul. ex. (1981Mc06).

[#] Conflicts between assignments are noted.

[@] Where needed, the signs reported by the authors have been changed to agree with the convention of the Nuclear Data Sheets. In some cases (1967Ke15,1970Ru09,1977Co22,1981Mc06) it is not clear what convention was used.

[&] 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.

[a] Multiply placed with undivided intensity.

[b] Multiply placed with intensity suitably divided.

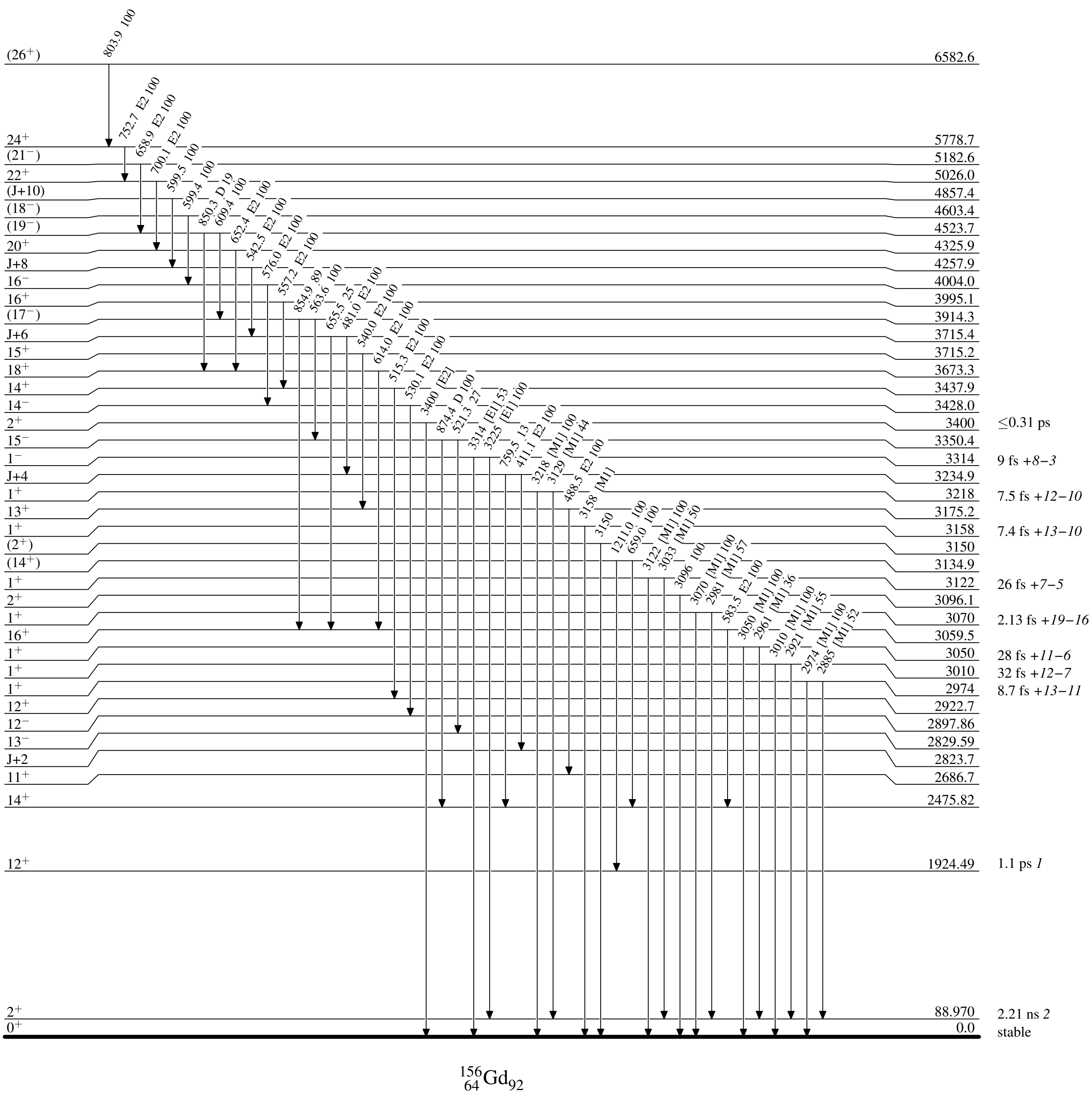
[c] Placement of transition in the level scheme is uncertain.

$^{156}_{64}$Gd$_{92}$-46

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



$^{156}_{64}Gd_{92}$

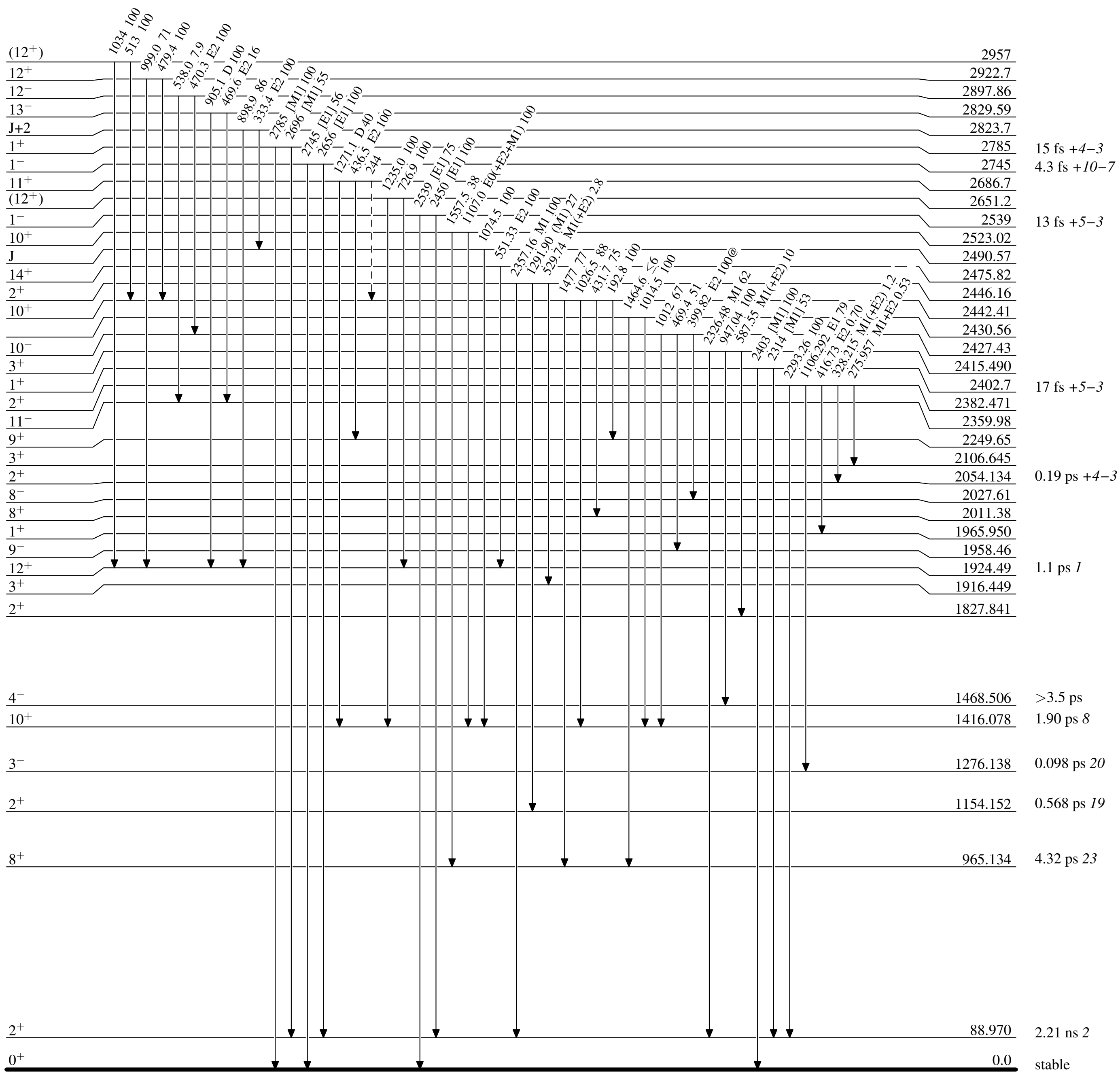
Adopted Levels, Gammas

Level Scheme (continued)

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

Legend

γ Decay (Uncertain)

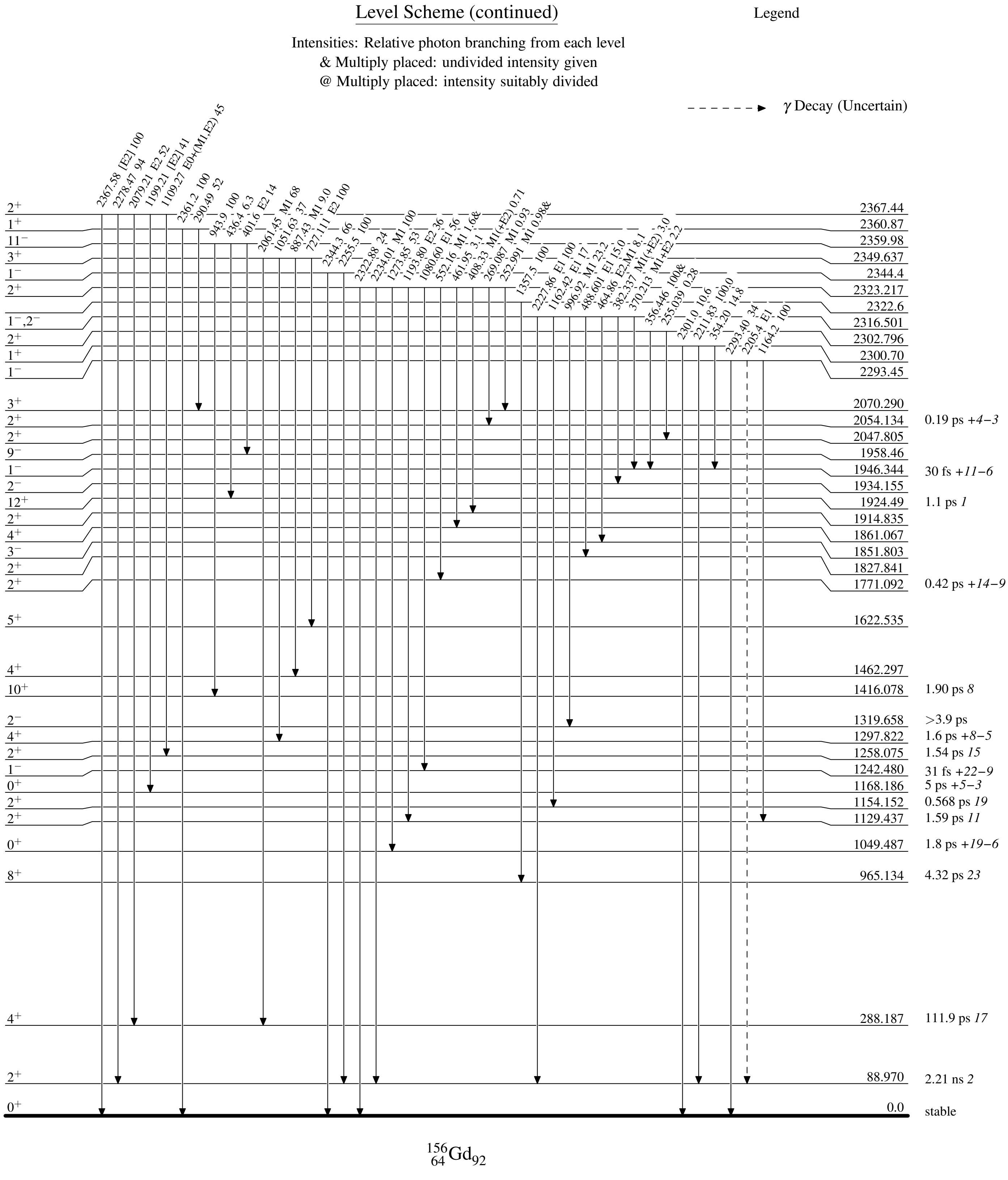


$^{156}_{64}Gd_{92}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided



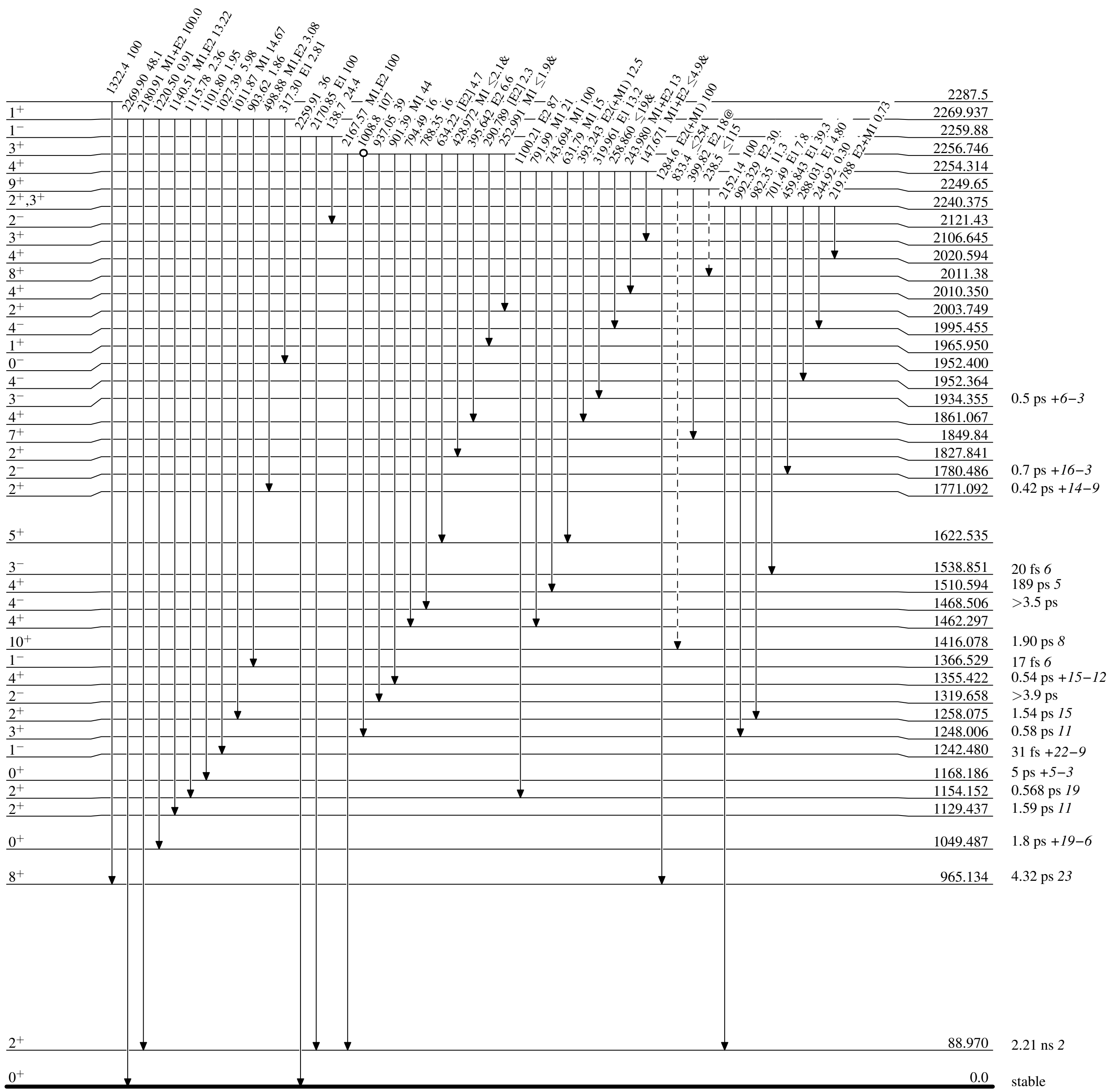
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend

γ Decay (Uncertain)
Coincidence
Coincidence (Uncertain)

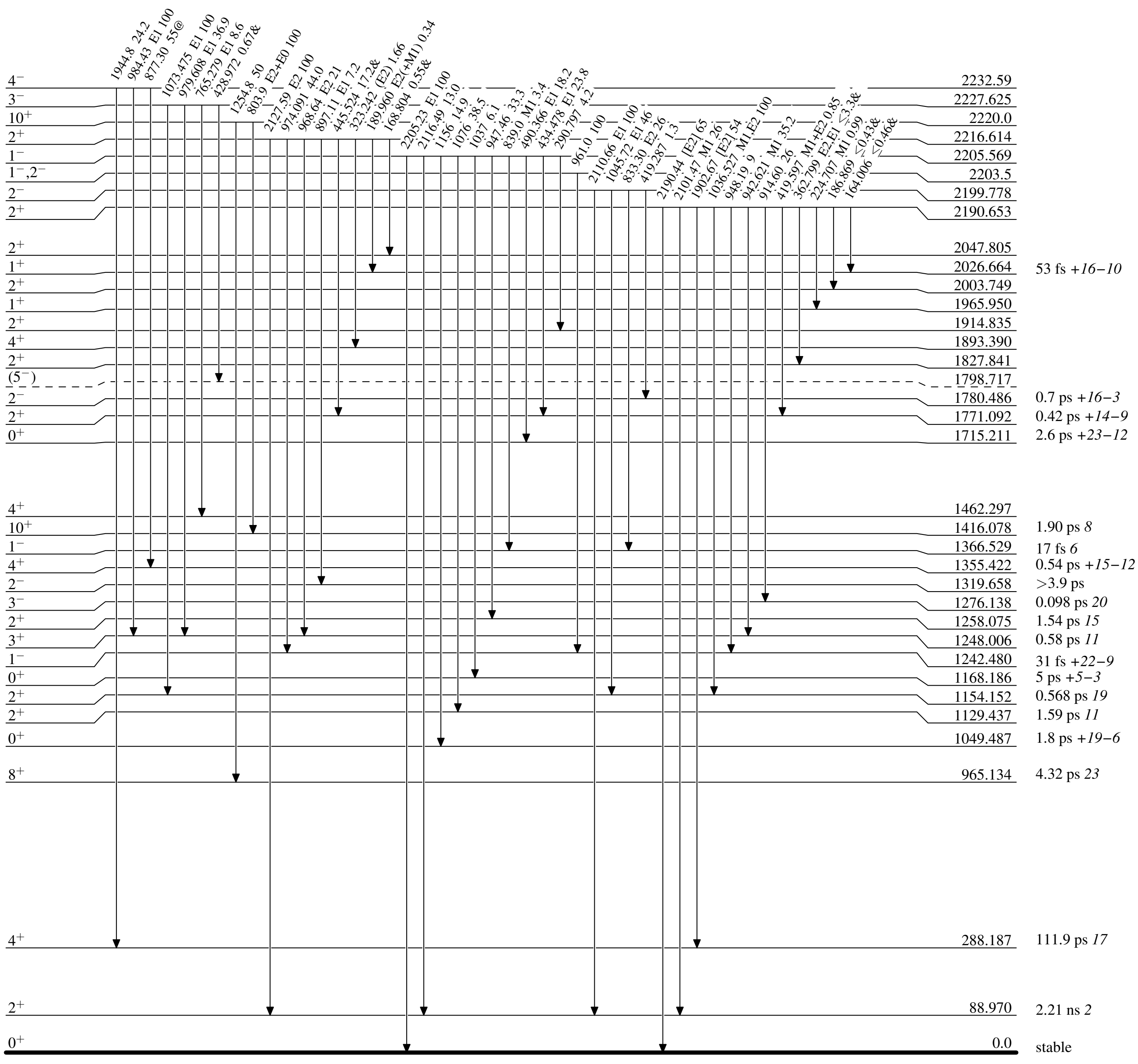


$^{156}_{64}Gd_{92}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided



$^{156}_{64}Gd_{92}$

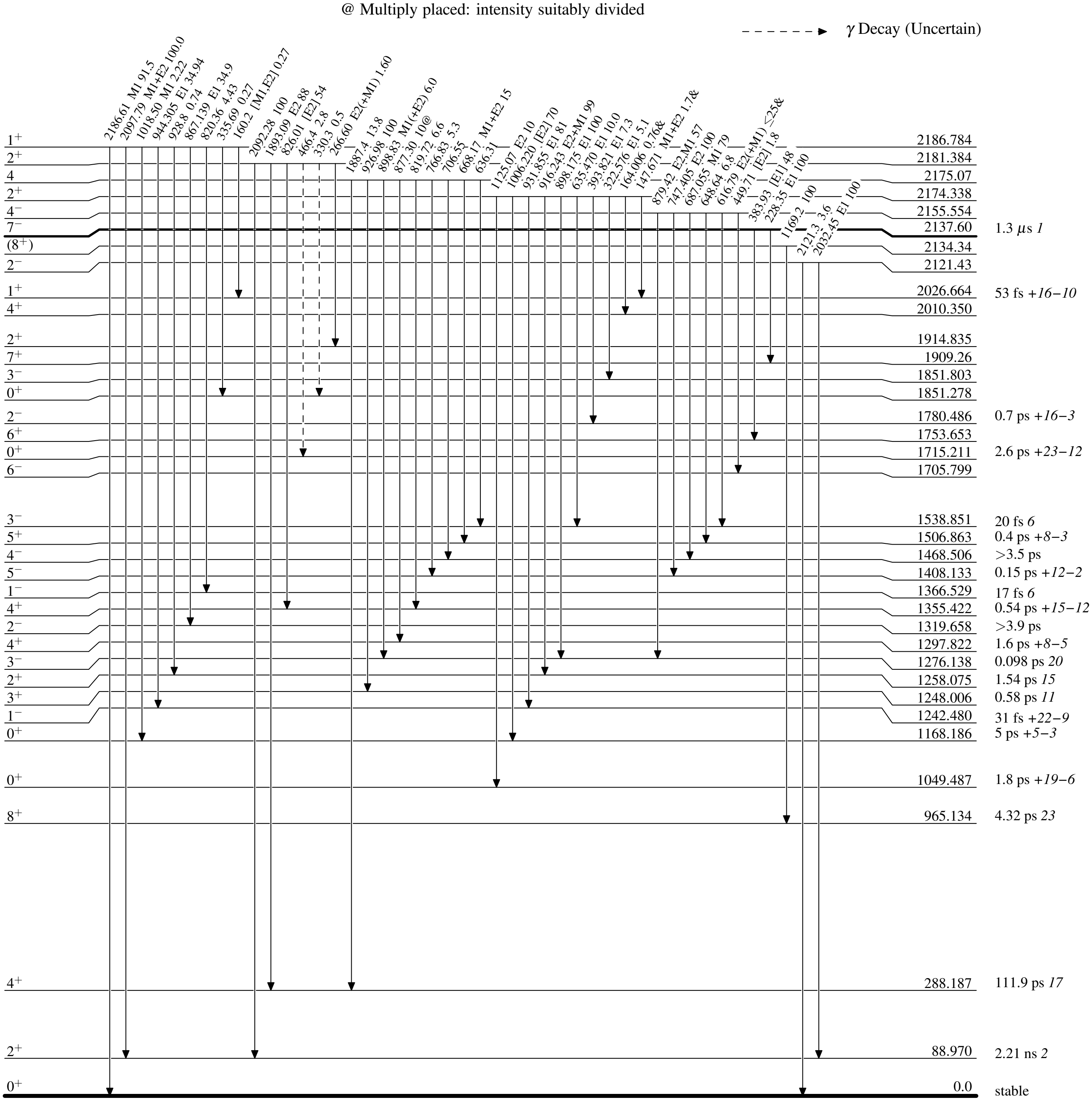
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend

γ Decay (Uncertain)



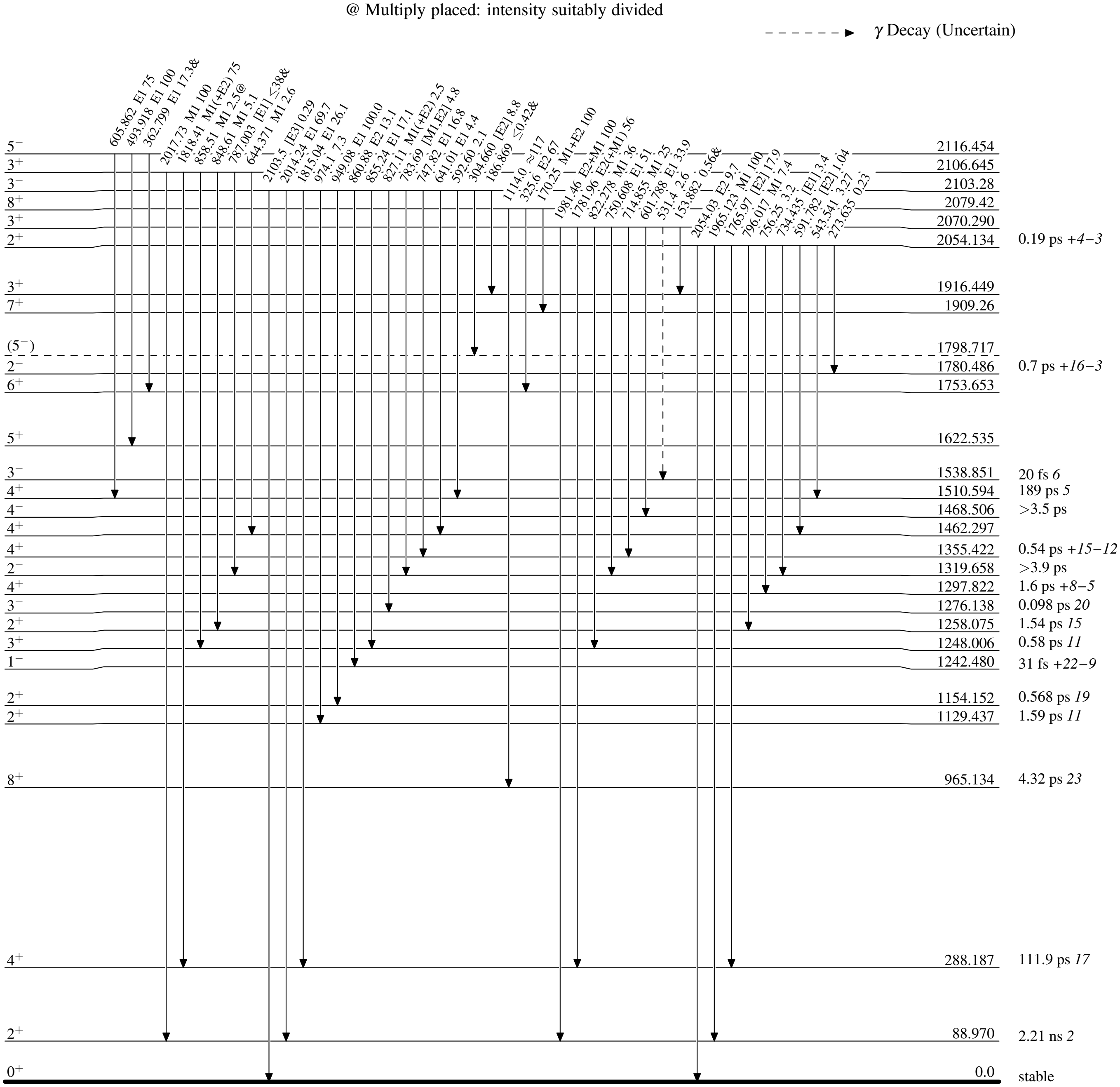
$^{156}_{64}Gd_{92}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend



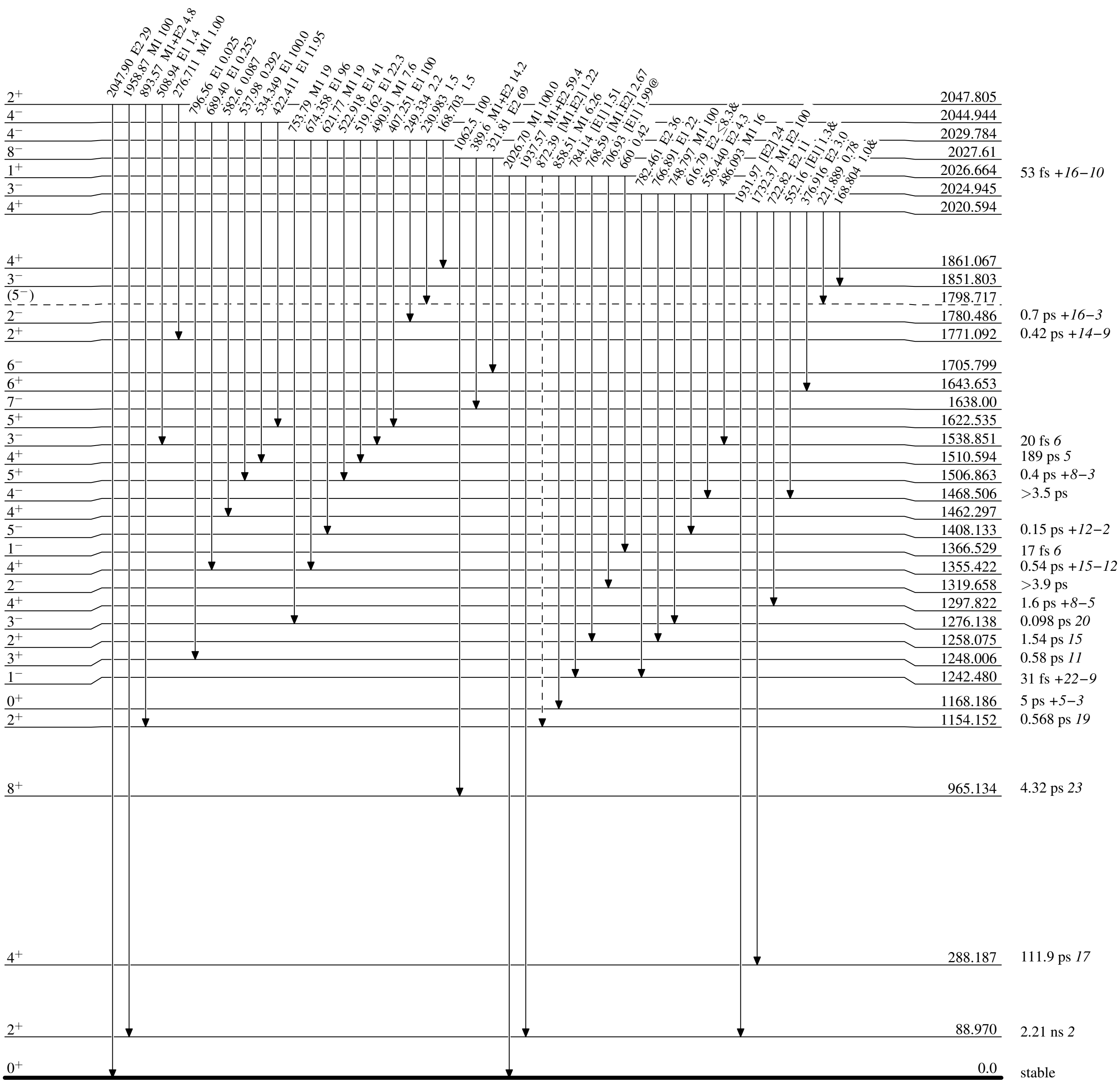
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend

γ Decay (Uncertain)

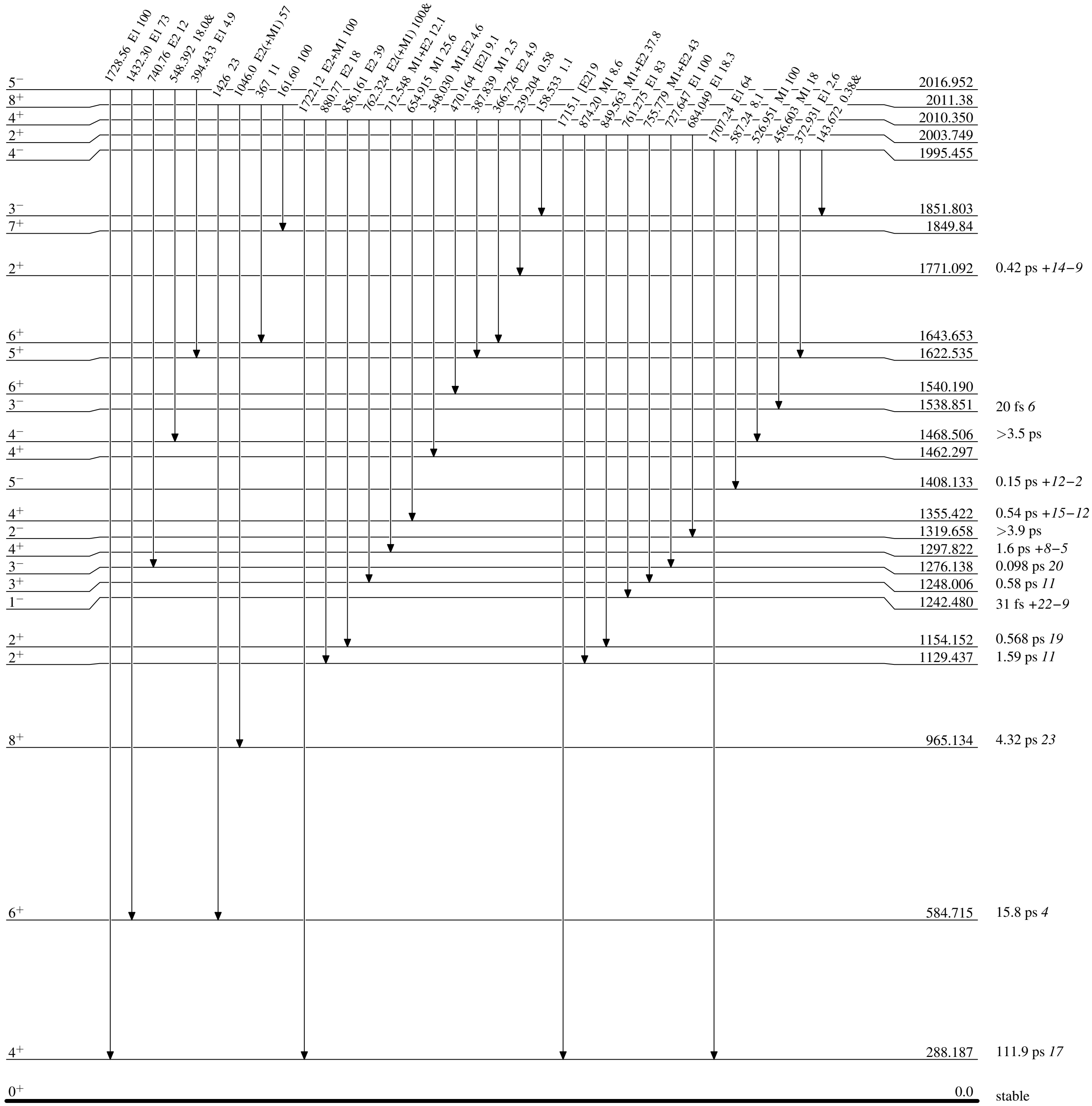


$^{156}_{64}Gd_{92}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

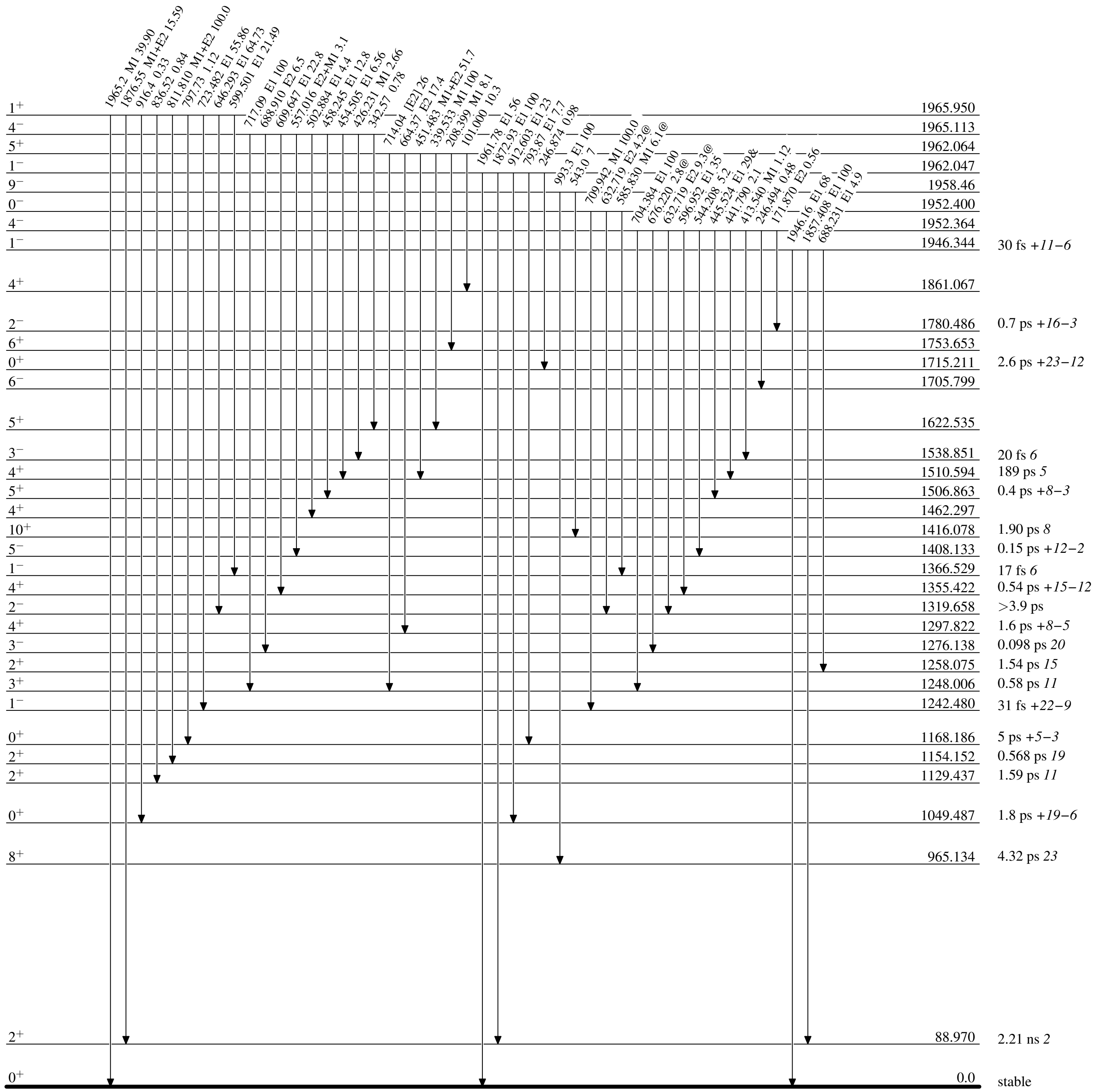


$^{156}_{64}Gd_{92}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

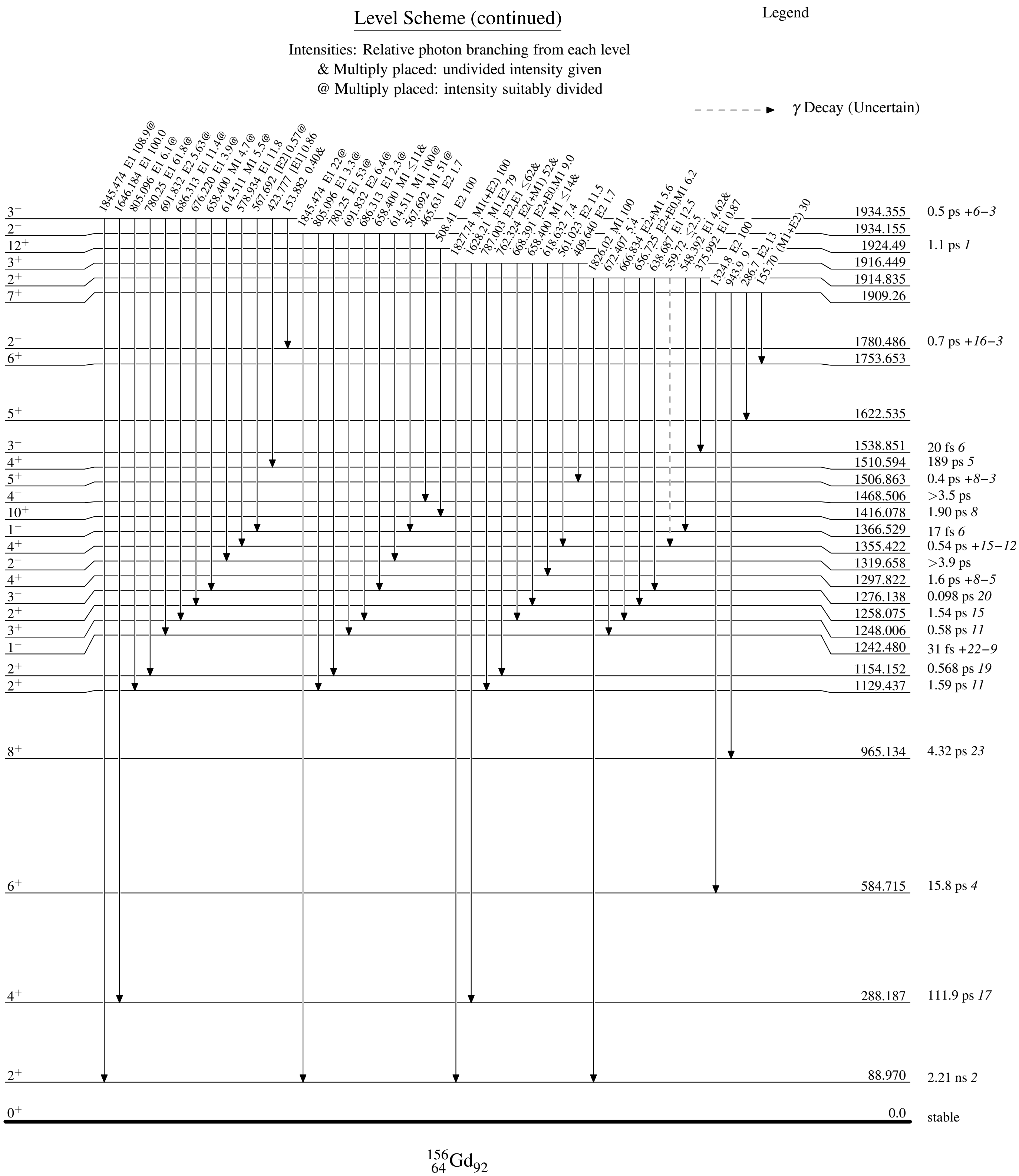


$^{156}_{64}Gd_{92}$

Adopted Levels, Gammas

Level Scheme (continued)

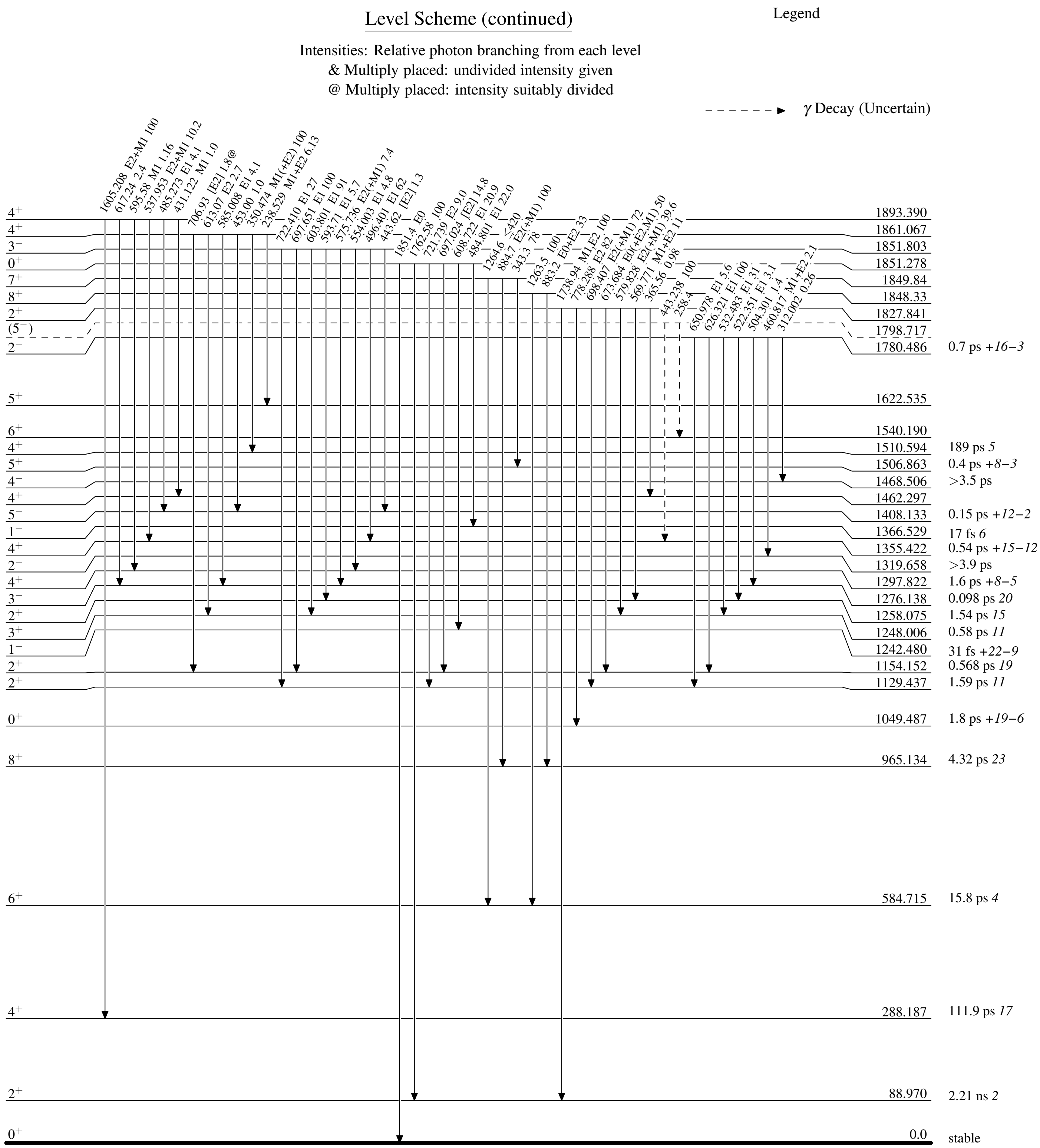
Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided



$^{156}_{64}Gd_{92}$

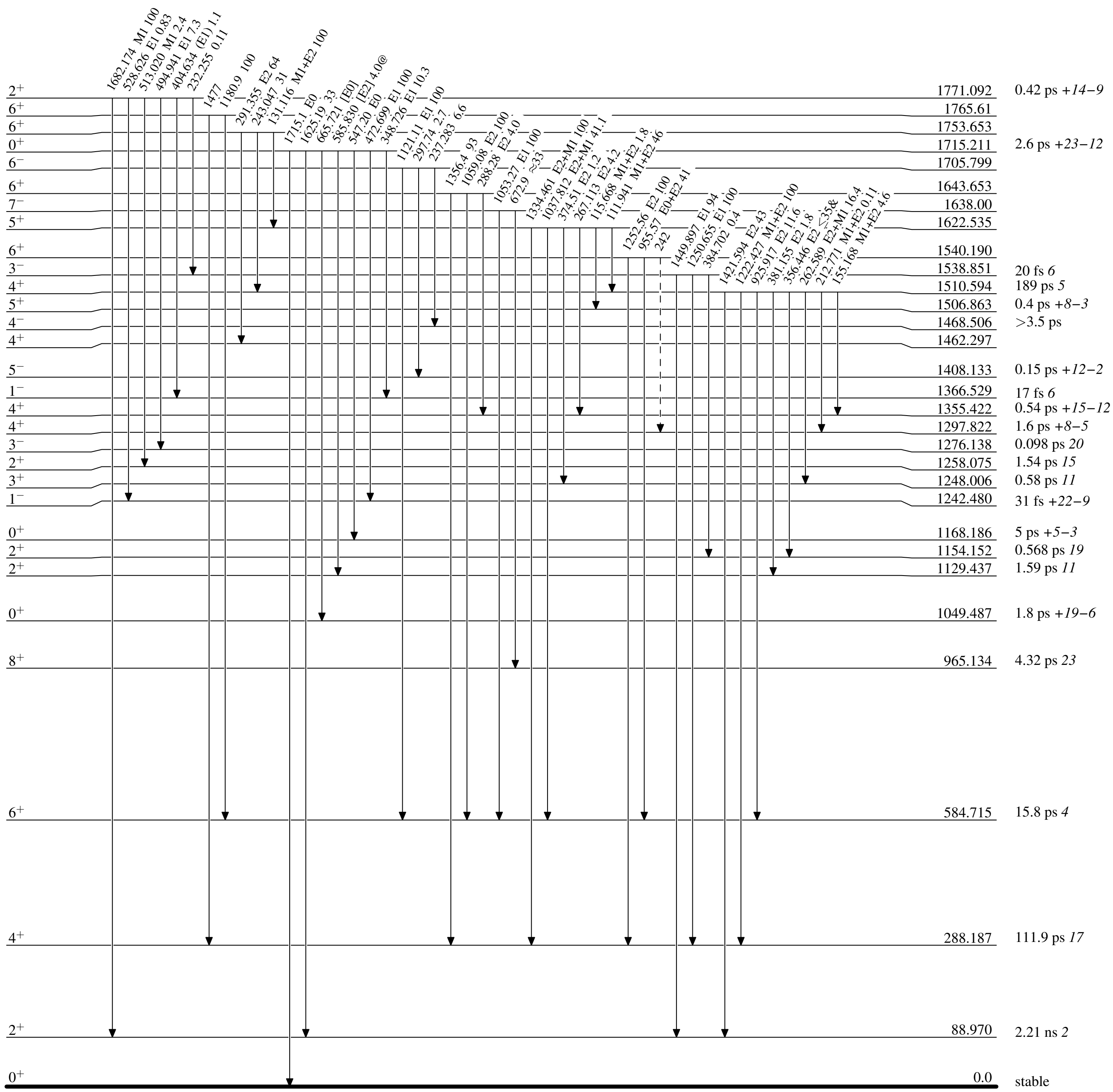
Adopted Levels, Gammas

Level Scheme (continued)

Intentsities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend

γ Decay (Uncertain)

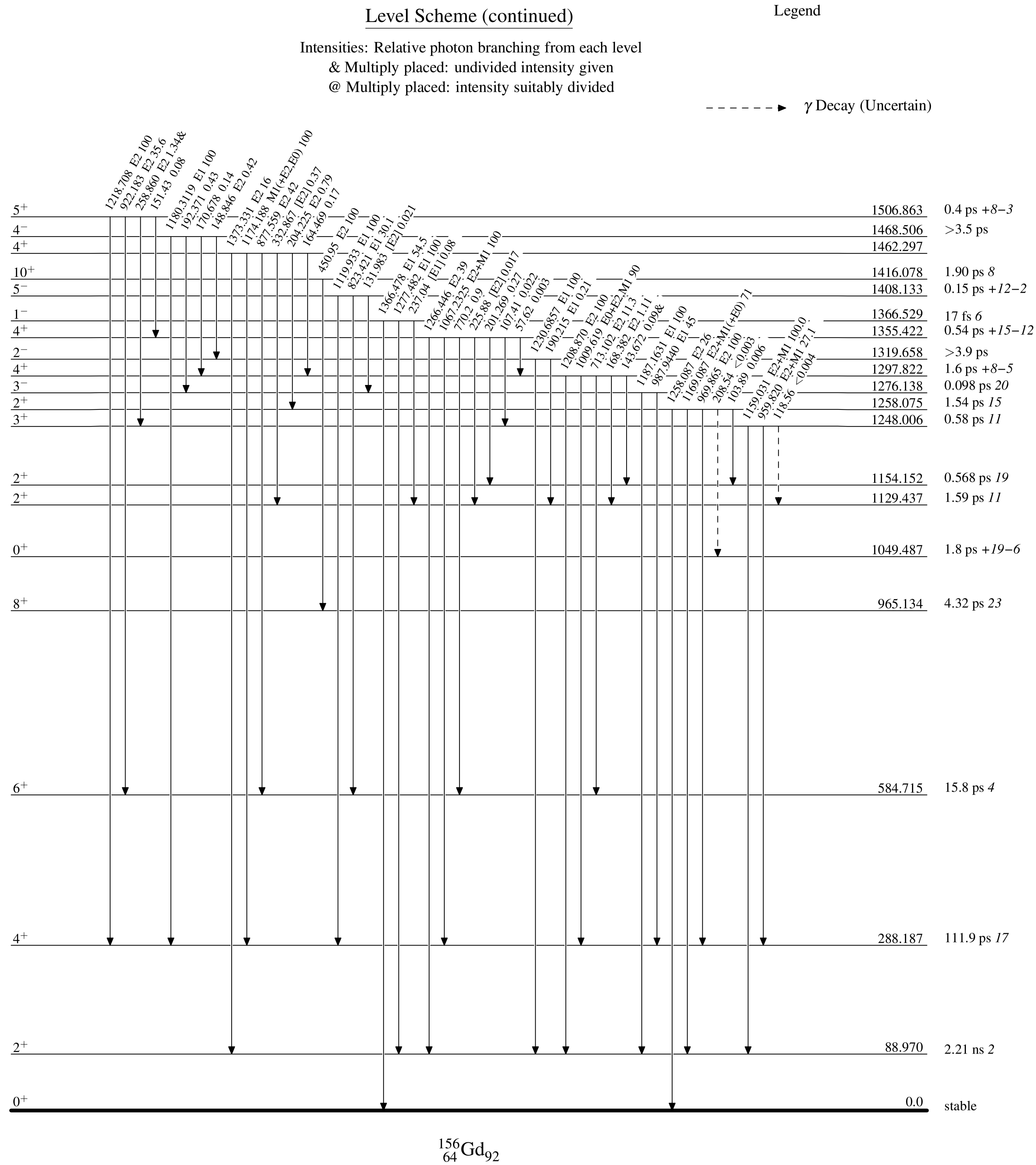


$^{156}_{64}Gd_{92}$

Adopted Levels, Gammas

Level Scheme (continued)

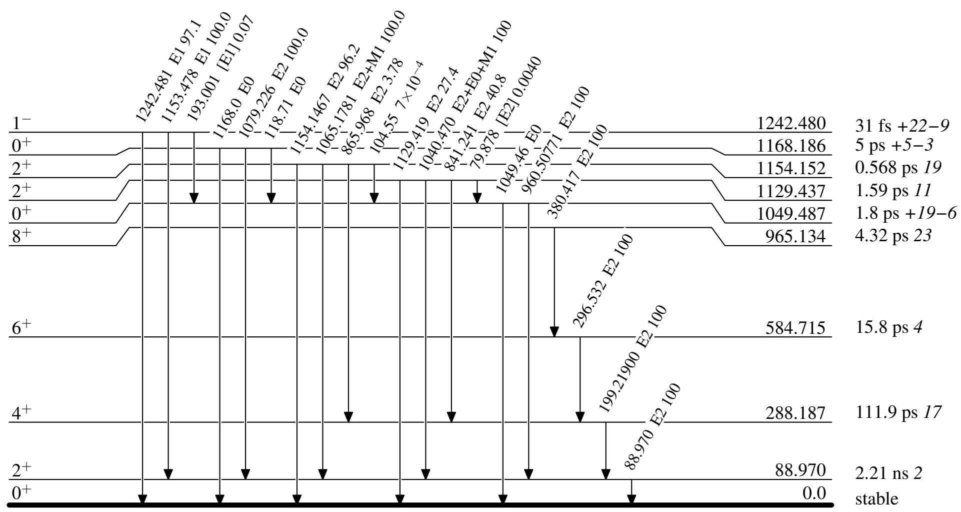
Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided



Adopted Levels, Gammas

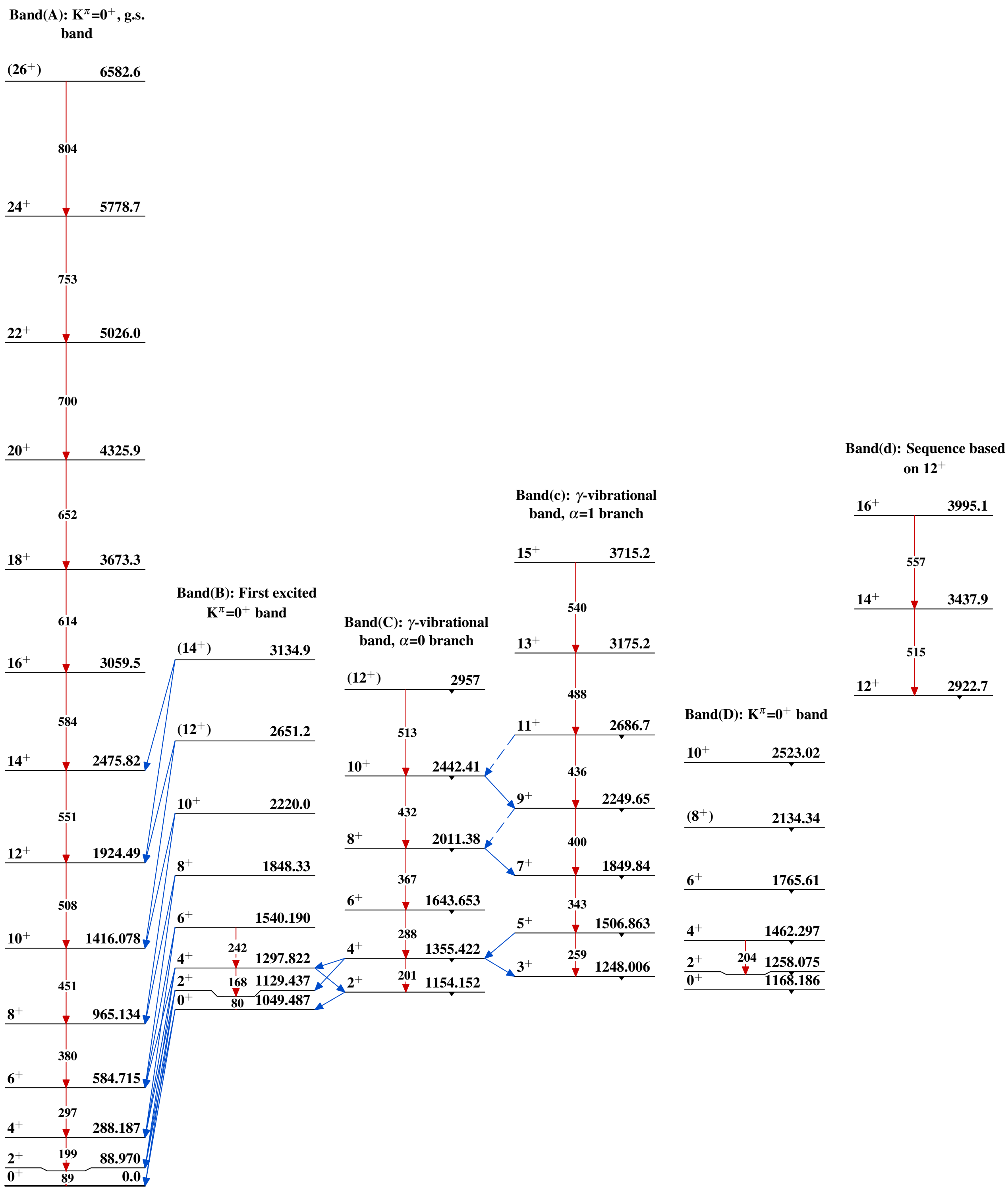
Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided



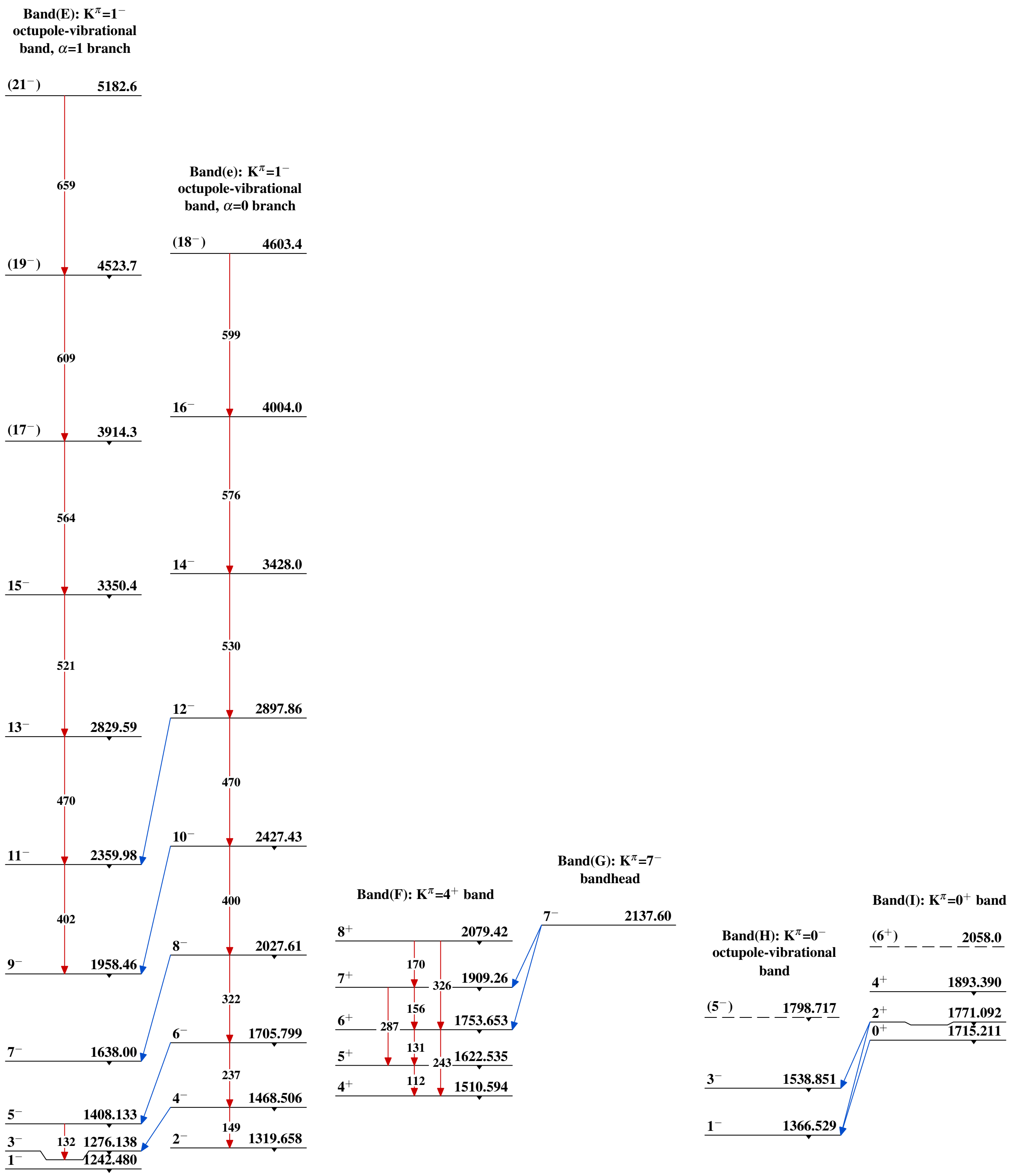
$^{156}_{64}Gd_{92}$

Adopted Levels, Gammas



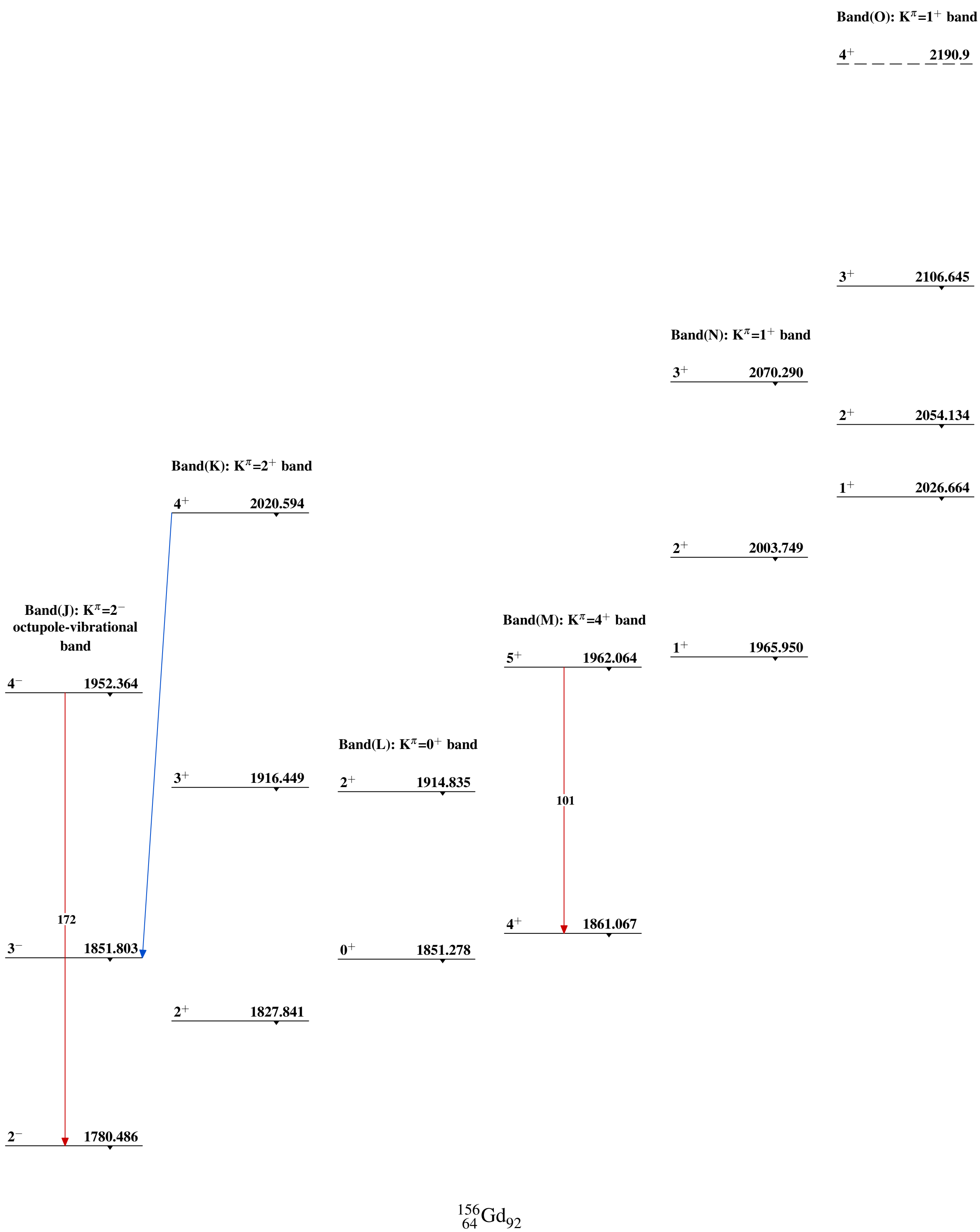
$^{156}_{64}Gd_{92}$

Adopted Levels, Gammas (continued)

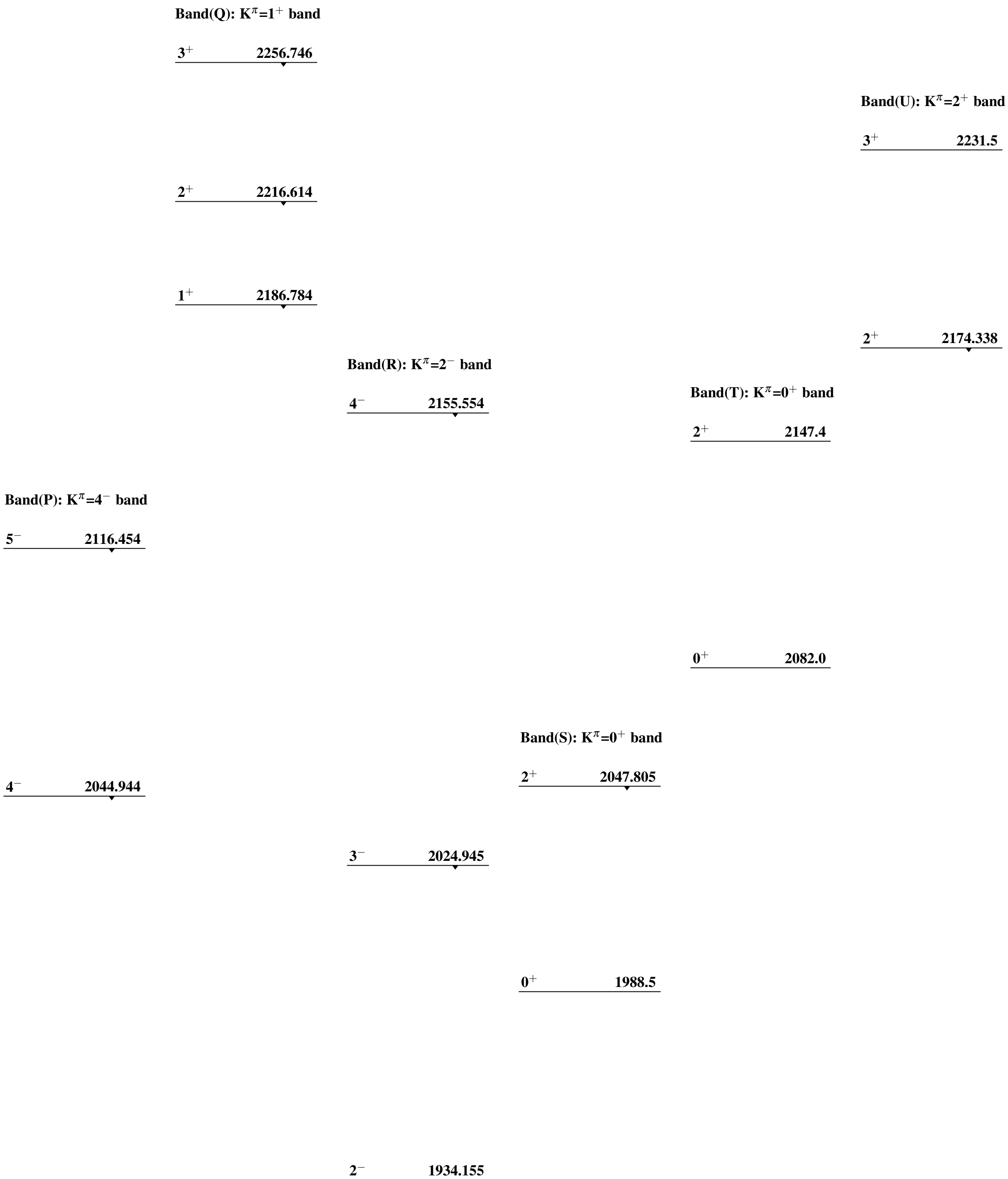


$^{156}_{64}Gd_{92}$

Adopted Levels, Gammas (continued)

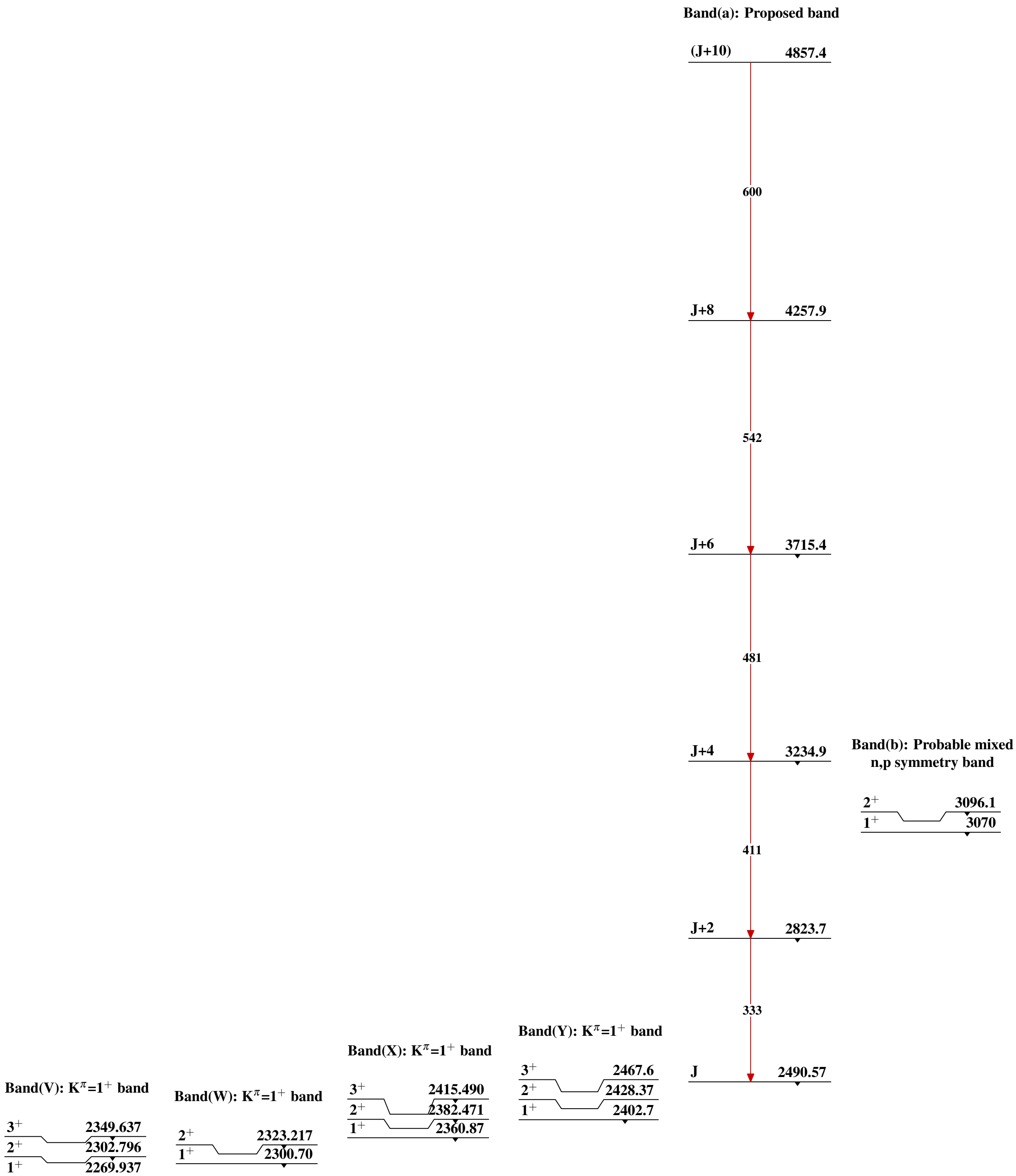


Adopted Levels, Gammas (continued)



$^{156}_{64}Gd_{92}$

Adopted Levels, Gammas (continued)



$^{156}_{64}Gd_{92}$

Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 141, 1 (2017)	1-Feb-2017

Q(β^-)=−1218.9 *10*; S(n)=7937.39 *6*; S(p)=8520 *4*; Q(α)=−659.3 *9* 2017Wa10
S(2n)=14297.27 *6*; S(2p)=15907 *4* 2017Wa10
Additional information 1.
Additional information 2.
α: Additional information 3.

^{158}Gd Levels

Some studies (1962Re04,1965Gr04,1966Iv01) suggest the existence of isomeric levels above the 4^+ level at 261 keV with $T_{1/2}$ of 0.46 ms and possibly 0.125 ms and 2 ms. Since such isomeric levels have not been verified and their decay modes are unknown, they are not included here. See ^{158}Gd IT decay for more information.

The energy-level spacings in the octupole-vibrational bands show large deviations from the I(I+1) formula, indicating strong band-mixing effects. 1978Gr14 have conducted a three-band Coriolis-mixing analysis including the $K^\pi=0^-$, 1^-, and 2^- bands which gives good agreement with experimental level energies.

Cross Reference (XREF) Flags

A	^{158}Eu β^- decay	F	^{157}Gd(d,p)	K	^{158}Gd(d,d′)
B	^{158}Gd IT decay	G	^{158}Gd(γ,γ)	L	^{159}Tb(pol t,α)
C	^{158}Tb ε decay	H	^{158}Gd(γ,γ'),^{158}Gd(e,e′)	M	^{160}Gd(p,t)
D	^{156}Gd(t,p)	I	^{158}Gd(p,p′γ)	N	Coulomb excitation
E	^{157}Gd(n,γ) E=th,res	J	^{158}Gd(n,n′γ)		

E(level)[†]	J^π	$T_{1/2}$	XREF	Comments
0.0[b]	0^+	stable	A CDEFGHIJKLMN	Evaluated RMS charge radius: $<r^2>^{1/2}$=5.1569 fm *43* (2013An02) others: $<r^2>\geq26.608$ *24* fm^2 deduced by 1983La08 from muonic-atom K and L x-ray energies (see also the curve in 1991Ho27 and reference cited therein). Measurements of $\delta<r^2>$or the related parameter $\lambda\approx\delta<r^2>$are given by 1983La08, 1987Bo58, 1988Al40 (plot only), 1990Du08, and 1990Wa25 (as well as earlier references quoted in 1990Du08 and 1990Wa25). From 1990Du08 and 1990Wa25, respectively, $\lambda(^{156}Gd-^{158}Gd)$=0.150 *5* and 0.130 *7* fm^2 and $\lambda(^{158}Gd-^{160}Gd)$=0.156 *5* and 0.134 *7* fm^2. The r^4 and r^6 radial moments are also given by 1990Wa25.
79.5143[b] *15*	2^+	2.56 ns *5*	A CDEFGHIJKLMN	Q=−2.01 *4*; μ=+0.762 *8* J^π: from E2 γ to 0^+ gs. $T_{1/2}$: weighted average with unc not smaller than the smallest unc of the measured values of the following values (same as those listed by 2001Ra27 that adopted 2.59 ns *5* using a special weighting procedure): 2.43 ns *13* (1958Ra12), 2.73 ns *21* (1959Bi10), 2.39 ns *13* (1960El07), 2.98 ns *49* (1961Go09), 2.34 ns *10* (1962Bi05), 2.47 ns *10* (1966Fu03), 2.56 ns *6* (1967Wo06), 2.52 ns *8* (1968Ku03), 2.59 ns *10* (1968Sc04), 2.59 ns *12* (1969Av01), 2.61 ns *10* (1972Er04), 2.59 ns *5* (1974Sh12), 2.58 ns *6* (1974Wo01), 2.61 ns *5* (1977Ro08). Other values (also considered but rejected by 2001Ra27 because they imply model-dependent analyses): 2.63 ns *13* 1983La08, 2.90 ns *6* 1985Bo31; Outlier: 1.18 ns *35* 1955He64. μ: From 2014StZZ compilation and based on g-factor measurement of 1988Al33 in ^{158}Tb ε decay; others: +0.78 *6* (1992Br07), +0.9 *2*

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Adopted Levels, Gammas (continued)

^{158}Gd Levels (continued)

E(level)[†]	J^π	$T_{1/2}$	XREF	Comments
				(1991St01), +0.8 *2* (1991St01). Q: From 2016St14 evaluation and based on data of 1983La08; other: −1.96 *4* (1974Ar23). Muonic isomer shift=−235 *70* eV (1974Ba77,1974En08) and 19 *197* eV (1983La08). From Mossbauer measurements, δ<r^2>(79 keV-0)=+0.0004 *3* fm^2 (1967Fi08) and δ<r^2>(79-0)/<r^2>(0)=0.000064 *17* (1968Ga09) and 0.00006 *3* (1970Ru04).
261.4580[b] *16*	4^+	0.148 ns *2*	A CDEF IJKLMN	μ=+1.64 *6* J^π: From E2 γ to 2^+ level and expected band structure. $T_{1/2}$: Weighted average of 0.162 ns *13* (1968Ku03), 0.20 ns *7* (1968Sc04), and 0.148 ns *2* (1988Al33) from ^{158}Tb ε decay. μ: From 2014StZZ compilation and based on g-factor of 1988Al33; others: 1.55 *12* (1991St01), 1.4 *2* (1990Ba39), 1.60 *12* (1992Br07).
539.022[b] *7*	6^+		DEF IJKLMN	μ=+2.46 *24* J^π: From E2 γ to 4^+ level and expected band structure. μ: From g-factor=0.41 *4* (1992Br07) − 2014StZZ compilation adopted rounded-off value +2.5 *2*; other: 2.4 *3*, 2.3 *3* (2014StZZ).
904.12[b] *3*	8^+	5.1 ps *4*	IJ N	μ=3.4 *4* J^π: From γ to 6^+ level and expected band structure. $T_{1/2}$: From Coulomb excitation by Doppler-shifted line shape (1977Ke06). μ: From 2014StZZ compilation adopted from g-factor=0.42 *5* (1992Br07).
977.1457[c] *19*	1^-	1.43 ps +*19*−*80*	A CDE JK MN	J^π: From E1 γ to 0^+ ground state. J^π: Configuration may include ((ν,5/2[642])-(ν,3/2[521])) (1978Gr14,1994So02) and ((π,5/2[532])-(π,3/2[411])) (1994So02). $T_{1/2}$: From γ-ray induced Doppler-broadening method following (n,γ) (1999Bo10).
1023.6978[c] *24*	2^-		A C EF J N	J^π: From E1 γ to 2^+ level, population by primary γ in (n,γ), and proposed band structure. $T_{1/2}$: From γ-ray induced Doppler-broadening method following (n,γ) (1999Bo10) it was obtained $T_{1/2}$ > 3.5 ps.
1041.6399[c] *19*	3^-	0.54 ps *15*	A CDEF JKLMN	J^π: From E1 γ's to 2^+ and 4^+ levels. $T_{1/2}$: From Coulomb excitation by Doppler-broadened line shape (1979McZU); other: 0.35 ps from γ-ray induced Doppler-broadening method following (n,γ) (1999Bo10); analysis provides a possible range of $T_{1/2}$ of 0.20 to 0.39 ps.
1158.9689[c] *23*	4^-	3.3 ps +*5*−*23*	C EF J N	XREF: F(1163). J^π: From E2 γ to 2^- level, E1 to 4^+, and expected band structure. $T_{1/2}$: From γ-ray induced Doppler-broadening method following (n,γ) (1999Bo10).
1176.481[c] *5*	5^-	0.32 ps +*4*−*17*	E JKL N	XREF: K(1172)L(1172). J^π: From E1 γ to 4^+ level and γ to 6^+. $T_{1/2}$: From γ-ray induced Doppler-broadening method following (n,γ) (1999Bo10).
1187.148[d] *3*	2^+	0.61 ps *4*	A CdEF JK MN	XREF: d(1196)F(1190). J^π: From E2 γ to 0^+ level. J^π: Configuration may include ((ν,3/2[521])+(ν,1/2[521])) and ((ν,5/2[523])-(ν,1/2[521])) (1994So02). $T_{1/2}$: Calculated from B(E2)↑=0.089 *4* and γ branching. 1999Bo10 measured range of $T_{1/2}$ of 0.35 to 0.69 ps.
1196.164[e] *7*	0^+	5.5 ps +*7*−*43*	A dE J MN	XREF: d(1196). J^π: From E2 γ to 2^+ level, γ to 1^-, and band structure. J^π: Configuration may include ((ν,3/2[521])-(ν,3/2[521]))

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Adopted Levels, Gammas (continued)

^{158}Gd Levels (continued)

E(level)[†]	J^{π}	$T_{1/2}$	L	XREF	Comments
					(1978Gr14,1994So02) and ((ν,5/2[523])-(ν,5/2[523])) (1994So02). $T_{1/2}$: From γ-ray induced Doppler-broadening method following (n,γ) (1999Bo10).
1259.8703[e] *18*	2^+	3.6 ps *3*		A dE J mN	XREF: d(1266)m(1262). J^{π}: From E2 γ to 0^+ level. $T_{1/2}$: Calculated from B(E2)↑=0.0080 *6* and γ branching. 1999Bo10 measured range of $T_{1/2}$ of 0.98 to 4.09 ps.
1263.515[f] *3*	1^-	13 fs *4*		A dE H JK mN	XREF: d(1266)m(1262). J^{π}: From E1 γ to 0^+ level. $T_{1/2}$: Calculated by evaluator from data from (γ,γ'); other: < 33 fs from γ-ray induced Doppler-broadening method following (n,γ) (1999Bo10).
1265.521[d] *3*	3^+	1.11 ps *+13−72*		A EF J LmN	XREF: m(1262). J^{π}: From E2 γ's to 2^+ and 4^+ levels and band structure. $T_{1/2}$: From γ-ray induced Doppler-broadening method following (n,γ) (1999Bo10).
1349.5[b] *9*	10^+	1.85 ps *15*		N	μ=3.2 *4* J^{π}: From γ to 8^+ level and band structure. $T_{1/2}$: From Coulomb excitation by Doppler-shifted line shape (1977Ke06). μ: From g-factor(10^+)/g-factor(2^+)=0.83 *11* from 2014StZZ compilation and based on data of 1983Ha24 and g-factor(2^+)=0.381 *4*.
1358.472[d] *3*	4^+	0.69 ps *+10−4*	1	DEF JK MN	J^{π}: From E2 γ's to 2^+ and 4^+ levels and band structure. $T_{1/2}$: From γ-ray induced Doppler-broadening method following (n,γ) (1999Bo10).
1371.942[c] *5*	6^-			E J N	J^{π}: From E2 γ to 4^- level and band structure.
1380.634[g] *6*	4^+			EF J L	XREF: L(1385). J^{π}: From E2 γ's to 2^+ and 4^+ levels and band structure. J^{π}: Major component is ((π,3/2[411])+(π,5/2[413])) from (pol t,α) (1981Bu10) and model calculations (1984So17,1986Ne06,1990So16,1994So02) with minor component of ((ν,5/2[523])+(ν,3/2[521])) suggested in calculations (1986Ne06,1990So16,1994So02,1997So26).
1390.6[c] *7*	7^-			N	J^{π}: From γ's to 6^+ and 8^+ levels and band structure.
1402.938[f] *3*	3^-	4.6[‡] fs *+8−7*		A E JK N	B(E3)↑=0.023 (1967Bl05) $T_{1/2}$: other: < 0.048 ps, from γ-ray induced Doppler-broadening method following (n,γ) (1999Bo10). J^{π}: From E1 γ's to 2^+ and 4^+ levels.
1406.7018[e] *25*	4^+	1.11 ps *+19−74*		E J N	J^{π}: From E2 γ's to 2^+ and 6^+ levels. $T_{1/2}$: From γ-ray induced Doppler-broadening method following (n,γ) (1999Bo10).
1414 *7*				D F	
1440				F	
1452.353[h] *6*	0^+	1.04 ps *+16−90*		A DE JK M	XREF: D(1461)K(1449). J^{π}: From L=0 in (p,t) and E0 transition to 0^+ level. J^{π}: Configuration may include ((π,5/2[413])-(π,5/2[413])) ((ν,3/2[521])-(ν,3/2[521])) (1984So17,1994So02). $T_{1/2}$: From γ-ray induced Doppler-broadening method following (n,γ) (1999Bo10).
1481.419[d] *4*	5^+			E J l N	XREF: l(1493). J^{π}: From E2 γ's to 4^+, M1,E2 γ to 6^+ level, and band structure.

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Adopted Levels, Gammas (continued)

^{158}Gd Levels (continued)

E(level)[†]	J^{π}	$T_{1/2}$	XREF	Comments
1499.104[g] *5*	5^+		EF J l	XREF: F(1503)l(1493). J^{π}: From E2(+M1) γ to 4^+ level, γ to 6^+, and band structure.
1517.4795[h] *20*	2^+	1.39 ps *15*	A DE JK MN	J^{π}: From E2 γ to 0^+ level. $T_{1/2}$: Calculated from B(E2)↑=0.0093 *9* and γ branching; other: 0.90 ps *+12−71* from γ-ray induced Doppler-broadening method following (n,γ) (1999Bo10).
1554 *7*			D	
1576.932 *16*	0^+		E M	
1623.5[d] *10*	6^+		N	J^{π}: From γ's to 4^+ and 6^+ levels and band structure.
1635.5[e] *10*	6^+		d N	XREF: d(1634). J^{π}: From γ's to 4^+ and 6^+ levels and band structure.
1636.299[i] *4*	4^-		E J	J^{π}: From E1 γ's to 4^+ and 5^+ levels and γ to 3^+. J^{π}: A component of the configuration is ((π,5/2[532])+(π,3/2[411])) from (pol t,α) (1981Bu10); model calculations (1990So16,1994So02) suggest this is a minor component, with the major component of ((ν,3/2[521])+(ν,5/2[642])).
1639.34?[f] *9*	(5^-)		dE J	XREF: d(1634). J^{π}: From (E1) γ to 4^+ level and γ to 6^+.
1653?			N	
1667.373[h] *6*	$(4)^+$		E J M	J^{π}: From E1 γ to 3^- level and γ's to 2^+ and 6^+.
1684.1[c] *10*	(9^-)		N	J^{π}: From γ to 8^+ level and band structure.
1716.807[i] *5*	5^-		E J	J^{π}: From E1 γ's to 4^+ and 5^+ levels and band structure.
1743.147[j] *14*	0^+	>0.75[‡] ps	DEF J M	XREF: D(1750). J^{π}: From E1 γ to 1^- level and L=0 in (t,p). J^{π}: A component in this band ((π,3/2[411])-(π,3/2[411])) from (pol t,α) (1981Bu10) and model calculations an additional component is ((ν,3/2[521])-(ν,3/2[521])) (1984So17,1994So02).
1791.797[j] *9*	2^+		E J L	XREF: L(1795). J^{π}: From E1 γ's to 1^- and 3^- levels and comparison of measured and calculated cross sections in (pol t,α).
1793.573[k] *7*	2^-	6.3 ps *+9−60*	A E J	J^{π}: From E1 γ's to 2^+ and 3^+ levels and γ to 0^+ level. J^{π}: Configuration may include ((π,7/2[523])-(π,3/2[411])) (1994So02). $T_{1/2}$: From γ-ray induced Doppler-broadening method following (n,γ) (1999Bo10).
1814.166[i] *5*	6^-		E J	J^{π}: From E1 γ to 5^+ and band structure.
1819			F	
1847.88[l] *3*	1^+		A E J	J^{π}: From E1 γ to 2^- level, γ to 1^-, and band structure. J^{π}: Probable components of configuration are ((ν,5/2[523])-(ν,3/2[521])) and ((π,5/2[413])-(π,3/2[411])) (1978Gr14) and model calculations suggest latter is the major component (1994So02).
1856.316[m] *15*	1^-		dEF J	XREF: d(1860)F(1854). J^{π}: From E1 γ to 2^+ level, M1 γ to 1^-, γ to 0^+, and band structure. J^{π}: Several possible configurations are suggested in 1978Gr14 and model calculations suggest ((ν,5/2[642])-(ν,3/2[521])) and ((π,5/2[532])-(π,3/2[411])) (1994So02).
1861.281[k] *7*	3^-		dE JK	XREF: d(1860)K(1856). J^{π}: From E1 γ's to 2^+ and 4^+ levels.
1865.0[b] *10*	12^+	0.98 ps *8*	N	J^{π}: From γ to 10^+ level and band structure. $T_{1/2}$: From Coulomb excitation by Doppler-shifted line shape (1977Ke06).

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Adopted Levels, Gammas (continued)

^{158}Gd Levels (continued)

E(level)[†]	J^π	$T_{1/2}$	XREF	Comments
1894.578[l] *21*	(2+)		A E J	J^π: From proposed population in thermal and average-resonance (n,γ) and band structure. Some γ's are to 1^- and 4^+ levels.
1894.616[m] *8*	2−		Ef J	XREF: f(1900). J^π: From E1 γ to 2^+ level and band structure.
1901.595[j] *16*	4+		Ef J L	XREF: f(1900)L(1904). J^π: From E1 γ to 3^- level, γ to 5^-, and band structure.
1916.938 *6*	(4,5,6)−		DE J	XREF: D(1912). J^π: From E1 γ's to 5^+ levels.
1920.264[n] *6*	4+		Ef J	XREF: f(1926). J^π: From E1 γ to 5^- level and γ's to 2^+ and 6^+. J^π: Major component of configuration is ((ν,5/2[523])+(ν,3/2[521])) from model calculations with minor component of ((π,3/2[411])+(π,5/2[413])) (1984So17,1986Ne06,1990So16,1994So02,1997So26).
1930.202[o] *24*	1+		A Ef J L	XREF: f(1926). J^π: From E1 γ to 2^- and band structure. J^π: Probable components of configuration are ((π,5/2[413])-(π,3/2[411])) and ((ν,5/2[523])-(ν,3/2[521])) (1978Gr14) and model calculations suggest the latter is the major component (1994So02).
1953.5 *6*	0+		M	
1941.27[l] *3*	3+		DE J	J^π: From E1 γ to 4^-, (E1) γ to 2^-, and band structure.
1948			F	
1952.425 *25*	(0)+		dE J	XREF: d(1954). J^π: From E1 γ to 1^- level, γ to 2^+, population in average-resonance capture, and band structure.
1953.760[k] *23*	4−		E J	J^π: From E1 γ to 3^+ level, γ (multiply placed) to 5^+, and band structure.
1957.27 *9*	0+	118[‡] fs *+35−24*	dE J M	XREF: d(1954)M(1960). J^π: From γ to 2^+ level and population in average-resonance capture.
1964.120[o] *21*	2+		A E J L	J^π: From E1 γ to 1^- level, γ to 0^+, and M1+E2 γ to 3^+.
1972 *3*	(0+)		D M	J^π: From L=(0) in (t,p).
1978.040[m] *8*	3−		E J	J^π: From E1 γ's to 2^+ and 4^+ levels.
1997			F	
2017.894[n] *11*	(5+)		E J	J^π: From M1 γ to 5^+ level and γ's to 4^- and 6^-.
2023.851 *13*	1+		A EF J	J^π: Assigned 1^+ in (n,γ) which is consistent with E2 γ to 2^+ level, inconsistent with E1 γ to 0^+ level.
2033.924[o] *17*	3+		E J L	J^π: From E1 γ's to 2^- and 4^- levels.
2035.70 *3*	(2+)		dE J	XREF: d(2039). J^π: From γ to 2^+ level and population in average-resonance capture.
2041 *7*			d F	XREF: d(2039).
2049.009 *22*	2−		E J	J^π: From M1 γ's to 1^- and 3^- levels.
2063			F	
2083.639 *24*	2+		E J	J^π: From E1 γ to 3^- level, γ to 1^-, and population in average-resonance capture.
2089.254 *8*	2+		E J	J^π: From E1 γ's to 2^- and 3^- levels and two γ's to 1^- levels. In (n,n′γ), the $\gamma(\theta)$ for the 902 γ is inconsistent with 2^+, so they assign 3^+ which is inconsistent with γ's to 1^- levels.
2095.20 *16*	(4+)		D F J L	XREF: L(2090). J^π: From comparison of measured and calculated cross sections in (pol t,α).
2120.25 *4*			E J L	XREF: L(2117).
2134 *7*			D	

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Adopted Levels, Gammas (continued)

^{158}Gd Levels (continued)

E(level)[†]	J^π	$T_{1/2}$	XREF	Comments
2153.178 *9*	$(2,3)^+$		EF	J^π: From E1 γ to 3^- level and γ's to 2^+ and 4^+.
2176[p]	(5^-)		L	J^π: From comparison of calculated and measured cross sections in (pol t,α). J^π: Assigned as $K^\pi=4^-$ band with bandhead unobserved. Major component of configuration is ((π,5/2[532])+(π,3/2[411])) from (pol t,α) (1991Bu10) and model calculations suggest this and ((ν,3/2[521])+(ν,5/2[642])) (1994So02) may be present.
2210			F	
2215.47 *8*	$(1,2,3)^+$		J	J^π: From M1 γ to 2^+ level.
2215.524 *22*	1		A E J	J^π: From γ's to 0^+ and 2^+ levels and γ to 0^+.
2221.63 *5*	2^-		A EF J L	XREF: F(2225)L(2224). J^π: $1^-,2^-,3^-$ from E1 γ to 2^+ level; 1^- less likely from γ to 3^+; 3^- less likely from log *ft*=8.3 from (1^-) parent.
2237			D	
2249.61 *5*	$2^+,3,4^+$		dEF J	XREF: d(2256)F(2252). J^π: From γ's to 2^+ and 4^+ levels.
2260.162 *18*	$1,2^+$[&]		dE J	XREF: d(2256). J^π: From M1,E2 γ to 3^+ level and γ's to 2^- and 3^-.
2267.16 *11*	1	33 fs *8*	d f H J	XREF: d(2272)f(2273). J^π: From dipole excitation in (γ,γ'). $T_{1/2}$: Calculated by evaluator from data from (γ,γ').
2269.269 *14*	$(0,1,2)^+$		A dEf	XREF: d(2272)f(2273). J^π: From M1,E2 γ to 1^+ level and γ to 1^-.
2276.02 *3*	$2,3^+$[&]		dEf M	XREF: d(2272)f(2273).
2276.76 *5*	0^+	49[‡] fs *+14−10*	J	J^π: E2 γ to 2^+ level and D γ to 1^- level.
2283.2 *6*			E	
2285[p]	(6^-)		F L	XREF: F(2287)L(2282). J^π: From comparison of calculated and measured cross section in ^{159}Tb(pol t,α).
2289.46 *12*	$1,2^+$		J	J^π: From γ's to 0^+ and 2^+ level.
2296 *7*			D	
2322.0 *6*	$2,3^+$[&]		E l	XREF: l(2323).
2325.32 *7*	$1^-,2^+$		A J l	XREF: l(2323). E(level): In (n,n$'\gamma$) the 1347 γ is placed from a level at 2325.11 and the 1060 and 2246 γ's are placed from a level at 2326.02. This division is not followed here. J^π: From γ's to 0^+, 1^-, and 3^- levels.
2327.3 *5*	$1,2^+$[@&]		E	
2339.93 *8*	0^+	0.17[‡] ps *+18−7*	d J M	XREF: d(2338)M(2338.0). J^π: From L=0 in (p,t).
2340.3 *3*	2^+		A d F	XREF: d(2338)F(2334). J^π: From comparison of measured and calculated cross sections in (d,p).
2344.7 *5*	$2^+,3^+$[@&]		dE	XREF: d(2338). J^π: 1^-,2,3 from 2015Va20 and E1 γ from π=−.
2355.0 *5*	$1^+,2^+$[@&]		DE	XREF: D(2358). J^π: 1,2,3^- from 2015Va20 and E1 γ from π=−.
2369.6 *15*			EF	XREF: F(2366).
2384			L	
2395.38 *11*	(3^+)		A DEF	XREF: D(2405)F(2400). J^π: From comparison of measured and calculated cross sections in (d,p) and γ's to 0^+ and 3^- levels and π=+ from E1 γ from thermal-n capture state.

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Adopted Levels, Gammas (continued)

^{158}Gd Levels (continued)

E(level)†	Jπ	$T_{1/2}$	XREF	Comments
2418[p]	(7−)		D L	XREF: D(2427). Jπ: From comparison of calculated and measured cross sections in ^{159}Tb(pol t,α).
2433.1 *8*			E	
2446.49 *15*	1	29 fs *8*	A f H J	XREF: f(2450). Jπ: From dipole excitation in (γ,γ′). $T_{1/2}$: Calculated by evaluator from data from (γ,γ′).
2450.74 *12*	1,2+		A Ef J	XREF: f(2450). Jπ: From γ′s to 0+ and 2+ levels.
2475.4 *3*	1,2+		A D	XREF: D(2471). Jπ: From γ′s to 0+ and 2+ levels.
2480.5 *14*			E	
2485.6 *7*			dE L	XREF: d(2490).
2499.22 *10*	(1,2)+		A d F	XREF: d(2490)F(2494). Jπ: From γ′s to 0+ and 3+ levels.
2500.6 *5*	(+)@		E	
2533.9 *5*	(+)@		E	
2538.7 *7*	(2+)		EF	Jπ: From comparison of measured and calculated cross sections in (d,p).
2564.98 *16*	1(+)	33 fs *9*	DEF H J	XREF: D(2561)F(2572). Jπ: From dipole excitation (γ,γ′) and π from E1 γ from thermal-n capture state. $T_{1/2}$: Calculated by evaluator from data from (γ,γ′).
2594.73 *20*	(+)#		EF J	XREF: F(2589).
2600	(3+)		d F	XREF: d(2601). Jπ: From comparison of measured and calculated cross sections in (d,p).
2600.28 *21*	1(+)	28 fs *10*	A dE H J	XREF: d(2601). Jπ: From dipole excitation in (γ,γ′) and π from E1 γ from thermal-n capture state. Level may be a doublet since (d,p) suggests Jπ=(3+). $T_{1/2}$: Calculated by evaluator from data from (γ,γ′).
2620.94 *23*			A	
2630.9 *5*	(+)@		EF	XREF: F(2634).
2642 *2*			A	XREF: A(2642).
2644.27 *5*	0+	13.2‡ fs *28*	J M	XREF: M(2643.4). Jπ: From L=0 in (p,t).
2644.3 *7*			E	
2656.9 *5*			dEF	XREF: d(2666)F(2658).
2670.7 *3*			A dE	XREF: d(2666)E(2672).
2674.56 *18*	(1),2+		J	Jπ: From (E2) γ to 0+ level and γ to 2−.
2686.9 *3*	1(+)		f J	XREF: f(2683). Jπ: From γ′s to 0+ and 2+ levels and γ(θ) in (n,n′γ) for 2686 γ eliminates 2+. π from E1 γ from 2−,(1−) upper level.
2687.1 *3*	0+		DEf M	XREF: D(2689)f(2683). Jπ: From L=0 in (p,t).
2700.93 *25*	2+,3&		EF J	XREF: E(2698.7)F(2701).
2723.7 *10*			E	
2741			F	
2750.43 *19*			E J	
2758.7 *5*	(+)@		E	
2761.96 *21*			A	
2769 *7*			D F	
2782.4 *5*	(+)@		E	
2794.9? *8*			DE	
2802.6 *6*	1	12.5 fs *21*	EF H	Jπ: From dipole excitation in (γ,γ′). $T_{1/2}$: Calculated by evaluator from data from (γ,γ′).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{158}Gd Levels (continued)

E(level)†	J^π	$T_{1/2}$	XREF	Comments
2805.1 *3*	1,2$^+$		J	J^π: From γ's to 0^+ and 2^+ levels.
2822.7 *5*	1$^-$	8.2 fs *22*	A E H J	J^π: From E1 excitation in (γ,γ'). $T_{1/2}$: Calculated by evaluator from data from (γ,γ').
2829.6 *7*	($^+$)#		dEF	XREF: d(2839).
2832.0 *3*	1		J	
2841.8 *7*	1	16 fs *3*	d H	XREF: d(2839). J^π: From dipole excitation in (γ,γ'). $T_{1/2}$: Calculated by evaluator from data from (γ,γ').
2844.7 *7*			A E	
2854.7 *4*			E J	
2859.6 *6*			A EF	
2878.8 *4*	2$^+$,3@&		E	
2886			F	
2896.0 *8*			E	
2909.6 *5*	0$^+$	33‡ fs *+44−18*	EF J M	XREF: E(2909.8)F(2915). J^π: From L=0 in (p,t).
2913.4 *7*			E	
2934.6 *11*			EF	XREF: F(2940).
2961.7 *7*			EF	XREF: F(2966).
2964.3 *5*	2$^+$		J	J^π: From γ's to 0^+ and 2^+ levels and $\gamma(\theta)$ in (n,n$'\gamma$).
2981.5 *9*			E	
2985.9 *5*	1$^{(+)}$	20 fs *4*	E H	J^π: From dipole excitation by (γ,γ'). π from E1 γ from 2^-,(1^-) upper level. $T_{1/2}$: Calculated by evaluator from data from (γ,γ').
2997.7 *6*	($^+$)@		E	
3008.3 *6*			E	
3011.9 *5*	2$^+$,3$^+$@&		E	J^π: 1^-,2,3 from 2015Va20 and E1 γ from π=−.
3029.2 *6*			E	
3038.2 *4*	1	24 fs *6*	H J	J^π: From dipole excitation by (γ,γ'). $T_{1/2}$: Calculated by evaluator from data from (γ,γ').
3045.5 *15*			E	
3060.0 *4*	2$^+$,3#&		E J	
3064.6 *4*			E J	
3066.8 *6*	($^+$)#		E	
3076.7 *16*	0$^+$		M	J^π: From L=0 in (p,t).
3080.0 *6*			E	
3107.8 *7*	1	5.7 fs *9*	H	J^π: From dipole excitation by (γ,γ'). $T_{1/2}$: Calculated by evaluator from data from (γ,γ').
3109.9 *11*	0$^+$		M	J^π: From L=0 in (p,t).
3118.5 *15*			E	
3141.5 *7*			E	
3150.8 *7*	($^+$)@		E	
3160.8 *7*	1$^-$	9.0 fs *27*	H	J^π: From E1 excitation by (γ,γ'). $T_{1/2}$: Calculated by evaluator from data from (γ,γ').
3171.1 *7*			E	
3192.3 *7*	1$^+$	4.1 fs *6*	H	J^π: From M1 excitation by (γ,γ'). $T_{1/2}$: Calculated by evaluator from data from (γ,γ').
3195.4 *6*			E	
3200.8 *6*	2$^+$,3&		E	E(level): 2015Va20 (^{157}Gd(n,γ)) conclude that this 3200.8 and 3201 (in (γ,γ')) are a doublet.
3201 *5*	1$^+$	3.2 fs *4*	H	J^π: From M1 excitation by (γ,γ'). $T_{1/2}$: Calculated by evaluator from data from (γ,γ').
3228.5 *8*			E	
3234.5 *5*			E	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{158}Gd Levels (continued)

E(level)[†]	J^π	$T_{1/2}$	XREF	Comments
3247.1 *5*			E	
3258.8 *7*	1^-	9 fs *3*	E H	J^π: From E1 excitation by (γ,γ'). $T_{1/2}$: Calculated by evaluator from data from (γ,γ').
3263.8 *7*			E	
3271.3 *8*			E	
3287.9 *5*	1	34 fs *13*	E H	J^π: From dipole excitation by (γ,γ'). $T_{1/2}$: Calculated by evaluator from data from (γ,γ').
3291.6 *10*			E	
3298.8 *7*	1	7.0 fs *11*	H	J^π: From dipole excitation by (γ,γ'). $T_{1/2}$: Calculated by evaluator from data from (γ,γ').
3351.9 *8*	$1,2,3^-$[&]		E	
3411.7 *5*			E	
3427.8 *7*	1	23 fs *8*	H	J^π: From dipole excitation by (γ,γ'). $T_{1/2}$: Calculated by evaluator from data from (γ,γ').
3436.4 *5*	$(^+)$[@]		E	
3446.0 *6*	1,2,3[&]		E	
3448.8 *5*	$(^+)$[@]		E	
3469.8 *7*	1	31 fs *12*	H	J^π: From dipole excitation by (γ,γ'). $T_{1/2}$: Calculated by evaluator from data from (γ,γ').
3534.8 *6*	$(^+)$[@]		E	
3570.7 *6*			E	
3576.8 *7*	1	24 fs *10*	H	J^π: From dipole excitation by (γ,γ'). $T_{1/2}$: Calculated by evaluator from data from (γ,γ').
3592.4 *6*	$(^-)$		E	J^π: From M1,E2 γ from thermal-n capture state.
3600.5 *6*			E	
3626.9 *6*	$(^+)$[#]		E	
3632.7 *8*	$1^+,2^+,3^+$[#&]		E	J^π: 1,2,3 from 2015Va20 and E1 γ from π=−.
3647.5 *8*			E	
3655.4 *8*	$1,2^+$[&]		E	
3660.5 *5*			E	
3663.3 *10*			E	
3702.5 *6*			E	
3750.1? *15*			E	
3794.6 *10*	$(^+)$[@]		E	
3819.8 *7*	1^-	5.2 fs *23*	H	J^π: From E1 excitation by (γ,γ'). $T_{1/2}$: Calculated by evaluator from data from (γ,γ').
3846.6 *5*	$(^+)$[@]		E	
3878.8 *5*	$(^+)$[@]		E	
3920.8 *7*	1^-	2.7 fs *15*	H	J^π: From E1 excitation by (γ,γ').
3923.9 *6*			E	
3948.0 *6*			E	
3965.1 *7*			E	
4015.8? *8*			E	
4110.7 *8*	$(^+)$[@]		E	
4139.5 *5*	$(^+)$[@]		E	
4161.4 *8*	$(^+)$[@]		E	
4237.0 *6*			E	
(7937.22[a] *10*)	$2^-,(1^-)$		C	

[†] From least-squares fit to γ energies in ^{157}Gd(n,γ) if given there, next from γ-ray energies from decay data or (n,n$'\gamma$), and

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{158}Gd Levels (continued)

finally from level energies from reactions. The level energies from the (n,γ) and (n,n$'\gamma$) data generally differ by much more than their uncertainties; this may be due, in part, to the rescaling of the γ-ray energies by 1999Bo10. The rescaled energies from (n,γ) are considered more accurate. As a result of these differences in the γ-ray energies, a least-squares fit to all of the energies is not considered to be appropriate.

‡ From 2007Le29 by DSAM (^{158}Gd(n,n$'\gamma$) dataset).

\# E1 γ from 2^-,(1^-) upper level.

@ From E1 γ from thermal-n capture state.

& From 2015Va20 (see ^{157}Gd(n,γ) J^π footnote for details).

[a] 1^-,2^- from thermal-n capture on J^π(^{157}Gd)=3/2$^-$. According to 1978Gr14 (^{157}Gd(n,γ) E=th,res) quoting 1973Mu14 the thermal-n capture state results primarily from and is dominated by a single compound nucleus resonance at 0.0314 eV and J^π=2^-.

[b] Band(A): Ground-state rotational band. α=13.33, B=−0.0128.

[c] Band(B): K^π=1^- octupole-vibrational band.

[d] Band(C): K^π=2^+ γ-vibrational band. α=13.39, B=−0.053, A_4=−0.0084.

[e] Band(D): K^π=0^+ β-vibrational band. α=10.66, B=−0.0065. Terminology and assignment can be reconsidered in view of critique addressed by 2001Ga02 (same observation can also be applied to this band in in the particular datasets).

[f] Band(E): K^π=0^- octupole-vibrational band. α=13.94.

[g] Band(F): K^π=4^+ band. α=11.85.

[h] Band(G): K^π=0^+ band. α=10.89, B=−0.0072.

[i] Band(H): K^π=4^- band. α=7.92, B=0.0027.

[j] Band(I): K^π=0^+ band. α=8.18, B=−0.013.

[k] Band(J): K^π=2^- octupole-vibrational band. α=10.93, B=0.019.

[l] Band(K): K^π=1^+ band.

[m] Band(L): K^π=1^- band.

[n] Band(M): K^π=4^+ band. α=9.76.

[o] Band(N): K^π=1^+.

[p] Band(O): K^π=4^-.

$\gamma(^{158}$Gd)

E_i(level)	J^π_i	E_γ[†‡]	I_γ[†]	E_f	J^π_f	Mult.[#]	α	Comments
79.5143	2^+	79.5132 *17*	100	0.0	0^+	E2	5.93	α(K)=2.02 *3*; α(L)=3.02 *5*; α(M)=0.714 *10*; α(N)=0.1591 *23*; α(O)=0.0207 *3*; α(P)=9.93×10^{-5} *14* B(E2)(W.u.)=198 *5*
261.4580	4^+	181.943 *1*	100	79.5143	2^+	E2	0.305	α(K)=0.206 *3*; α(L)=0.0769 *11*; α(M)=0.01779 *25*; α(N)=0.00400 *6*; α(O)=0.000545 *8* α(P)=1.157×10^{-5} *17* B(E2)(W.u.)=290 *4*
539.022	6^+	277.554 *8*	100	261.4580	4^+	E2	0.0767	α(K)=0.0579 *9*; α(L)=0.01467 *21*; α(M)=0.00333 *5*; α(N)=0.000753 *11*; α(O)=0.0001063 *15* α(P)=3.57×10^{-6} *5*
904.12	8^+	365.10 *3*	100	539.022	6^+	[E2]	0.0334	α(K)=0.0263 *4*; α(L)=0.00555 *8*; α(M)=0.001246 *18*; α(N)=0.000283 *4*; α(O)=4.08×10^{-5} *6* α(P)=1.699×10^{-6} *24* B(E2)(W.u.)=3.3×10^{2} *3*
977.1457	1^-	897.622 *13*	76 *4*	79.5143	2^+	E1	1.39×10^{-3}	α(K)=0.001195 *17*; α(L)=0.0001567 *22*; α(M)=3.37×10^{-5} *5*; α(N)=7.73×10^{-6} *11* α(O)=1.196×10^{-6} *17*; α(P)=8.01×10^{-8} *12* B(E1)(W.u.)=9.7×10^{-5} *+127−11* I_γ: Value of 148 *6* from ^{158}Gd(n,n′γ) is discrepant.
		977.144 *2*	100 *5*	0.0	0^+	E1	1.19×10^{-3}	α(K)=0.001017 *15*; α(L)=0.0001329 *19*; α(M)=2.85×10^{-5} *4*; α(N)=6.55×10^{-6} *10* α(O)=1.015×10^{-6} *15*; α(P)=6.83×10^{-8} *10* B(E1)(W.u.)=9.8×10^{-5} *+128−11*
1023.6978	2^-	944.181 *2*	100	79.5143	2^+	E1	1.27×10^{-3}	α(K)=0.001085 *16*; α(L)=0.0001420 *20*; α(M)=3.05×10^{-5} *5*; α(N)=7.00×10^{-6} *10* α(O)=1.084×10^{-6} *16*; α(P)=7.28×10^{-8} *11*
1041.6399	3^-	780.183 *3*	47.2 *9*	261.4580	4^+	E1	0.00183	α(K)=0.001571 *22*; α(L)=0.000207 *3*; α(M)=4.46×10^{-5} *7*; α(N)=1.023×10^{-5} *15* α(O)=1.580×10^{-6} *23*; α(P)=1.050×10^{-7} *15* B(E1)(W.u.)=0.00029 *8*
		962.122 *2*	100.0 *20*	79.5143	2^+	E1	1.22×10^{-3}	α(K)=0.001047 *15*; α(L)=0.0001369 *20*; α(M)=2.94×10^{-5} *5*; α(N)=6.75×10^{-6} *10* α(O)=1.046×10^{-6} *15*; α(P)=7.03×10^{-8} *10* B(E1)(W.u.)=0.00033 *10*
1158.9689	4^-	117.335 *4*	0.55 *7*	1041.6399	3^-		1.408	Mult.: according to ^{157}Gd(n,γ) this is an (E2) γ but if so B(E2)(W.u.)>1000 so its placement, multipolarity or branching ratio seem uncertain.
		135.263[c] *4*	3.0 *3*	1023.6978	2^-			Mult.: according to ^{157}Gd(n,γ) this is an E2 γ but if so B(E2)(W.u.)=2100 so its placement or branching ratio seem uncertain. I_γ: from ^{157}Gd(n,γ); other: 1.33 *10* from ^{158}Gd(n,n′γ).
		897.506 *2*	100 *14*	261.4580	4^+	E1	1.39×10^{-3}	α(K)=0.001195 *17*; α(L)=0.0001567 *22*; α(M)=3.37×10^{-5} *5*;

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γ(^{158}Gd) (continued)

E_i(level)	J_i^π	E_γ †‡	I_γ †	E_f	J_f^π	Mult.#	δ#&	α	Comments
									α(N)=7.73×10^{-6} *11* α(O)=1.196×10^{-6} *17*; α(P)=8.01×10^{-8} *12* B(E1)(W.u.)=9.3×10^{-5} *+186−12*
1176.481	5$^-$	134.848 *6*	0.06 *1*	1041.6399	3$^-$	[E2]		0.859	α(K)=0.504 *7*; α(L)=0.275 *4*; α(M)=0.0642 *9*; α(N)=0.01437 *21*; α(O)=0.00192 *3* α(P)=2.64×10^{-5} *4* B(E2)(W.u.)=369 *+418−41*
		637.469 *21*	26.7 *16*	539.022	6$^+$	[E1]		0.00278	α(K)=0.00237 *4*; α(L)=0.000316 *5*; α(M)=6.81×10^{-5} *10*; α(N)=1.561×10^{-5} *22*; α(O)=2.41×10^{-6} *4* α(P)=1.578×10^{-7} *22* B(E1)(W.u.)=0.00059 *+67−7*
		915.03 *5*	100 *6*	261.4580	4$^+$	E1		1.34×10^{-3}	α(K)=0.001152 *17*; α(L)=0.0001509 *22*; α(M)=3.24×10^{-5} *5*; α(N)=7.44×10^{-6} *11* α(O)=1.152×10^{-6} *17*; α(P)=7.73×10^{-8} *11* B(E1)(W.u.)=0.00074 *+84−8*
1187.148	2$^+$	925.65 *7*	1.78 *20*	261.4580	4$^+$	(E2)		0.00324	α(K)=0.00273 *4*; α(L)=0.000401 *6*; α(M)=8.74×10^{-5} *13*; α(N)=2.00×10^{-5} *3*; α(O)=3.06×10^{-6} *5* α(P)=1.89×10^{-7} *3* B(E2)(W.u.)=0.27 *4*
		1107.626 *4*	100 *8*	79.5143	2$^+$	E2+M1	−9.0 *15*	0.00225	α(K)=0.00190 *3*; α(L)=0.000270 *4*; α(M)=5.85×10^{-5} *9*; α(N)=1.343×10^{-5} *20*; α(O)=2.06×10^{-6} *3* α(P)=1.319×10^{-7} *19* B(E2)(W.u.)=6.0 *7*; B(M1)(W.u.)=0.00018 *7*
		1187.143 *5*	78.5 *14*	0.0	0$^+$	E2		0.00194	α(K)=0.001643 *23*; α(L)=0.000231 *4*; α(M)=5.00×10^{-5} *7*; α(N)=1.147×10^{-5} *16* α(O)=1.766×10^{-6} *25*; α(P)=1.140×10^{-7} *16* B(E2)(W.u.)=3.4 *3*
1196.164	0$^+$	219.023 *7*	0.083 *10*	977.1457	1$^-$	[E1]		0.0357	α(K)=0.0303 *5*; α(L)=0.00427 *6*; α(M)=0.000923 *13*; α(N)=0.000210 *3*; α(O)=3.17×10^{-5} *5* α(P)=1.87×10^{-6} *3* B(E1)(W.u.)=3.31×10^{-6} +1188-41
		1116.52 *5*	100 *6*	79.5143	2$^+$	E2		0.00219	α(K)=0.00186 *3*; α(L)=0.000263 *4*; α(M)=5.71×10^{-5} *8*; α(N)=1.311×10^{-5} *19*; α(O)=2.01×10^{-6} *3* α(P)=1.287×10^{-7} *18* B(E2)(W.u.)=1.17 *+418−13*
1259.8703	2$^+$	218.221 *5*	6.9 *6*	1041.6399	3$^-$	E1		0.0361	α(K)=0.0306 *5*; α(L)=0.00431 *6*; α(M)=0.000932 *13*; α(N)=0.000212 *3*; α(O)=3.20×10^{-5} *5* α(P)=1.89×10^{-6} *3* B(E1)(W.u.)=0.000189 *24*
		236.176 *6*	0.56 *4*	1023.6978	2$^-$	[E1]		0.0294	α(K)=0.0249 *4*; α(L)=0.00349 *5*; α(M)=0.000755 *11*;

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$\gamma(^{158}$Gd) (continued)

E_i(level)	J_i^π	E_γ †‡	I_γ †	E_f	J_f^π	Mult.#	δ#&	α	Comments
									α(N)=0.0001722 *25*; α(O)=2.60×10⁻⁵ *4* α(P)=1.551×10⁻⁶ *22* B(E1)(W.u.)=1.21×10⁻⁵ *14*
1259.8703	2⁺	282.726 *7*	5.1 *4*	977.1457	1⁻	E1		0.0185	α(K)=0.01572 *22*; α(L)=0.00218 *3*; α(M)=0.000471 *7*; α(N)=0.0001077 *15* α(O)=1.634×10⁻⁵ *23*; α(P)=9.96×10⁻⁷ *14* B(E1)(W.u.)=6.4×10⁻⁵ *8*
		998.409 *2*	100 *6*	261.4580	4⁺	E2		0.00276	α(K)=0.00233 *4*; α(L)=0.000338 *5*; α(M)=7.34×10⁻⁵ *11*; α(N)=1.682×10⁻⁵ *24*; α(O)=2.58×10⁻⁶ *4* α(P)=1.614×10⁻⁷ *23* B(E2)(W.u.)=1.39 *15*
		1180.35 *9*	40 *3*	79.5143	2⁺	M1+E2	−0.70 *7*	0.00272 *7*	α(K)=0.00231 *6*; α(L)=0.000315 *7*; α(M)=6.80×10⁻⁵ *15*; α(N)=1.56×10⁻⁵ *4*; α(O)=2.43×10⁻⁶ *6* α(P)=1.65×10⁻⁷ *4* B(E2)(W.u.)=0.079 *14*; B(M1)(W.u.)=0.00044 *6* δ: from α_K(exp), ρ^2(E0) ≤ 0.0008 (1999Wo07).
		1259.865 *3*	72 *4*	0.0	0⁺	E2		1.73×10⁻³	α(K)=0.001462 *21*; α(L)=0.000203 *3*; α(M)=4.40×10⁻⁵ *7*; α(N)=1.011×10⁻⁵ *15* α(O)=1.559×10⁻⁶ *22*; α(P)=1.014×10⁻⁷ *15* B(E2)(W.u.)=0.31 *4*
1263.515	1⁻	1184.01 *8*	100 *6*	79.5143	2⁺	E1(+M2)	+0.11 *8*	0.00093 *15*	α(K)=0.00078 *13*; α(L)=0.000102 *19*; α(M)=2.2×10⁻⁵ *4*; α(N)=5.1×10⁻⁶ *10*; α(O)=7.8×10⁻⁷ *15* α(P)=5.3×10⁻⁸ *10* B(E1)(W.u.)=0.0064 *21* Mult.: From α_K(exp) assigned E2, but that is not consistent with J^π's, so reanalyzed as E1(+M2).
		1263.509 *3*	66 *4*	0.0	0⁺	E1		7.97×10⁻⁴	α(K)=0.000638 *9*; α(L)=8.25×10⁻⁵ *12*; α(M)=1.770×10⁻⁵ *25*; α(N)=4.07×10⁻⁶ *6*; α(O)=6.31×10⁻⁷ *9* α(P)=4.30×10⁻⁸ *6* B(E1)(W.u.)=0.0035 *12*
1265.521	3⁺	1004.04 *8*	22 *2*	261.4580	4⁺	E2(+M1)	−23 *+19−7*	0.00273 *11*	α(K)=0.00231 *10*; α(L)=0.000334 *12*; α(M)=7.3×10⁻⁵ *3*; α(N)=1.66×10⁻⁵ *6*; α(O)=2.55×10⁻⁶ *10* α(P)=1.60×10⁻⁷ *8* B(E2)(W.u.)=1.77 *+327−19* I_γ: From ^{157}Gd(n,γ); others: 16 *5* from ^{158}Eu β-decay and 21.6 *14* from ^{158}Gd(n,n′γ).
		1186.002 *3*	100 *6*	79.5143	2⁺	E2(+M1)	+30 *+32−14*	0.00195	α(K)=0.001647 *24*; α(L)=0.000231 *4*; α(M)=5.01×10⁻⁵ *7*; α(N)=1.151×10⁻⁵ *17* α(O)=1.771×10⁻⁶ *25*; α(P)=1.143×10⁻⁷ *17* B(E2)(W.u.)=3.50 *+647−37*
1349.5	10⁺	446.	100	904.12	8⁺	[E2]		0.0190	α(K)=0.01527 *22*; α(L)=0.00289 *4*; α(M)=0.000644 *9*; α(N)=0.0001464 *21*; α(O)=2.15×10⁻⁵ *3*

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$\gamma(^{158}\mathrm{Gd})$ (continued)

E_i(level)	J_i^π	E_γ [†‡]	I_γ [†]	E_f	J_f^π	Mult. [#]	δ [#&]	α	Comments
									α(P)=1.012×10⁻⁶ *15* B(E2)(W.u.)=3.4×10² *3*
1358.472	4^+	171.328 *5*	0.14 *1*	1187.148	2^+	[E2]		0.374	α(K)=0.247 *4*; α(L)=0.0987 *14*; α(M)=0.0229 *4*; α(N)=0.00514 *8*; α(O)=0.000697 *10* α(P)=1.367×10⁻⁵ *20* B(E2)(W.u.)=113 *+166−13*
		819.56[a] *5*	<5.9[a]	539.022	6^+	[E2]		0.00423	α(K)=0.00354 *5*; α(L)=0.000536 *8*; α(M)=0.0001170 *17*; α(N)=2.68×10⁻⁵ *4*; α(O)=4.07×10⁻⁶ *6* α(P)=2.44×10⁻⁷ *4* B(E2)(W.u.)>0.95
		1097.007 *3*	100 *6*	261.4580	4^+	E2+M1	+6.4 *+14−10*	0.00231	α(K)=0.00195 *3*; α(L)=0.000277 *5*; α(M)=6.02×10⁻⁵ *9*; α(N)=1.380×10⁻⁵ *21*; α(O)=2.12×10⁻⁶ *4* α(P)=1.356×10⁻⁷ *21* B(E2)(W.u.)=7.3 *+107−9*; B(M1)(W.u.)=0.00043 *+62−5*
		1278.96 *7*	32.5 *21*	79.5143	2^+	E2		1.69×10⁻³	α(K)=0.001419 *20*; α(L)=0.000197 *3*; α(M)=4.27×10⁻⁵ *6*; α(N)=9.79×10⁻⁶ *14* α(O)=1.511×10⁻⁶ *22*; α(P)=9.84×10⁻⁸ *14* B(E2)(W.u.)=1.13 *+165−14*
1371.942	6^-	195.461 *6*	9.0 *7*	1176.481	5^-				
		212.979 *5*	100 *7*	1158.9689	4^-	E2		0.180	α(K)=0.1279 *18*; α(L)=0.0406 *6*; α(M)=0.00934 *13*; α(N)=0.00210 *3*; α(O)=0.000290 *4* α(P)=7.45×10⁻⁶ *11*
		832.889[a] *10*	≤277[a]	539.022	6^+				
1380.634	4^+	339.14 *10*	2.13 *21*	1041.6399	3^-				I_γ: from ^{158}Gd(n,n′γ).
		1119.20 *6*	100 *6*	261.4580	4^+	E2+M1	−4.5 *+20−17*	0.00224 *13*	α(K)=0.00190 *11*; α(L)=0.000269 *14*; α(M)=5.8×10⁻⁵ *3*; α(N)=1.34×10⁻⁵ *7*; α(O)=2.06×10⁻⁶ *11* α(P)=1.32×10⁻⁷ *9*
		1300.90 *12*	20.5 *18*	79.5143	2^+	E2		1.64×10⁻³	α(K)=0.001373 *20*; α(L)=0.000190 *3*; α(M)=4.12×10⁻⁵ *6*; α(N)=9.45×10⁻⁶ *14* α(O)=1.458×10⁻⁶ *21*; α(P)=9.52×10⁻⁸ *14*
1390.6	7^-	486.		904.12	8^+				
		852.		539.022	6^+				
1402.938	3^-	139.434[c] *3*	0.07 *1*	1263.515	1^-			0.764	
		143.065 *6*	0.04 *1*	1259.8703	2^+	[E1]		0.1112	α(K)=0.0938 *14*; α(L)=0.01363 *19*; α(M)=0.00295 *5*; α(N)=0.000669 *10*; α(O)=9.95×10⁻⁵ *14* α(P)=5.51×10⁻⁶ *8* B(E1)(W.u.)=0.0037 *+11−12*
		1141.477 *3*	85 *5*	261.4580	4^+	E1		8.97×10⁻⁴	α(K)=0.000764 *11*; α(L)=9.93×10⁻⁵ *14*;

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$\gamma(^{158}Gd)$ (continued)

E_i(level)	J_i^π	E_γ †‡	I_γ †	E_f	J_f^π	Mult.#	δ#&	α	Comments
									α(M)=2.13×10^{-5} *3*; α(N)=4.89×10^{-6} *7*; α(O)=7.59×10^{-7} *11* α(P)=5.15×10^{-8} *8* B(E1)(W.u.)=0.016 *3*
1402.938	3$^-$	1323.44 *5*	100 *6*	79.5143	2$^+$	E1		7.70×10^{-4}	α(K)=0.000588 *9*; α(L)=7.60×10^{-5} *11*; α(M)=1.629×10^{-5} *23*; α(N)=3.74×10^{-6} *6*; α(O)=5.81×10^{-7} *9* α(P)=3.97×10^{-8} *6* B(E1)(W.u.)=0.0117 *+20−23*
1406.7018	4$^+$	141.182 *10*	0.05 *2*	1265.521	3$^+$	[M1,E2]		0.743 *16*	α(K)=0.54 *10*; α(L)=0.158 *67*; α(M)=0.036 *17*; α(N)=0.0082 *36*; α(O)=0.00114 *44* α(P)=3.5×10^{-5} *13*
		146.831 *5*	0.57 *6*	1259.8703	2$^+$	[E2]		0.637	α(K)=0.392 *6*; α(L)=0.190 *3*; α(M)=0.0443 *7*; α(N)=0.00992 *14*; α(O)=0.001331 *19* α(P)=2.09×10^{-5} *3* B(E2)(W.u.)=456 *+912−67*
		219.547 *8*	0.12 *2*	1187.148	2$^+$	[E2]		0.1630	α(K)=0.1166 *17*; α(L)=0.0360 *5*; α(M)=0.00827 *12*; α(N)=0.00186 *3*; α(O)=0.000258 *4* α(P)=6.84×10^{-6} *10* B(E2)(W.u.)=12.8 *+256−19*
		230.233 *7*	6.6 *5*	1176.481	5$^-$	[E1]		0.0314	α(K)=0.0266 *4*; α(L)=0.00374 *6*; α(M)=0.000808 *12*; α(N)=0.000184 *3*; α(O)=2.78×10^{-5} *4* α(P)=1.653×10^{-6} *24* B(E1)(W.u.)=0.00061 *+122−9*
		247.716 *6*	0.33 *3*	1158.9689	4$^-$	[E1]		0.0259	α(K)=0.0220 *3*; α(L)=0.00308 *5*; α(M)=0.000666 *10*; α(N)=0.0001519 *22*; α(O)=2.30×10^{-5} *4* α(P)=1.378×10^{-6} *20* B(E1)(W.u.)=2.46×10^{-5} *+492−36*
		365.063 *9*	19.9 *12*	1041.6399	3$^-$	E1		0.00982	α(K)=0.00836 *12*; α(L)=0.001146 *16*; α(M)=0.000247 *4*; α(N)=5.65×10^{-5} *8*; α(O)=8.63×10^{-6} *12* α(P)=5.40×10^{-7} *8* B(E1)(W.u.)=0.000463 *+926−68* I_γ: from ^{157}Gd(n,γ); other: 75 *6* from ^{158}Gd(n,n′γ).
		867.75 *5*	28.5 *17*	539.022	6$^+$	E2		0.00373	α(K)=0.00313 *5*; α(L)=0.000467 *7*; α(M)=0.0001019 *15*; α(N)=2.33×10^{-5} *4*; α(O)=3.56×10^{-6} *5* α(P)=2.16×10^{-7} *3* B(E2)(W.u.)=3.16 *+632−46*
		1145.26 *11*	27 *4*	261.4580	4$^+$	M1+E2	+1.0 *2*	0.00270 *14*	α(K)=0.00230 *12*; α(L)=0.000315 *16*; α(M)=6.8×10^{-5} *4*; α(N)=1.57×10^{-5} *8*; α(O)=2.43×10^{-6} *12* α(P)=1.63×10^{-7} *10* B(M1)(W.u.)=0.00097 *+194−14*; B(E2)(W.u.)=0.37 *+74−5*
		1327.184 *3*	100 *6*	79.5143	2$^+$	E2		1.58×10^{-3}	α(K)=0.001321 *19*; α(L)=0.000183 *3*; α(M)=3.95×10^{-5} *6*; α(N)=9.06×10^{-6} *13*

$\gamma(^{158}Gd)$ (continued)

E_i(level)	J^π_i	E_γ[†‡]	I_γ[†]	E_f	J^π_f	Mult.[#]	δ[#&]	α	$I_{(\gamma+ce)}$	Comments
										α(O)=1.399×10^{-6} *20*; α(P)=9.16×10^{-8} *13* B(E2)(W.u.)=1.32 *+264−19*
1452.353	0$^+$	188.845 *5*	1.92 *15*	1263.515	1$^-$	[E1]		0.0529		α(K)=0.0447 *7*; α(L)=0.00637 *9*; α(M)=0.001376 *20*; α(N)=0.000313 *5*; α(O)=4.70×10^{-5} *7* α(P)=2.72×10^{-6} *4* B(E1)(W.u.)=0.00060 *+387−8*
		475.218 *16*	2.94 *23*	977.1457	1$^-$	E1		0.00529		α(K)=0.00451 *7*; α(L)=0.000610 *9*; α(M)=0.0001314 *19*; α(N)=3.01×10^{-5} *5*; α(O)=4.62×10^{-6} *7* α(P)=2.96×10^{-7} *5* B(E1)(W.u.)=5.8×10^{-5} *+373−8* I_γ: from ^{157}Gd(n,γ); other: 6.6 *9* from ^{158}Gd(n,n′γ).
		1372.95 *14*	100 *10*	79.5143	2$^+$	E2		1.49×10^{-3}		α(K)=0.001237 *18*; α(L)=0.0001702 *24*; α(M)=3.68×10^{-5} *6*; α(N)=8.45×10^{-6} *12* α(O)=1.305×10^{-6} *19*; α(P)=8.58×10^{-8} *12* B(E2)(W.u.)=2.1 *+134−3*
		1452.36 *20*		0.0	0$^+$	E0			0.30 *3*	$I_{(\gamma+ce)}$: from Ice$_K$=0.14 *1* in (n,γ) (1978Gr14) and L/K=0.136 (1969Ha61).
1481.419	5$^+$	100.787[c] *4*	0.19 *4*	1380.634	4$^+$					
		122.943 *10*	0.08 *3*	1358.472	4$^+$					
		215.898 *5*	0.75 *4*	1265.521	3$^+$					
		942.34 *7*	23 *3*	539.022	6$^+$	M1,E2		0.0042 *11*		α(K)=0.00356 *94*; α(L)=0.00050 *12*; α(M)=0.000108 *24*; α(N)=2.5×10^{-5} *6*; α(O)=3.8×10^{-6} *9* α(P)=2.53×10^{-7} *72*
		1219.91 *8*	100 *6*	261.4580	4$^+$	E2		0.00184		α(K)=0.001557 *22*; α(L)=0.000218 *3*; α(M)=4.72×10^{-5} *7*; α(N)=1.083×10^{-5} *16* α(O)=1.668×10^{-6} *24*; α(P)=1.080×10^{-7} *16*
1499.104	5$^+$	118.464 *10*	0.26 *7*	1380.634	4$^+$					
		960.03 *7*	26 *3*	539.022	6$^+$					
		1237.56 *9*	100 *5*	261.4580	4$^+$	E2(+M1)	>1	0.00204 *25*		α(K)=0.00172 *22*; α(L)=0.00024 *3*; α(M)=5.1×10^{-5} *6*; α(N)=1.18×10^{-5} *14*; α(O)=1.83×10^{-6} *22* α(P)=1.21×10^{-7} *17*
1517.4795	2$^+$	114.544 *4*	0.50 *7*	1402.938	3$^-$	[E1]		0.203		α(K)=0.1703 *24*; α(L)=0.0253 *4*; α(M)=0.00548 *8*; α(N)=0.001240 *18*; α(O)=0.000183 *3* α(P)=9.71×10^{-6} *14* B(E1)(W.u.)=0.00024 *5*
		158.986 *20*	0.07 *2*	1358.472	4$^+$	[E2]		0.484		α(K)=0.309 *5*; α(L)=0.1352 *19*; α(M)=0.0314 *5*; α(N)=0.00705 *10*; α(O)=0.000951 *14*

$^{158}_{64}Gd_{94}$-16

$\gamma(^{158}Gd)$ (continued)

E_i(level)	J^π_i	E_γ †‡	I_γ †	E_f	J^π_f	Mult. #	δ #&	α	Comments
									α(P)=1.682×10^{-5} *24* B(E2)(W.u.)=24 *8*
1517.4795	2$^+$	253.952 *6*	3.41 *24*	1263.515	1$^-$	E1		0.0243	α(K)=0.0207 *3*; α(L)=0.00289 *4*; α(M)=0.000623 *9*; α(N)=0.0001423 *20*; α(O)=2.15×10^{-5} *3* α(P)=1.296×10^{-6} *19* B(E1)(W.u.)=0.000150 *21*
		475.839 *1*	5.6 *4*	1041.6399	3$^-$	E1		0.00527	α(K)=0.00450 *7*; α(L)=0.000608 *9*; α(M)=0.0001310 *19*; α(N)=3.00×10^{-5} *5*; α(O)=4.60×10^{-6} *7* α(P)=2.95×10^{-7} *5* B(E1)(W.u.)=3.8×10^{-5} *5*
		493.793 *21*	1.03 *8*	1023.6978	2$^-$	[E1]		0.00485	α(K)=0.00414 *6*; α(L)=0.000558 *8*; α(M)=0.0001203 *17*; α(N)=2.75×10^{-5} *4*; α(O)=4.23×10^{-6} *6* α(P)=2.72×10^{-7} *4* B(E1)(W.u.)=6.2×10^{-6} *9*
		540.35 *20*	0.6 *4*	977.1457	1$^-$	[E1]		0.00397	α(K)=0.00339 *5*; α(L)=0.000455 *7*; α(M)=9.80×10^{-5} *14*; α(N)=2.24×10^{-5} *4*; α(O)=3.45×10^{-6} *5* α(P)=2.24×10^{-7} *4* B(E1)(W.u.)=2.7×10^{-6} *19*
		1256.02 *10*	34 *3*	261.4580	4$^+$	E2		1.74×10^{-3}	α(K)=0.001470 *21*; α(L)=0.000205 *3*; α(M)=4.43×10^{-5} *7*; α(N)=1.018×10^{-5} *15* α(O)=1.569×10^{-6} *22*; α(P)=1.020×10^{-7} *15* B(E2)(W.u.)=0.38 *6*
		1437.960 *3*	100 *6*	79.5143	2$^+$	E0+M1+E2	−1.5 *4*	0.00157 *10*	α(K)=0.00129 *8*; α(L)=0.000176 *10*; α(M)=3.79×10^{-5} *22*; α(N)=8.7×10^{-6} *5*; α(O)=1.35×10^{-6} *8* α(P)=9.1×10^{-8} *6* B(M1)(W.u.)=0.0016 *4* α: Measured value. δ: from α_K(exp), ρ^2(E0)=0.017 *3* (1999Wo07).
		1517.49 *11*	85 *6*	0.0	0$^+$	E2		1.28×10^{-3}	α(K)=0.001022 *15*; α(L)=0.0001391 *20*; α(M)=3.00×10^{-5} *5*; α(N)=6.89×10^{-6} *10* α(O)=1.067×10^{-6} *15*; α(P)=7.09×10^{-8} *10* B(E2)(W.u.)=0.37 *5*
1576.932	0$^+$	317.02 *3*	10 *3*	1259.8703	2$^+$				
		388.47 *5*	32 *8*	1187.148	2$^+$				E_γ: poor energy fit.
		600.08 *6*	100 *17*	977.1457	1$^-$				
1623.5	6$^+$	1084[c]		539.022	6$^+$				
		1362		261.4580	4$^+$				
1635.5	6$^+$	1096[c]		539.022	6$^+$				
		1374		261.4580	4$^+$				
1636.299	4$^-$	137.195 *3*	1.84 *24*	1499.104	5$^+$				Mult.: α_K(exp) value allows M1,E2 or E1+M2; from the J^π's E1+M2 is required and then δ=0.25 *+8−12* (from ^{157}Gd(n,γ) E=th,res).

$^{158}_{64}Gd_{94}$-17

Adopted Levels, Gammas (continued)

γ(^{158}Gd) (continued)

E_i(level)	J^{π}_i	E_{γ}[†‡]	I_{γ}[†]	E_f	J^{π}_f	Mult.[#]	α	Comments
1636.299	4^-	154.874 4	4.3 4	1481.419	5^+	E1	0.0898	α(K)=0.0759 11; α(L)=0.01095 16; α(M)=0.00237 4; α(N)=0.000538 8; α(O)=8.02×10^{-5} 12 α(P)=4.50×10^{-6} 7 I_{γ}: from ^{157}Gd(n,γ); other: 6.3 6 from ^{158}Gd(n,n′γ).
		229.598 6	0.34 3	1406.7018	4^+			
		255.672 6	100 8	1380.634	4^+	E1	0.0239	α(K)=0.0203 3; α(L)=0.00284 4; α(M)=0.000613 9; α(N)=0.0001398 20; α(O)=2.12×10^{-5} 3 α(P)=1.274×10^{-6} 18
		277.834 8	5.1 4	1358.472	4^+			
		370.73 4	0.11 3	1265.521	3^+			
1639.34?	(5^-)	1100.29 13	34 5	539.022	6^+			I_{γ}: from ^{157}Gd(n,γ); other: 61 6 from ^{158}Gd(n,n′γ).
		1377.90 12	100 8	261.4580	4^+	(E1)	7.57×10^{-4}	α(K)=0.000548 8; α(L)=7.07×10^{-5} 10; α(M)=1.517×10^{-5} 22; α(N)=3.48×10^{-6} 5; α(O)=5.41×10^{-7} 8 α(P)=3.70×10^{-8} 6
1653?		1392[c]	100	261.4580	4^+			
1667.373	$(4)^+$	149.907 9	0.22 5	1517.4795	2^+			
		264.430 6	2.35 14	1402.938	3^-	E1	0.0219	α(K)=0.0186 3; α(L)=0.00260 4; α(M)=0.000561 8; α(N)=0.0001280 18; α(O)=1.94×10^{-5} 3 α(P)=1.173×10^{-6} 17
		490.863 21	3.2 3	1176.481	5^-			
		625.79 6	2.1 4	1041.6399	3^-			
		1129.20 13	62 7	539.022	6^+			I_{γ}: from ^{157}Gd(n,γ); other: 20.6 21 from ^{158}Gd(n,n′γ).
		1405.91 15	90 7	261.4580	4^+	M1+E2	0.0018 4	α(K)=0.0015 3; α(L)=0.00020 4; α(M)=4.3×10^{-5} 8; α(N)=9.8×10^{-6} 18; α(O)=1.5×10^{-6} 3 α(P)=1.04×10^{-7} 22
		1587.71 5	100 7	79.5143	2^+	E2	1.21×10^{-3}	α(K)=0.000939 14; α(L)=0.0001271 18; α(M)=2.74×10^{-5} 4; α(N)=6.30×10^{-6} 9 α(O)=9.76×10^{-7} 14; α(P)=6.51×10^{-8} 10 E_{γ},I_{γ}: from ^{158}Gd(n,n′γ) where γ is a singlet; other: E_{γ}=1588.21 15 and I_{γ} < 134 from doublet in ^{157}Gd(n,γ).
1684.1	(9^-)	780.	100	904.12	8^+			
1716.807	5^-	217.703 5	33 3	1499.104	5^+	E1	0.0363	α(K)=0.0308 5; α(L)=0.00434 6; α(M)=0.000938 14; α(N)=0.000214 3; α(O)=3.22×10^{-5} 5 α(P)=1.90×10^{-6} 3 I_{γ}: from ^{157}Gd(n,γ); other: 96 8 from ^{158}Gd(n,n′γ).
		235.379 6	61 4	1481.419	5^+	E1	0.0296	α(K)=0.0251 4; α(L)=0.00353 5; α(M)=0.000762 11; α(N)=0.0001737 25; α(O)=2.62×10^{-5} 4 α(P)=1.564×10^{-6} 22 I_{γ}: from ^{157}Gd(n,γ); other: 94 8 from ^{158}Gd(n,n′γ).
		310.10 3	0.36 13	1406.7018	4^+			
		336.167 8	100 7	1380.634	4^+	E1	0.01201	α(K)=0.01022 15; α(L)=0.001406 20; α(M)=0.000303 5;

$^{158}_{64}$Gd$_{94}$-18

Adopted Levels, Gammas (continued)

$\gamma(^{158}Gd)$ (continued)

E_i(level)	J^π_i	E_γ †‡	I_γ †	E_f	J^π_f	Mult.#	α	Comments
								α(N)=6.94×10^{-5} *10* α(O)=1.057×10^{-5} *15*; α(P)=6.56×10^{-7} *10*
1716.807	5$^-$	358.336 *10*	7.0 *5*	1358.472	4$^+$			
1743.147	0$^+$	225.659[c] *7*	0.66 *7*	1517.4795	2$^+$			
		479.632 *14*	28.3 *17*	1263.515	1$^-$	E1	0.00518	α(K)=0.00442 *7*; α(L)=0.000597 *9*; α(M)=0.0001286 *18*; α(N)=2.95×10^{-5} *5*; α(O)=4.52×10^{-6} *7* α(P)=2.90×10^{-7} *4* B(E1)(W.u.)<0.00061
		1663.77 *20*	100 *10*	79.5143	2$^+$	[E2]	1.14×10^{-3}	α(K)=0.000860 *12*; α(L)=0.0001159 *17*; α(M)=2.50×10^{-5} *4*; α(N)=5.74×10^{-6} *8* α(O)=8.90×10^{-7} *13*; α(P)=5.97×10^{-8} *9* B(E2)(W.u.)<0.90
1791.797	2$^+$	385.08 *3*	0.48 *9*	1406.7018	4$^+$			
		388.827 *16*	9.0 *7*	1402.938	3$^-$	E1	0.00844	α(K)=0.00719 *10*; α(L)=0.000982 *14*; α(M)=0.000212 *3*; α(N)=4.85×10^{-5} *7*; α(O)=7.40×10^{-6} *11* α(P)=4.66×10^{-7} *7*
		528.231 *18*	32 *3*	1263.515	1$^-$	E1	0.00417	α(K)=0.00356 *5*; α(L)=0.000479 *7*; α(M)=0.0001031 *15*; α(N)=2.36×10^{-5} *4*; α(O)=3.63×10^{-6} *5* α(P)=2.35×10^{-7} *4*
		531.906 *18*	7.4 *5*	1259.8703	2$^+$	M1	0.0216	α(K)=0.0184 *3*; α(L)=0.00255 *4*; α(M)=0.000551 *8*; α(N)=0.0001268 *18*; α(O)=1.97×10^{-5} *3* α(P)=1.343×10^{-6} *19*
		750.16 *4*	100 *6*	1041.6399	3$^-$	(E1)	0.00199	α(K)=0.001699 *24*; α(L)=0.000225 *4*; α(M)=4.83×10^{-5} *7*; α(N)=1.108×10^{-5} *16* α(O)=1.711×10^{-6} *24*; α(P)=1.135×10^{-7} *16* I_γ: from ^{157}Gd(n,γ); other: the I_γ of ^{158}Gd(n,n′γ) would agree better if this I_γ were ≈ 200.
		768.09 *5*	25 *4*	1023.6978	2$^-$			
		814.65 *4*	76 *5*	977.1457	1$^-$	E1	1.68×10^{-3}	α(K)=0.001442 *21*; α(L)=0.000190 *3*; α(M)=4.08×10^{-5} *6*; α(N)=9.37×10^{-6} *14* α(O)=1.448×10^{-6} *21*; α(P)=9.65×10^{-8} *14*
		1530.12 *15*	93 *8*	261.4580	4$^+$	E2	1.27×10^{-3}	α(K)=0.001006 *14*; α(L)=0.0001368 *20*; α(M)=2.95×10^{-5} *5*; α(N)=6.78×10^{-6} *10* α(O)=1.050×10^{-6} *15*; α(P)=6.98×10^{-8} *10*
		1712.8 *6*	45 *9*	79.5143	2$^+$			
1793.573	2$^-$	528.041 *18*	38.7 *23*	1265.521	3$^+$	E1	0.00417	α(K)=0.00356 *5*; α(L)=0.000479 *7*; α(M)=0.0001032 *15*; α(N)=2.36×10^{-5} *4*; α(O)=3.63×10^{-6} *5* α(P)=2.35×10^{-7} *4* B(E1)(W.u.)=5.0×10^{-5} *+100−6*
		606.446 *21*	100 *5*	1187.148	2$^+$	E1	0.00309	α(K)=0.00264 *4*; α(L)=0.000352 *5*; α(M)=7.59×10^{-5} *11*; α(N)=1.739×10^{-5} *25*; α(O)=2.68×10^{-6} *4*

$\gamma(^{158}$Gd) (continued)

E_i(level)	J^π_i	E_γ[†‡]	I_γ[†]	E_f	J^π_f	Mult.[#]	α	Comments
								α(P)=1.750×10^{-7} *25* B(E1)(W.u.)=8.6×10^{-5} *+172−11*
1793.573	2$^-$	634.77[c] *5*	<1.25	1158.9689	4$^-$	[E2]	0.00764	α(K)=0.00632 *9*; α(L)=0.001032 *15*; α(M)=0.000227 *4*; α(N)=5.19×10^{-5} *8*; α(O)=7.78×10^{-6} *11* α(P)=4.31×10^{-7} *6* B(E2)(W.u.)=0.056 +1120-7
		751.91 *4*	5.6 *4*	1041.6399	3$^-$	M1(+E2)	0.0071 *20*	α(K)=0.0060 *18*; α(L)=0.00086 *20*; α(M)=0.00019 *5*; α(N)=4.3×10^{-5} *10*; α(O)=6.6×10^{-6} *17* α(P)=4.3×10^{-7} *14* I_γ: From ^{157}Gd(n,γ); other: 7.1 *11* from ^{158}Eu β- decay.
		769.88 *4*	16.0 *11*	1023.6978	2$^-$	E2	0.00486	α(K)=0.00406 *6*; α(L)=0.000625 *9*; α(M)=0.0001368 *20*; α(N)=3.13×10^{-5} *5*; α(O)=4.74×10^{-6} *7* α(P)=2.80×10^{-7} *4* B(E2)(W.u.)=0.54 +1080-7
		816.42 *4*	24.5 *15*	977.1457	1$^-$	[M1,E2]	0.0059 *16*	α(K)=0.0050 *14*; α(L)=0.00070 *17*; α(M)=0.00015 *4*; α(N)=3.5×10^{-5} *8*; α(O)=5.4×10^{-6} *13* α(P)=3.5×10^{-7} *11* I_γ: from ^{157}Gd(n,γ); others: 22.1 *21* from ^{158}Gd(n,n′γ) and 9.2 *6* from ^{158}Eu β- decay.
		1531.4 *5*	1.5 *3*	261.4580	4$^+$	[M2]	0.00387	α(K)=0.00326 *5*; α(L)=0.000455 *7*; α(M)=9.86×10^{-5} *14*; α(N)=2.27×10^{-5} *4*; α(O)=3.54×10^{-6} *5* α(P)=2.42×10^{-7} *4* B(M2)(W.u.)=0.16 *+312−2*
		1712.8 *6*	4.6 *5*	79.5143	2$^+$	[E1]	8.05×10^{-4}	α(K)=0.000380 *6*; α(L)=4.87×10^{-5} *7*; α(M)=1.044×10^{-5} *15*; α(N)=2.40×10^{-6} *4*; α(O)=3.73×10^{-7} *6* α(P)=2.57×10^{-8} *4* B(E1)(W.u.)=1.75×10^{-7} +3500-22 I_γ: from ^{158}Eu β- decay; other: 22 *4* from ^{157}Gd(n,γ) which suggests the latter maybe be a multiplet.
		1793.5 *15*	0.38 *15*	0.0	0$^+$	[M2]	0.00271	α(K)=0.00222 *4*; α(L)=0.000306 *5*; α(M)=6.63×10^{-5} *10*; α(N)=1.527×10^{-5} *22*; α(O)=2.38×10^{-6} *4* α(P)=1.633×10^{-7} *24* B(M2)(W.u.)=0.0179 +3580-22
1814.166	6$^-$	97.357 *3*	43 *8*	1716.807	5$^-$			
		177.844 *10*	5.2 *18*	1636.299	4$^-$			
		315.043 *9*	53 *4*	1499.104	5$^+$	E1	0.01410	α(K)=0.01199 *17*; α(L)=0.001656 *24*; α(M)=0.000357 *5*; α(N)=8.17×10^{-5} *12* α(O)=1.242×10^{-5} *18*; α(P)=7.66×10^{-7} *11*
		332.797 *9*	100 *8*	1481.419	5$^+$	E1	0.01231	α(K)=0.01047 *15*; α(L)=0.001442 *21*; α(M)=0.000311 *5*; α(N)=7.11×10^{-5} *10* α(O)=1.083×10^{-5} *16*; α(P)=6.72×10^{-7} *10*

$^{158}_{64}$Gd$_{94}$-20

$\gamma(^{158}$Gd) (continued)

E_i(level)	J^π_i	E_γ[†‡]	I_γ[†]	E_f	J^π_f	Mult.[#]	α	Comments
1847.88	1^+	444.92[c] *5*	1.4 *4*	1402.938	3^-			
		584.39[c] *4*	1.25 *14*	1263.515	1^-			
		824.12 *4*	100 *6*	1023.6978	2^-	E1	1.65×10^{-3}	α(K)=0.001410 *20*; α(L)=0.000186 *3*; α(M)=3.99×10^{-5} *6*; α(N)=9.15×10^{-6} *13* α(O)=1.415×10^{-6} *20*; α(P)=9.44×10^{-8} *14*
		870.89 *5*	98 *12*	977.1457	1^-			I_γ: from ^{157}Gd(n,γ); other: I_γ(870)/I_γ(824) = 3.3 *2* in ^{158}Gd(n,n′γ).
		1768.5 *5*	3.0 *7*	79.5143	2^+			
1856.316	1^-	279.288 *14*	0.10 *2*	1576.932	0^+			E_γ: poor energy fit.
		453.68[c] *4*	0.66 *20*	1402.938	3^-			
		592.905 *21*	9.8 *5*	1263.515	1^-	M1	0.01645	α(K)=0.01399 *20*; α(L)=0.00193 *3*; α(M)=0.000418 *6*; α(N)=9.61×10^{-5} *14*; α(O)=1.497×10^{-5} *21* α(P)=1.020×10^{-6} *15* E_γ: poor energy fit.
		669.29 *4*	13.0 *13*	1187.148	2^+	E1	0.00251	α(K)=0.00214 *3*; α(L)=0.000285 *4*; α(M)=6.13×10^{-5} *9*; α(N)=1.407×10^{-5} *20*; α(O)=2.17×10^{-6} *3* α(P)=1.428×10^{-7} *20* E_γ: poor energy fit.
		832.89[a] *5*	<14.6[a]	1023.6978	2^-	(M1,E2)	0.0056 *16*	α(K)=0.0047 *14*; α(L)=0.00067 *16*; α(M)=0.00015 *4*; α(N)=3.3×10^{-5} *8*; α(O)=5.2×10^{-6} *13* α(P)=3.4×10^{-7} *11* I_γ: from ^{157}Gd(n,γ); other: I_γ(832)/I_γ(1856) = 2.2 *2* in ^{158}Gd(n,n′γ).
		879.32 *5*	67 *4*	977.1457	1^-	M1	0.00623	α(K)=0.00531 *8*; α(L)=0.000723 *11*; α(M)=0.0001562 *22*; α(N)=3.60×10^{-5} *5*; α(O)=5.60×10^{-6} *8* α(P)=3.84×10^{-7} *6*
		1857.1 *4*	100 *11*	0.0	0^+			
1861.281	3^-	502.789 *15*	59 *4*	1358.472	4^+	E1	0.00465	α(K)=0.00397 *6*; α(L)=0.000536 *8*; α(M)=0.0001154 *17*; α(N)=2.64×10^{-5} *4*; α(O)=4.06×10^{-6} *6* α(P)=2.61×10^{-7} *4*
		595.763 *21*	74 *4*	1265.521	3^+	E1	0.00321	α(K)=0.00274 *4*; α(L)=0.000366 *6*; α(M)=7.89×10^{-5} *11*; α(N)=1.81×10^{-5} *3*; α(O)=2.78×10^{-6} *4* α(P)=1.82×10^{-7} *3*
		674.15 *3*	68 *4*	1187.148	2^+	E1	0.00247	α(K)=0.00211 *3*; α(L)=0.000281 *4*; α(M)=6.04×10^{-5} *9*; α(N)=1.385×10^{-5} *20*; α(O)=2.14×10^{-6} *3* α(P)=1.407×10^{-7} *20*
		702.37 *5*	5.8 *5*	1158.9689	4^-	M1(+E2)	0.0084 *24*	α(K)=0.0071 *21*; α(L)=0.00102 *24*; α(M)=0.00022 *5*; α(N)=5.1×10^{-5} *12*; α(O)=7.9×10^{-6} *19* α(P)=5.1×10^{-7} *17*
		819.56[a] *5*	<42[a]	1041.6399	3^-			I_γ: from ^{157}Gd(n,γ); other: I_γ(819)/I_γ(1782) = 2.2 *2* in ^{158}Gd(n,n′γ).

$^{158}_{64}$Gd$_{94}$-21

$\gamma(^{158}Gd)$ (continued)

E_i(level)	J^π_i	E_γ[†‡]	I_γ[†]	E_f	J^π_f	Mult.[#]	α	Comments
1861.281	3^-	884.18 *6*	27.8 *22*	977.1457	1^-	E2	0.00358	α(K)=0.00301 *5*; α(L)=0.000447 *7*; α(M)=9.74×10^{-5} *14*; α(N)=2.23×10^{-5} *4*; α(O)=3.40×10^{-6} *5* α(P)=2.08×10^{-7} *3*
		1782.1 *5*	100 *15*	79.5143	2^+			
1865.0	12^+	516.	100	1349.5	10^+	[E2]	0.01285	α(K)=0.01048 *15*; α(L)=0.00185 *3*; α(M)=0.000411 *6*; α(N)=9.36×10^{-5} *13*; α(O)=1.386×10^{-5} *20* α(P)=7.04×10^{-7} *10* B(E2)(W.u.)=3.1×10^{2} *3*
1894.578	(2^+)	491.543[c] *21*	4.7 *7*	1402.938	3^-			
		628.99[a] *4*	<2.5[a]	1265.521	3^+			
		630.92[c] *6*	4.0 *16*	1263.515	1^-			
		852.89 *4*	100 *7*	1041.6399	3^-			I_γ: This γ is assigned only to this level in ^{158}Eu β- decay and this is assumed here, although it is also assigned to the 1894, 2^- level in the (n,γ) data.
		870.89[b] *5*	61[b] *6*	1023.6978	2^-			I_γ: from ^{158}Eu β- decay.
		917.50[b] *5*	70[b] *10*	977.1457	1^-			I_γ: from ^{158}Eu β- decay.
		1632.8 *7*	5.0 *12*	261.4580	4^+			E_γ: only reported in ^{158}Gd(n,n′γ).
		1815.2[b] *5*	9.1[b] *23*	79.5143	2^+			I_γ: from ^{158}Eu β- decay.
1894.616	2^-	101.042 *3*	1.43 *20*	1793.573	2^-			
		491.71 *3*	6.2 *9*	1402.938	3^-	(M1,E2)	0.0205 *60*	α(K)=0.0171 *53*; α(L)=0.0026 *5*; α(M)=0.00057 *10*; α(N)=0.000132 *24*; α(O)=2.0×10^{-5} *4* α(P)=1.22×10^{-6} *43*
		631.07 *3*	23.8 *15*	1263.515	1^-	(E2)	0.00775	α(K)=0.00641 *9*; α(L)=0.001048 *15*; α(M)=0.000231 *4*; α(N)=5.27×10^{-5} *8*; α(O)=7.90×10^{-6} *11* α(P)=4.37×10^{-7} *7*
		707.55 *3*	48. *3*	1187.148	2^+	E1	0.00224	α(K)=0.00191 *3*; α(L)=0.000254 *4*; α(M)=5.45×10^{-5} *8*; α(N)=1.251×10^{-5} *18*; α(O)=1.93×10^{-6} *3* α(P)=1.276×10^{-7} *18*
		852.89 *4*		1041.6399	3^-			I_γ: This γ is assigned only to the 1894, 2^+ level as in the ^{158}Eu β- decay and this is assumed here, although it is also assigned to this level in the (n,γ) data.
		870.89[b] *5*	76[b] *26*	1023.6978	2^-			I_γ: from evaluator′s decomposition based on data from ^{158}Eu β- decay and (n,γ).
		917.50[b] *5*	100[b] *20*	977.1457	1^-			I_γ: from evaluator′s decomposition based on data from ^{158}Eu β- decay and (n,γ).
		1815.2[b] *5*	61[b] *11*	79.5143	2^+			I_γ: from evaluator′s decomposition based on data from ^{158}Eu β- decay and (n,γ).
1901.595	4^+	498.663 *16*	21.5 *13*	1402.938	3^-	E1	0.00474	α(K)=0.00405 *6*; α(L)=0.000546 *8*; α(M)=0.0001176 *17*; α(N)=2.69×10^{-5} *4*; α(O)=4.13×10^{-6} *6* α(P)=2.66×10^{-7} *4*
		725.11 *8*	6.5 *9*	1176.481	5^-			

$^{158}_{64}Gd_{94}$-22

Adopted Levels, Gammas (continued)

$\gamma(^{158}Gd)$ (continued)

E_i(level)	J^π_i	E_γ †‡	I_γ †	E_f	J^π_f	Mult.#	δ #&	α	Comments
1901.595	4^+	859.85 *6*	61 *5*	1041.6399	3^-	(E1)		1.51×10^{-3}	α(K)=0.001298 *19*; α(L)=0.0001705 *24*; α(M)=3.66×10^{-5} *6*; α(N)=8.41×10^{-6} *12* α(O)=1.301×10^{-6} *19*; α(P)=8.70×10^{-8} *13*
		1640.0 *5*	100 *18*	261.4580	4^+				I_γ: from ^{157}Gd(n,γ); other: I_γ(1640)/I_γ(859) = 0.25 *4* from ^{158}Gd(n,n$'\gamma$).
1916.938	$(4,5,6)^-$	200.118 *6*	29.2 *22*	1716.807	5^-	E2,M1		0.25 *4*	α(K)=0.20 *5*; α(L)=0.043 *9*; α(M)=0.0098 *23*; α(N)=0.0022 *5*; α(O)=0.00032 *6* α(P)=1.34×10^{-5} *46*
		280.653 *7*	14.7 *10*	1636.299	4^-	E2		0.0741	α(K)=0.0560 *8*; α(L)=0.01408 *20*; α(M)=0.00320 *5*; α(N)=0.000723 *11*; α(O)=0.0001021 *15* α(P)=3.46×10^{-6} *5*
		417.843 *11*	55 *3*	1499.104	5^+	E1		0.00712	α(K)=0.00607 *9*; α(L)=0.000826 *12*; α(M)=0.0001781 *25*; α(N)=4.08×10^{-5} *6*; α(O)=6.24×10^{-6} *9* α(P)=3.95×10^{-7} *6*
		435.515 *12*	100 *6*	1481.419	5^+	E1		0.00646	α(K)=0.00551 *8*; α(L)=0.000748 *11*; α(M)=0.0001613 *23*; α(N)=3.69×10^{-5} *6*; α(O)=5.65×10^{-6} *8* α(P)=3.60×10^{-7} *5*
1920.264	4^+	203.467 *9*	0.41 *4*	1716.807	5^-				
		283.965 *7*	2.75 *20*	1636.299	4^-	E1		0.0183	α(K)=0.01555 *22*; α(L)=0.00216 *3*; α(M)=0.000466 *7*; α(N)=0.0001065 *15* α(O)=1.615×10^{-5} *23*; α(P)=9.85×10^{-7} *14*
		421.166 *12*	3.10 *22*	1499.104	5^+	M1		0.0393	α(K)=0.0333 *5*; α(L)=0.00466 *7*; α(M)=0.001008 *15*; α(N)=0.000232 *4*; α(O)=3.61×10^{-5} *5* α(P)=2.45×10^{-6} *4*
		438.825 *13*	6.0 *5*	1481.419	5^+	E2+M1		0.0276 *78*	α(K)=0.0230 *71*; α(L)=0.0036 *6*; α(M)=0.00079 *12*; α(N)=0.00018 *3*; α(O)=2.8×10^{-5} *5* α(P)=1.63×10^{-6} *58*
		539.620 *18*	100 *5*	1380.634	4^+	M1+E2		0.0161 *47*	α(K)=0.0135 *42*; α(L)=0.0020 *5*; α(M)=0.00045 *9*; α(N)=0.000102 *21*; α(O)=1.6×10^{-5} *4* α(P)=9.6×10^{-7} *34*
		561.77 *4*	6.8 *8*	1358.472	4^+	E2(+M1)		0.0146 *43*	α(K)=0.0122 *38*; α(L)=0.0018 *4*; α(M)=0.00040 *8*; α(N)=9.2×10^{-5} *19*; α(O)=1.4×10^{-5} *4* α(P)=8.7×10^{-7} *30*
		654.67 *8*	1.4 *3*	1265.521	3^+				
		733.16 *9*	3.3 *5*	1187.148	2^+				
		1381.1 *6*	18 *8*	539.022	6^+				
		1658.0 *7*	33 *8*	261.4580	4^+				
1930.202	1^+	743.08 *3*	100 *5*	1187.148	2^+	M1+E2	+0.17 *15*	0.0093 *3*	α(K)=0.0079 *3*; α(L)=0.00108 *3*; α(M)=0.000234 *7*; α(N)=5.39×10^{-5} *16*; α(O)=8.40×10^{-6} *25* α(P)=5.73×10^{-7} *20*

$^{158}_{64}Gd_{94}$-23

γ(^{158}Gd) (continued)

E_i(level)	J^π_i	E_γ[†‡]	I_γ[†]	E_f	J^π_f	Mult.[#]	α	Comments
1930.202	1+	906.49 5	44 3	1023.6978	2−	E1	1.37×10−3	α(K)=0.001172 17; α(L)=0.0001537 22; α(M)=3.30×10−5 5; α(N)=7.58×10−6 11 α(O)=1.173×10−6 17; α(P)=7.87×10−8 11 Iγ: from 157Gd(n,γ); others: 24.8 20 from 158Gd(n,n′γ) and 51 3 from 158Eu β- decay.
		952.96 6	51 4	977.1457	1−	(E1)	1.24×10−3	α(K)=0.001066 15; α(L)=0.0001395 20; α(M)=3.00×10−5 5; α(N)=6.88×10−6 10 α(O)=1.065×10−6 15; α(P)=7.16×10−8 10
		1850.3 4	4.2 8	79.5143	2+			
		1930.2 6	1.25 25	0.0	0+			Iγ: from 157Gd(n,γ); other: 13.6 15 from 158Gd(n,n′γ).
1941.27	3+	676.3 2	32 4	1265.521	3+			Eγ,Iγ: from 158Gd(n,n′γ).
		782.31 4	100 6	1158.9689	4−	E1	0.00182	α(K)=0.001562 22; α(L)=0.000206 3; α(M)=4.43×10−5 7; α(N)=1.017×10−5 15 α(O)=1.571×10−6 22; α(P)=1.045×10−7 15
		899.69 9	25 5	1041.6399	3−			
		917.50 5	<217	1023.6978	2−			
1952.425	(0)+	160.654[c] 6	0.13 3	1791.797	2+			
		434.91[c] 11	0.36 18	1517.4795	2+			
		688.86 3	100 6	1263.515	1−	E1	0.00236	α(K)=0.00202 3; α(L)=0.000268 4; α(M)=5.77×10−5 8; α(N)=1.323×10−5 19; α(O)=2.04×10−6 3 α(P)=1.346×10−7 19
		765.35 5	11.9 9	1187.148	2+			
		975.43 8	41 5	977.1457	1−			
1953.760	4−	472.38[a] 3	<3.5[a]	1481.419	5+			
		595.11 7	3.2 6	1358.472	4+			
		688.25 5	16.8 20	1265.521	3+	E1	0.00237	α(K)=0.00202 3; α(L)=0.000269 4; α(M)=5.78×10−5 8; α(N)=1.326×10−5 19; α(O)=2.05×10−6 3 α(P)=1.349×10−7 19
		794.73[a] 7	<12.4[a]	1158.9689	4−			
		1691.7 7	100 12	261.4580	4+			Iγ: from 157Gd(n,γ); other: from 158Gd(n,n′γ) Iγ(1692)/Iγ(688) = 0.243 19.
1957.27	0+	1877.76 9	100	79.5143	2+	E2	1.03×10−3	α(K)=0.000688 10; α(L)=9.17×10−5 13; α(M)=1.97×10−5 3; α(N)=4.54×10−6 7; α(O)=7.05×10−7 10 α(P)=4.77×10−8 7 B(E2)(W.u.)=4.0 12
1964.120	2+	698.60 3	65 4	1265.521	3+	E2+M1	0.0085 25	α(K)=0.0072 22; α(L)=0.00104 24; α(M)=0.00023 5; α(N)=5.2×10−5 12; α(O)=8.0×10−6 20 α(P)=5.1×10−7 17 Iγ: from 158Eu β- decay; others: 80 7 from 158Gd(n,n′γ) and 60 4 from 157Gd(n,γ).
		776.98 5	48 6	1187.148	2+	M1	0.00842	α(K)=0.00717 10; α(L)=0.000981 14; α(M)=0.000212 3; α(N)=4.88×10−5 7; α(O)=7.60×10−6 11

$^{158}_{64}$Gd$_{94}$-24

$\gamma(^{158}Gd)$ (continued)

E_i(level)	J^π_i	E_γ[†‡]	I_γ[†]	E_f	J^π_f	Mult.[#]	α	Comments
								α(P)=5.20×10^{-7} *8* I_γ: from ^{158}Eu β- decay; others: 39 *4* from ^{158}Gd(n,n′γ) and 46 *4* from ^{157}Gd(n,γ).
1964.120	2$^+$	922.53 *5*	100 *11*	1041.6399	3$^-$	(E1)	1.32×10^{-3}	α(K)=0.001134 *16*; α(L)=0.0001485 *21*; α(M)=3.19×10^{-5} *5*; α(N)=7.32×10^{-6} *11* α(O)=1.134×10^{-6} *16*; α(P)=7.61×10^{-8} *11*
		940.31 *14*	20 *6*	1023.6978	2$^-$			I_γ: From ^{158}Eu β- decay; other: 31 *15* from ^{157}Gd(n,γ).
		986.87 *6*	83 *6*	977.1457	1$^-$	E1	1.16×10^{-3}	α(K)=0.000998 *14*; α(L)=0.0001304 *19*; α(M)=2.80×10^{-5} *4*; α(N)=6.43×10^{-6} *9* α(O)=9.96×10^{-7} *14*; α(P)=6.71×10^{-8} *10*
		1702.8 *2*	8.3 *11*	261.4580	4$^+$			I_γ: from ^{158}Eu β- decay; other: 24 *4* from ^{158}Gd(n,n′γ).
		1883.1[c] *11*	76 *4*	79.5143	2$^+$	M1+E2	0.00117 *15*	α(K)=0.00079 *11*; α(L)=0.000105 *14*; α(M)=2.3×10^{-5} *3*; α(N)=5.2×10^{-6} *7*; α(O)=8.1×10^{-7} *12* α(P)=5.6×10^{-8} *9*
		1964.2 *3*	8.1 *9*	0.0	0$^+$			
1978.040	3$^-$	116.758 *4*	1.12 *16*	1861.281	3$^-$			
		184.491 *13*	0.12 *5*	1793.573	2$^-$			
		619.52 *3*	12.2 *8*	1358.472	4$^+$	E1	0.00295	α(K)=0.00252 *4*; α(L)=0.000337 *5*; α(M)=7.24×10^{-5} *11*; α(N)=1.660×10^{-5} *24*; α(O)=2.56×10^{-6} *4* α(P)=1.674×10^{-7} *24*
		712.52 *5*	13.6 *12*	1265.521	3$^+$			
		714.48 *15*	2.5 *8*	1263.515	1$^-$			
		790.89 *4*	33 *3*	1187.148	2$^+$	E1	1.79×10^{-3}	α(K)=0.001529 *22*; α(L)=0.000202 *3*; α(M)=4.33×10^{-5} *6*; α(N)=9.95×10^{-6} *14* α(O)=1.537×10^{-6} *22*; α(P)=1.023×10^{-7} *15*
		936.30 *6*	37 *3*	1041.6399	3$^-$			I_γ: from ^{157}Gd(n,γ); other: from ^{158}Gd(n,n′γ) I_γ(936)/I_γ(790) = 0.16 *5*.
		954.31 *6*	71 *5*	1023.6978	2$^-$	(E2)	0.00304	α(K)=0.00256 *4*; α(L)=0.000374 *6*; α(M)=8.14×10^{-5} *12*; α(N)=1.87×10^{-5} *3*; α(O)=2.85×10^{-6} *4* α(P)=1.772×10^{-7} *25*
		1000.82 *7*	100 *7*	977.1457	1$^-$	E2	0.00275	α(K)=0.00232 *4*; α(L)=0.000336 *5*; α(M)=7.30×10^{-5} *11*; α(N)=1.673×10^{-5} *24*; α(O)=2.56×10^{-6} *4* α(P)=1.606×10^{-7} *23*
2017.894	(5$^+$)	203.718 *14*	1.6 *6*	1814.166	6$^-$			
		301.125 *20*	8.0 *15*	1716.807	5$^-$			
		381.581 *18*	7.6 *8*	1636.299	4$^-$			
		518.80 *6*	70 *20*	1499.104	5$^+$	M1	0.0230	α(K)=0.0196 *3*; α(L)=0.00271 *4*; α(M)=0.000587 *9*; α(N)=0.0001352 *19*; α(O)=2.10×10^{-5} *3* α(P)=1.431×10^{-6} *20*
		637.24 *5*	100 *35*	1380.634	4$^+$			
2023.851	1$^+$	231.989 *13*	0.06 *2*	1791.797	2$^+$			E_γ: poor energy fit.
		571.80[a] *3*	<3.7[a]	1452.353	0$^+$			

From ENSDF

$^{158}_{64}Gd_{94}$-25

Adopted Levels, Gammas (continued)

$\gamma(^{158}Gd)$ (continued)

E_i(level)	J_i^{π}	E_γ[†‡]	I_γ[†]	E_f	J_f^{π}	Mult.[#]	α	Comments
2023.851	1^+	763.98 *4*	16.5 *10*	1259.8703	2^+	E2	0.00495	α(K)=0.00413 *6*; α(L)=0.000637 *9*; α(M)=0.0001394 *20*; α(N)=3.19×10^{-5} *5*; α(O)=4.84×10^{-6} *7* α(P)=2.84×10^{-7} *4* I_γ: From ^{157}Gd(n,γ); other: 39 *3* from ^{158}Eu β- decay.
		827.78 *5*	11.4 *10*	1196.164	0^+			I_γ: From ^{157}Gd(n,γ); other: 23.9 *24* from ^{158}Eu β- decay. Mult.: E1 assignment is inconsistent with J^π assignment in ^{157}Gd(n,γ).
		1943.5 *5*	100 *12*	79.5143	2^+			
		2023.9 *6*	65 *10*	0.0	0^+			I_γ: From ^{157}Gd(n,γ); others: 57 *3* from ^{158}Eu β- decay and 73 *7* from ^{158}Gd(n,n′γ).
2033.924	3^+	675.45 *3*	36.4 *22*	1358.472	4^+	M1+E2	0.0092 *27*	α(K)=0.0078 *24*; α(L)=0.0011 *3*; α(M)=0.00025 *6*; α(N)=5.7×10^{-5} *13*; α(O)=8.7×10^{-6} *21* α(P)=5.6×10^{-7} *19*
		768.43 *5*	72 *9*	1265.521	3^+	M1	0.00865	α(K)=0.00737 *11*; α(L)=0.001008 *15*; α(M)=0.000218 *3*; α(N)=5.01×10^{-5} *7*; α(O)=7.81×10^{-6} *11* α(P)=5.35×10^{-7} *8* I_γ: from ^{157}Gd(n,γ); other: 193 *17* from ^{158}Gd(n,n′γ).
		846.81 *5*	14.5 *10*	1187.148	2^+	E2+M1	0.0054 *15*	α(K)=0.0046 *13*; α(L)=0.00064 *15*; α(M)=0.00014 *4*; α(N)=3.2×10^{-5} *8*; α(O)=5.0×10^{-6} *12* α(P)=3.25×10^{-7} *97*
		875.00 *4*	79 *5*	1158.9689	4^-	E1	1.46×10^{-3}	α(K)=0.001255 *18*; α(L)=0.0001647 *23*; α(M)=3.54×10^{-5} *5*; α(N)=8.12×10^{-6} *12* α(O)=1.257×10^{-6} *18*; α(P)=8.41×10^{-8} *12*
		1010.20 *5*	100 *5*	1023.6978	2^-	E1	1.11×10^{-3}	α(K)=0.000956 *14*; α(L)=0.0001247 *18*; α(M)=2.68×10^{-5} *4*; α(N)=6.15×10^{-6} *9* α(O)=9.53×10^{-7} *14*; α(P)=6.42×10^{-8} *9*
2035.70	(2^+)	629.01[a] *4*	<2.4[a]	1406.7018	4^+			
		775.66 *20*	0.7 *4*	1259.8703	2^+			
		1774.82[c] *4*	47 *5*	261.4580	4^+			
		1956.9 *6*	100 *10*	79.5143	2^+	M1+E2	0.00114 *13*	α(K)=0.00073 *10*; α(L)=9.7×10^{-5} *13*; α(M)=2.1×10^{-5} *3*; α(N)=4.8×10^{-6} *7*; α(O)=7.5×10^{-7} *10* α(P)=5.1×10^{-8} *8*
		2035.6 *6*	9.0 *2*	0.0	0^+			I_γ: from ^{158}Gd(n,n′γ).
2049.009	2^-	646.08 *3*	26.5 *17*	1402.938	3^-	M1	0.01327	α(K)=0.01129 *16*; α(L)=0.001554 *22*; α(M)=0.000336 *5*; α(N)=7.74×10^{-5} *11* α(O)=1.205×10^{-5} *17*; α(P)=8.22×10^{-7} *12* I_γ: from ^{157}Gd(n,γ); other: 49 *4* from ^{158}Gd(n,n′γ).
		785.49 *4*	63 *4*	1263.515	1^-	M1	0.00820	α(K)=0.00698 *10*; α(L)=0.000955 *14*; α(M)=0.000206 *3*; α(N)=4.75×10^{-5} *7*; α(O)=7.40×10^{-6} *11* α(P)=5.07×10^{-7} *7* I_γ: from ^{157}Gd(n,γ); other: 47 *4* from ^{158}Gd(n,n′γ).

Adopted Levels, Gammas (continued)

γ(^{158}Gd) (continued)

E_i(level)	J^π_i	E_γ[†‡]	I_γ[†]	E_f	J^π_f	Mult.[#]	δ[#&]	α	Comments
2049.009	2^-	1007.29 *7*	100 *7*	1041.6399	3^-	M1		0.00449	α(K)=0.00383 *6*; α(L)=0.000519 *8*; α(M)=0.0001121 *16*; α(N)=2.58×10^{-5} *4*; α(O)=4.02×10^{-6} *6* α(P)=2.77×10^{-7} *4*
		1025.33 *7*	52 *4*	1023.6978	2^-	M1		0.00431	α(K)=0.00367 *6*; α(L)=0.000498 *7*; α(M)=0.0001074 *15*; α(N)=2.47×10^{-5} *4*; α(O)=3.86×10^{-6} *6* α(P)=2.65×10^{-7} *4* I_γ: from ^{157}Gd(n,γ); other: 78 *7* from ^{158}Gd(n,n′γ).
2083.639	2^+	680.72 *3*	59 *4*	1402.938	3^-	E1		0.00242	α(K)=0.00207 *3*; α(L)=0.000275 *4*; α(M)=5.92×10^{-5} *9*; α(N)=1.357×10^{-5} *19*; α(O)=2.09×10^{-6} *3* α(P)=1.379×10^{-7} *20*
		820.08 *4*	100 *6*	1263.515	1^-				
		887.51 *14*	33 *3*	1196.164	0^+				E_γ,I_γ: from ^{158}Gd(n,n′γ).
2089.254	2^+	227.973 *8*	1.37 *14*	1861.281	3^-				
		295.677 *8*	6.7 *5*	1793.573	2^-	E1		0.01652	α(K)=0.01404 *20*; α(L)=0.00195 *3*; α(M)=0.000420 *6*; α(N)=9.60×10^{-5} *14*; α(O)=1.458×10^{-5} *21* α(P)=8.93×10^{-7} *13*
		571.80[a] *3*	<12.7[a]	1517.4795	2^+				
		686.36 *4*	25.2 *20*	1402.938	3^-	E1		0.00238	α(K)=0.00204 *3*; α(L)=0.000270 *4*; α(M)=5.82×10^{-5} *9*; α(N)=1.334×10^{-5} *19*; α(O)=2.06×10^{-6} *3* α(P)=1.356×10^{-7} *19*
		825.70 *10*	22 *5*	1263.515	1^-				
		829.39 *8*	19.7 *20*	1259.8703	2^+				
		902.07 *6*	100 *10*	1187.148	2^+	M1+E2	+1.5 *7*	0.0042 *8*	α(K)=0.0035 *7*; α(L)=0.00050 *8*; α(M)=0.000109 *17*; α(N)=2.5×10^{-5} *4*; α(O)=3.9×10^{-6} *7* α(P)=2.5×10^{-7} *5*
		1047.40[c] *13*	37 *4*	1041.6399	3^-				
		1111.86[c] *20*	38 *10*	977.1457	1^-				
		2009.9 *3*	27.3 *23*	79.5143	2^+	M1+E2		0.00112 *12*	α(K)=0.00069 *9*; α(L)=9.2×10^{-5} *12*; α(M)=1.97×10^{-5} *25*; α(N)=4.5×10^{-6} *6*; α(O)=7.1×10^{-7} *9* α(P)=4.9×10^{-8} *7* E_γ,I_γ: from ^{158}Gd(n,n′γ).
2095.20	(4^+)	1052.9[c] *2*	73 *7*	1041.6399	3^-				
		1833.73 *16*	100 *7*	261.4580	4^+				
		2014.8[c] *3*	67 *7*	79.5143	2^+				
2120.25		602.69[c] *11*	0.74 *26*	1517.4795	2^+				
		713.52 *5*	8.7 *8*	1406.7018	4^+				
		860.40 *6*	16.6 *21*	1259.8703	2^+				Mult.: E1 assignment is inconsistent with J^π assignment in ^{157}Gd(n,γ).
		1858.83 *8*	91 *9*	261.4580	4^+				E_γ,I_γ: from ^{158}Gd(n,n′γ).
		2040.7 *6*	100 *16*	79.5143	2^+				
2153.178	$(2,3)^+$	291.896 *8*	2.62 *16*	1861.281	3^-	E1		0.01706	α(K)=0.01450 *21*; α(L)=0.00201 *3*; α(M)=0.000434 *6*;

$\gamma(^{158}Gd)$ (continued)

E_i(level)	J_i^π	E_γ[†‡]	I_γ[†]	E_f	J_f^π	Mult.[#]	α	Comments
								$\alpha(N)=9.92\times10^{-5}$ *14*; $\alpha(O)=1.506\times10^{-5}$ *21* $\alpha(P)=9.21\times10^{-7}$ *13*
2153.178	$(2,3)^+$	359.602 *11*	3.8 *3*	1793.573	2^-			
		746.47 *6*	12.8 *21*	1406.7018	4^+	E2	0.00522	$\alpha(K)=0.00435$ *6*; $\alpha(L)=0.000676$ *10*; $\alpha(M)=0.0001479$ *21*; $\alpha(N)=3.38\times10^{-5}$ *5*; $\alpha(O)=5.12\times10^{-6}$ *8* $\alpha(P)=2.99\times10^{-7}$ *5*
		794.73[a] *7*	<20[a]	1358.472	4^+			
		887.74 *5*	100 *6*	1265.521	3^+			
		893.30 *7*	25 *3*	1259.8703	2^+			
		965.97 *7*	55 *5*	1187.148	2^+	M1,E2	0.0040 *10*	$\alpha(K)=0.00337$ *87*; $\alpha(L)=0.00047$ *11*; $\alpha(M)=0.000102$ *23*; $\alpha(N)=2.3\times10^{-5}$ *6*; $\alpha(O)=3.6\times10^{-6}$ *9* $\alpha(P)=2.39\times10^{-7}$ *67*
		2072.7 *25*		79.5143	2^+			
2215.47	$(1,2,3)^+$	1028.32 *8*	100 *8*	1187.148	2^+	M1	0.00428	$\alpha(K)=0.00365$ *6*; $\alpha(L)=0.000494$ *7*; $\alpha(M)=0.0001067$ *15*; $\alpha(N)=2.46\times10^{-5}$ *4*; $\alpha(O)=3.83\times10^{-6}$ *6* $\alpha(P)=2.63\times10^{-7}$ *4* This γ is placed from the 2214 level in $^{157}Gd(n,\gamma)$, but from a separate level in $^{158}Gd(n,n'\gamma)$.
2215.524	1	423.74 *3*	60 *7*	1791.797	2^+			
		472.38[a] *3*	<95[a]	1743.147	0^+			
		697.89 *9*	100 *19*	1517.4795	2^+			
		1018.9		1196.164	0^+			E_γ: from $^{158}Gd(n,n'\gamma)$.
		2135.26		79.5143	2^+			E_γ: from $^{158}Gd(n,n'\gamma)$.
		2215.18		0.0	0^+			E_γ: from $^{158}Gd(n,n'\gamma)$.
2221.63	2^-	956.07 *6*	39 *3*	1265.521	3^+			
		1034.51 *6*	100 *6*	1187.148	2^+	E1	1.07×10^{-3}	$\alpha(K)=0.000915$ *13*; $\alpha(L)=0.0001193$ *17*; $\alpha(M)=2.56\times10^{-5}$ *4*; $\alpha(N)=5.88\times10^{-6}$ *9* $\alpha(O)=9.11\times10^{-7}$ *13*; $\alpha(P)=6.15\times10^{-8}$ *9*
2249.61	$2^+,3,4^+$	891.24 *7*	42 *4*	1358.472	4^+			
		984.02 *8*	81 *7*	1265.521	3^+			
		1062.38 *9*	100 *9*	1187.148	2^+			
2260.162	$1,2^+$	226.242 *9*	0.12 *2*	2033.924	3^+			
		306.089[c] *20*	0.12 *2*	1952.425	$(0)^+$			
		329.816[c] *9*	1.42 *11*	1930.202	1^+	M1	0.0744	$\alpha(K)=0.0630$ *9*; $\alpha(L)=0.00888$ *13*; $\alpha(M)=0.00192$ *3*; $\alpha(N)=0.000443$ *7*; $\alpha(O)=6.88\times10^{-5}$ *10* $\alpha(P)=4.65\times10^{-6}$ *7*
		398.86 *8*	0.20 *9*	1861.281	3^-			
		466.53 *5*	0.33 *9*	1793.573	2^-			I_γ: from $^{157}Gd(n,\gamma)$; other: 42 *4* from $^{158}Gd(n,n'\gamma)$.
		994.57 *9*	24.7 *24*	1265.521	3^+	M1,E2	0.0037 *10*	$\alpha(K)=0.00315$ *81*; $\alpha(L)=0.00044$ *10*; $\alpha(M)=9.5\times10^{-5}$ *21*; $\alpha(N)=2.2\times10^{-5}$ *5*; $\alpha(O)=3.4\times10^{-6}$ *8* $\alpha(P)=2.24\times10^{-7}$ *62*
		1072.66 *17*	18.2 *24*	1187.148	2^+			

$^{158}_{64}Gd_{94}$-28

Adopted Levels, Gammas (continued)

$\gamma(^{158}Gd)$ (continued)

E_i(level)	J_i^π	E_γ †‡	I_γ †	E_f	J_f^π	Mult. #	α	Comments
2260.162	1,2$^+$	1218.67 *20*	31 *7*	1041.6399	3$^-$			
		1236.2 *3*	24 *5*	1023.6978	2$^-$			
		2180.4 *3*	100 *29*	79.5143	2$^+$			
		2260.16 *16*	69 *7*	0.0	0$^+$	E2	9.84×10^{-4}	α(K)=0.000491 *7*; α(L)=6.47×10^{-5} *9*; α(M)=1.390×10^{-5} *20*; α(N)=3.20×10^{-6} *5*; α(O)=4.97×10^{-7} *7* α(P)=3.40×10^{-8} *5* E_γ,I_γ: from ^{158}Gd(n,n′γ).
2267.16	1	2187.9 *2*	54 *5*	79.5143	2$^+$	D		
		2267.04 *12*	100 *8*	0.0	0$^+$	D		
2269.269	(0,1,2)$^+$	245.417 *6*	6.0 *4*	2023.851	1$^+$	M1,E2	0.14 *3*	α(K)=0.11 *3*; α(L)=0.0215 *19*; α(M)=0.0048 *6*; α(N)=0.00109 *11*; α(O)=0.000160 *8* α(P)=7.6×10^{-6} *27*
		1005.82 *9*	100 *11*	1263.515	1$^-$			
		1292.3 *2*	22 *3*	977.1457	1$^-$			
		2189.3 *8*	2.2 *5*	79.5143	2$^+$			
2276.02	2,3$^+$	240.324 *11*	16 *3*	2035.70	(2$^+$)			
		381.35 *5*	23 *6*	1894.578	(2$^+$)			
		428.23 *6*	100 *30*	1847.88	1$^+$			
		2016.2		261.4580	4$^+$			
2276.76	0$^+$	1013.88 *10*	2 *1*	1263.515	1$^-$	D,[E1]		
		1089.36 *21*	2 *1*	1187.148	2$^+$	E2	0.00231	α(K)=0.00195 *3*; α(L)=0.000278 *4*; α(M)=6.03×10^{-5} *9*; α(N)=1.384×10^{-5} *20*; α(O)=2.13×10^{-6} *3* α(P)=1.352×10^{-7} *19* B(E2)(W.u.)=2.9 *+16−17*
		2197.08 *5*	100 *1*	79.5143	2$^+$	E2	9.84×10^{-4}	α(K)=0.000517 *8*; α(L)=6.81×10^{-5} *10*; α(M)=1.466×10^{-5} *21*; α(N)=3.37×10^{-6} *5*; α(O)=5.24×10^{-7} *8* α(P)=3.58×10^{-8} *5* B(E2)(W.u.)=4.3 *+9−13*
2283.2		2204.4	100	79.5143	2$^+$			
2289.46	1,2$^+$	2210.2 c *3*	49 *5*	79.5143	2$^+$			
		2289.44 c *12*	100 *9*	0.0	0$^+$			
2322.0	2,3$^+$	2061.3		261.4580	4$^+$			
		2242.2		79.5143	2$^+$			
2325.32	1$^-$,2$^+$	922.4 *3*	18.6 *22*	1402.938	3$^-$			
		1061.68 *16*	19.6 *16*	1263.515	1$^-$			
		1138.3 *3*	12.9 *16*	1187.148	2$^+$			
		1284.0 *2*	3.8 *6*	1041.6399	3$^-$			
		1301.68 *14*	11.1 *11*	1023.6978	2$^-$			
		1347.95 *13*	100 *5*	977.1457	1$^-$			
		2246.1 *3*	27.8 *20*	79.5143	2$^+$			
		2326.0 *15*	1.1 *4*	0.0	0$^+$			
2327.3	1,2$^+$	2327.3 @		0.0	0$^+$			

From ENSDF

$^{158}_{64}Gd_{94}$-29

γ(^{158}Gd) (continued)

E_i(level)	J^π_i	E_γ[†‡]	I_γ[†]	E_f	J^π_f	Mult.[#]	α	Comments
2339.93	0^+	1076.6 *1*		1263.515	1^-	D		
		1152.8 *2*		1187.148	2^+	Q		
		1362.29 *16*		977.1457	1^-	D		
		2260.54[c] *5*		79.5143	2^+	Q		E_γ: this γ ray is a triplet.
2340.3	2^+	2260.7[c] *3*	100 *10*	79.5143	2^+			
		2340.5[c] *10*	12 *4*	0.0	0^+			
2344.7	$2^+,3^+$	1303.1[@]		1041.6399	3^-			
		2266.4	100	79.5143	2^+			
2355.0	$1^+,2^+$	1377.9[@]		977.1457	1^-			
2395.38	(3^+)	1353.64 *14*	89 *11*	1041.6399	3^-			
		1372.0 *2*	100 *23*	1023.6978	2^-			
		2315.3 *10*	16 *7*	79.5143	2^+			
		2395.6[a] *5*	39[a] *7*	0.0	0^+			
2446.49	1	2367.7 *3*	100 *5*	79.5143	2^+	D		
		2446.26 *16*	97 *8*	0.0	0^+	D		E_γ: from ^{158}Gd(n,n′γ). I_γ: from ^{157}Gd(n,γ); other: 130 *10* from ^{158}Gd(n,n′γ).
2450.74	$1,2^+$	1263.6 *4*	93 *40*	1187.148	2^+			
		2450.72 *12*	100 *3*	0.0	0^+			
2475.4	$1,2^+$	1215.7 *4*	100 *21*	1259.8703	2^+			
		2395.6[a] *5*	61[a] *11*	79.5143	2^+			
		2475.5 *5*	46 *7*	0.0	0^+			
2499.22	$(1,2)^+$	1233.7 *2*	58 *12*	1265.521	3^+			
		1312.08 *12*	100 *8*	1187.148	2^+			
		1475.2 *4*	18 *4*	1023.6978	2^-			
		2421.0 *11*	5.6 *22*	79.5143	2^+			
		2499.0 *10*	23.4 *14*	0.0	0^+			
2500.6	$(^+)$	2420.6	100	79.5143	2^+			
2538.7	(2^+)	2459.3	100	79.5143	2^+			
2564.98	$1^{(+)}$	2485.7 *4*	24 *5*	79.5143	2^+	D		I_γ: from ^{158}Gd(n,n′γ); other: 38 *11* from ^{158}Gd(γ,γ′).
		2564.82 *18*	100 *8*	0.0	0^+	D		
2594.73	$(^+)$	2515.2 *2*	100	79.5143	2^+			
2600.28	$1^{(+)}$	2520.8 *3*	72 *8*	79.5143	2^+	D		I_γ: from ^{158}Gd(n,n′γ); others: 62 *21* from (γ,γ′) and 24 *12* from ^{158}Eu β- decay for γ′s with questionable placements.
		2600.1 *3*	100 *8*	0.0	0^+	D		
2620.94		1433.7 *3*	100 *38*	1187.148	2^+			
		1596.9 *7*	38 *10*	1023.6978	2^-			
		1644.0 *4*	57 *19*	977.1457	1^-			
		2542.0 *16*	17 *5*	79.5143	2^+			
2642		2564[c] *2*	81 *27*	79.5143	2^+			
		2640[c] *2*	100 *41*	0.0	0^+			
2644.27	0^+	2564.73 *5*	100	79.5143	2^+	E2	1.01×10^{-3}	α(K)=0.000392 *6*; α(L)=5.12×10^{-5} *8*; α(M)=1.101×10^{-5} *16*; α(N)=2.53×10^{-6} *4*; α(O)=3.94×10^{-7} *6*

$\gamma(^{158}Gd)$ (continued)

E_i(level)	J_i^π	E_γ †‡	I_γ †	E_f	J_f^π	Mult.#	α	Comments
								α(P)=2.72×10^{-8} *4* B(E2)(W.u.)=7.6 *17*
2644.3		2383.1	100	261.4580	4^+			
2656.9		2577.7		79.5143	2^+			
		2656.8		0.0	0^+			
2670.7		1693.4 *3*	100 *24*	977.1457	1^-			
		2673 *2*	19 *8*	0.0	0^+			
2674.56	(1),2^+	1650.8 *2*	88 *10*	1023.6978	2^-			
		1697.3 *6*	18 *5*	977.1457	1^-			
		2674.8 *4*	100 *12*	0.0	0^+	(E2)	1.03×10^{-3}	α(K)=0.000364 *5*; α(L)=4.75×10^{-5} *7*; α(M)=1.020×10^{-5} *15*; α(N)=2.35×10^{-6} *4*; α(O)=3.65×10^{-7} *6* α(P)=2.52×10^{-8} *4*
2686.9	$1^{(+)}$	2607.5 *4*	64 *8*	79.5143	2^+			
		2686.3 *8*	100 *12*	0.0	0^+			
2700.93	2^+,3	2440.2		261.4580	4^+			
		2618.1		79.5143	2^+			E_γ: poor energy fit.
		2702.0 *3*		0.0	0^+	E2	1.03×10^{-3}	α(K)=0.000358 *5*; α(L)=4.66×10^{-5} *7*; α(M)=1.001×10^{-5} *14*; α(N)=2.30×10^{-6} *4*; α(O)=3.59×10^{-7} *5* α(P)=2.48×10^{-8} *4* E_γ,I_γ: from ^{158}Gd(n,n′γ).
2750.43		2670.2 *6*	87 *12*	79.5143	2^+			E_γ,I_γ: from ^{158}Gd(n,n′γ).
		2750.4 *2*	100 *12*	0.0	0^+			E_γ,I_γ: from ^{158}Gd(n,n′γ).
2758.7	$(^+)$	2680.0	100	79.5143	2^+			
2761.96		1738.0 *3*	100 *19*	1023.6978	2^-			
		1785.0 *3*	57 *10*	977.1457	1^-			
		2764 *2*	15 *3*	0.0	0^+			
2782.4	$(^+)$	2703.5	100	79.5143	2^+			
2802.6	1	2724	40 *7*	79.5143	2^+	D		
		2802.2	100	0.0	0^+	D		
2805.1	1,2^+	1617.6 *6*	31 *10*	1187.148	2^+			
		2805.1 *3*	100 *14*	0.0	0^+			
2822.7	1^-	2742.0 *8*	100 *10*	79.5143	2^+	E1	1.26×10^{-3}	α(K)=0.000182 *3*; α(L)=2.30×10^{-5} *4*; α(M)=4.92×10^{-6} *7*; α(N)=1.132×10^{-6} *16*; α(O)=1.765×10^{-7} *25* α(P)=1.228×10^{-8} *18* B(E1)(W.u.)=0.0009 *3*
		2822.8 *7*	50 *5*	0.0	0^+	E1	1.30×10^{-3}	α(K)=0.0001738 *25*; α(L)=2.20×10^{-5} *3*; α(M)=4.71×10^{-6} *7*; α(N)=1.083×10^{-6} *16* α(O)=1.689×10^{-7} *24*; α(P)=1.176×10^{-8} *17* B(E1)(W.u.)=0.00042 *13*
2829.6	$(^+)$	2828.6	100	0.0	0^+			
2832.0	1	2832.0 *3*	100	0.0	0^+			
2841.8	1	2762	68 *13*	79.5143	2^+	D		
		2842	100	0.0	0^+	D		

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Adopted Levels, Gammas (continued)

γ(^{158}Gd) (continued)

E_i(level)	J^π_i	E_γ[†‡]	I_γ[†]	E_f	J^π_f	Mult.[#]	α	Comments
2844.7		2844[c] *2*	100	0.0	0^+			
2854.7		2775.4 *5*	76 *13*	79.5143	2^+			E_γ,I_γ: from ^{158}Gd(n,n′γ).
		2854.6 *5*	100 *13*	0.0	0^+			E_γ,I_γ: from ^{158}Gd(n,n′γ).
2859.6		1835.9 *6*	100	1023.6978	2^-			
2878.8	2^+,3	2616.6		261.4580	4^+			
		2799.8		79.5143	2^+			
		2878.1		0.0	0^+			
2909.6	0^+	2832.02[c] *14*	100	79.5143	2^+	E2	1.06×10^{-3}	α(K)=0.000329 *5*; α(L)=4.28×10^{-5} *6*; α(M)=9.20×10^{-6} *13*; α(N)=2.11×10^{-6} *3*; α(O)=3.30×10^{-7} *5* α(P)=2.28×10^{-8} *4* B(E2)(W.u.)=1.9 *+19−11*
2961.7		2961.9	100	0.0	0^+			
2964.3	2^+	2885.1 *10*	56 *12*	79.5143	2^+			E_γ,I_γ: from ^{158}Gd(n,n′γ).
		2964.2 *5*	100 *11*	0.0	0^+			E_γ,I_γ: from ^{158}Gd(n,n′γ).
2985.9	$1^{(+)}$	2906	45 *12*	79.5143	2^+	D		
		2986	100	0.0	0^+	D		
2997.7	$(^+)$	2918.5	100	79.5143	2^+			
3008.3		2746.0		261.4580	4^+			
		2929.2		79.5143	2^+			
3011.9	2^+,3^+	1970.3[@]	100	1041.6399	3^-			
3029.2		2950.2	100	79.5143	2^+			
3038.2	1	2959	28 *12*	79.5143	2^+	D		
		3038.1 *4*	100	0.0	0^+	D		
3060.0	2^+,3	2798.5[@]	100	261.4580	4^+			
		2980.4 *6*	100 *21*	79.5143	2^+			
		3059.8 *9*	69 *16*	0.0	0^+			
3064.6		2085.1		977.1457	1^-			
		2986.0 *7*	80 *16*	79.5143	2^+			
		3064.7 *5*	100 *15*	0.0	0^+			
3107.8	1	3028	58 *7*	79.5143	2^+	D		
		3108	100	0.0	0^+	D		
3141.5		3062.0	100	79.5143	2^+			
3150.8	$(^+)$	3072.7	100	79.5143	2^+			
3160.8	1^-	3081	100 *22*	79.5143	2^+	E1	1.40×10^{-3}	α(K)=0.0001527 *22*; α(L)=1.93×10^{-5} *3*; α(M)=4.13×10^{-6} *6*; α(N)=9.49×10^{-7} *14* α(O)=1.481×10^{-7} *21*; α(P)=1.032×10^{-8} *15* B(E1)(W.u.)=0.00051 *20*
		3161	72	0.0	0^+	E1	1.44×10^{-3}	α(K)=0.0001470 *21*; α(L)=1.86×10^{-5} *3*; α(M)=3.97×10^{-6} *6*; α(N)=9.14×10^{-7} *13* α(O)=1.426×10^{-7} *20*; α(P)=9.94×10^{-9} *14* B(E1)(W.u.)=0.00034 *12*
3192.3	1^+	3113	41 *5*	79.5143	2^+	M1	1.27×10^{-3}	α(K)=0.000298 *5*; α(L)=3.90×10^{-5} *6*; α(M)=8.39×10^{-6} *12*; α(N)=1.93×10^{-6} *3*;

$^{158}_{64}$Gd$_{94}$-32

γ(^{158}Gd) (continued)

E_i(level)	J^π_i	E_γ[†‡]	I_γ[†]	E_f	J^π_f	Mult.[#]	α	Comments
								α(O)=3.02×10^{-7} *5* α(P)=2.11×10^{-8} *3* B(M1)(W.u.)=0.052 *10*
3192.3	1^+	3192	100	0.0	0^+	M1	1.29×10^{-3}	α(K)=0.000282 *4*; α(L)=3.70×10^{-5} *6*; α(M)=7.95×10^{-6} *12*; α(N)=1.83×10^{-6} *3*; α(O)=2.86×10^{-7} *4* α(P)=2.00×10^{-8} *3* B(M1)(W.u.)=0.117 *18*
3200.8	2^+,3	2939.3[@]	100	261.4580	4^+			
3201	1^+	3121	53 *5*	79.5143	2^+	M1	1.27×10^{-3}	α(K)=0.000296 *5*; α(L)=3.88×10^{-5} *6*; α(M)=8.35×10^{-6} *12*; α(N)=1.92×10^{-6} *3*; α(O)=3.00×10^{-7} *5* α(P)=2.10×10^{-8} *3* B(M1)(W.u.)=0.078 *13*
		3201	100	0.0	0^+	M1	1.29×10^{-3}	α(K)=0.000281 *4*; α(L)=3.68×10^{-5} *6*; α(M)=7.91×10^{-6} *11*; α(N)=1.82×10^{-6} *3*; α(O)=2.84×10^{-7} *4* α(P)=1.99×10^{-8} *3* B(M1)(W.u.)=0.137 *18*
3258.8	1^-	3179	100 *23*	79.5143	2^+	E1	1.45×10^{-3}	α(K)=0.0001458 *21*; α(L)=1.84×10^{-5} *3*; α(M)=3.94×10^{-6} *6*; α(N)=9.06×10^{-7} *13* α(O)=1.414×10^{-7} *20*; α(P)=9.86×10^{-9} *14* B(E1)(W.u.)=0.00052 *23*
		3259	53	0.0	0^+	E1	1.48×10^{-3}	α(K)=0.0001406 *20*; α(L)=1.776×10^{-5} *25*; α(M)=3.80×10^{-6} *6*; α(N)=8.73×10^{-7} *13* α(O)=1.363×10^{-7} *19*; α(P)=9.50×10^{-9} *14* B(E1)(W.u.)=0.00026 *10*
3287.9	1	3208	45 *23*	79.5143	2^+	D		
		3288	100	0.0	0^+	D		
3291.6		3291.6	100	0.0	0^+			
3298.8	1	3219	47 *7*	79.5143	2^+	D		
		3299	100	0.0	0^+	D		
3351.9	1,2,3^-	2374.7[@]	100	977.1457	1^-			
3427.8	1	3348	64 *23*	79.5143	2^+	D		
		3428	100	0.0	0^+	D		
3446.0	1,2,3	2374.7[@]						
3469.8	1	3390	39 *23*	79.5143	2^+	D		
		3470	100	0.0	0^+	D		
3570.7		3492.7		79.5143	2^+			
		3570.1		0.0	0^+			
3576.8	1	3497	26 *21*	79.5143	2^+	D		
		3577	100	0.0	0^+	D		
3600.5		3521.0		79.5143	2^+			
		3600.6		0.0	0^+			
3632.7	1^+,2^+,3^+	3553.2[@]	100	79.5143	2^+			

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$\gamma(^{158}Gd)$ (continued)

E_i(level)	J_i^π	E_γ[†‡]	I_γ[†]	E_f	J_f^π	Mult.[#]	α	Comments
3655.4	1,2$^+$	3655.4[@]	100	0.0	0$^+$			
3660.5		3580.6		79.5143	2$^+$			
		3658.9		0.0	0$^+$			
3663.3		3583.8[@]	100	79.5143	2$^+$			
3702.5		3439.8		261.4580	4$^+$			
		3623.7		79.5143	2$^+$			
3819.8	1$^-$	3740	100 *31*	79.5143	2$^+$	E1	1.67×10^{-3}	α(K)=0.0001154 *17*; α(L)=1.453×10^{-5} *21*; α(M)=3.11×10^{-6} *5*; α(N)=7.14×10^{-7} *10* α(O)=1.115×10^{-7} *16*; α(P)=7.79×10^{-9} *11* B(E1)(W.u.)=0.0005 *3*
		3820	74	0.0	0$^+$	E1	1.70×10^{-3}	α(K)=0.0001119 *16*; α(L)=1.410×10^{-5} *20*; α(M)=3.01×10^{-6} *5*; α(N)=6.93×10^{-7} *10* α(O)=1.082×10^{-7} *16*; α(P)=7.56×10^{-9} *11* B(E1)(W.u.)=0.00034 *17*
3920.8	1$^-$	3841	100 *34*	79.5143	2$^+$	E1	1.71×10^{-3}	α(K)=0.0001111 *16*; α(L)=1.399×10^{-5} *20*; α(M)=2.99×10^{-6} *5*; α(N)=6.88×10^{-7} *10* α(O)=1.073×10^{-7} *15*; α(P)=7.50×10^{-9} *11* B(E1)(W.u.)=0.0010 *7*
		3921 *1*	50	0.0	0$^+$	E1	1.74×10^{-3}	α(K)=0.0001079 *16*; α(L)=1.358×10^{-5} *19*; α(M)=2.90×10^{-6} *4*; α(N)=6.68×10^{-7} *10* α(O)=1.042×10^{-7} *15*; α(P)=7.29×10^{-9} *11* B(E1)(W.u.)=0.0005 *3*
3923.9		3842.9		79.5143	2$^+$			
		3924.7		0.0	0$^+$			
(7937.22)	2$^-$,(1$^-$)	3700.2 *6*	9.5 *14*	4237.0				
		3775.8 *8*	6.1 *10*	4161.4	($^+$)	E1	1.68×10^{-3}	α(K)=0.0001138 *16*; α(L)=1.434×10^{-5} *20*; α(M)=3.07×10^{-6} *5* α(N)=7.05×10^{-7} *10*; α(O)=1.100×10^{-7} *16*; α(P)=7.69×10^{-9} *11*; α(IPF)=0.001552 *22*
		3797.7 *4*	9.5 *14*	4139.5	($^+$)	E1	1.69×10^{-3}	α(K)=0.0001129 *16*; α(L)=1.422×10^{-5} *20*; α(M)=3.04×10^{-6} *5* α(N)=6.99×10^{-7} *10*; α(O)=1.091×10^{-7} *16*; α(P)=7.62×10^{-9} *11*; α(IPF)=0.001562 *22*
		3826.5 *8*	7 *3*	4110.7	($^+$)	E1	1.70×10^{-3}	α(K)=0.0001117 *16*; α(L)=1.406×10^{-5} *20*; α(M)=3.01×10^{-6} *5* α(N)=6.91×10^{-7} *10*; α(O)=1.079×10^{-7} *16*; α(P)=7.54×10^{-9} *11*; α(IPF)=0.001574 *22*
		3921.3[c] *8*	3.7 *10*	4015.8?				
		3972.1 *7*	4.8 *14*	3965.1				
		3989.2 *6*	9.9 *14*	3948.0				
		4012.8		3923.9				
		4058.4 *4*	7.8 *14*	3878.8	($^+$)	E1	1.78×10^{-3}	α(K)=0.0001028 *15*; α(L)=1.293×10^{-5} *19*; α(M)=2.76×10^{-6} *4* α(N)=6.36×10^{-7} *9*; α(O)=9.92×10^{-8} *14*; α(P)=6.94×10^{-9} *10*; α(IPF)=0.001663 *24*
		4090.6 *4*	9.5 *20*	3846.6	($^+$)	E1	0.00179	α(K)=0.0001017 *15*; α(L)=1.279×10^{-5} *18*; α(M)=2.73×10^{-6} *4*

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$\gamma(^{158}Gd)$ (continued)

E_i(level)	E_γ †‡	I_γ †	E_f	J^π_f	Mult.#	α	Comments
							α(N)=6.29×10^{-7} 9; α(O)=9.81×10^{-8} 14; α(P)=6.86×10^{-9} 10; α(IPF)=0.001674 24
(7937.22)	4142.6 10	6.1 17	3794.6	(+)	E1	0.00181	α(K)=9.99×10^{-5} 14; α(L)=1.256×10^{-5} 18; α(M)=2.69×10^{-6} 4 α(N)=6.17×10^{-7} 9; α(O)=9.64×10^{-8} 14; α(P)=6.74×10^{-9} 10; α(IPF)=0.001692 24
	4187.3[c] 15	2.4 10	3750.1?				
	4234.2		3702.5				
	4273.9@		3663.3				
	4275.7 7	5.8 14	3660.5				
	4281.8@		3655.4	1,2+			
	4289.7 8	6.1 14	3647.5				
	4304.5 8	6.5 14	3632.7	1+,2+,3+	E1	0.00187	α(K)=9.47×10^{-5} 14; α(L)=1.190×10^{-5} 17; α(M)=2.54×10^{-6} 4 α(N)=5.85×10^{-7} 9; α(O)=9.13×10^{-8} 13; α(P)=6.39×10^{-9} 9; α(IPF)=0.001758 25
	4310.3 6	7.5 24	3626.9	(+)	E1	0.00187	α(K)=9.45×10^{-5} 14; α(L)=1.188×10^{-5} 17; α(M)=2.54×10^{-6} 4 α(N)=5.84×10^{-7} 9; α(O)=9.12×10^{-8} 13; α(P)=6.38×10^{-9} 9; α(IPF)=0.001760 25
	4336.9		3600.5				
	4344.8 6	5.1 10	3592.4	(−)	M1,E2	0.00153 9	α(K)=0.000154 5; α(L)=1.99×10^{-5} 5; α(M)=4.26×10^{-6} 10 α(N)=9.81×10^{-7} 23; α(O)=1.53×10^{-7} 4; α(P)=1.072×10^{-8} 24; α(IPF)=0.00135 10
	4367.4		3570.7				
	4402.4 6	4.4 10	3534.8	(+)	E1	0.00190	α(K)=9.18×10^{-5} 13; α(L)=1.153×10^{-5} 17; α(M)=2.46×10^{-6} 4 α(N)=5.67×10^{-7} 8; α(O)=8.85×10^{-8} 13; α(P)=6.20×10^{-9} 9; α(IPF)=0.00180 3
	4488.4 5	6.5 10	3448.8	(+)	E1	0.00193	α(K)=8.94×10^{-5} 13; α(L)=1.122×10^{-5} 16; α(M)=2.40×10^{-6} 4 α(N)=5.52×10^{-7} 8; α(O)=8.61×10^{-8} 12; α(P)=6.03×10^{-9} 9; α(IPF)=0.00183 3
	4491.2@		3446.0	1,2,3			
	4500.8 5	5.4 10	3436.4	(+)	E1	0.00194	α(K)=8.90×10^{-5} 13; α(L)=1.118×10^{-5} 16; α(M)=2.39×10^{-6} 4 α(N)=5.49×10^{-7} 8; α(O)=8.58×10^{-8} 12; α(P)=6.01×10^{-9} 9; α(IPF)=0.00183 3
	4525.5 5	4.8 10	3411.7				
	4585.3 8	3.6 7	3351.9	1,2,3−			
	4649.2 6	4.0 6	3287.9	1			
	4665.8 8	3.0 5	3271.3				
	4673.3 7	4.7 7	3263.8				
	4690.0 5	3.7 6	3247.1				
	4708.6 8	3.4 10	3228.5				
	4736.4 7	4.2 8	3200.8	2+,3			
	4741.7 6	5.5 8	3195.4				
	4766.0 7	3.0 6	3171.1				
	4787.3 8	4.4 10	3150.8	(+)	E1	0.00203	α(K)=8.18×10^{-5} 12; α(L)=1.027×10^{-5} 15; α(M)=2.19×10^{-6} 3 α(N)=5.04×10^{-7} 7; α(O)=7.88×10^{-8} 11; α(P)=5.52×10^{-9} 8; α(IPF)=0.00193 3
	4795.7 8	4.1 8	3141.5				
	4870.3 6	5.6 8	3066.8	(+)	E1	0.00205	α(K)=7.99×10^{-5} 12; α(L)=1.003×10^{-5} 14; α(M)=2.14×10^{-6} 3 α(N)=4.93×10^{-7} 7; α(O)=7.69×10^{-8} 11; α(P)=5.39×10^{-9} 8; α(IPF)=0.00196 3
	4876.9 6	7.8 14	3060.0	2+,3	E1	0.00205	α(K)=7.98×10^{-5} 12; α(L)=1.001×10^{-5} 14; α(M)=2.14×10^{-6} 3 α(N)=4.92×10^{-7} 7; α(O)=7.68×10^{-8} 11; α(P)=5.38×10^{-9} 8; α(IPF)=0.00196 3
	4891.6 15	3.7 20	3045.5				

$^{158}_{64}Gd_{94}$-35

$\gamma(^{158}Gd)$ (continued)

E_i(level)	E_γ[†‡]	I_γ[†]	E_f	J^π_f	Mult.[#]	α	Comments
(7937.22)	4908.2 *6*	3.2 *5*	3029.2				
	4925.2 *5*	24.5 *24*	3011.9	$2^+,3^+$	E1	0.00207	α(K)=7.87×10^{-5} *11*; α(L)=9.87×10^{-6} *14*; α(M)=2.11×10^{-6} *3* α(N)=4.85×10^{-7} *7*; α(O)=7.58×10^{-8} *11*; α(P)=5.31×10^{-9} *8*; α(IPF)=0.00197 *3*
	4928.6		3008.3				
	4939.5 *6*	6.9 *10*	2997.7	$(^+)$	E1	0.00207	α(K)=7.84×10^{-5} *11*; α(L)=9.83×10^{-6} *14*; α(M)=2.10×10^{-6} *3* α(N)=4.83×10^{-7} *7*; α(O)=7.55×10^{-8} *11*; α(P)=5.29×10^{-9} *8*; α(IPF)=0.00198 *3*
	4951.1 *6*	4.2 *6*	2985.9	$1^{(+)}$	E1	0.00207	α(K)=7.81×10^{-5} *11*; α(L)=9.80×10^{-6} *14*; α(M)=2.09×10^{-6} *3* α(N)=4.82×10^{-7} *7*; α(O)=7.52×10^{-8} *11*; α(P)=5.27×10^{-9} *8*; α(IPF)=0.00198 *3*
	4955.6 *9*	2.5 *8*	2981.5				
	4975.6		2961.7				
	5002.5 *11*	3.0 *5*	2934.6				
	5027.5 *5*	4.9 *7*	2909.6	0^+	E1	0.00209	α(K)=7.65×10^{-5} *11*; α(L)=9.60×10^{-6} *14*; α(M)=2.05×10^{-6} *3* α(N)=4.72×10^{-7} *7*; α(O)=7.36×10^{-8} *11*; α(P)=5.16×10^{-9} *8*; α(IPF)=0.00200 *3*
	5041.1 *8*	3.0 *6*	2896.0				
	5058.2 *5*	10.9 *10*	2878.8	$2^+,3$	E1	0.00210	α(K)=7.59×10^{-5} *11*; α(L)=9.52×10^{-6} *14*; α(M)=2.03×10^{-6} *3* α(N)=4.68×10^{-7} *7*; α(O)=7.30×10^{-8} *11*; α(P)=5.12×10^{-9} *8*; α(IPF)=0.00201 *3*
	5082.9		2854.7				
	5092.4 *7*	2.8 *6*	2844.7				
	5106.9 *8*	3.3 *7*	2829.6	$(^+)$	E1	0.00211	α(K)=7.49×10^{-5} *11*; α(L)=9.40×10^{-6} *14*; α(M)=2.01×10^{-6} *3* α(N)=4.62×10^{-7} *7*; α(O)=7.21×10^{-8} *10*; α(P)=5.05×10^{-9} *7*; α(IPF)=0.00203 *3*
	5113.6 *7*	3.1 *6*	2822.7	1^-			
	5135.2		2802.6	1			
	5142.4[c] *9*	1.7 *4*	2794.9?				
	5154.9 *5*	6.7 *7*	2782.4	$(^+)$	E1	0.00213	α(K)=7.40×10^{-5} *11*; α(L)=9.28×10^{-6} *13*; α(M)=1.98×10^{-6} *3* α(N)=4.56×10^{-7} *7*; α(O)=7.12×10^{-8} *10*; α(P)=4.99×10^{-9} *7*; α(IPF)=0.00204 *3*
	5178.7 *5*	12.2 *14*	2758.7	$(^+)$	E1	0.00213	α(K)=7.35×10^{-5} *11*; α(L)=9.22×10^{-6} *13*; α(M)=1.97×10^{-6} *3* α(N)=4.53×10^{-7} *7*; α(O)=7.07×10^{-8} *10*; α(P)=4.96×10^{-9} *7*; α(IPF)=0.00205 *3*
	5185.7 *7*	3.5 *5*	2750.43				
	5238.6 *5*	8.2 *8*	2700.93	$2^+,3$	E1	0.00215	α(K)=7.24×10^{-5} *11*; α(L)=9.08×10^{-6} *13*; α(M)=1.94×10^{-6} *3* α(N)=4.46×10^{-7} *7*; α(O)=6.96×10^{-8} *10*; α(P)=4.88×10^{-9} *7*; α(IPF)=0.00207 *3*
	5250.2 *5*	9.9 *10*	2686.9	$1^{(+)}$	E1	0.00215	α(K)=7.22×10^{-5} *11*; α(L)=9.05×10^{-6} *13*; α(M)=1.93×10^{-6} *3* α(N)=4.45×10^{-7} *7*; α(O)=6.94×10^{-8} *10*; α(P)=4.87×10^{-9} *7*; α(IPF)=0.00207 *3*
	5265.1 *15*	2.0 *6*	2670.7				
	5280.4 *6*	3.3 *5*	2656.9				
	5293.1 *9*	1.5 *4*	2644.3				
	5306.2 *5*	4.9 *7*	2630.9	$(^+)$	E1	0.00217	α(K)=7.12×10^{-5} *10*; α(L)=8.92×10^{-6} *13*; α(M)=1.91×10^{-6} *3* α(N)=4.38×10^{-7} *7*; α(O)=6.84×10^{-8} *10*; α(P)=4.80×10^{-9} *7*; α(IPF)=0.00209 *3*
	5336.1 *8*	3.2 *8*	2600.28	$1^{(+)}$	E1	0.00218	α(K)=7.06×10^{-5} *10*; α(L)=8.85×10^{-6} *13*; α(M)=1.89×10^{-6} *3* α(N)=4.35×10^{-7} *6*; α(O)=6.79×10^{-8} *10*; α(P)=4.76×10^{-9} *7*; α(IPF)=0.00210 *3*
	5342.6 *9*	2.6 *7*	2594.73	$(^+)$	E1	0.00218	α(K)=7.05×10^{-5} *10*; α(L)=8.84×10^{-6} *13*; α(M)=1.89×10^{-6} *3* α(N)=4.34×10^{-7} *6*; α(O)=6.78×10^{-8} *10*; α(P)=4.75×10^{-9} *7*; α(IPF)=0.00210 *3*
	5370.4 *8*	2.3 *3*	2564.98	$1^{(+)}$	E1	0.00219	α(K)=7.00×10^{-5} *10*; α(L)=8.78×10^{-6} *13*; α(M)=1.87×10^{-6} *3* α(N)=4.31×10^{-7} *6*; α(O)=6.73×10^{-8} *10*; α(P)=4.72×10^{-9} *7*; α(IPF)=0.00211 *3*

$^{158}_{64}Gd_{94}$-36

$\gamma(^{158}Gd)$ (continued)

E_i(level)	E_γ[†‡]	I_γ[†]	E_f	J^π_f	Mult.[#]	α	Comments
(7937.22)	5398.5		2538.7	(2^+)			
	5403.2 *5*	13.6 *14*	2533.9	$(^+)$	E1	0.00220	α(K)=6.95×10^{-5} *10*; α(L)=8.70×10^{-6} *13*; α(M)=1.86×10^{-6} *3* α(N)=4.28×10^{-7} *6*; α(O)=6.68×10^{-8} *10*; α(P)=4.68×10^{-9} *7*; α(IPF)=0.00212 *3*
	5436.4 *5*	7.3 *7*	2500.6	$(^+)$	E1	0.00221	α(K)=6.89×10^{-5} *10*; α(L)=8.63×10^{-6} *12*; α(M)=1.84×10^{-6} *3* α(N)=4.24×10^{-7} *6*; α(O)=6.62×10^{-8} *10*; α(P)=4.64×10^{-9} *7*; α(IPF)=0.00213 *3*
	5486.7[c] *7*	2.1 *8*	2450.74	$1,2^+$			
	5504.1[c] *9*	1.7 *4*	2433.1				
	5542.6 *5*	11.6 *10*	2395.38	(3^+)	E1	0.00224	α(K)=6.71×10^{-5} *10*; α(L)=8.41×10^{-6} *12*; α(M)=1.80×10^{-6} *3* α(N)=4.13×10^{-7} *6*; α(O)=6.45×10^{-8} *9*; α(P)=4.52×10^{-9} *7*; α(IPF)=0.00216 *3*
	5567.6[c] *15*	0.9 *5*	2369.6				
	5582.1 *5*	17.0 *17*	2355.0	$1^+,2^+$	E1	0.00225	α(K)=6.65×10^{-5} *10*; α(L)=8.33×10^{-6} *12*; α(M)=1.780×10^{-6} *25* α(N)=4.09×10^{-7} *6*; α(O)=6.39×10^{-8} *9*; α(P)=4.48×10^{-9} *7*; α(IPF)=0.00217 *3*
	5592.7 *5*	10.2 *10*	2344.7	$2^+,3^+$	E1	0.00225	α(K)=6.63×10^{-5} *10*; α(L)=8.31×10^{-6} *12*; α(M)=1.775×10^{-6} *25* α(N)=4.08×10^{-7} *6*; α(O)=6.37×10^{-8} *9*; α(P)=4.47×10^{-9} *7*; α(IPF)=0.00217 *3*
	5609.8 *5*	8.05 *8*	2327.3	$1,2^+$	E1	0.00225	α(K)=6.61×10^{-5} *10*; α(L)=8.27×10^{-6} *12*; α(M)=1.768×10^{-6} *25* α(N)=4.06×10^{-7} *6*; α(O)=6.35×10^{-8} *9*; α(P)=4.45×10^{-9} *7*; α(IPF)=0.00218 *3*
	5615.6		2322.0	$2,3^+$			
	5654.2 *6*	5.1 *5*	2283.2				
	5661.1 *5*	12.6 *14*	2276.02	$2,3^+$			
	5668.7 *6*	3.6 *5*	2269.269	$(0,1,2)^+$			
	5676.7 *5*	13.3 *14*	2260.162	$1,2^+$	E1	0.00227	α(K)=6.50×10^{-5} *10*; α(L)=8.14×10^{-6} *12*; α(M)=1.740×10^{-6} *25* α(N)=4.00×10^{-7} *6*; α(O)=6.25×10^{-8} *9*; α(P)=4.38×10^{-9} *7*; α(IPF)=0.00220 *3*
	5687.9 *8*	1.6 *8*	2249.61	$2^+,3,4^+$			
	5714.3 *7*	2.9 *4*	2221.63	2^-			
	5721.7 *6*	2.6 *4*	2215.524	1			
	5783.8 *5*	10.5 *10*	2153.178	$(2,3)^+$	E1	0.00231	α(K)=6.35×10^{-5} *9*; α(L)=7.94×10^{-6} *12*; α(M)=1.697×10^{-6} *24* α(N)=3.90×10^{-7} *6*; α(O)=6.09×10^{-8} *9*; α(P)=4.28×10^{-9} *6*; α(IPF)=0.00223 *4*
	5816.2[c] *8*	1.8 *5*	2120.25				
	5845.4 *8*	1.5 *4*	2089.254	2^+			
	5853.1 *6*	2.6 *4*	2083.639	2^+			
	5891.8[c] *13*	2.1 *6*	2049.009	2^-			
	5903.2 *5*	51 *4*	2033.924	3^+	E1	0.00233	α(K)=6.18×10^{-5} *9*; α(L)=7.73×10^{-6} *11*; α(M)=1.651×10^{-6} *24* α(N)=3.80×10^{-7} *6*; α(O)=5.93×10^{-8} *9*; α(P)=4.16×10^{-9} *6*; α(IPF)=0.00226 *4*
	5912.5[c] *9*	2.8 *6*	2023.851	1^+			
	5972.5		1964.120	2^+			
	5981.8		1957.27	0^+			
	5995.5 *5*	5.6 *6*	1941.27	3^+			
	6006.4 *5*	2.7 *3*	1930.202	1^+			
	6042.6[a] *5*	3.7[a] *4*	1894.616	2^-			
	6042.6[a] *5*	3.7[a] *4*	1894.578	(2^+)			
	6073.1 *13*	1.2 *4*	1865.0	12^+			
	6079.6 *9*	1.4 *4*	1856.316	1^-			

$^{158}_{64}Gd_{94}$-37

γ(^{158}Gd) (continued)

E_i(level)	J^π_i	E_γ †‡	I_γ †	E_f	J^π_f	Mult.#
(7937.22)	2^-,(1^-)	6144.9 *5*	6.4 *6*	1791.797	2^+	E1
		6420.1 *5*	12.9 *14*	1517.4795	2^+	E1
		6671.6 *5*	8.1 *4*	1265.521	3^+	E1
		6750.0 *5*	100	1187.148	2^+	E1
(7937.22)	2^-,(1^-)	6757.9		1176.481	5^-	
		6913.6 *5*	5.4 *4*	1023.6978	2^-	M1
		6959.9 *7*	0.88 *14*	977.1457	1^-	M1
		7857.4 *7*	0.60 *6*	79.5143	2^+	

† Most values are from ^{157}Gd(n,γ). When not available the most precise values are adopted from ^{158}Eu β- decay, ^{158}Gd(n,n′γ), or ^{158}Tb ε decay.

‡ The unplaced γ′s are not repeated here, see ^{157}Gd(n,γ), ^{158}Gd(n,n′γ), and ^{158}Eu β- decay. See the ^{157}Gd(n,γ) for the primary γ′s following neutron capture.

Most mult values were measured in ^{157}Gd(n,γ) E=th,res, also in ^{158}Gd(n,n′γ). Mixing ratios are from ^{158}Gd(n,n′γ).

@ From 2015Va20 in ^{157}Gd(n,γ) (ΔE of Adopted Levels).

& If no value given it was assumed δ=1.00 for E2/M1, δ=1.00 for E3/M2 and δ=0.10 for the other multipolarities.

[a] Multiply placed with undivided intensity.

[b] Multiply placed with intensity suitably divided.

[c] Placement of transition in the level scheme is uncertain.

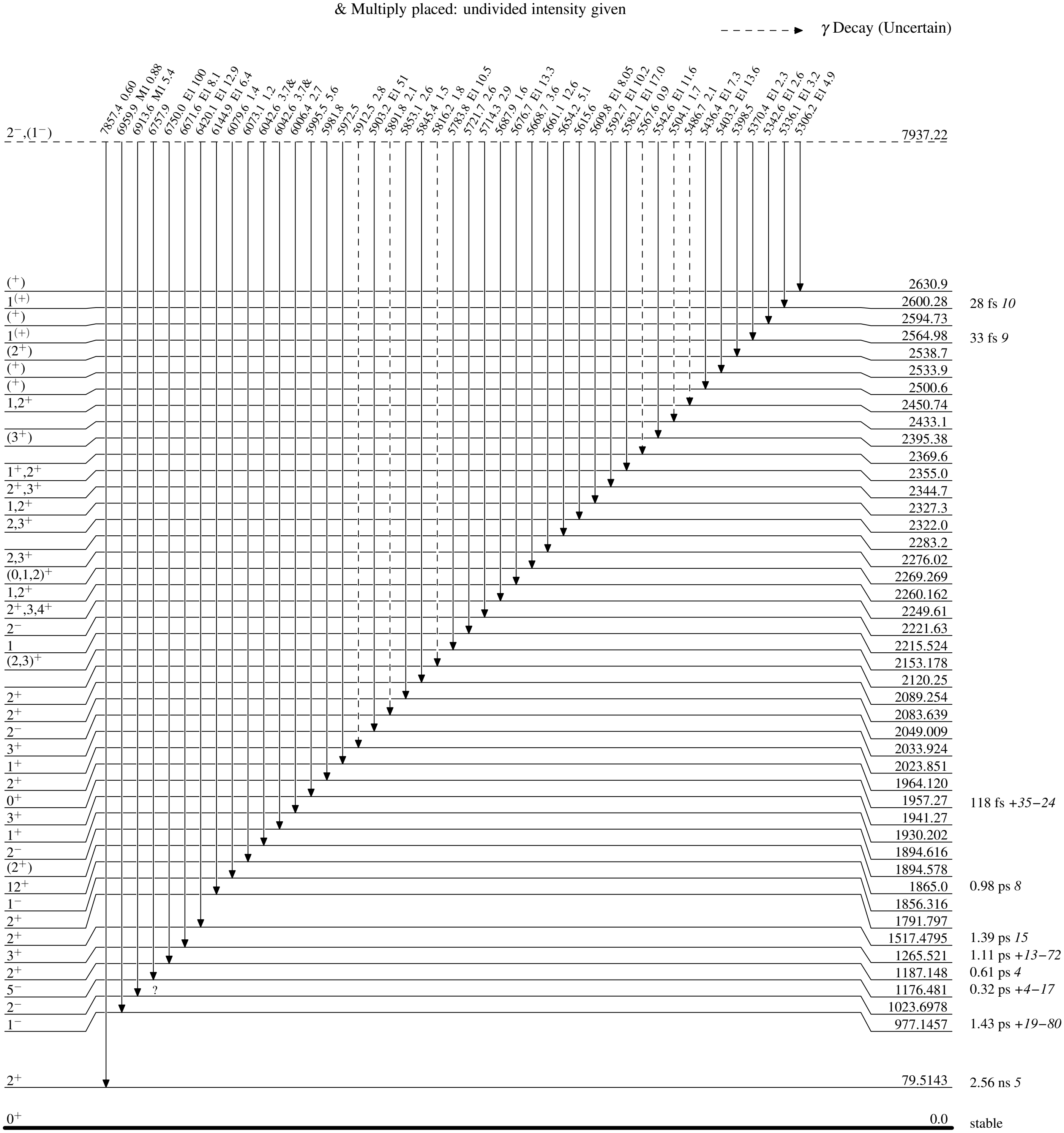
$^{158}_{64}Gd_{94}$-38

Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

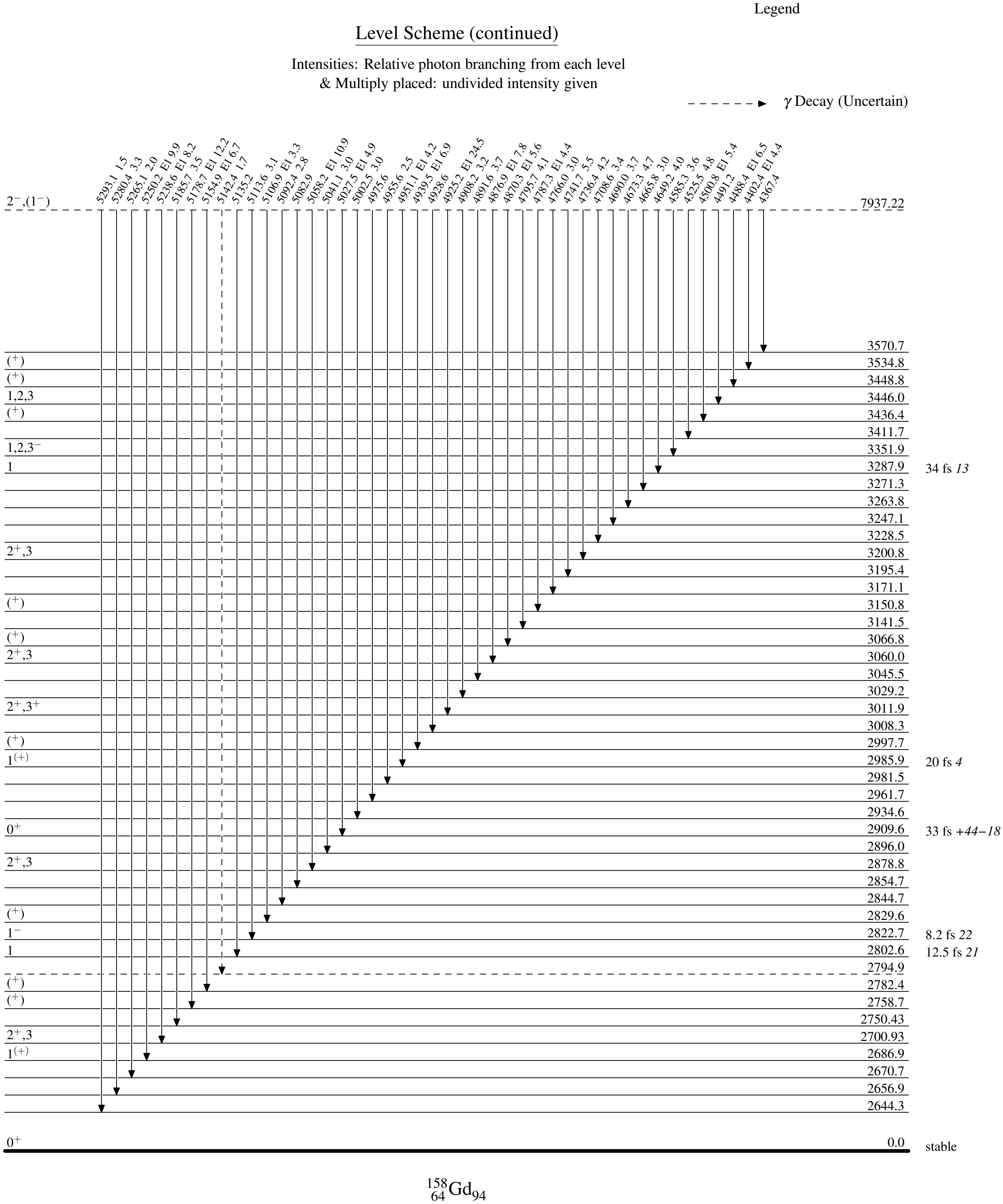


$^{158}_{64}Gd_{94}$

Adopted Levels, Gammas

Level Scheme (continued)

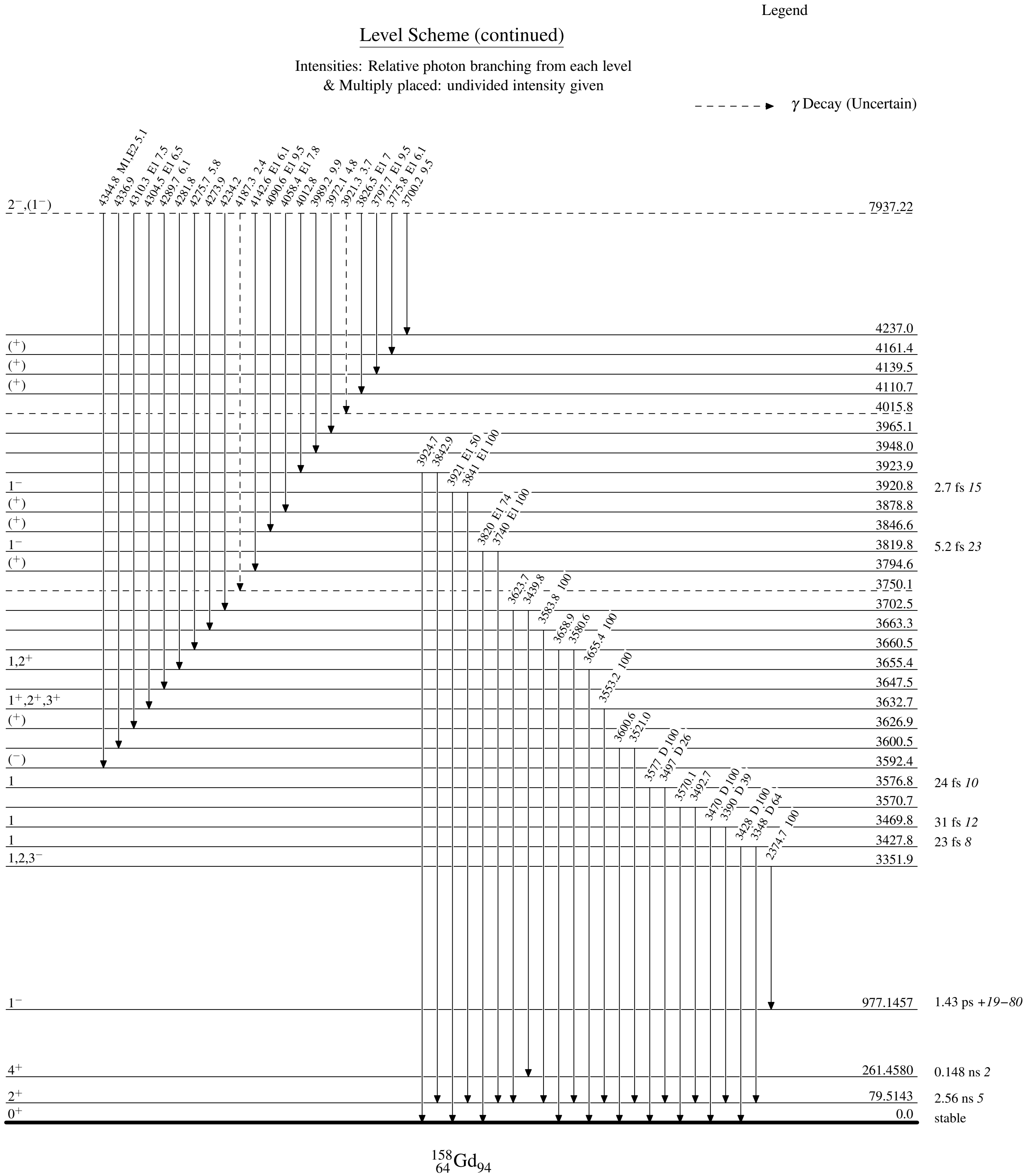
Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

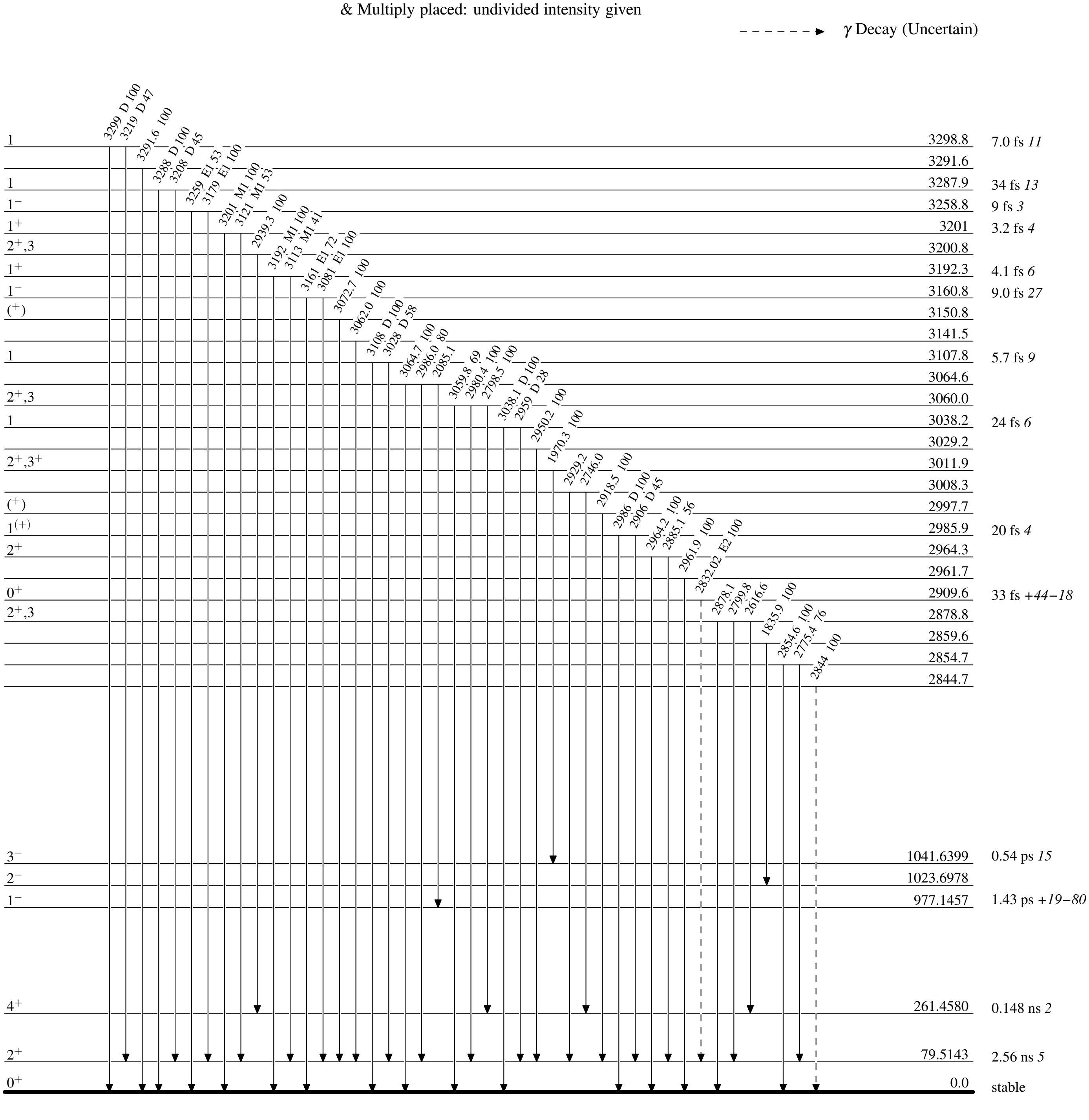


Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

Legend



$^{158}_{64}Gd_{94}$

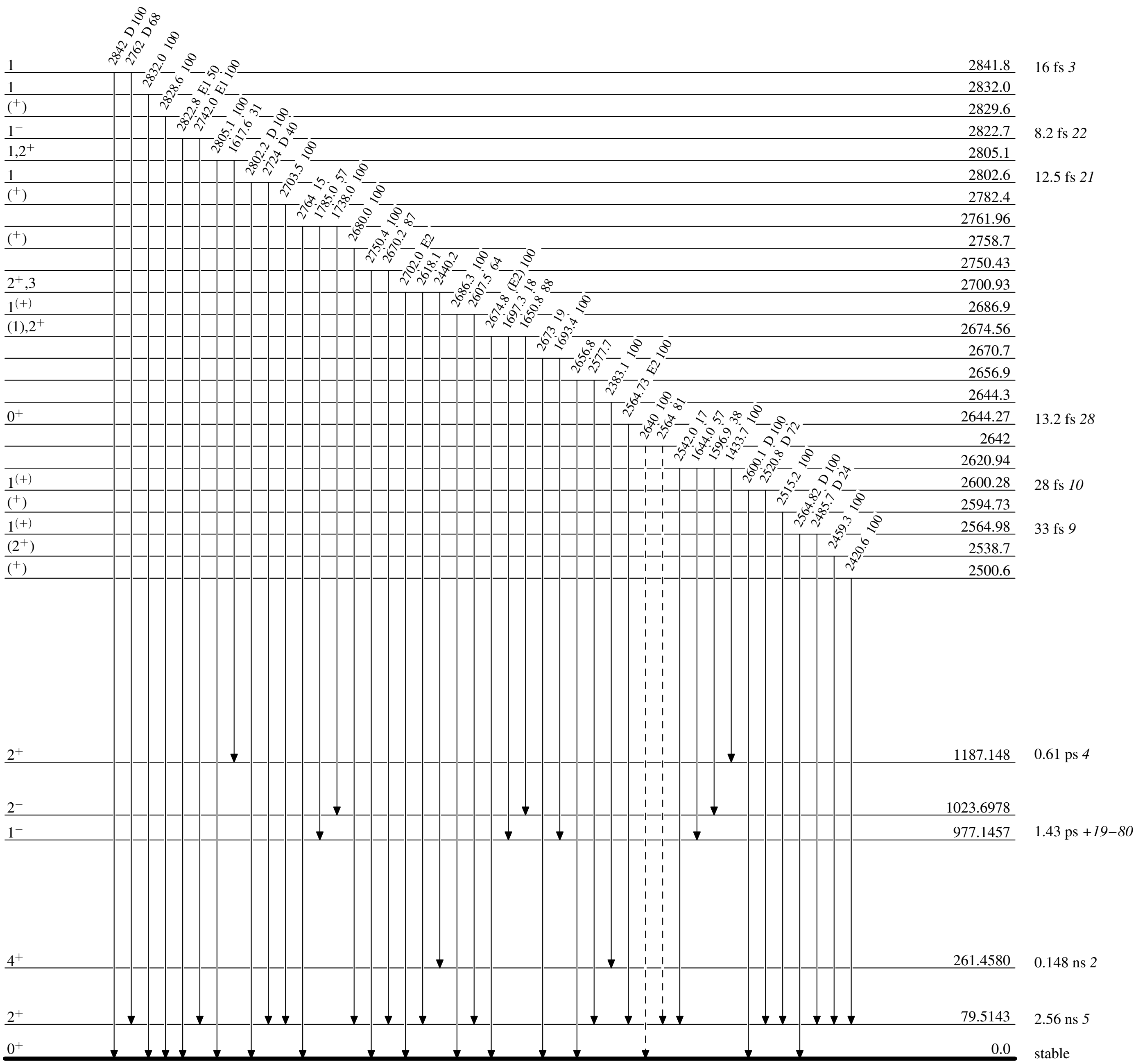
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

Legend

γ Decay (Uncertain)



$^{158}_{64}Gd_{94}$

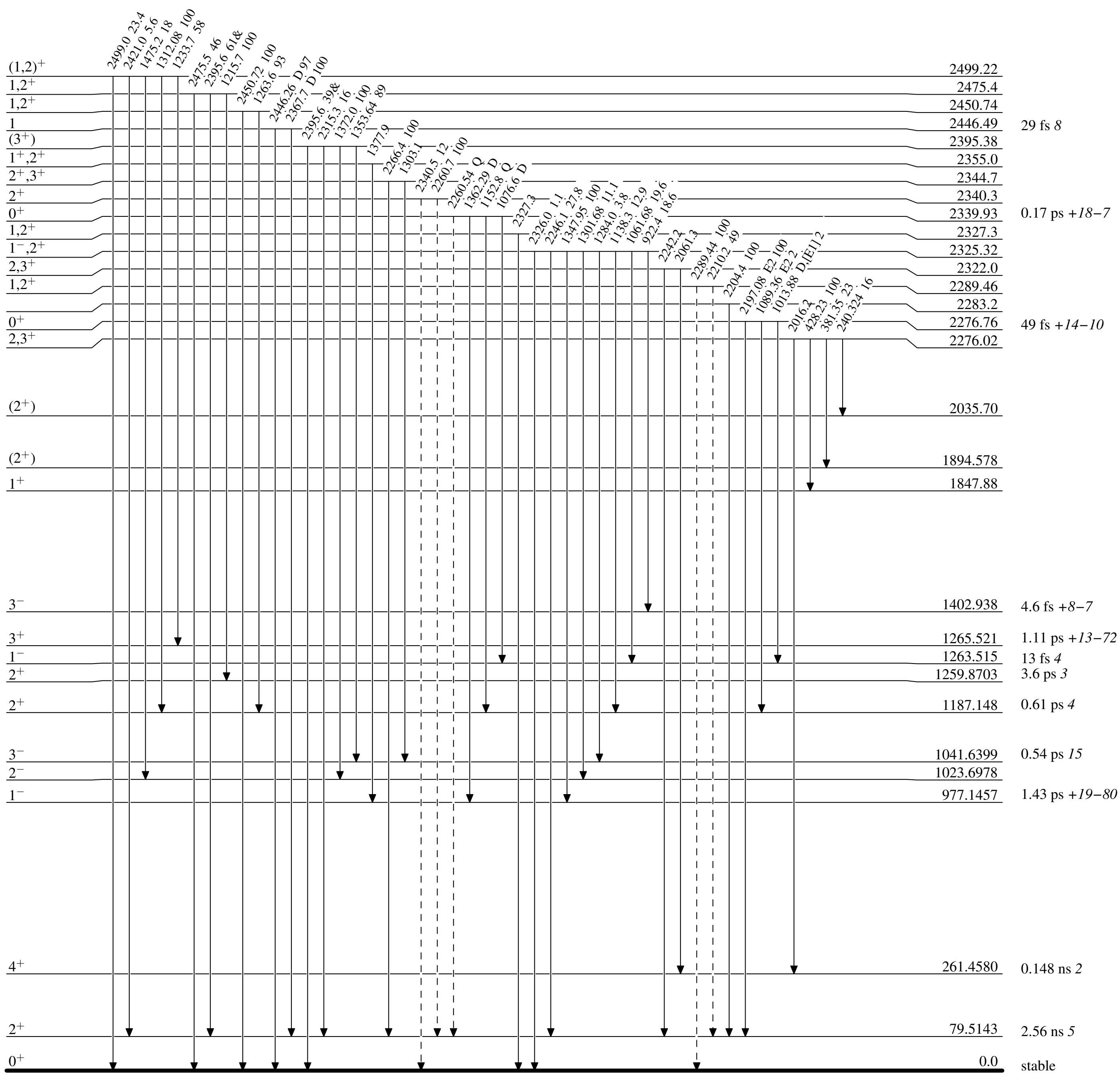
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

γ Decay (Uncertain)



$^{158}_{64}Gd_{94}$

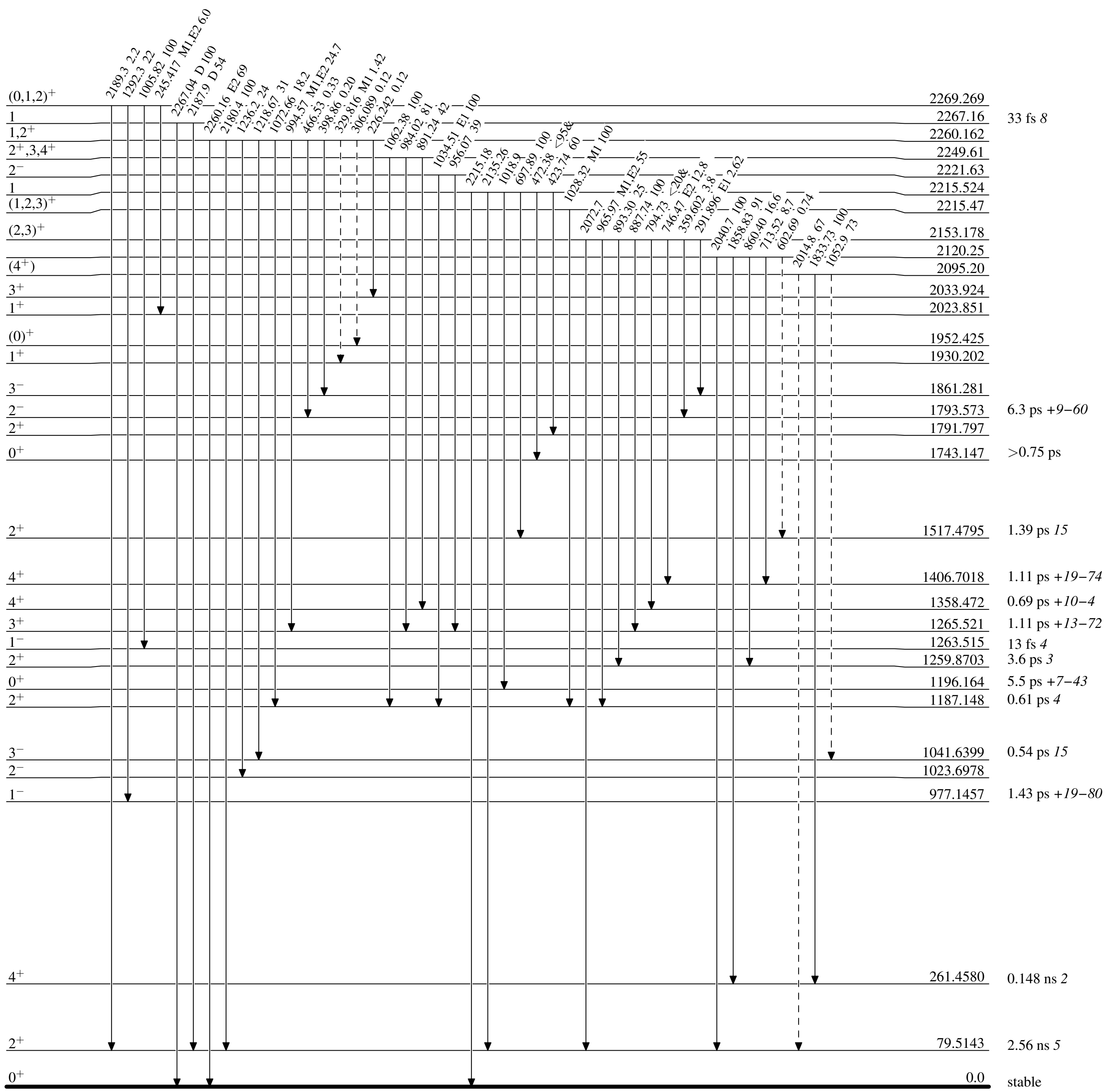
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

γ Decay (Uncertain)

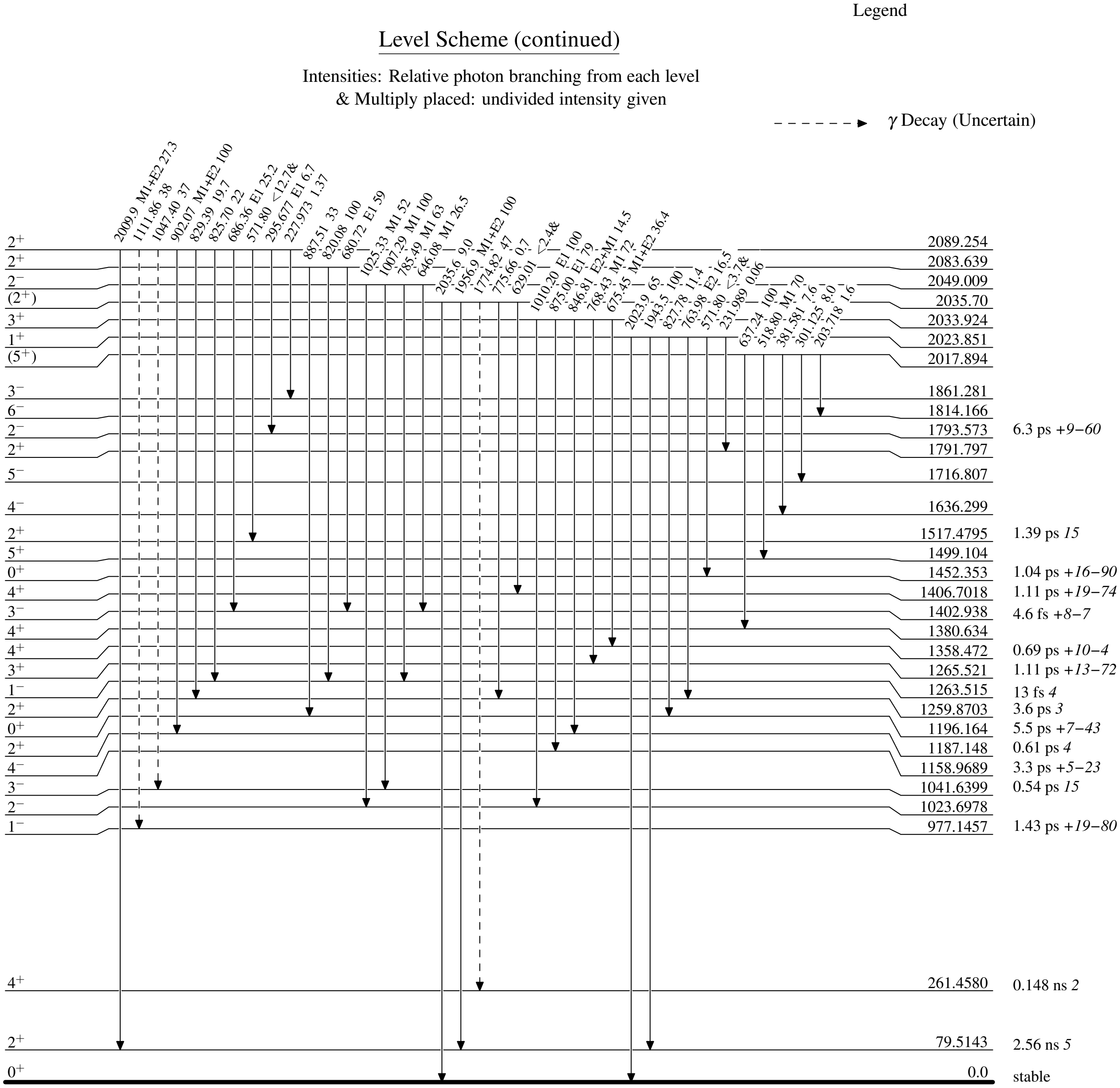


$^{158}_{64}Gd_{94}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given



$^{158}_{64}Gd_{94}$

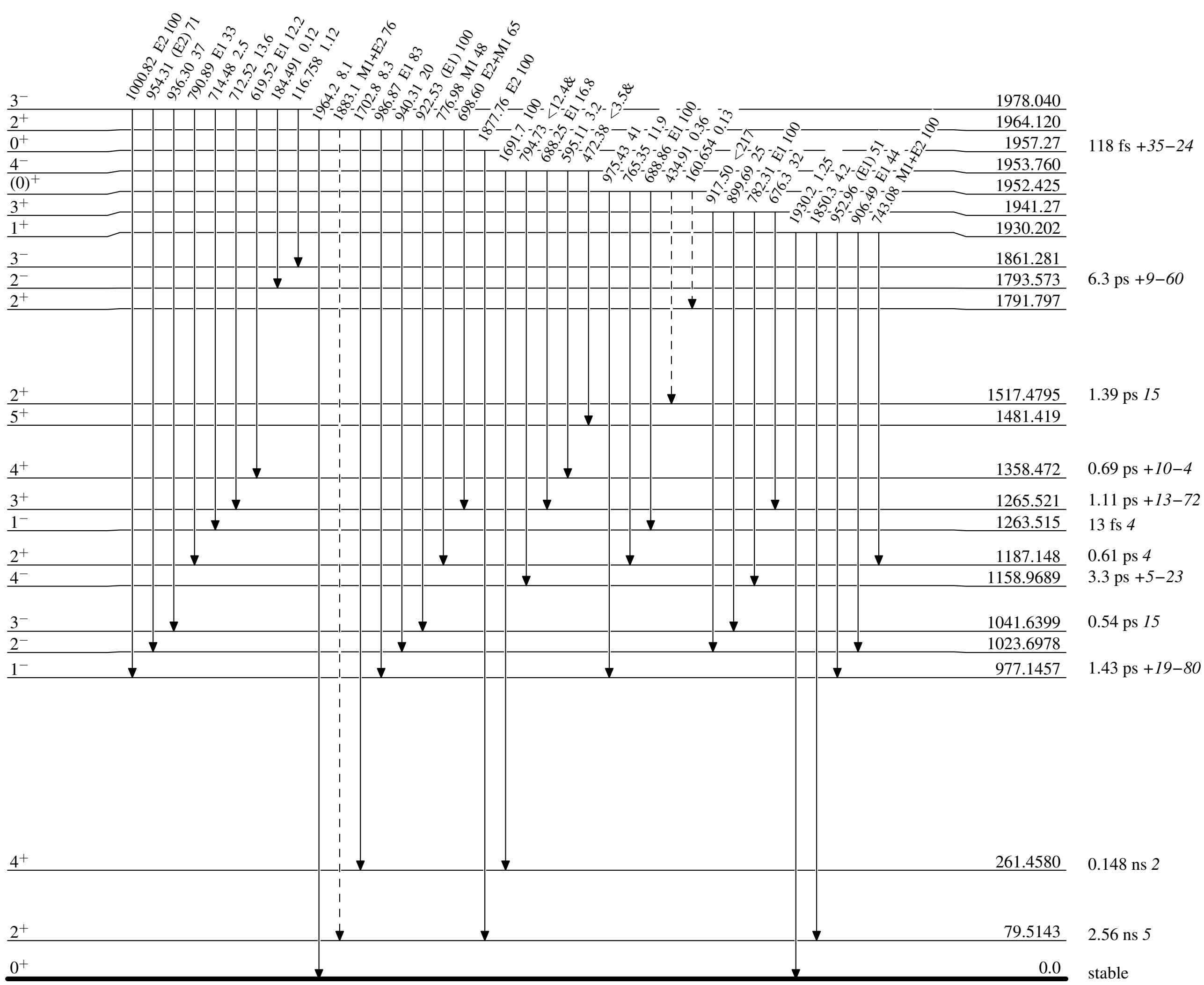
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

- - - - - -► γ Decay (Uncertain)



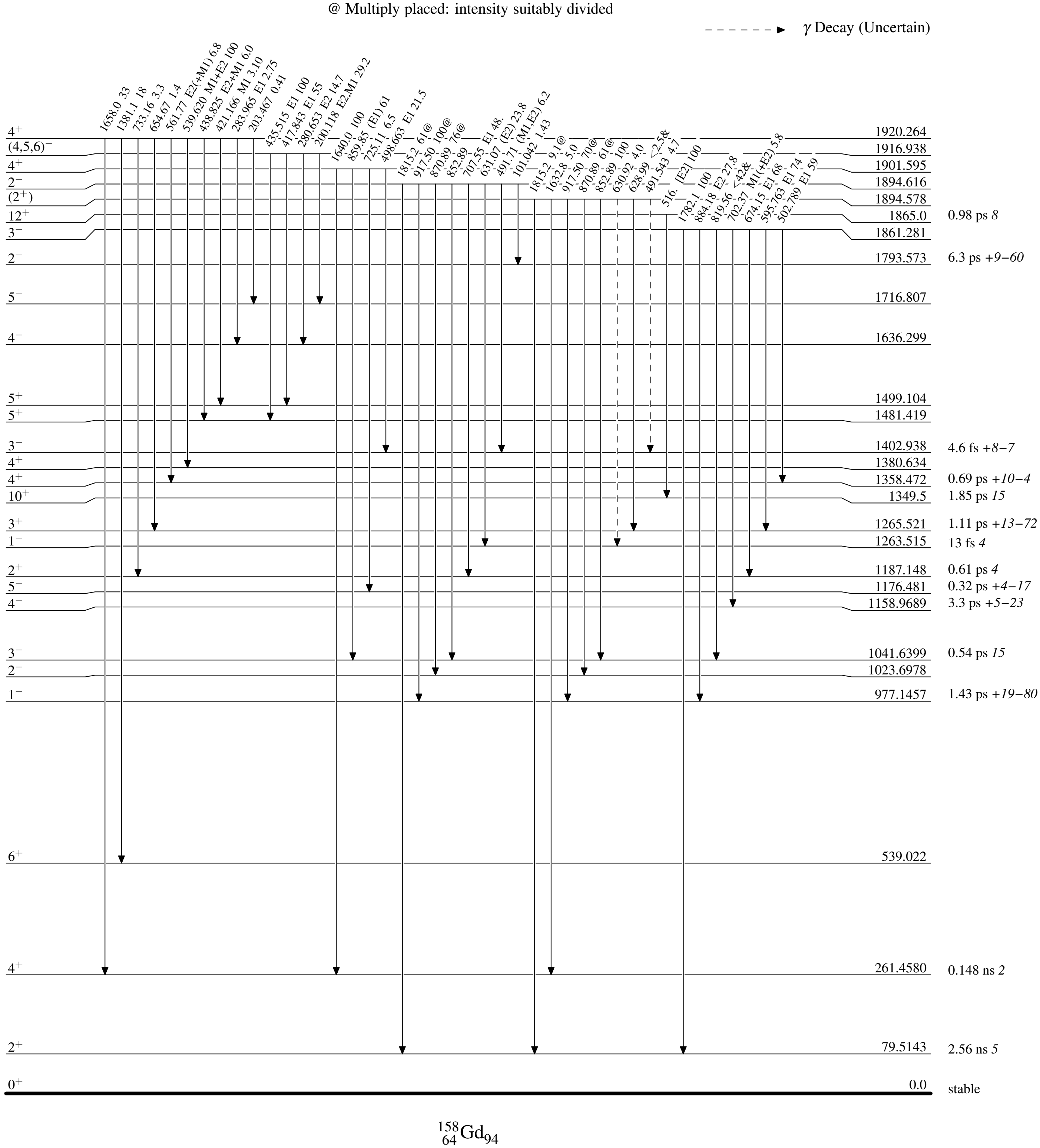
$^{158}_{64}Gd_{94}$

Adopted Levels, Gammas

Level Scheme (continued)

Legend

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

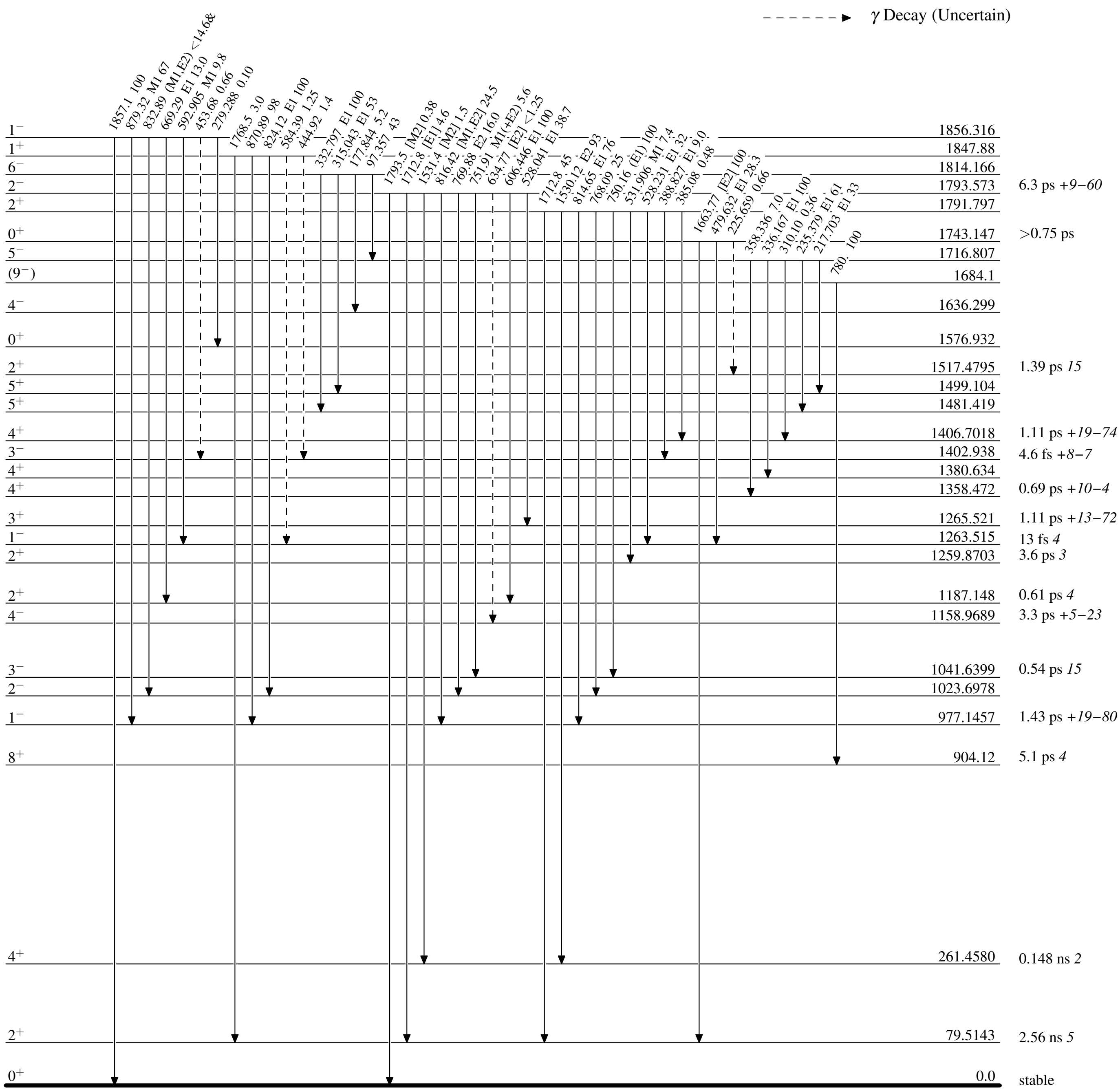


Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend



$^{158}_{64}Gd_{94}$

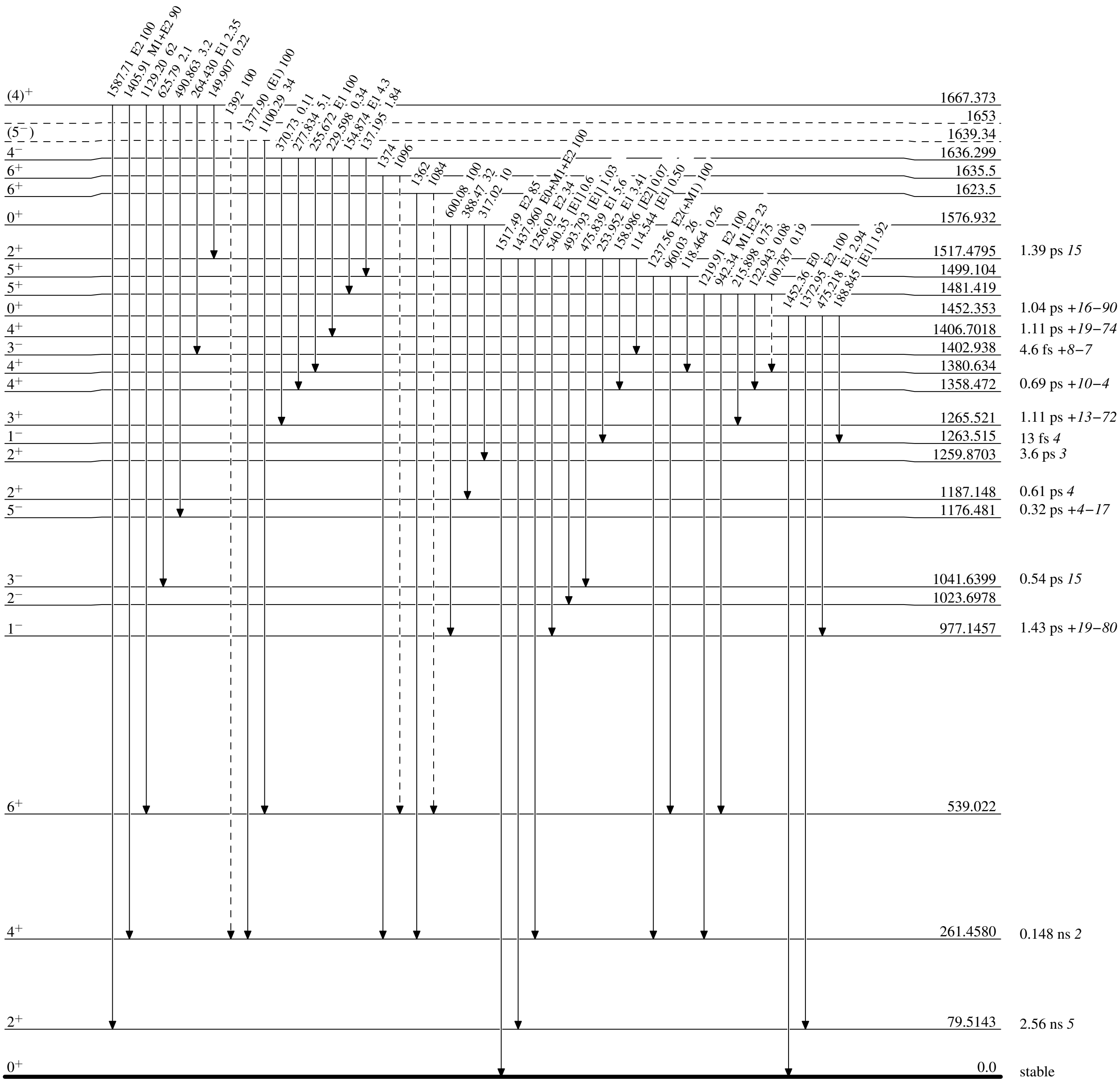
Adopted Levels, Gammas

Level Scheme (continued)

Legend

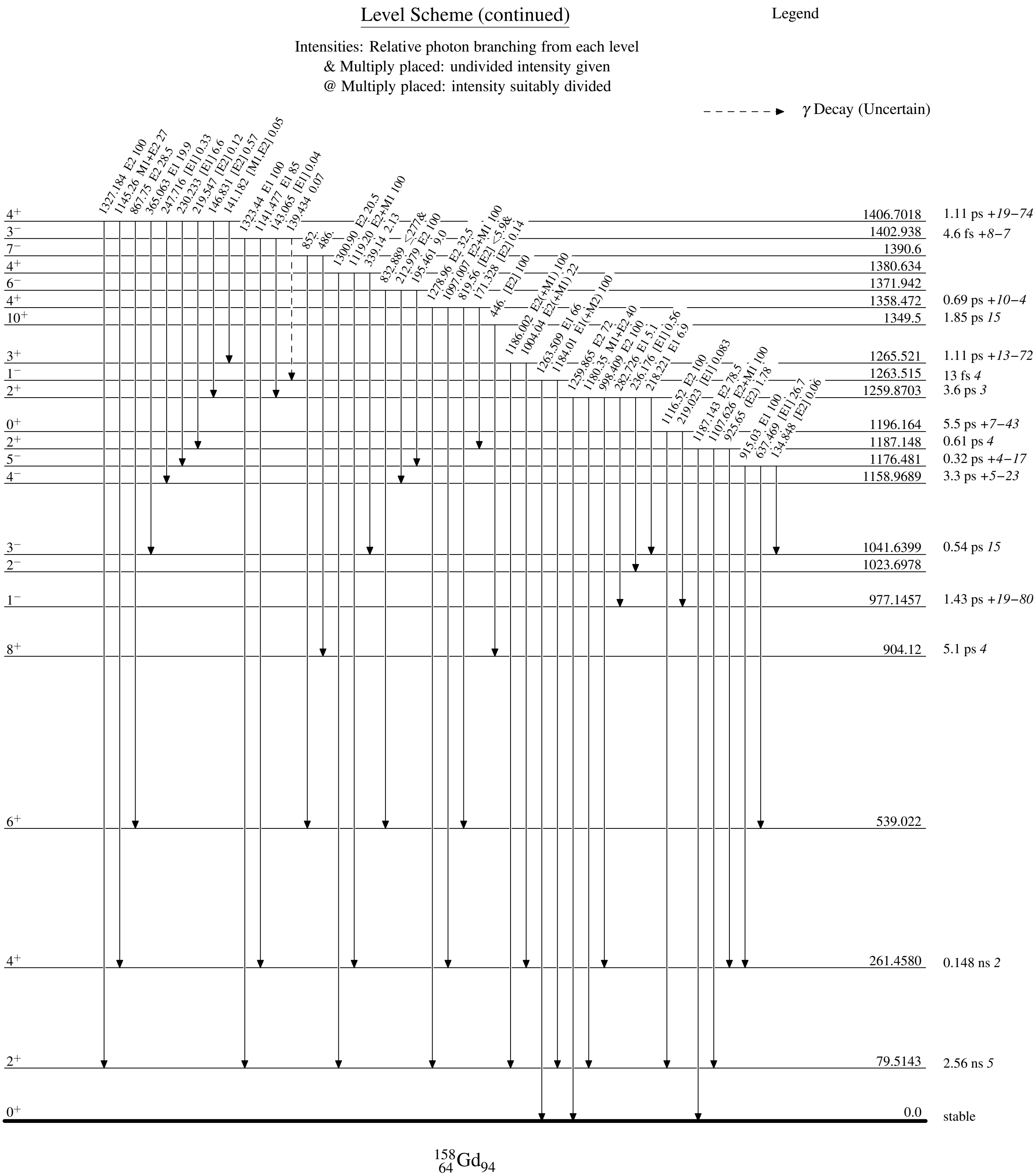
Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

γ Decay (Uncertain)



$^{158}_{64}Gd_{94}$

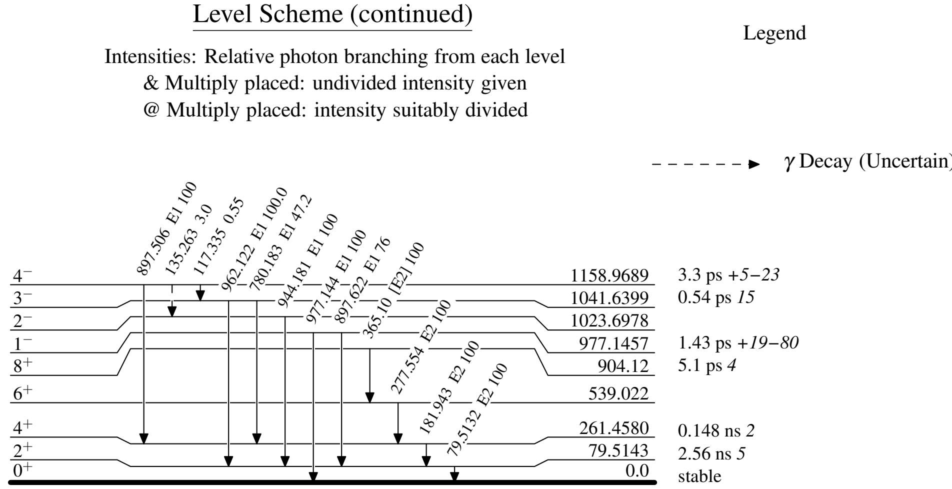
Adopted Levels, Gammas



Adopted Levels, Gammas

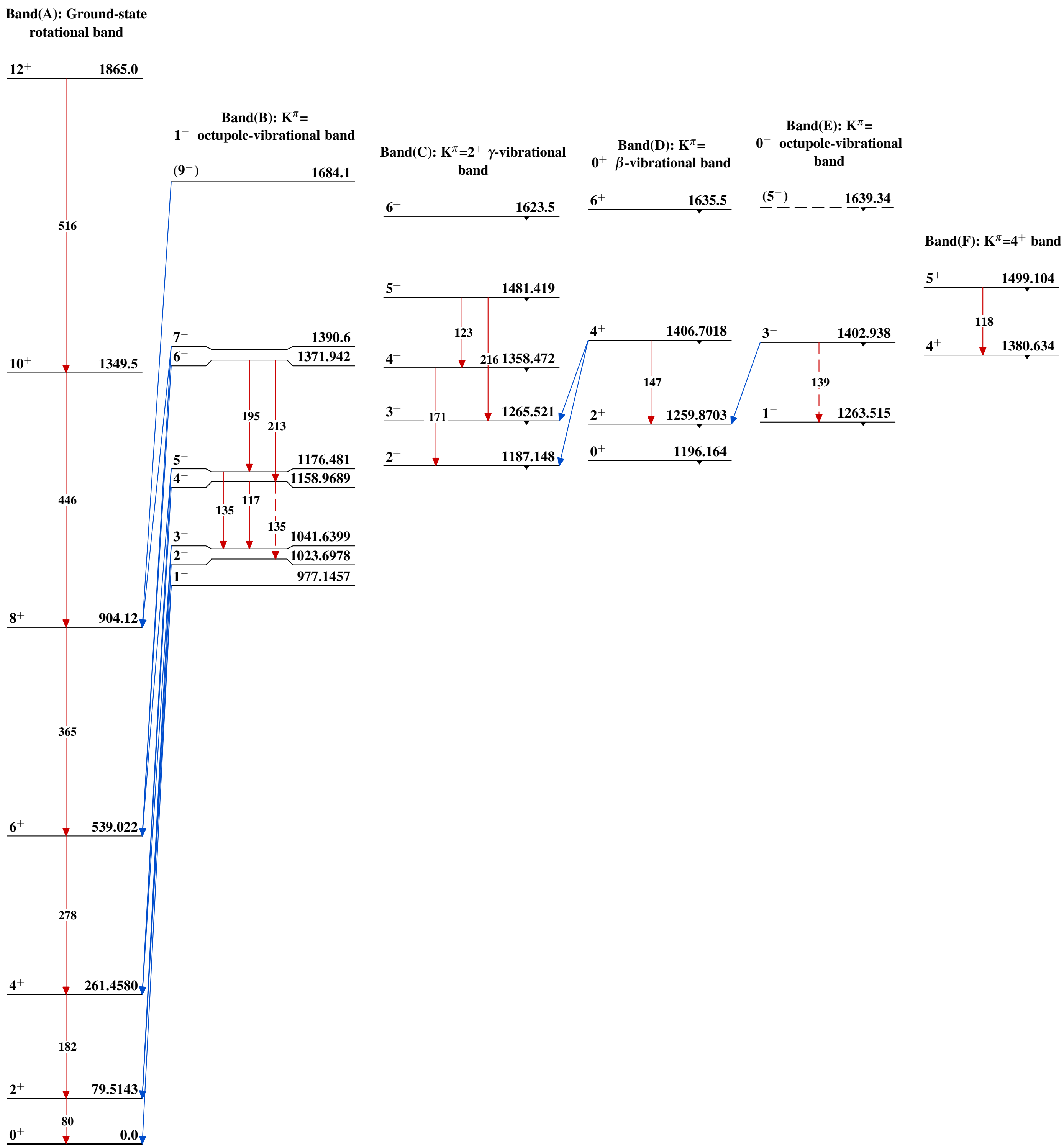
Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided



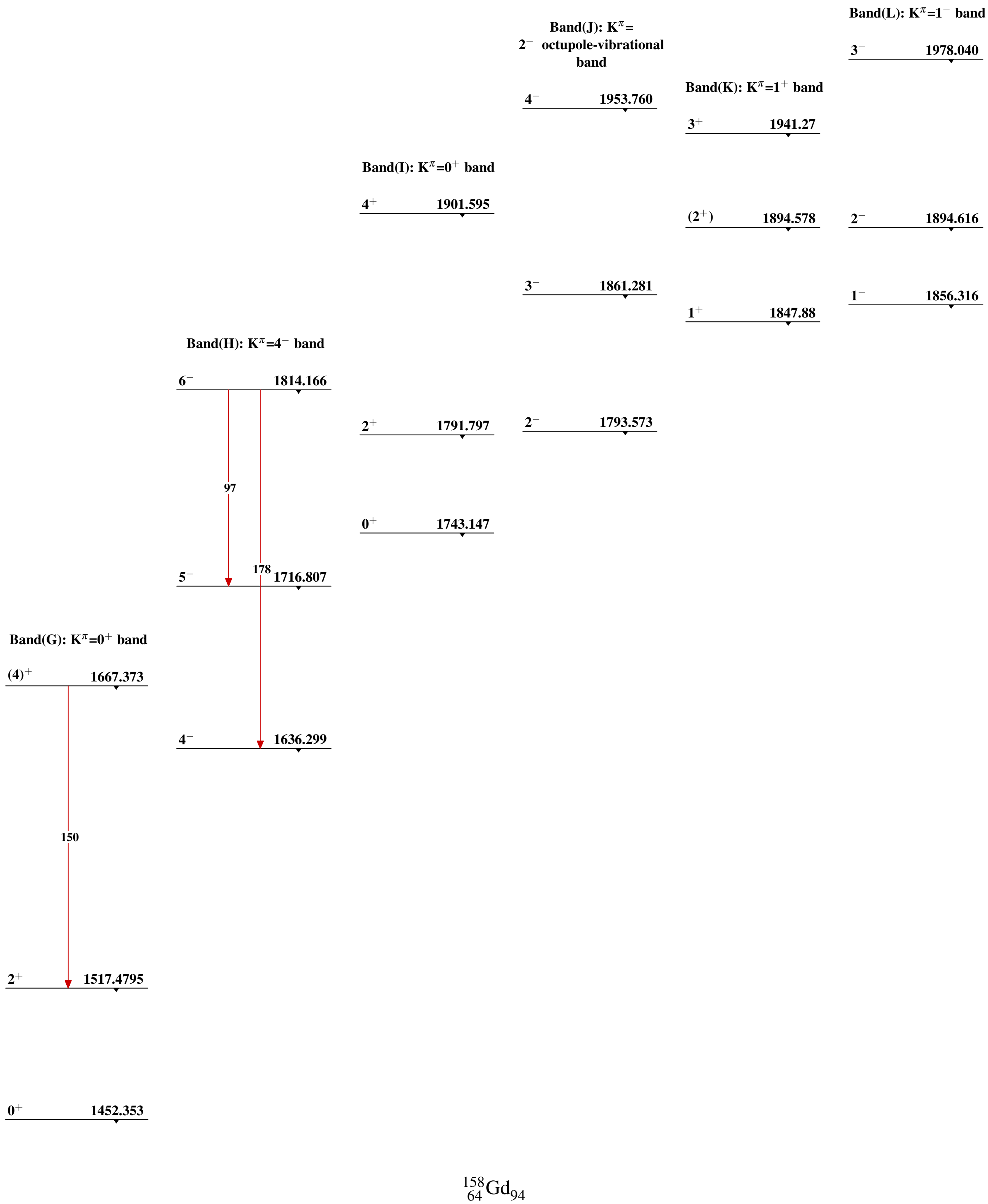
$^{158}_{64}Gd_{94}$

Adopted Levels, Gammas

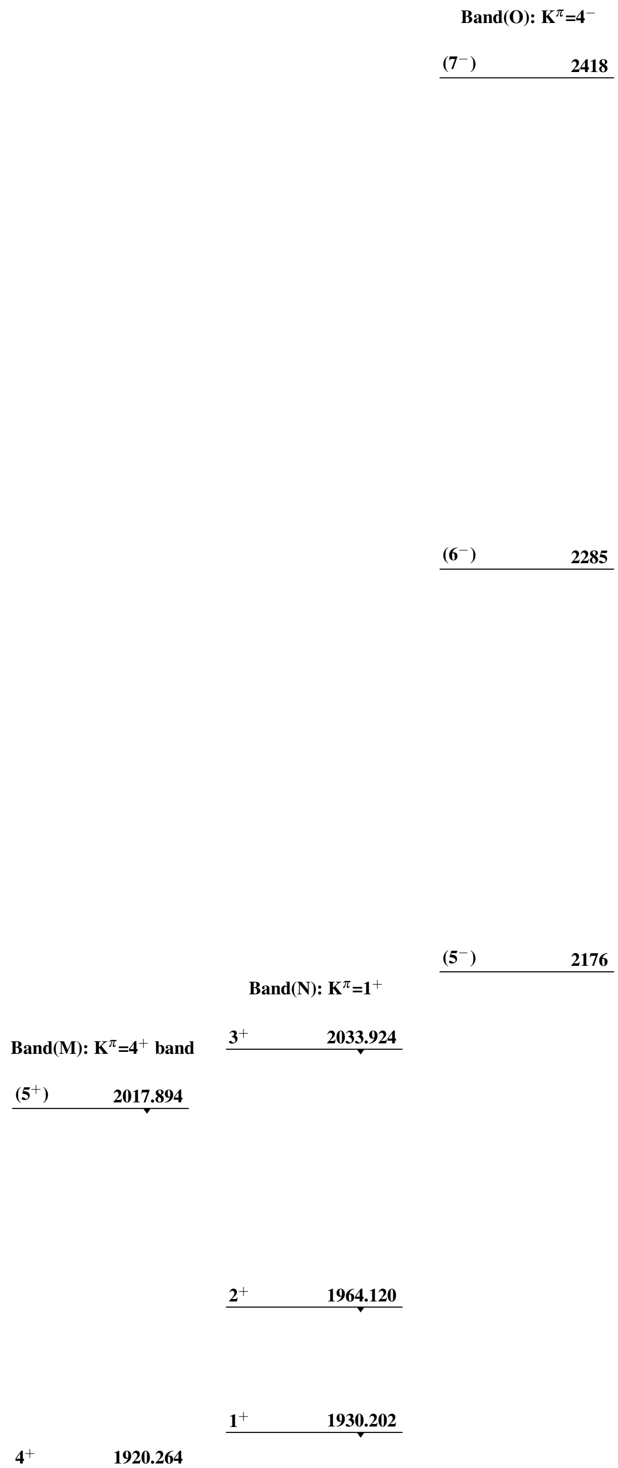


$^{158}_{64}Gd_{94}$

Adopted Levels, Gammas (continued)



Adopted Levels, Gammas (continued)



$^{158}_{64}Gd_{94}$

Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 176, 1 (2021)	1-May-2021

Q(β^-)=−105.6 *10*; S(n)=7451.5 *7*; S(p)=9188 *4*; Q(α)=−1006 *9* 2021Wa16
S(2n)=13394.7 *7*, S(2p)=17268 *5* (2021Wa16).
Additional information 1.
A number of studies, both experimental and theoretical, of double β-decay processes from the ^{160}Gd g.s. have been published. Some of the more recent experimental studies include those of 1995Ko14, 1995Bu18, 1996Da38, 1996De60, 1997Ge14, 2001BiZZ, and 2001Da22. The general trend with time of the results of these studies is to establish ever larger lower limits for the various processes involved (which have not yet been observed). Recent theoretical work is given by 2002Hi06, 2002Hi09, 2002Hi12, 2003Su34, 2004Ra13, 2011Ra41, 2011Ra26, 2011Fa02, 2012Ro44, 2012Ra07, 2012Ko10, 2012Fa11, 2012Fa01, 2012Ba30, 2013Da02, 2013Ba05, 2014Re05, 2015Ko15.

^{160}Gd Levels

Band structures are mostly from (n,n′γ) dataset.

Cross Reference (XREF) Flags

A	^{160}Eu β^- decay (42.6 s)	F	^{160}Gd(p,p′),(pol p,p′)
B	^{160}Eu β^- decay (30.8 s)	G	^{160}Gd(n,n′γ)
C	^{252}Cf SF decay	H	^{160}Gd(d,d′)
D	^{158}Gd(t,p)	I	Coulomb excitation
E	^{160}Gd(γ,γ′)		

E(level)†	J$^\pi$	T$_{1/2}$‡	XREF	Comments
0.0#	0$^+$	stable	ABCDEFGHI	Values for Δ<r^2>(^{160}Gd−^{158}Gd) measured using a variety of techniques have been reported. Some of these are as follows (the values being expressed in units of fm^2): 0.161 *12*, from muonic K- and L-x-ray measurements (1983La08); 0.164 *5*, from LASER-spectroscopic measurements of optical isotope shifts (1990Du08); 0.154 *10*, from isotope shifts of electronic K-x-ray transitions (1969Bh02); and 0.146 *8*, from optical isotope-shift measurements (1987Bo58). 1990Wa25 report λ(^{160}Gd-^{158}Gd)=0.135 *7* (where $\lambda\approx\Delta$<r^2>) from optical isotope-shift measurements. Other measurements are reported by, e.g., 1976Ah04, 1988Al40, 1988Kr15. 1987Au06 give a compilation of optical isotope-shift information (expressed, however, in terms of the nuclear parameter λ). 1995Fr22 report an analysis of Δ<r^2> values from optical, muonic-atom, and electromagnetic interactions for a number of Gd-isotope pairs. For ^{160}Gd, they report Δ<r^2>(^{160}Gd−^{156}Gd)=0.335 fm^2 35. In an evaluation of nuclear rms charge radii, 2013An02 report <r^2>$^{1/2}$=5.1734 fm *44*. T$_{1/2}$: T$_{1/2}$>1.3×10^{21} y for 0ν,2β decay and >1.9×10^{19} y for 2ν,2β decay, from the survey by 2002Tr04 (these are the values reported by 2001Da22 and are quoted at the 90% confidence level).
75.263# *9*	2$^+$	2.72 ns *1*	ABCDEFGHI	μ=+0.72 *4*; Q=−2.08 *4* J$^\pi$: Coulomb excited; member of g.s. band. T$_{1/2}$: from Coulomb excitation. μ: from the compilation of 2014StZZ (measured by 1974Ar23 by the recoil into gas or vacuum method (reevaluated or adjusted by compiler)). Q: from the compilation of 2016St14 (measured by 1983La08 by muonic X-ray hyperfine structure method).
248.502# *18*	4$^+$		ABCD FGHI	μ=+1.6 *2* M(E4; 0$^+$ to 4$^+$)=0.33 *5* from Coul. ex.

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Adopted Levels, Gammas (continued)

^{160}Gd Levels (continued)

E(level)†	J$^{\pi}$	T$_{1/2}$‡	XREF	Comments
				J$^{\pi}$: E2 γ to 2^{+}, E4 Coulomb excited, member of g.s. band. μ: from the compilation of 2014StZZ (from g-factor measured by 1991St01 by transient field integral perturbed angular correlation method).
514.81# *4*	6^{+}		A CD FGHI	μ=+2.4 *3* J$^{\pi}$: E2 γ to 4^{+}, member of g.s. band. μ: from the compilation of 2014StZZ (from g-factor measured by 1991St01 by transient field integral perturbed angular correlation method).
868.6# *6*	8^{+}		C G I	J$^{\pi}$: E2 γ to 6^{+}, member of g.s. band.
913? *7*			D	
946?			H	
988.548@ *15*	2^{+}	1.40 ps *6*	B D FGHI	J$^{\pi}$: E2 γ's to 0^{+} and 4^{+}. T$_{1/2}$: from B(E2) in Coul. ex.; other value: > 1.25 ps (2017Le04, (n,n′γ)).
1016?			H	
1057.426@ *19*	3^{+}	>1525 fs	B D FG I	J$^{\pi}$: M1+E2 γ's to 2^{+} and 4^{+}.
1070.422& *21*	4^{+}		A GH	J$^{\pi}$: E2 γ to 2^{+} and γ to 6^{+}.
1147.985@ *21*	4^{+}	0.75 ps *+51−22*	D FGHI	J$^{\pi}$: E2 γ to 2^{+} and M1+E2 γ to 4^{+}. B(E4)↑ value, from (pol p,p′) coupled-channel analysis, is suggestive of collective (γ-vibrational) character.
1173.09& *4*	(5)$^{+}$		A G	J$^{\pi}$: 4^{+},5^{+} from M1+E2 γ to 4^{+}, γ to 6^{+}; member of K^{π}=4^{+} band makes 4^{+} less likely.
1224.237b *22*	1$^{(-)}$	14.2 fs *14*	B EFGHI	J$^{\pi}$: (E1) γ's to 0^{+} and 2^{+}. Population of this level in (d,d′) suggests natural parity, although level is only weakly excited there. Bandhead of K^{π}=0^{-} octupole vibration. T$_{1/2}$: other value calculated by evaluator from $\Gamma^2_{\gamma 0}/\Gamma$=4.5 meV 12 in ($\gamma$,$\gamma$′) (1989Pi05) and the adopted γ branching from this level: 15 fs *4*.
1260.98@ *4*	5^{+}	243 fs *+83−55*	A G	J$^{\pi}$: M1+E2 γ's to 4^{+} and 6^{+}.
1289.76b *3*	3^{-}	23.6 fs *21*	B D FGHI	B(E3)↑=0.118 *7* XREF: D(1299). B(E3)↑: from Coul. Ex. (1981Mc06). J$^{\pi}$: E1+M2 γ to 4^{+} and (E1) γ to 2^{+}; E3 excitation in Coul. ex. B(E3)↑ indicates collective excitation. T$_{1/2}$: other value: 51 fs *14* (1981Mc06, based on Doppler-broadened line shape in Coul. ex.).
1295.22& *5*	(6^{+})		A G	J$^{\pi}$: (4^{+},5,6^{+}) from γ's to 4^{+} and 6^{+}; (6^{+}) adopted by 2009Go33 in (n,n′γ) dataset as member of K^{π}=4^{+} band.
1301.3# *9*	10^{+}		G I	g(10^{+})/g(2^{+})=0.93 *13* (1983Ha24). J$^{\pi}$: Coulomb excited, with sole observed decay mode being a γ to the 8^{+} member of the g.s. band. This, together with the level energy, indicates that this is the 10^{+} member of this band.
1325.7 *10*	(2^{+})		G	J$^{\pi}$: previous (0^{+}) assignment in (n,n′γ) by 1989Be48 rejected by 2015Le05 and 2009Go33 found this γ anisotropic; (2^{+}) was tentatively assigned by 2015Le05 based on the observed anisotropy.
1351.188e *20*	1^{-}	125 fs *14*	B G	J$^{\pi}$: E1 γ to 2^{+} and γ to 0^{+}; K^{π}=1^{-} band head (2009Go33).
1376.73e *3*	2^{-}	>381 fs	B G	J$^{\pi}$: 2^{-},3^{-} from E1+M2 γ to 2^{+} and γ to 3^{+}, of which 2^{-} is adopted by in (n,n′γ) dataset (2009Go33) as second level in K^{π}=1^{-} band.
1379.54c *4*	0^{+}	>936 fs	D G	XREF: D(1382). J$^{\pi}$: E2 γ to 2^{+}; spin 0^{+} confirmed by isotropic pattern of 1304γ (see (n,n′γ) dataset).
1392.99@ *8*	6^{+}		A G I	J$^{\pi}$: stretched E2 γ to 4^{+} and M1+E2 γ to 6^{+}. Energy spacing and

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{160}Gd Levels (continued)

E(level)[†]	J$^{\pi}$	T$_{1/2}$[‡]	XREF	Comments
				excitation in Coul. ex. (indicating collective character) support assignment of the state as the 6^{+} member of the γ-vibrational band.
1427.40[b] *5*	5^{-}	35 fs *7*	GHI	J$^{\pi}$: E1+M2 γ to 4^{+}; ratio of (d,d′) cross sections at 90° and 125°, together with level energy, indicate that this is the 5^{-} member of the K^{π}=0^{-} octupole band.
1436.27[c] *3*	2^{+}	>236 fs	B G	J$^{\pi}$: E2 γ′s to 0^{+} and 4^{+}.
1437.40[&] *19*	(7^{+})		A G	J$^{\pi}$: member of first K$^{\pi}$=4^{+} band.
1460.3 *4*	(3^{-})		F H	J$^{\pi}$: ratio of (d,d′) cross sections at 90° and 125°. γ′s to 4^{+} and, possibly, 2^{+} states.
1463.83[e] *4*	3^{-}	5.0 fs *35*	B G	J$^{\pi}$: E1+M2 γ to 2^{+}.
1483.08[a] *7*	(4^{+})		A	J$^{\pi}$: γ′s to 2^{+} and 6^{+} and proposed bandhead configuration.
1498.85[e] *5*	4^{-}	>277 fs	G	J$^{\pi}$: E1(+M2) γ to 4^{+}, γ to 3^{+}, and member of K^{π}=1^{-} band.
1531.95[g] *8*	3^{-}		G	J$^{\pi}$: E1+M2 γ to 4^{+}, and γ′s to 2^{+} and 4^{+}. possibly the bandhead of first K^{π}=3^{-} band (2009Go33, (n,n′γ)).
1548.18[@] *9*	(7^{+})		A G	J$^{\pi}$: γ′s to 6^{+} and expected band structure of γ-vibrational band.
1558.35[d] *8*	0^{+}	>409 fs	G	J$^{\pi}$: stretched E2 γ to 2^{+}; $\gamma(\theta)$ confirms J=0 assignment.
1561.45[c] *5*	4^{+}	>222 fs	G	J$^{\pi}$: 4^{+},5^{+} from M1+E2 γ to 4^{+} and γ to 6^{+}; 2009Go33 and 2017Le04 adopt 4^{+} as member of first excited K$^{\pi}$=0^{+} band; the latter superseded 2015Le05 that from Alaga rules for γ-ray branching ratios concluded that this level is not a member of the that band.
1568.67[f] *4*	1^{+}	0.7 ps *+13−3*	G	J$^{\pi}$: M1+E2 γ to 2^{+} and (M1) γ to 0^{+} states.
1581.81[a] *14*	(5^{+})		A	J$^{\pi}$: M1 γ to (4^{+}) and proposed band assignment.
1583.59 *14*			G	
1586.56[f] *4*	2^{+}	>347 fs	G	J$^{\pi}$: M1+E2 γ to 2^{+} and γ to 0^{+}; 2009Go33 adopt it as 2^{+} member in K^{π}=1 band.
1597.3[&] *10*	(8^{+})		G	J$^{\pi}$: γ to (6^{+}) and member of K$^{\pi}$=4^{+} band.
1598.82[d] *5*	2^{+}	0.56 ps *+51−21*	G	J$^{\pi}$: E2 γ to 0^{+} and M1+E2 γ to 3^{+}.
1608.3 *7*			B	
1621.37[h] *7*	2^{-}	0.2 ps *+25−1*	G	J$^{\pi}$: E1 γ to 3^{+} and γ 2^{+}, bandhead of first K^{π}=2^{-} band.
1644.39[b] *13*	(7^{-})		G I	J$^{\pi}$: γ′s to 6^{+} and 8^{+} members of the g.s. band. Energy spacing and excitation in Coul. ex. suggest that this is the 7^{-} member of the 0^{-} octupole band.
1647.95 *8*	4^{+}	0.21 ps *+18−7*	G	J$^{\pi}$: E2 γ to 2^{+} and γ to 6^{+}.
1653.26[e] *8*	5^{-}	42 fs *+14−10*	G	J$^{\pi}$: E1+M2 γ′s to 4^{+} and 6^{+}.
1657.2 *5*	(1^{-},2)		B	J$^{\pi}$: (1^{-},2,3^{-}) from γ′s to (1^{-}) and 3^{-}; (1,2^{-}) from possible β feeding from (1^{-}) (2020Ha13).
1661.76 *5*	(2^{+},3,4^{+})	0.6 ps *+11−3*	G	J$^{\pi}$: γ′s to 2^{+} and 4^{+}.
1665.09[f] *5*	3^{+}		G	J$^{\pi}$: M1+E2 γ′s to 2^{+} and 4^{+}.
1668.4[e] *10*	(6^{-})		G	J$^{\pi}$: member of first K$^{\pi}$=1^{-} band.
1688	(3^{-})		D H	XREF: D(1694). this level was related with 1687.9 in 2005Re18 evaluation based on 1989Be48; however neither of the γ′s depopulating 1687.9 level were confirmed by 2009Go33 and it was not adopted in this evaluation. J$^{\pi}$: ratio of the (d,d′) cross sections at 90° and 125° suggests 3^{-}.
1691.35[h] *6*	3^{-}	0.15 ps *+24−7*	G	J$^{\pi}$: E1 γ to 4^{+} and (E1) γ to 2^{+}.
1692.8?[f] *6*	(4^{+})		G	E(level): very close lying to well defined 1691 level; according to 2012Gr22 (in (n,n′γ) dataset) both these levels are deexcited by 1442.95γ and 1443.0γ (possibly of same intensities). J$^{\pi}$: γ′s to 2^{+} and 4^{+} and member of first K$^{\pi}$=1^{+} band.

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Adopted Levels, Gammas (continued)

^{160}Gd Levels (continued)

E(level)†	Jπ	T1/2‡	XREF	Comments
1698.21 *22*	(5,6+)		A	Jπ: (5,6) adopted in β^- decay (42.6 s) based on direct feeding from (5−) parent; (4+,5,6+) from γ′s to (4+) and 6+.
1717.5@ *6*	(8+)		G I	Jπ: γ′s to 6+ and 8+ levels. Level energy consistent with that of the 8+ member of the γ-vibrational band.
1720.48 *9*	(2+)		G	Jπ: 2−,3,4+ ruled out by γ(θ) (2009Go33, (n,n′γ)); (2+,3,4+) from γ′s to 2+ and 4+.
1731.93 *7*	NOT 1		G	Jπ: 1 is ruled out by A_2=+0.25 in γ(θ) (2009Go33, (n,n′γ)).
1748.55c	(6+)		G	Jπ: member of first excited Kπ=0+ band.
1782.48h *7*	(4)−		G	Jπ: E1 γ to 4+ and member of first Kπ=2− band.
1804.97 *6*	2+	>208 fs	G	Jπ: E2 γ to 0+ and γ to 4+.
1806.9# *11*	12+		G I	Jπ: γ to 10+ member of g.s. band. Level energy and population in Coulomb excitation indicate that this is the 12+ member of this band.
1884.0h *4*	(5−)		G	Jπ: member of first Kπ=2− band.
1886.8 *7*	(1,2)		B	Jπ: γ to 2+ and possible β feeding from (1−) (2020Ha13).
1910.7e *4*	(7−)		G	Jπ: member of first Kπ=1− band.
1931.86 *10*	2+	0.5 ps *+12−2*	B G	Jπ: M1+E2 γ to 2+ and γ′s to 0+ and 4+.
1941.5b *10*	(9−)		G I	Jπ: γ′s to 8+ and 10+ members of the g.s. band. Level energy consistent with assignment as the 9− member of the 0− octupole band.
1966.51 *10*	(1−)	23 fs *8*	B E G	Jπ: E1 γ′s to 0+ and 2+, with both γ′s from all three datasets which observed this level. However this contradicts (2+,3,4+) from other γ′s coming exclusively from β^- decay (30.8 s) to 2+ and 4+, which suggests that this level could be a doublet. See also comments on 908.2, 977.3 and 1717.0 γ transitions. $T_{1/2}$: mean value of 20 fs *5* from $\Gamma^2_{\gamma 0}/\Gamma$=3.9 meV 9 (1989Pi05, (γ,γ′), assuming that the 1891 and 1967 γ′s are the only deexciting transitions) and 26 fs *+6−5* from DSAM (2017Le04, (n,n′γ))
1969.67 *13*	2+		G	Jπ: M1+E2 γ to 2+ and γ′s to 0+ and 4+.
1973			H	this level was related with 1971.5 in 2005Re18 evaluation based on 1989Be48; however neither of the γ′s depopulating 1971.5 level were confirmed by 2009Go33 and it was not adopted in this evaluation.
1996.26 *15*			G	
1998.71 *8*	(5−)		A	Jπ: γ′s to 4+ and 6+ and proposed configuration. Possible Kπ=5− bandhead. Proposed π^2(5/2[413],5/2[532]) configuration in β^- decay (42.6 s) (2018Ha19, 2020Ha13).
2030.61 *13*	2+,3+		G	Jπ: M1+E2 γ to 2+ and γ′s to 4+.
2059.62 *10*	2(−),3(−)	159 fs *+62−35*	GH	XREF: H(2063). Jπ: (E1+M2) γ to 4+ allows J=2,3,4 and tentative negative parity; 2009Go33 in (n,n′γ) dataset explicitly exclude 2+, 4−, and 6+ (from the A_2 value of angular distribution coefficient).
2109.33 *9*	1(+)	229 fs *+83−49*	G	Jπ: (M1) γ to 0+.
2118.6@ *8*	(10+)		G I	Jπ: γ′s to 8+ and 10+ states. Level energy consistent with assignment as the 10+ member of the γ-vibrational band.
2118.90 *18*	2+		G	Jπ: E2 γ to 0+.
2135.72 *10*		0.29 ps *+61−13*	G	
2139 *7*			D H	XREF: H(2141).
2162.69 *12*	1		E G	Jπ: dipole excitation in (γ,γ′).
2236	(0+)		D	Jπ: L=(0) in (t,p) (1986Lo15).
2242.2 *6*	(1,2)		B	
2252.7 *3*			A	
2277.4 *5*	1		B E	Jπ: stretched D γ to 0+ in (γ,γ′).

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Adopted Levels, Gammas (continued)

^{160}Gd Levels (continued)

E(level)†	J^π	XREF	Comments
2282.74 *22*	$(1^+,2^+)$	B G	J^π: γ's to 0^+ and 3^+.
2301.54 *16*	2^+	G	J^π: E2 γ to 0^+.
2313.3[b] *13*	(11^-)	G I	J^π: γ to the 10^+ member and possible γ to the 12^+ member of the g.s. band. Level energy consistent with assignment as the 11^- member of the 0^- octupole band.
2315.8 *10*	(1,2)	B	J^π: from possible β feeding from (1^-) (2020Ha13).
2327.5 *6*	$(1^+,2)$	B	J^π: $(1^+,2,3^-)$ from γ's to 1^- and 3^+ respectively; $(1^+,2)$ from possible β feeding from (1^-) (2020Ha13).
2333.5 *5*	$(1,2^+)$	B	J^π: $(0^+,1,2^+)$ from γ's to 0^+ and 2^+ respectively; $(1^+,2)$ from possible β feeding from (1^-) (2020Ha13).
2344.5 *4*		A	
2347.4 *4*	1^+	dE G	XREF: d(2350). J^π: M1 excitation in (γ,γ').
2361.93 *14*	$(2^+,3^-)$	B G	J^π: γ's to $1^{(-)}$ and 4^+.
2377.9[#] *15*	14^+	G I	J^π: sole observed decay mode is a γ to the 12^+ member of the g.s. band. Level energy and population in Coulomb excitation indicate that this is the 14^+ member of that band.
2383.6 *6*	$(2^+,3,4^+)$	G	J^π: γ's to 2^+ and 4^+.
2385.6 *7*	(1,2)	B	J^π: from possible β feeding from (1^-) (2020Ha13).
2432.7 *4*	$(1^-,2^+)$	B	J^π: γ's to 0^+ and 3^-.
2444.8 *3*	$(2^+,3,4^+)$	G	J^π: γ's to 2^+ and 4^+.
2456.0 *3*	$(2^+,3,4^+)$	G	J^π: γ's to 2^+ and 4^+.
2464.41 *10*	(1^-)	B	J^π: $(1,2^+)$ from γ's to 0^+, 2^+ and 2^-; (1^-) from possible β feeding from (1^-) (2020Ha13).
2471.77 *10*	1^-	B E G	J^π: E1 excitation in (γ,γ'). the large B(E1) value (3.1×10^{-5} *5*) for exciting this level in (γ,γ') has been used as evidence for considering it to be a collective electric-dipole excitation arising from, for example, a reflection-asymmetric shape and/or a cluster configuration.
2489.60 *13*	$(5^+,6^+)$	A	J^π: γ's to (4^+) and (7^+).
2510.7 *5*	$(1,2^-)$	B	
2516.5 *5*	(2)	B	J^π: $(2,3^-)$ from γ's to 1^-, 3^+ and 3^-; (2) from possible β feeding from (1^-) (2020Ha13).
2529.9 *5*	$(1^-,2)$	B	J^π: $(1^-,2,3^-)$ from γ's to 1^- and 3^-; $(1^-,2)$ from possible β feeding from (1^-) (2020Ha13).
2547.0 *5*	$(0^+,1,2^+)$	G	J^π: γ's to 0^+ and 2^+.
2559.54 *13*	$(5^+,6^+)$	A	J^π: γ's to (4^+) and (7^+).
2582.9[@] *10*	(12^+)	G I	J^π: γ's to 10^+ and 12^+ levels. Level energy consistent with assignment as the 12^+ member of the γ-vibrational band.
2670.2 *7*	1^+	E	J^π: M1 excitation in (γ,γ').
2761.2 *7*	1	E	J^π: dipole excitation in (γ,γ').
2796.2 *7*	1^+	E	J^π: M1 excitation in (γ,γ').
2820.2 *7*	$1^{(+)}$	E	J^π: dipole, $\Delta\pi$=(no) excitation in (γ,γ').
2999.2 *7*	1	E	J^π: dipole excitation in (γ,γ').
3008.7[#] *18*	16^+	G I	J^π: sole observed mode of decay is a γ to the 14^+ member of the g.s. band. Level energy and population in Coulomb excitation indicate that this is the 16^+ member of that band.
3032.2 *7*	1^-	E	J^π: E1 excitation in (γ,γ').
3131.2 *7*	1^-	E	J^π: E1 excitation in (γ,γ').
3166.2 *7*	$1^{(-)}$	E	J^π: dipole, $\Delta\pi$=(yes) excitation in (γ,γ').
3170.2 *7*	1^+	E	J^π: M1 excitation in (γ,γ').
3228.2 *7*	1	E	J^π: dipole excitation in (γ,γ').
3277.2 *7*	1^+	E	J^π: M1 excitation in (γ,γ').
3292.2 *7*	1	E	J^π: dipole excitation in (γ,γ').
3308.2 *7*	1^+	E	J^π: M1 excitation in (γ,γ').
3328.2 *7*	1	E	J^π: dipole excitation in (γ,γ').
3331.2 *7*	1^+	E	J^π: M1 excitation in (γ,γ').
3340.2 *7*	1^+	E	J^π: M1 excitation in (γ,γ').
3357.2 *7*	1	E	J^π: dipole excitation in (γ,γ').
3376.2 *7*	1	E	J^π: dipole excitation in (γ,γ').
3415.2 *7*	1^-	E	J^π: E1 excitation in (γ,γ').
3460.2 *7*	1^-	E	J^π: E1 excitation in (γ,γ').

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Adopted Levels, Gammas (continued)

^{160}Gd Levels (continued)

E(level)[†]	J^π	XREF	Comments
3477.2 7	$1^{(+)}$	E	J^π: dipole, $\Delta\pi$=(no) excitation in (γ,γ').
3537.2 7	1	E	J^π: dipole excitation in (γ,γ').
3550.2 7	1	E	J^π: dipole excitation in (γ,γ').

[†] Except for levels populated only in (γ,γ'), from a least-squares fit to the γ-ray energies with ΔE_γ=1 keV for γ's with no listed uncertainties. No unc is assigned to levels when no unc is assigned to the energy values of its decaying γ's. Values from the dataset are adopted for transitions populated exclusively in (γ,γ') (see comment therein).

[‡] From $\gamma(\theta)$ and DSAM in (n,n$'\gamma$) dataset (2017Le04 and 2015Le05) unless noted otherwise.

[#] Band(A): $K^\pi=0^+$ ground-state rotational band. A=12.60 keV, B=−8.6 eV (from 0^+, 2^+, and 4^+ levels).

[@] Band(B): $K^\pi=2^+$ γ-vibrational band. A=11.54 keV, B=−7.9 eV, and A_4=−0.89 eV (from 2^+, 3^+, 4^+, and 5^+ levels).

[&] Band(C): First $K^\pi=4^+$ band. possible hexadecapole-vibrational band. A=11.85 keV (from 4^+ and 6^+ levels). A significant odd-even shift in the level energies renders extraction of additional band parameters from only two energy differences ambiguous. The quasiparticle-phonon model calculations of 1996So19 and 1997So26 indicate that this band is predominantly hexadecapole-vibrational in makeup. Dominant 2-qp ν^2(3/2[521],5/2[523]) configuration (2018Ha19, 2020Ha13).

[a] Band(c): Second $K^\pi=4^+$ band. Dominant 2-qp π^2(3/2[411],5/2[413]) configuration (2018Ha19, 2020Ha13).

[b] Band(D): $K^\pi=0^-$ octupole-vibrational band. A=6.58 keV (from 1^- and 3^- levels). Small A-value and relatively large, positive, implied B-value probably reflects strong Coriolis mixing with other octupole bands.

[c] Band(E): first excited $K^\pi=0^+$ band.

[d] Band(F): second excited $K^\pi=0^+$ band.

[e] Band(G): first $K^\pi=1^-$ band.

[f] Band(H): first $K^\pi=1^+$ band.

[g] Band(a): first $K^\pi=3^-$ band ?

[h] Band(b): first $K^\pi=2^-$ band.

$\gamma(^{160}Gd)$

E_i(level)	J^π_i	E_γ[†‡]	I_γ[#]	E_f	J^π_f	Mult.[&]	δ[&h]	α[g]	Comments
75.263	2^+	75.26 *1*	100	0.0	0^+	[E2]		7.33	α(K)=2.26 *4*; α(L)=3.91 *6*; α(M)=0.925 *13* α(N)=0.206 *3*; α(O)=0.0267 *4*; α(P)=0.0001124 *16* B(E2)(W.u.)=200.5 *+25−27* E_γ: from curved crystal measurement in Coul. ex.
248.502	4^+	173.24 *3*	100	75.263	2^+	E2		0.361	α(K)=0.239 *4*; α(L)=0.0942 *14*; α(M)=0.0218 *3* α(N)=0.00490 *7*; α(O)=0.000666 *10*; α(P)=1.326×10^{-5} *19*
514.81	6^+	266.31 *4*	100	248.502	4^+	E2		0.0874	α(K)=0.0654 *10*; α(L)=0.01711 *24*; α(M)=0.00390 *6* α(N)=0.000880 *13*; α(O)=0.0001237 *18*; α(P)=4.00×10^{-6} *6*
868.6	8^+	353.19	100	514.81	6^+	E2		0.0368	α(K)=0.0289 *4*; α(L)=0.00621 *9*; α(M)=0.001397 *20* α(N)=0.000317 *5*; α(O)=4.56×10^{-5} *7*; α(P)=1.85×10^{-6} *3*
988.548	2^+	739.96 *10*	4.7 *4*	248.502	4^+	E2		0.00532	α(K)=0.00444 *7*; α(L)=0.000691 *10*; α(M)=0.0001513 *22* α(N)=3.46×10^{-5} *5*; α(O)=5.24×10^{-6} *8*; α(P)=3.05×10^{-7} *5* B(E2)(W.u.)=0.85 *8*
		913.27 *2*	100.0[@] *1*	75.263	2^+	M1+E2	−0.45 *+4−5*	0.00529 *11*	B(M1)(W.u.)=0.00884 *+46−51*; B(E2)(W.u.)=1.07 *+21−16* α(K)=0.00450 *9*; α(L)=0.000618 *12*; α(M)=0.0001336 *25* α(N)=3.07×10^{-5} *6*; α(O)=4.78×10^{-6} *10*; α(P)=3.24×10^{-7} *7* δ: from 2017Le04; other values: < −37 and −72 *+35−∞* (2009Go33).
		988.56 *2*	88.7[@] *1*	0.0	0^+	E2		0.00282	α(K)=0.00238 *4*; α(L)=0.000345 *5*; α(M)=7.50×10^{-5} *11* α(N)=1.721×10^{-5} *24*; α(O)=2.63×10^{-6} *4*; α(P)=1.647×10^{-7} *23* B(E2)(W.u.)=3.80 *16*
1057.426	3^+	808.94 *3*	20.6[@] *2*	248.502	4^+	M1+E2	−11.7 *+16−23*	0.00437	α(K)=0.00366 *6*; α(L)=0.000556 *8*; α(M)=0.0001214 *17* α(N)=2.78×10^{-5} *4*; α(O)=4.22×10^{-6} *6*; α(P)=2.53×10^{-7} *4* B(M1)(W.u.)<4.6×10^{-5}; B(E2)(W.u.)<3.6 δ: from 2009Go33; other value: 0.11 *3* (2017Le04).
		982.16 *2*	100[@] *1*	75.263	2^+	M1+E2	+47 *+18−10*	0.00286	α(K)=0.00241 *4*; α(L)=0.000350 *5*; α(M)=7.62×10^{-5} *11* α(N)=1.747×10^{-5} *25*; α(O)=2.67×10^{-6} *4*; α(P)=1.670×10^{-7} *24* B(M1)(W.u.)<9.2×10^{-6}; B(E2)(W.u.)<6.5 δ: from 2009Go33.
1070.422	4^+	555.6 *5*	1.6[@] *1*	514.81	6^+				
		821.92 *2*	100[@] *2*	248.502	4^+	M1+E2	−0.71 *3*	0.00629 *11*	α(K)=0.00534 *9*; α(L)=0.000746 *12*; α(M)=0.000162 *3* α(N)=3.71×10^{-5} *6*; α(O)=5.75×10^{-6} *10*; α(P)=3.83×10^{-7} *7* δ: from 2009Go33.
		995.16 *3*	64.2[@] *13*	75.263	2^+	E2		0.00278	α(K)=0.00235 *4*; α(L)=0.000340 *5*; α(M)=7.39×10^{-5} *11* α(N)=1.695×10^{-5} *24*; α(O)=2.60×10^{-6} *4*; α(P)=1.625×10^{-7} *23* δ: E2+M3 in (n,n′γ) with mixing ratio not given.
1147.985	4^+	899.47 *2*	100[@] *1*	248.502	4^+	M1+E2	+21 *+21−7*	0.00345	α(K)=0.00290 *5*; α(L)=0.000430 *6*; α(M)=9.36×10^{-5} *14* α(N)=2.15×10^{-5} *3*; α(O)=3.27×10^{-6} *5*; α(P)=2.01×10^{-7} *3* B(M1)(W.u.)=6×10^{-5} *+8−5*; B(E2)(W.u.)=16 *+7−6* δ: from 2009Go33.

$^{160}_{64}Gd_{96}$-7

$\gamma(^{160}$Gd) (continued)

E_i(level)	J_i^π	E_γ[†‡]	I_γ[#]	E_f	J_f^π	Mult.[&]	δ[&h]	α[g]	Comments
1147.985	4^+	1072.74 *3*	58.5[@] *9*	75.263	2^+	E2		0.00238	α(K)=0.00201 *3*; α(L)=0.000288 *4*; α(M)=6.24×10^{-5} *9* α(N)=1.432×10^{-5} *20*; α(O)=2.20×10^{-6} *3*; α(P)=1.395×10^{-7} *20* B(E2)(W.u.)=3.8 *+16−15*
1173.09	$(5)^+$	102.7[e] *3*	30.2[e] *19*	1070.422	4^+	M1		1.87	α(K)=1.58 *3*; α(L)=0.227 *4*; α(M)=0.0494 *8* α(N)=0.01137 *19*; α(O)=0.00176 *3*; α(P)=0.0001175 *20* E_γ,I_γ,Mult.: from β^- decay (42.6 s).
		658.20 *12*	13.4 *9*	514.81	6^+				I_γ: from β^- decay (42.6 s).
		924.59 *3*	100 *3*	248.502	4^+	M1+E2	+40 *+23−11*	0.00325	α(K)=0.00274 *4*; α(L)=0.000403 *6*; α(M)=8.77×10^{-5} *13* α(N)=2.01×10^{-5} *3*; α(O)=3.07×10^{-6} *5*; α(P)=1.89×10^{-7} *3* δ: from 2009Go33.
1224.237	$1^{(-)}$	235.8[fj] *10*	2.3[f] *3*	988.548	2^+	[E1]		0.0295 *6*	α(K)=0.0250 *5*; α(L)=0.00351 *7*; α(M)=0.000758 *14* α(N)=0.000173 *4*; α(O)=2.61×10^{-5} *5*; α(P)=1.56×10^{-6} *3* B(E1)(W.u.)=0.0167 *+30−26* exceeds RUL=0.01.
		1148.98 *3*	100[@] *1*	75.263	2^+	(E1)		8.88×10^{-4}	α(K)=0.000755 *11*; α(L)=9.81×10^{-5} *14*; α(M)=2.10×10^{-5} *3* α(N)=4.83×10^{-6} *7*; α(O)=7.50×10^{-7} *11*; α(P)=5.09×10^{-8} *8*; α(IPF)=8.44×10^{-6} *12* B(E1)(W.u.)=0.0063 *+7−6* Mult.: pure dipole in Coul. ex. does not exclude M1.
		1224.21 *3*	67.5[@] *8*	0.0	0^+	(E1)		8.21×10^{-4}	α(K)=0.000674 *10*; α(L)=8.74×10^{-5} *13*; α(M)=1.87×10^{-5} *3* α(N)=4.30×10^{-6} *6*; α(O)=6.68×10^{-7} *10*; α(P)=4.54×10^{-8} *7*; α(IPF)=3.53×10^{-5} *5* B(E1)(W.u.)=0.00350 *+40−32* Mult.: pure dipole in Coul. ex. does not exclude M1.
1260.98	5^+	203.2[j] *4*	4.5 *13*	1057.426	3^+	[E2]		0.211 *4*	α(K)=0.1474 *23*; α(L)=0.0490 *8*; α(M)=0.01129 *19* α(N)=0.00254 *4*; α(O)=0.000349 *6*; α(P)=8.50×10^{-6} *13* E_γ: uncertain placement: B(E2)(W.u.)=4.7E3 *+19−18* exceeds RUL. Additional information 2.
		746.21 *8*	19.6[@] *9*	514.81	6^+	M1+E2	+8 *+13−4*	0.00528 *20*	α(K)=0.00441 *17*; α(L)=0.000682 *21*; α(M)=0.000149 *5* α(N)=3.42×10^{-5} *10*; α(O)=5.18×10^{-6} *16*;

$^{160}_{64}$Gd$_{96}$-8

$\gamma(^{160}$Gd) (continued)

E_i(level)	J_i^π	E_γ[†‡]	I_γ[#]	E_f	J_f^π	Mult.[&]	δ[&h]	α[g]	Comments
									α(P)=3.04×10^{-7} *13* B(M1)(W.u.)=0.0005 *+15−5*; B(E2)(W.u.)=30 *8* δ: from 2017Le04; other values: +0.03 *3* or −22 *+11−800* (2009Go33); 0.24 *10* (2017Le04, higher χ^2 than for adopted value).
1260.98	5$^+$	1012.46 *3*	100[@] *1*	248.502	4$^+$	M1+E2	+15 *+17−6*	0.00269	α(K)=0.00227 *4*; α(L)=0.000328 *5*; α(M)=7.12×10^{-5} *11* α(N)=1.634×10^{-5} *24*; α(O)=2.50×10^{-6} *4*; α(P)=1.574×10^{-7} *23* B(E2)(W.u.)<45 δ: from 2017Le04; other value: +49 *+34−14* (2009Go33).
1289.76	3$^-$	1041.27 *3*	54.6[@] *7*	248.502	4$^+$	E1		1.05×10^{-3}	B(E1)(W.u.)=0.00304 *+30−25* α(K)=0.000904 *13*; α(L)=0.0001178 *17*; α(M)=2.53×10^{-5} *4* α(N)=5.81×10^{-6} *9*; α(O)=9.00×10^{-7} *13*; α(P)=6.08×10^{-8} *9* Mult.,δ: E1+M2, δ=+0.10 *2* (2009Go33); M2 mixing not adopted becasue B(M2)(W.u.) exceeds RUL.
		1214.43 *5*	100[@] *1*	75.263	2$^+$	(E1)		8.28×10^{-4}	α(K)=0.000684 *10*; α(L)=8.86×10^{-5} *13*; α(M)=1.90×10^{-5} *3* α(N)=4.37×10^{-6} *7*; α(O)=6.78×10^{-7} *10*; α(P)=4.61×10^{-8} *7*; α(IPF)=3.09×10^{-5} *5* B(E1)(W.u.)=0.00351 *+34−28* Mult.: from Coul. ex.
1295.22	(6$^+$)	123[j] *1*	<11	1173.09	(5)$^+$				E_γ,I_γ: from 2020Ha13 (β^- decay (4.6 s)).
		224.96 *12*	53 *4*	1070.422	4$^+$				
		780.66 *13*	35 *3*	514.81	6$^+$				
		1046.62[i] *5*	100[i] *4*	248.502	4$^+$				
1301.3	10$^+$	432.7[b]	100	868.6	8$^+$	[E2]		0.0206	α(K)=0.01654 *24*; α(L)=0.00318 *5*; α(M)=0.000709 *10* α(N)=0.0001612 *23*; α(O)=2.36×10^{-5} *4*; α(P)=1.093×10^{-6} *16*
1325.7	(2$^+$)	1250.42	100	75.263	2$^+$				γ ray initially considered isotropic by 1989Be48 was proved unisotropic by 2009Go33 and 2015Le05. Moreover 2009Go33 replaced it uniquely at 1499, while 2015Le05 found it as doublet placed at 1499 and 1326 respectively.
1351.188	1$^-$	1275.90 *2*	100[@] *2*	75.263	2$^+$	E1		7.90×10^{-4}	α(K)=0.000627 *9*; α(L)=8.11×10^{-5} *12*; α(M)=1.739×10^{-5} *25* α(N)=4.00×10^{-6} *6*; α(O)=6.20×10^{-7} *9*; α(P)=4.23×10^{-8} *6*; α(IPF)=5.99×10^{-5} *9* B(E1)(W.u.)=7.4×10^{-4} *+9−8* Mult.,δ: E1+M2, δ=+0.14 *5* (2009Go33); M2 mixing not adopted becasue B(M2)(W.u.) exceeds RUL.
		1351.30 *5*	20.0[@] *4*	0.0	0$^+$	E1		7.62×10^{-4}	α(K)=0.000567 *8*; α(L)=7.32×10^{-5} *11*; α(M)=1.570×10^{-5} *22*

$^{160}_{64}$Gd$_{96}$-9

Adopted Levels, Gammas (continued)

$\gamma(^{160}Gd)$ (continued)

E_i(level)	J^π_i	E_γ †‡	I_γ #	E_f	J^π_f	Mult. &	δ &h	α g	Comments
									α(N)=3.61×10^{-6} *5*; α(O)=5.60×10^{-7} *8*; α(P)=3.83×10^{-8} *6*; α(IPF)=0.0001019 *15* B(E1)(W.u.)=1.24×10^{-4} *+16−13*

$^{160}_{64}Gd_{96}$-10

Adopted Levels, Gammas (continued)

γ(^{160}Gd) (continued)

E_i(level)	J^π_i	E_γ[†‡]	I_γ[#]	E_f	J^π_f	Mult.[&]	δ[&h]	α[g]	Comments
1376.73	2^-	319.2 *6*	1.8[@] *1*	1057.426	3^+	E1		0.01364	α(K)=0.01160 *18*; α(L)=0.001602 *24*; α(M)=0.000346 *6* α(N)=7.90$\times10^{-5}$ *12*; α(O)=1.202$\times10^{-5}$ *18*; α(P)=7.42$\times10^{-7}$ *11* B(E1)(W.u.)<3.5$\times10^{-4}$
		1128.3[j] *10*	≤1	248.502	4^+				E_γ: from β- decay (30.8 s), not confirmed by other studies (if placed here it would be a M2 γ which is less likely).
		1301.46 *3*	100[@] *1*	75.263	2^+	E1(+M2)	−0.08 *+5−4*	0.00081 *4*	α(K)=0.00063 *4*; α(L)=8.2$\times10^{-5}$ *5*; α(M)=1.76$\times10^{-5}$ *11* α(N)=4.05$\times10^{-6}$ *25*; α(O)=6.3$\times10^{-7}$ *4*; α(P)=4.3$\times10^{-8}$ *3*; α(IPF)=7.25$\times10^{-5}$ *12* B(E1)(W.u.)<2.7$\times10^{-4}$ δ: from 2009Go33. B(M2)(W.u.)<10 exceeds RUL=1.
1379.54	0^+	1304.27 *4*	100	75.263	2^+	E2		1.63$\times10^{-3}$	α(K)=0.001366 *20*; α(L)=0.000189 *3*; α(M)=4.09$\times10^{-5}$ *6* α(N)=9.40$\times10^{-6}$ *14*; α(O)=1.450$\times10^{-6}$ *21*; α(P)=9.48$\times10^{-8}$ *14*; α(IPF)=2.08$\times10^{-5}$ *3* B(E2)(W.u.)<3.1
1392.99	6^+	878.17 *8*	100 *6*	514.81	6^+	M1+E2	+14 *16*	0.0036 *6*	α(K)=0.0031 *5*; α(L)=0.00046 *6*; α(M)=9.9$\times10^{-5}$ *12* α(N)=2.3$\times10^{-5}$ *3*; α(O)=3.5$\times10^{-6}$ *5*; α(P)=2.1$\times10^{-7}$ *4* δ: from 2009Go33; other value: +30<δ < −1.5 (2009Go33).
		1144.63 *25*	58 *4*	248.502	4^+	E2		0.00209	α(K)=0.001767 *25*; α(L)=0.000250 *4*; α(M)=5.41$\times10^{-5}$ *8* α(N)=1.242$\times10^{-5}$ *18*; α(O)=1.91$\times10^{-6}$ *3*; α(P)=1.225$\times10^{-7}$ *18*; α(IPF)=1.412$\times10^{-6}$ *23*
1427.40	5^-	1178.90 *4*	100	248.502	4^+	E1		8.57$\times10^{-4}$	α(K)=0.000721 *10*; α(L)=9.36$\times10^{-5}$ *13*; α(M)=2.01$\times10^{-5}$ *3* α(N)=4.61$\times10^{-6}$ *7*; α(O)=7.15$\times10^{-7}$ *10*; α(P)=4.86$\times10^{-8}$ *7*; α(IPF)=1.681$\times10^{-5}$ *24* B(E1)(W.u.)=0.0040 *+10−7* Mult.,δ: E1+M2, δ=−0.03 *2* (2009Go33); M2 mixing not adopted becasue B(M2)(W.u.) exceeds RUL.

$\gamma(^{160}Gd)$ (continued)

E_i(level)	J_i^π	E_γ[†‡]	I_γ[#]	E_f	J_f^π	Mult.[&]	α[g]	Comments
1436.27	2^+	288.21[ij] 25	8.4[i] 12	1147.985	4^+	[E2]	0.0682	α(K)=0.0518 8; α(L)=0.01277 19; α(M)=0.00290 5 α(N)=0.000655 10; α(O)=9.27×10^{-5} 14; α(P)=3.21×10^{-6} 5 E_γ: uncertain placement: B(E2)(W.u.)<1419 exceeds RUL=1000. Additional information 3.
		1187.76 4	100[@] 1	248.502	4^+	E2	0.00194	α(K)=0.001642 23; α(L)=0.000231 4; α(M)=4.99×10^{-5} 7 α(N)=1.146×10^{-5} 16; α(O)=1.764×10^{-6} 25; α(P)=1.138×10^{-7} 16; α(IPF)=4.30×10^{-6} 6 B(E2)(W.u.)<13
		1361.06 5	36.4[@] 4	75.263	2^+	M1+E2	0.0019 4	α(K)=0.0016 4; α(L)=0.00021 4; α(M)=4.6×10^{-5} 9 α(N)=1.06×10^{-5} 20; α(O)=1.6×10^{-6} 4; α(P)=1.11×10^{-7} 25; α(IPF)=3.51×10^{-5} 20 δ: −0.02 4 or +2.46 +30−25 (2009Go33, (n,n′γ)).
		1436.16 7	13.5[@] 2	0.0	0^+	E2	1.39×10^{-3}	α(K)=0.001135 16; α(L)=0.0001553 22; α(M)=3.36×10^{-5} 5 α(N)=7.71×10^{-6} 11; α(O)=1.191×10^{-6} 17; α(P)=7.87×10^{-8} 11; α(IPF)=5.39×10^{-5} 8 B(E2)(W.u.)<0.67
1437.40	(7^+)	264.5[e] 3	100	1173.09	$(5)^+$			
1460.3	(3^-)	1385.0 4	100 14	75.263	2^+			
		1461.7[j] 6	64 7	0.0	0^+			
1463.83	3^-	1215.3[f] 8	100[f] 5	248.502	4^+	[E1]	8.27×10^{-4}	α(K)=0.000683 10; α(L)=8.85×10^{-5} 13; α(M)=1.90×10^{-5} 3 α(N)=4.36×10^{-6} 7; α(O)=6.77×10^{-7} 10; α(P)=4.60×10^{-8} 7; α(IPF)=3.13×10^{-5} 6 B(E1)(W.u.)=0.016 +18−7
		1388.56 4	64.1[f] 14	75.263	2^+	E1	7.56×10^{-4}	α(K)=0.000541 8; α(L)=6.98×10^{-5} 10; α(M)=1.496×10^{-5} 21 α(N)=3.44×10^{-6} 5; α(O)=5.34×10^{-7} 8; α(P)=3.65×10^{-8} 6; α(IPF)=0.0001263 18 B(E1)(W.u.)=0.007 +7−3 Mult.,δ: E1+M2, δ=−0.050 20 (2009Go33); M2 mixing not adopted because B(M2)(W.u.) exceeds RUL.
1483.08	(4^+)	187.5[e] 3	2.0[e] 7	1295.22	(6^+)			
		310.0[e] 2	7.6[e] 5	1173.09	$(5)^+$			
		412.7[e] 1	100[e] 5	1070.422	4^+			
		968.4[e] 3	4.6[e] 6	514.81	6^+			
		1234.6[e] 2	13.4[e] 7	248.502	4^+			
		1408.1[e] 3	1.3[e] 5	75.263	2^+			
1498.85	4^-	441.51 22	7.8 12	1057.426	3^+	[E1]	0.00626	α(K)=0.00534 8; α(L)=0.000725 11; α(M)=0.0001562 22 α(N)=3.58×10^{-5} 5; α(O)=5.48×10^{-6} 8; α(P)=3.49×10^{-7} 5 B(E1)(W.u.)<8.2×10^{-4}

$^{160}_{64}Gd_{96}$-12

$\gamma(^{160}Gd)$ (continued)

E_i(level)	J_i^π	E_γ [†‡]	I_γ [#]	E_f	J_f^π	Mult. [&]	δ [&h]	α [g]	Comments
1498.85	4^-	1250.34 *4*	100 *3*	248.502	4^+	E1(+M2)	+0.05 *6*	0.00082 *6*	α(K)=0.00066 *5*; α(L)=8.6×10^{-5} *7*; α(M)=1.84×10^{-5} *15* α(N)=4.2×10^{-6} *4*; α(O)=6.6×10^{-7} *6*; α(P)=4.5×10^{-8} *4*; α(IPF)=4.74×10^{-5} *8* B(E1)(W.u.)<4.0×10^{-4} δ: from 2009Go33. B(M2)(W.u.)<14 exceeds RUL=1.
1531.95	3^-	384.02 *10*	100 *6*	1147.985	4^+	E1+M2	−0.14 *5*	0.012 *3*	α(K)=0.0101 *23*; α(L)=0.00148 *38*; α(M)=3.22×10^{-4} *85* α(N)=7.4×10^{-5} *20*; α(O)=1.13×10^{-5} *30*; α(P)=7.2×10^{-7} *20* δ: from 2009Go33.
		543.37[i] *11*	62[i] *5*	988.548	2^+				
		1283.1 *3*	6 *3*	248.502	4^+				
1548.18	(7^+)	286.9[e] *3*	20[e] *10*	1260.98	5^+				
		1033.40 *8*	100	514.81	6^+				
1558.35	0^+	1483.08 *8*	100	75.263	2^+	E2		1.32×10^{-3}	α(K)=0.001068 *15*; α(L)=0.0001456 *21*; α(M)=3.14×10^{-5} *5* α(N)=7.22×10^{-6} *11*; α(O)=1.117×10^{-6} *16*; α(P)=7.41×10^{-8} *11*; α(IPF)=6.86×10^{-5} *10* B(E2)(W.u.)<3.7
1561.45	4^+	1046.62[i] *5*	100[i@] *1*	514.81	6^+	[E2]		0.00250	α(K)=0.00212 *3*; α(L)=0.000304 *5*; α(M)=6.59×10^{-5} *10* α(N)=1.512×10^{-5} *22*; α(O)=2.32×10^{-6} *4*; α(P)=1.466×10^{-7} *21* B(E2)(W.u.)<23
		1312.99 *7*	74.8[@] *3*	248.502	4^+	M1+E2	+0.28 *+34−12*	0.00237 *17*	B(M1)(W.u.)<0.018; B(E2)(W.u.)<1.5 α(K)=0.00200 *15*; α(L)=0.000269 *19*; α(M)=5.8×10^{-5} *4* α(N)=1.34×10^{-5} *10*; α(O)=2.08×10^{-6} *15*; α(P)=1.43×10^{-7} *12*; α(IPF)=2.48×10^{-5} *7* δ: from 2017Le04; other value: +0.57 *+17−44* (2009Go33).
1568.67	1^+	217.4[i] *3*	8.8[i@] *15*	1351.188	1^-	E1		0.0364	α(K)=0.0309 *5*; α(L)=0.00436 *7*; α(M)=0.000941 *14* α(N)=0.000215 *4*; α(O)=3.23×10^{-5} *5*; α(P)=1.91×10^{-6} *3* B(E1)(W.u.)=0.0010 *+8−5*
		580.11 *7*	89.2[@] *16*	988.548	2^+	M1+E2	+0.28 *+25−18*	0.0168 *12*	α(K)=0.0143 *11*; α(L)=0.00199 *11*; α(M)=0.000431 *23* α(N)=9.9×10^{-5} *6*; α(O)=1.54×10^{-5} *9*;

$^{160}_{64}Gd_{96}$-13

$\gamma(^{160}Gd)$ (continued)

E_i(level)	J_i^π	E_γ[†‡]	I_γ[#]	E_f	J_f^π	Mult.[&]	δ[&h]	α[g]	Comments
									α(P)=1.04×10^{-6} *9* B(M1)(W.u.)=0.045 *+33−25*; B(E2)(W.u.)=5 *+13−4* δ: from 2017Le04; other values: +0.45 *+50−24* or +2<δ < −11 (2009Go33).
1568.67	1$^+$	1493.39 *7*	94.4[@] *16*	75.263	2$^+$	M1+E2	+1.34 *+16−6*	0.00151 *4*	α(K)=0.00122 *3*; α(L)=0.000165 *4*; α(M)=3.56×10^{-5} *9* α(N)=8.19×10^{-6} *19*; α(O)=1.27×10^{-6} *3*; α(P)=8.60×10^{-8} *22*; α(IPF)=7.52×10^{-5} *12* B(M1)(W.u.)=0.0011 *+8−7*; B(E2)(W.u.)=0.43 *+36−24* δ: from 2017Le04; other values: +12.5 *122* and +0.3<δ<+24.6 (2009Go33).
		1568.70 *7*	100[@] *2*	0.0	0$^+$	(M1)		1.70×10^{-3}	α(K)=0.001359 *19*; α(L)=0.000182 *3*; α(M)=3.91×10^{-5} *6* α(N)=9.01×10^{-6} *13*; α(O)=1.407×10^{-6} *20*; α(P)=9.74×10^{-8} *14*; α(IPF)=0.0001115 *16* B(M1)(W.u.)=0.0028 *+22−15* Mult.: pure dipole in (n,n′γ) (2009Go33) does not exclude E1.
1581.81	(5$^+$)	98.8[e] *3*	8.9[e] *22*	1483.08	(4$^+$)	M1		2.08 *4*	α(K)=1.76 *3*; α(L)=0.254 *5*; α(M)=0.0552 *10* α(N)=0.01271 *21*; α(O)=0.00197 *4*; α(P)=0.0001313 *22* Mult.: from β^- decay (42.6 s).
		286[ej]	<1.4[e]	1295.22	(6$^+$)				
		408.9[e] *2*	100[e] *5*	1173.09	(5)$^+$				
1583.59		293.76 *17*	100	1289.76	3$^-$				
1586.56	2$^+$	1511.40 *7*	33.0 *15*	75.263	2$^+$	M1+E2	−0.24 *5*	0.00179	α(K)=0.001455 *23*; α(L)=0.000195 *3*; α(M)=4.20×10^{-5} *7* α(N)=9.67×10^{-6} *15*; α(O)=1.509×10^{-6} *24*; α(P)=1.043×10^{-7} *17*; α(IPF)=8.75×10^{-5} *13* B(M1)(W.u.)<0.0047; B(E2)(W.u.)<0.082 δ: from 2017Le04; other values: −0.24 *5* or +5.8 *+24−13* (2009Go33).
		1586.50[i] *5*	100[i] *4*	0.0	0$^+$	[E2]		1.21×10^{-3}	α(K)=0.000940 *14*; α(L)=0.0001273 *18*; α(M)=2.75×10^{-5} *4* α(N)=6.31×10^{-6} *9*; α(O)=9.77×10^{-7} *14*; α(P)=6.52×10^{-8} *10*; α(IPF)=0.0001051 *15* B(E2)(W.u.)<2.4
1597.3	(8$^+$)	302.1		1295.22	(6$^+$)				
		729.8[j]		868.6	8$^+$				E_γ: from 2012Gr22 in (n,n′γ) dataset where is unclear if this placement or that at 1437.2 level is valid (the latter would populate an inexiting level).
1598.82	2$^+$	309.0 *5*	8.9[@] *4*	1289.76	3$^-$	E1		0.01479	α(K)=0.01258 *19*; α(L)=0.00174 *3*; α(M)=0.000375 *6*

$^{160}_{64}Gd_{96}$-14

γ(^{160}Gd) (continued)

E_i(level)	J^π_i	E_γ[†‡]	I_γ[#]	E_f	J^π_f	Mult.[&]	δ[&h]	α[g]	Comments
									α(N)=8.58×10^{-5} *13*; α(O)=1.304×10^{-5} *19*; α(P)=8.03×10^{-7} *12* B(E1)(W.u.)=0.00051 *+31−25*
1598.82	2$^+$	374.6 *4*	14.8[@] *3*	1224.237	1$^{(-)}$	E1		0.00923	α(K)=0.00786 *12*; α(L)=0.001076 *16*; α(M)=0.000232 *4* α(N)=5.31×10^{-5} *8*; α(O)=8.10×10^{-6} *12*; α(P)=5.09×10^{-7} *8* B(E1)(W.u.)=0.00048 *+29−22*
		541.40 *12*	36.8[@] *3*	1057.426	3$^+$	M1		0.0207	α(K)=0.01757 *25*; α(L)=0.00243 *4*; α(M)=0.000527 *8* α(N)=0.0001212 *17*; α(O)=1.89×10^{-5} *3*; α(P)=1.284×10^{-6} *18* B(M1)(W.u.)=0.038 *+23−18* δ: −0.06 *10* or −4.3 *+13−29* (2009Go33); −0.01 *9* or −5.6 *+19−50* (2017Le04).
		1523.54 *6*	100[@] *1*	75.263	2$^+$	M1+E2	−1.0 *+2−21*	0.00153 *22*	α(K)=0.00123 *18*; α(L)=0.000166 *23*; α(M)=3.6×10^{-5} *5* α(N)=8.2×10^{-6} *12*; α(O)=1.28×10^{-6} *19*; α(P)=8.7×10^{-8} *14*; α(IPF)=8.8×10^{-5} *5* B(M1)(W.u.)=0.0023 *+16−15*; B(E2)(W.u.)=0.50 *+36−25* δ: from 2017Le04; other values: −0.83 *+10−15* or −3.4 *+8−11* (2009Go33).
		1598.81 *7*	78.7[@] *1*	0.0	0$^+$	E2		1.20×10^{-3}	α(K)=0.000927 *13*; α(L)=0.0001254 *18*; α(M)=2.70×10^{-5} *4* α(N)=6.21×10^{-6} *9*; α(O)=9.63×10^{-7} *14*; α(P)=6.43×10^{-8} *9*; α(IPF)=0.0001098 *16* B(E2)(W.u.)=0.61 *+37−28*
1608.3		384.1[f] *10*	100[f]	1224.237	1$^{(-)}$				
1621.37	2$^-$	397.10 *17*	16.4 *15*	1224.237	1$^{(-)}$	[M1]		0.0457	α(K)=0.0388 *6*; α(L)=0.00543 *8*; α(M)=0.001177 *17* α(N)=0.000271 *4*; α(O)=4.21×10^{-5} *6*; α(P)=2.85×10^{-6} *4* B(M1)(W.u.)=0.20 *+22−11*
		563.99 *15*	29.0[@] *7*	1057.426	3$^+$	E1		0.00361	α(K)=0.00308 *5*; α(L)=0.000413 *6*; α(M)=8.90×10^{-5} *13* α(N)=2.04×10^{-5} *3*; α(O)=3.14×10^{-6} *5*; α(P)=2.04×10^{-7} *3* B(E1)(W.u.)=0.0013 *+14−7*
		632.82 *8*	100[@] *2*	988.548	2$^+$	E1		0.00282	α(K)=0.00241 *4*; α(L)=0.000321 *5*; α(M)=6.92×10^{-5} *10* α(N)=1.586×10^{-5} *23*; α(O)=2.44×10^{-6} *4*; α(P)=1.602×10^{-7} *23* B(E1)(W.u.)=0.0031 *+33−17*
1644.39	(7$^-$)	217.4[i] *3*	35[i] *11*	1427.40	5$^-$				observed only in (n,n′γ).
		775		868.6	8$^+$				observed only in Coul. ex.
		1129.51 *13*	100 *11*	514.81	6$^+$				observed in both Coul. ex. and (n,n′γ).
1647.95	4$^+$	1132.7 *8*	3.9 *15*	514.81	6$^+$	[E2]		0.00213	α(K)=0.00180 *3*; α(L)=0.000255 *4*; α(M)=5.54×10^{-5} *8*

$^{160}_{64}$Gd$_{96}$-15

$\gamma(^{160}$Gd) (continued)

E_i(level)	J_i^π	E_γ [†‡]	I_γ [#]	E_f	J_f^π	Mult. [&]	δ [&h]	α [g]	Comments
									α(N)=1.270×10^{-5} *18*; α(O)=1.95×10^{-6} *3*; α(P)=1.251×10^{-7} *18*; α(IPF)=9.7×10^{-7} *3* B(E2)(W.u.)=1.0 *+7−6*
1647.95	4$^+$	1399.4 *4*	7.5 *23*	248.502	4$^+$	[M1,E2]		0.0018 *4*	α(K)=0.0015 *3*; α(L)=0.00020 *4*; α(M)=4.3×10^{-5} *8* α(N)=9.9×10^{-6} *19*; α(O)=1.5×10^{-6} *3*; α(P)=1.05×10^{-7} *23*; α(IPF)=4.6×10^{-5} *3*
		1572.68 *8*	100 *5*	75.263	2$^+$	E2		1.22×10^{-3}	α(K)=0.000956 *14*; α(L)=0.0001295 *19*; α(M)=2.79×10^{-5} *4* α(N)=6.42×10^{-6} *9*; α(O)=9.94×10^{-7} *14*; α(P)=6.63×10^{-8} *10*; α(IPF)=0.0001000 *14* B(E2)(W.u.)=4.9 *+25−21*
1653.26	5$^-$	1138.44 *16*	100 *7*	514.81	6$^+$	E1(+M2)	−0.06 *5*	0.00093 *7*	α(K)=0.00079 *6*; α(L)=0.000103 *8*; α(M)=2.21×10^{-5} *17* α(N)=5.1×10^{-6} *4*; α(O)=7.9×10^{-7} *6*; α(P)=5.3×10^{-8} *4*; α(IPF)=6.34×10^{-6} *11* B(E1)(W.u.)=0.0018 *+6−5* δ: from 2009Go33. B(M2)(W.u.)=23 *+63−19* exceeds RUL=1.
		1404.75 *8*	100 *5*	248.502	4$^+$	E1		7.55×10^{-4}	α(K)=0.000530 *8*; α(L)=6.84×10^{-5} *10*; α(M)=1.466×10^{-5} *21* α(N)=3.37×10^{-6} *5*; α(O)=5.24×10^{-7} *8*; α(P)=3.58×10^{-8} *5*; α(IPF)=0.0001372 *20* B(E1)(W.u.)=0.00098 *+31−25* Mult.,δ: E1+M2, δ=−0.08 *4* (2009Go33); M2 mixing not adopted becasue B(M2)(W.u.) exceeds RUL.
1657.2	(1$^-$,2)	367.4[f] *10*	95[f] *4*	1289.76	3$^-$				
		433.2[f] *10*	100[f] *7*	1224.237	1$^{(-)}$				
1661.76	(2$^+$,3,4$^+$)	1412.95 *25*	5.6[@] *2*	248.502	4$^+$				
		1586.50[i] *5*	100[i@] *1*	75.263	2$^+$				
1665.09	3$^+$	288.21[i] *25*	43[i] *6*	1376.73	2$^-$				
		1416.66 *6*	100 *6*	248.502	4$^+$	M1+E2	+1.5 *10*	0.0016 *4*	α(K)=0.0013 *3*; α(L)=0.00018 *4*; α(M)=3.9×10^{-5} *8* α(N)=9.0×10^{-6} *18*; α(O)=1.4×10^{-6} *3*; α(P)=9.4×10^{-8} *21*; α(IPF)=5.0×10^{-5} *3* δ: from 2009Go33.
		1589.69 *8*	98 *5*	75.263	2$^+$	M1+E2	−0.9 *5*	0.00146 *15*	α(K)=0.00115 *12*; α(L)=0.000154 *16*; α(M)=3.3×10^{-5} *4* α(N)=7.6×10^{-6} *8*; α(O)=1.19×10^{-6} *13*; α(P)=8.1×10^{-8} *10*; α(IPF)=0.000114 *5* δ: from 2009Go33.
1668.4	(6$^-$)	1153.54	100	514.81	6$^+$				

$^{160}_{64}$Gd$_{96}$-16

Adopted Levels, Gammas (continued)

γ(^{160}Gd) (continued)

E$_i$(level)	J$^\pi_i$	E$_\gamma$[†‡]	I$_\gamma$[#]	E$_f$	J$^\pi_f$	Mult.[&]	α[g]	Comments
1691.35	3$^-$	466.95 12	37 4	1224.237	1$^{(-)}$	[E2]	0.01674	α(K)=0.01353 19; α(L)=0.00250 4; α(M)=0.000557 8 α(N)=0.0001268 18; α(O)=1.87×10^{-5} 3; α(P)=9.01×10^{-7} 13 B(E2)(W.u.)=4.0×10^{2} +36−22
		543.37[i] 11	60.8[i@] 15	1147.985	4$^+$	E1	0.00392	α(K)=0.00334 5; α(L)=0.000449 7; α(M)=9.68×10^{-5} 14 α(N)=2.22×10^{-5} 4; α(O)=3.41×10^{-6} 5; α(P)=2.21×10^{-7} 3 B(E1)(W.u.)=0.0019 +17−10
		634.18[i] 20	99.5[i@] 25	1057.426	3$^+$	E1	0.00281	α(K)=0.00240 4; α(L)=0.000320 5; α(M)=6.88×10^{-5} 10 α(N)=1.578×10^{-5} 23; α(O)=2.43×10^{-6} 4; α(P)=1.595×10^{-7} 23 B(E1)(W.u.)=0.0019 +18−11
		702.82 8	100[@] 2	988.548	2$^+$	(E1)	0.00227	α(K)=0.00194 3; α(L)=0.000257 4; α(M)=5.53×10^{-5} 8 α(N)=1.269×10^{-5} 18; α(O)=1.96×10^{-6} 3; α(P)=1.293×10^{-7} 19 B(E1)(W.u.)=0.0014 +13−8 Mult.,δ: E1+M2, δ=+0.06 4 (2009Go33); M2 mixing not adopted becasue B(M2)(W.u.) exceeds RUL.
		1443.0 3	8.6[@] 6	248.502	4$^+$	E1	7.53×10^{-4}	α(K)=0.000507 7; α(L)=6.53×10^{-5} 10; α(M)=1.399×10^{-5} 20 α(N)=3.21×10^{-6} 5; α(O)=5.00×10^{-7} 7; α(P)=3.42×10^{-8} 5; α(IPF)=0.0001638 23 B(E1)(W.u.)=1.4×10^{-5} +13−8
1692.8?	(4$^+$)	1442.95[j]	<86	248.502	4$^+$			E$_\gamma$,I$_\gamma$: almost identical with 1443.0γ from 1691 level (in (n,n′γ)).
		1617.5 6	100 21	75.263	2$^+$			
1698.21	(5,6$^+$)	215[ej]	41[e] 9	1483.08	(4$^+$)			
		1183.5[e] 3	100[e] 27	514.81	6$^+$			
1717.5	(8$^+$)	325		1392.99	6$^+$			
		849		868.6	8$^+$			
		1202		514.81	6$^+$			
1720.48	(2$^+$)	663.4 6	9 5	1057.426	3$^+$			
		731.93 9	100 7	988.548	2$^+$			δ: −0.67 +15−24 or −6 +3−11 for J(1720)=2.
		1471.9 3	8 3	248.502	4$^+$			
1731.93	NOT 1	743.39 7	100 6	988.548	2$^+$			
		1656.4 4	12.7 19	75.263	2$^+$			
1782.48	(4)$^-$	521.44 17	19 3	1260.98	5$^+$			E$_\gamma$,I$_\gamma$: from (n,n′γ) (2012Gr22).
		634.18[i] 20	100[i]	1147.985	4$^+$	E1	0.00281	α(K)=0.00240 4; α(L)=0.000320 5; α(M)=6.88×10^{-5} 10 α(N)=1.578×10^{-5} 23; α(O)=2.43×10^{-6} 4; α(P)=1.595×10^{-7} 23 E$_\gamma$,I$_\gamma$: from (n,n′γ) (2012Gr22).
		725.12 8	69 5	1057.426	3$^+$			E$_\gamma$,I$_\gamma$: from (n,n′γ) (2012Gr22).
1804.97	2$^+$	734.50 13	44.3[@] 14	1070.422	4$^+$	E2	0.00541	α(K)=0.00451 7; α(L)=0.000704 10; α(M)=0.0001542 22 α(N)=3.53×10^{-5} 5; α(O)=5.33×10^{-6} 8; α(P)=3.10×10^{-7} 5 B(E2)(W.u.)<54
		747.8 3	25 4	1057.426	3$^+$	[M1]	0.00925	α(K)=0.00788 11; α(L)=0.001078 16; α(M)=0.000233 4 α(N)=5.36×10^{-5} 8; α(O)=8.36×10^{-6} 12; α(P)=5.72×10^{-7} 8 B(M1)(W.u.)<0.034

$^{160}_{64}$Gd$_{96}$-17

$\gamma(^{160}Gd)$ (continued)

E_i(level)	J^π_i	E_γ[†‡]	I_γ[#]	E_f	J^π_f	Mult.[&]	δ[&h]	α[g]	Comments
1804.97	2^+	816.43 *7*	100[@] *2*	988.548	2^+	M1+E2	−1.8 *+9−8*	0.0050 *11*	α(K)=0.0042 *9*; α(L)=0.00062 *11*; α(M)=0.000134 *22* α(N)=3.1×10^{-5} *6*; α(O)=4.7×10^{-6} *9*; α(P)=3.0×10^{-7} *7* B(M1)(W.u.)<0.052; B(E2)(W.u.)<61 δ: from 2009Go33; other values: −0.76 *+10−13* or −3.90 *+97−134* (2017Le04).
		1729.2 *4*	20 *4*	75.263	2^+	[M1,E2]		0.00128 *18*	α(K)=0.00094 *15*; α(L)=0.000126 *19*; α(M)=2.7×10^{-5} *4* α(N)=6.3×10^{-6} *10*; α(O)=9.7×10^{-7} *15*; α(P)=6.7×10^{-8} *12*; α(IPF)=0.000175 *12*
		1805.51[j] *25*	33 *4*	0.0	0^+	E2		1.06×10^{-3}	α(K)=0.000739 *11*; α(L)=9.89×10^{-5} *14*; α(M)=2.13×10^{-5} *3* α(N)=4.89×10^{-6} *7*; α(O)=7.60×10^{-7} *11*; α(P)=5.13×10^{-8} *8*; α(IPF)=0.000197 *3* B(E2)(W.u.)<0.47
1806.9	12^+	505.5[b]	100	1301.3	10^+	[E2]		0.01356	α(K)=0.01104 *16*; α(L)=0.00197 *3*; α(M)=0.000437 *7* α(N)=9.95×10^{-5} *14*; α(O)=1.472×10^{-5} *21*; α(P)=7.41×10^{-7} *11*
1884.0	(5^-)	622.3 *8*	47 *24*	1260.98	5^+				
		736.2 *4*	100 *24*	1147.985	4^+				
1886.8	(1,2)	898.2[f] *10*	6.9[f] *6*	988.548	2^+				
		1811.6[f] *8*	100.0[f] *18*	75.263	2^+				
1910.7	(7^-)	1395.9 *4*	100	514.81	6^+				
1931.86	2^+	874.4 *3*	50[f] *3*	1057.426	3^+	M1+E2		0.0050 *14*	α(K)=0.0042 *12*; α(L)=0.00060 *14*; α(M)=0.00013 *3* α(N)=3.0×10^{-5} *7*; α(O)=4.6×10^{-6} *11*; α(P)=3.01×10^{-7} *89*
		943.7[f] *10*	24.9[f] *22*	988.548	2^+				
		1683.22 *21*	65[f] *3*	248.502	4^+	E2		1.13×10^{-3}	α(K)=0.000842 *12*; α(L)=0.0001133 *16*; α(M)=2.44×10^{-5} *4* α(N)=5.61×10^{-6} *8*; α(O)=8.70×10^{-7} *13*; α(P)=5.84×10^{-8} *9*; α(IPF)=0.0001438 *21* B(E2)(W.u.)=0.38 *+27−20*
		1856.63 *13*	100[f] *3*	75.263	2^+	M1+E2	+0.92 *+41−64*	0.00120 *12*	α(K)=0.00082 *9*; α(L)=0.000110 *12*; α(M)=2.36×10^{-5} *25* α(N)=5.4×10^{-6} *6*; α(O)=8.5×10^{-7} *9*; α(P)=5.8×10^{-8} *7*; α(IPF)=0.000237 *13*

$^{160}_{64}Gd_{96}$-18

Adopted Levels, Gammas (continued)

$\gamma(^{160}Gd)$ (continued)

E_i(level)	J^{π}_i	E_γ[†‡]	I_γ[#]	E_f	J^{π}_f	Mult.[&]	δ[&h]	α[g]	Comments
									B(M1)(W.u.)=0.0013 *+12−8*; B(E2)(W.u.)=0.16 *+15−13* δ: from 2017Le04; other values: +0.50 *+87−24* (2017Le04); +0.16 *+18−13* or +1.5 *5* (2009Go33).
1931.86	2^+	1931.9 *3*	36.2[f] *22*	0.0	0^+	E2		1.02×10^{-3}	α(K)=0.000653 *10*; α(L)=8.68×10^{-5} *13*; α(M)=1.87×10^{-5} *3* α(N)=4.30×10^{-6} *6*; α(O)=6.68×10^{-7} *10*; α(P)=4.53×10^{-8} *7*; α(IPF)=0.000255 *4* B(E2)(W.u.)=0.11 *+8−6*
1941.5	(9^-)	640		1301.3	10^+				
		1073		868.6	8^+				
1966.51	(1^-)	908.2[fj] *10*	62[f] *6*	1057.426	3^+				E_γ: uncertain placement. If this γ originates from (1^-), 1966.5 level it would be M2, but B(M2)(W.u.)=1.7E4 *+9−5* exceeds RUL=1, so M2 is very unlikely. Consequently most likely this γ originates from a close lying $(2^+,3,4^+)$ level (see J^π comment on 1966 level). Additional information 4.
		977.3[fj] *10*	34[f] *3*	988.548	2^+				E_γ: uncertain placement. This transition is part of the group of three γ′s that more likely originate from a $(2^+,3,4^+)$ level, which makes unlikely its placement to this (1^-) level.
		1717.0[fj] *10*	32[f] *3*	248.502	4^+				E_γ: uncertain placement. If this γ originates from (1^-), 1966.5 level it would be E3, but B(E3)(W.u.)=1.0E5 *+5−3* exceeds RUL=100, so E3 is very unlikely. Consequently most likely this γ originates from a close lying $(2^+,3,4^+)$ level (see J^π comment on 1966 level). Additional information 5.
		1891.26 *12*	35[f] *3*	75.263	2^+	(E1(+M2))	−0.03 *+25−31*	0.00087 *16*	α(K)=3.3×10^{-4} *17*; α(L)=4.2×10^{-5} *24*; α(M)=8.9×10^{-6} *51* α(N)=2.0×10^{-6} *12*; α(O)=3.2×10^{-7} *19*; α(P)=2.2×10^{-8} *13*; α(IPF)=0.00050 *4* B(E1)(W.u.)=0.00020 *+15−8* Mult.: relatively pure dipole was adopted as E1(+M2), however M1(+E2) cannot be excluded. δ: from 2009Go33.
		1966.52 *15*	100[f] *5*	0.0	0^+	E1		9.04×10^{-4}	α(K)=0.000304 *5*; α(L)=3.88×10^{-5} *6*; α(M)=8.31×10^{-6} *12* α(N)=1.91×10^{-6} *3*; α(O)=2.98×10^{-7} *5*;

Adopted Levels, Gammas (continued)

$\gamma(^{160}Gd)$ (continued)

E_i(level)	J^π_i	E_γ †‡	I_γ #	E_f	J^π_f	Mult.&	δ &h	α g	Comments
									α(P)=2.06×10^{-8} *3*; α(IPF)=0.000551 *8* B(E1)(W.u.)=0.00050 *+26−13* Mult.: from (γ,γ').
1969.67	2^+	1721.2 *9*	13 *5*	248.502	4^+				
		1894.39 *16*	98 *9*	75.263	2^+	M1+E2		0.00117 *14*	α(K)=0.00078 *11*; α(L)=0.000104 *14*; α(M)=2.2×10^{-5} *3* α(N)=5.1×10^{-6} *7*; α(O)=8.0×10^{-7} *11*; α(P)=5.5×10^{-8} *9*; α(IPF)=0.000255 *18* δ: >+5 or −0.33 *+11−13* (2009Go33, $(n,n'\gamma)$).
		1969.65 *20*	100 *9*	0.0	0^+				
1996.26		412.66 *7*	100.0 *19*	1583.59					
		560.0 *7*	4.7 *19*	1436.27	2^+				
		1007.86 *24*	11.2 *19*	988.548	2^+				
1998.71	(5^-)	300.6[e] *3*	0.56[e] *23*	1698.21	$(5,6^+)$				
		417.1[e] *2*	17.2[e] *9*	1581.81	(5^+)				
		450.7[e] *3*	2.3[e] *5*	1548.18	(7^+)				
		515.7[e] *1*	100[e] *5*	1483.08	(4^+)				
		605.7[e] *3*	2.5[e] *6*	1392.99	6^+				
		737.6[e] *2*	16.4[e] *9*	1260.98	5^+				
		825.6[e] *3*	2.2[e] *2*	1173.09	$(5)^+$				
		928.0[e] *3*	2.1[e] *7*	1070.422	4^+				
		1483.6[e] *3*	0.64[e] *30*	514.81	6^+				
		1750.2[e] *3*	1.3[e] *5*	248.502	4^+				
2030.61	$2^+,3^+$	973.4 *3*	45 *6*	1057.426	3^+				
		1782.1 *4*	16.1[@] *22*	248.502	4^+				
		1955.28 *14*	100[@] *3*	75.263	2^+	M1+E2		0.00114 *13*	α(K)=0.00073 *10*; α(L)=9.7×10^{-5} *13*; α(M)=2.1×10^{-5} *3* α(N)=4.8×10^{-6} *7*; α(O)=7.5×10^{-7} *10*; α(P)=5.2×10^{-8} *8*; α(IPF)=0.000285 *20* δ: −0.03 *+12−11* or +2.4 *+11−6* (2009Go33).
2059.62	$2^{(-)},3^{(-)}$	1811.11 *9*	100	248.502	4^+	(E1+M2)	+0.07 *6*	8.49×10^{-4} *25*	α(K)=0.000356 *22*; α(L)=4.6×10^{-5} *3*; α(M)=9.8×10^{-6} *7* α(N)=2.25×10^{-6} *16*; α(O)=3.50×10^{-7} *24*; α(P)=2.41×10^{-8} *17*; α(IPF)=0.000435 *8* B(E1)(W.u.)=2.4×10^{-4} *7* Mult.: rather pure dipole in $(n,n'\gamma)$ does not exclude (M1+E2).
2109.33	$1^{(+)}$	1051.72 *20*	47.4[@] *18*	1057.426	3^+	E2		0.00248	α(K)=0.00210 *3*; α(L)=0.000300 *5*; α(M)=6.52×10^{-5} *10*

$\gamma(^{160}Gd)$ (continued)

E_i(level)	J_i^π	E_γ[†‡]	I_γ[#]	E_f	J_f^π	Mult.[&]	α[g]	Comments
								α(N)=1.496×10^{-5} *21*; α(O)=2.30×10^{-6} *4*; α(P)=1.452×10^{-7} *21* B(E2)(W.u.)=6.3 *+18−17*
2109.33	$1^{(+)}$	1120.52 *21*	58[@] *3*	988.548	2^+	M1+E2	0.0028 *7*	α(K)=0.0024 *6*; α(L)=0.00033 *7*; α(M)=7.2×10^{-5} *15* α(N)=1.6×10^{-5} *4*; α(O)=2.6×10^{-6} *6*; α(P)=1.71×10^{-7} *44*; α(IPF)=6.8×10^{-7} *4*
		2034.17[a] *12*	100[@] *2*	75.263	2^+	M1+E2	0.00111 *12*	α(K)=0.00067 *8*; α(L)=8.9×10^{-5} *11*; α(M)=1.92×10^{-5} *23* α(N)=4.4×10^{-6} *6*; α(O)=6.9×10^{-7} *9*; α(P)=4.7×10^{-8} *7*; α(IPF)=0.000326 *23*
		2109.36 *17*	73.3[@] *21*	0.0	0^+	(M1)	1.20×10^{-3}	α(K)=0.000695 *10*; α(L)=9.21×10^{-5} *13*; α(M)=1.98×10^{-5} *3* α(N)=4.57×10^{-6} *7*; α(O)=7.13×10^{-7} *10*; α(P)=4.96×10^{-8} *7*; α(IPF)=0.000389 *6* B(M1)(W.u.)=0.0027 *7* Mult.: pure dipole in (n,n′γ) does not exclude (E1).
2118.6	(10^+)	401		1717.5	(8^+)			
		817		1301.3	10^+			
		1250		868.6	8^+			
2118.90	2^+	2043.6 *3*	35 *8*	75.263	2^+			
		2118.89 *21*	100 *11*	0.0	0^+	E2	9.88×10^{-4}	α(K)=0.000552 *8*; α(L)=7.29×10^{-5} *11*; α(M)=1.569×10^{-5} *22* α(N)=3.61×10^{-6} *5*; α(O)=5.61×10^{-7} *8*; α(P)=3.82×10^{-8} *6*; α(IPF)=0.000343 *5*
2135.72		2060.44[a] *10*	100 *8*	75.263	2^+			
		2135.7[i] *3*	47[i] *6*	0.0	0^+			
2162.69	1	2087.45 *14*	100 *9*	75.263	2^+			
		2162.58 *22*	89 *9*	0.0	0^+			
2242.2	(1,2)	865.4[f] *10*	14.7[f] *25*	1376.73	2^-			
		891.0[f] *10*	37[f] *4*	1351.188	1^-			
		1017.9[f] *10*	100[f] *9*	1224.237	$1^{(-)}$			
2252.7		769.6[e] *3*	100[e]	1483.08	(4^+)			
2277.4	1	841.1[f] *10*	6.8[f] *7*	1436.27	2^+			
		1288.9[f] *10*	4.6[f] *5*	988.548	2^+			
		2202.1[f] *9*	73.7[f] *20*	75.263	2^+			
		2277.5[f] *8*	100[f] *2*	0.0	0^+	D		
2282.74	$(1^+,2^+)$	1057.9 *7*	37 *11*	1224.237	$1^{(-)}$			
		1226.1[f] *10*	29[f] *3*	1057.426	3^+			
		1295.0[f] *10*	61[f] *7*	988.548	2^+			
		2207.5[i] *3*	100[i] *15*	75.263	2^+			
		2282.6 *4*	96 *15*	0.0	0^+			
2301.54	2^+	1153.5 *4*	42 *6*	1147.985	4^+			
		2301.53[a] *17*	100 *8*	0.0	0^+	E2	9.86×10^{-4}	α(K)=0.000476 *7*; α(L)=6.25×10^{-5} *9*; α(M)=1.344×10^{-5} *19*

$^{160}_{64}Gd_{96}$-21

γ(^{160}Gd) (continued)

E_i(level)	J^π_i	E_γ[†‡]	I_γ[#]	E_f	J^π_f	Mult.[&]	α[g]	Comments
								α(N)=3.09×10^{-6} *5*; α(O)=4.81×10^{-7} *7*; α(P)=3.29×10^{-8} *5*; α(IPF)=0.000430 *6*
2313.3	(11$^-$)	507[j]		1806.9	12$^+$			
		1012		1301.3	10$^+$			
2315.8	(1,2)	1327.2[f] *10*	100	988.548	2$^+$			
2327.5	(1$^+$,2)	976.3[f] *10*	8.4[f] *8*	1351.188	1$^-$			
		1269.9[f] *10*	66.9[f] *24*	1057.426	3$^+$			
		1339.0[f] *9*	100[f] *3*	988.548	2$^+$			
2333.5	(1,2$^+$)	897.1[f] *10*	20.2[f] *19*	1436.27	2$^+$			
		982.5[f] *10*	9.0[f] *19*	1351.188	1$^-$			
		1109.3[f] *10*	100[f] *10*	1224.237	1$^{(-)}$			
		1344.9[f] *10*	30[f] *4*	988.548	2$^+$			
		2333.3[f] *10*	4.1[f] *11*	0.0	0$^+$			
2344.5		646[ej]	6[e] *3*	1698.21	(5,6$^+$)			
		762.7[e] *3*	100[e] *6*	1581.81	(5$^+$)			
2347.4	1$^+$	2272.5[d] *7*	63 *13*	75.263	2$^+$	[M1]	1.17×10^{-3}	B(M1)(W.u.)=0.023 *3* α(K)=0.000589 *9*; α(L)=7.79×10^{-5} *11*; α(M)=1.677×10^{-5} *24* α(N)=3.86×10^{-6} *6*; α(O)=6.03×10^{-7} *9*; α(P)=4.20×10^{-8} *6*; α(IPF)=0.000479 *7*
		2347.3[d] *4*	100 *13*	0.0	0$^+$	[M1]	1.16×10^{-3}	B(M1)(W.u.)=0.042 *3* α(K)=0.000548 *8*; α(L)=7.25×10^{-5} *11*; α(M)=1.559×10^{-5} *22* α(N)=3.59×10^{-6} *5*; α(O)=5.61×10^{-7} *8*; α(P)=3.90×10^{-8} *6*; α(IPF)=0.000521 *8*
2361.93	(2$^+$,3$^-$)	705.1[f] *10*	1.55[f] *21*	1657.2	(1$^-$,2)			
		898.4[f] *10*	3.3[f] *3*	1463.83	3$^-$			
		985.3[f] *10*	1.55[f] *21*	1376.73	2$^-$			
		1138.1[f] *9*	21.6[f] *7*	1224.237	1$^{(-)}$			
		1304.9[f] *10*	10.8[f] *7*	1057.426	3$^+$			
		1373.9[f] *10*	1.28[f] *14*	988.548	2$^+$			
		2113.40 *16*	100 *10*	248.502	4$^+$			
		2286.5 *3*	85.0[f] *12*	75.263	2$^+$			
2377.9	14$^+$	571.0[b]	100	1806.9	12$^+$	[E2]	0.00991	α(K)=0.00815 *12*; α(L)=0.001383 *20*; α(M)=0.000305 *5* α(N)=6.97×10^{-5} *10*; α(O)=1.039×10^{-5} *15*; α(P)=5.52×10^{-7} *8*
2383.6	(2$^+$,3,4$^+$)	2135.7[ij] *3*	100[i] *13*	248.502	4$^+$			
		2308.3[a] *6*	52 *13*	75.263	2$^+$			
2385.6	(1,2)	1034.5[f] *10*	50[f] *4*	1351.188	1$^-$			
		1161.2[f] *10*	100[f] *7*	1224.237	1$^{(-)}$			

$^{160}_{64}$Gd$_{96}$-22

$\gamma(^{160}Gd)$ (continued)

E_i(level)	J^{π}_i	E_γ[†‡]	I_γ[#]	E_f	J^{π}_f	Mult.[&]	α[g]	Comments
2432.7	$(1^-,2^+)$	968.9[f] *10*	16.0[f] *11*	1463.83	3^-			
		1055.8[f] *10*	22.1[f] *22*	1376.73	2^-			
		1081.6[f] *10*	8.7[f] *9*	1351.188	1^-			
		1142.8[f] *8*	100.0[f] *21*	1289.76	3^-			
		1208.5[f] *10*	38.8[f] *16*	1224.237	$1^{(-)}$			
		2357.5[f] *9*	56.6[f] *16*	75.263	2^+			
		2432.9[f] *10*	5.3[f] *9*	0.0	0^+			
2444.8	$(2^+,3,4^+)$	2196.0 *6*	61 *13*	248.502	4^+			
		2369.6 *3*	100 *13*	75.263	2^+			
2456.0	$(2^+,3,4^+)$	2207.5[i] *3*	100[i] *15*	248.502	4^+			
		2380.3 *8*	41 *11*	75.263	2^+			
2464.41	(1^-)	807.2[f] *10*	1.85[f] *15*	1657.2	$(1^-,2)$			
		856.1[f] *10*	4.48[f] *30*	1608.3				
		1027.8[f] *10*	0.96[f] *7*	1436.27	2^+			
		1087.5[f] *9*	18.9[f] *4*	1376.73	2^-			
		1113.1[f] *9*	14.6[f] *4*	1351.188	1^-			
		1240.1[f] *8*	22.6[f] *16*	1224.237	$1^{(-)}$			
		1475.9[f] *10*	1.22[f] *7*	988.548	2^+			
		2389.2[f] *10*	6.6[f] *3*	75.263	2^+			
		2464.4[f] *1*	100.00[f] *11*	0.0	0^+			
2471.77	1^-	2395.2[ac] *5*	29.1[f] *23*	75.263	2^+	[E1]	1.10×10^{-3}	B(E1)(W.u.)=9.0×10^{-04} *17* α(K)=0.000223 *4*; α(L)=2.83×10^{-5} *4*; α(M)=6.07×10^{-6} *9* α(N)=1.395×10^{-6} *20*; α(O)=2.17×10^{-7} *3*; α(P)=1.509×10^{-8} *22*; α(IPF)=0.000840 *12*
		2471.8[ic] *1*	100.0[if] *5*	0.0	0^+	E1	1.13×10^{-3}	B(E1)(W.u.)=5.4×10^{-04} *8* α(K)=0.000213 *3*; α(L)=2.70×10^{-5} *4*; α(M)=5.78×10^{-6} *8* α(N)=1.328×10^{-6} *19*; α(O)=2.07×10^{-7} *3*; α(P)=1.437×10^{-8} *21*; α(IPF)=0.000887 *13* Mult.: from (γ,γ').
2489.60	$(5^+,6^+)$	491.1[e] *2*	100[e] *6*	1998.71	(5^-)			
		1006.5[e] *3*	70[e] *4*	1483.08	(4^+)			
		1052.1[e] *3*	17.7[e] *24*	1437.40	(7^+)			
		1194.1[e] *3*	4.9[e] *18*	1295.22	(6^+)			
		1316.4[e] *3*	63[e] *4*	1173.09	$(5)^+$			
2510.7	$(1,2^-)$	1046.7[f] *10*	50[f] *3*	1463.83	3^-			
		1159.6[f] *10*	17.2[f] *12*	1351.188	1^-			
		1286.5[f] *9*	100.0[f] *24*	1224.237	$1^{(-)}$			

$^{160}_{64}Gd_{96}$-23

γ(^{160}Gd) (continued)

E_i(level)	J^π_i	E_γ [†‡]	I_γ [#]	E_f	J^π_f	Mult. [&]	α [g]	Comments
2510.7	(1,2⁻)	1522.3[f] *10*	9.4[f] *10*	988.548	2⁺			
		2435.2[f] *9*	67.7[f] *22*	75.263	2⁺			
2516.5	(2)	1052.6[f] *9*	100[f] *4*	1463.83	3⁻			
		1165.3[f] *10*	46[f] *5*	1351.188	1⁻			
		1226.7[f] *10*	41[f] *4*	1289.76	3⁻			
		1292.4[f] *10*	84[f] *7*	1224.237	1⁽⁻⁾			
		1459.0[f] *10*	38[f] *3*	1057.426	3⁺			
2529.9	(1⁻,2)	1153.2[f] *10*	6.8[f] *8*	1376.73	2⁻			
		1178.7[f] *10*	22.3[f] *15*	1351.188	1⁻			
		1240.0[f] *9*	100[f] *6*	1289.76	3⁻			
		1305.7[f] *10*	15.0[f] *12*	1224.237	1⁽⁻⁾			
2547.0	(0⁺,1,2⁺)	2471.8[ij] *4*	100[i] *15*	75.263	2⁺			
		2547.0 *5*	46 *9*	0.0	0⁺			
2559.54	(5⁺,6⁺)	560.8[e] *2*	100[e] *5*	1998.71	(5⁻)			
		1076.4[e] *3*	57[e] *4*	1483.08	(4⁺)			
		1122.4[e] *3*	9.5[e] *11*	1437.40	(7⁺)			
		1264.1[e] *3*	16.0[e] *22*	1295.22	(6⁺)			
		1386.5[e] *3*	42[e] *5*	1173.09	(5)⁺			
2582.9	(12⁺)	464		2118.6	(10⁺)			
		776		1806.9	12⁺			
		1282		1301.3	10⁺			
2670.2	1⁺	2595[d] *1*	53 *4*	75.263	2⁺	[M1]	1.17×10^{-3}	B(M1)(W.u.)=0.021 *2* α(K)=0.000440 *7*; α(L)=5.80×10^{-5} *9*; α(M)=1.248×10^{-5} *18* α(N)=2.87×10^{-6} *4*; α(O)=4.49×10^{-7} *7*; α(P)=3.13×10^{-8} *5*; α(IPF)=0.000656 *10*
		2670[d] *1*	100	0.0	0⁺	M1	1.18×10^{-3}	B(M1)(W.u.)=0.036 *3* α(K)=0.000414 *6*; α(L)=5.45×10^{-5} *8*; α(M)=1.172×10^{-5} *17* α(N)=2.70×10^{-6} *4*; α(O)=4.22×10^{-7} *6*; α(P)=2.94×10^{-8} *5*; α(IPF)=0.000696 *10*
2761.2	1	2686 *1*	100	75.263	2⁺			
		2761 *1*	56 *12*	0.0	0⁺	D		
2796.2	1⁺	2721[d] *1*	56.8 *22*	75.263	2⁺	[M1]	1.19×10^{-3}	B(M1)(W.u.)=0.086 *6* α(K)=0.000397 *6*; α(L)=5.23×10^{-5} *8*; α(M)=1.124×10^{-5} *16* α(N)=2.59×10^{-6} *4*; α(O)=4.04×10^{-7} *6*; α(P)=2.82×10^{-8} *4*; α(IPF)=0.000722 *11*
		2796[d] *1*	100	0.0	0⁺	M1	1.20×10^{-3}	B(M1)(W.u.)=0.14 *1* α(K)=0.000375 *6*; α(L)=4.93×10^{-5} *7*; α(M)=1.059×10^{-5} *15* α(N)=2.44×10^{-6} *4*; α(O)=3.81×10^{-7} *6*; α(P)=2.66×10^{-8} *4*; α(IPF)=0.000761 *11*

$^{160}_{64}Gd_{96}$-24

$\gamma(^{160}Gd)$ (continued)

E_i(level)	J_i^π	E_γ[†‡]	I_γ[#]	E_f	J_f^π	Mult.[&]	α[g]	Comments
2820.2	$1^{(+)}$	2745[d] *1*	100 *14*	75.263	2^+	[M1]	1.19×10^{-3}	B(M1)(W.u.)=0.053 *13* α(K)=0.000390 *6*; α(L)=5.13×10^{-5} *8*; α(M)=1.103×10^{-5} *16* α(N)=2.54×10^{-6} *4*; α(O)=3.97×10^{-7} *6*; α(P)=2.77×10^{-8} *4*; α(IPF)=0.000735 *11*
		2820[d] *1*	76	0.0	0^+	(M1)	1.20×10^{-3}	B(M1)(W.u.)=0.037 *7* α(K)=0.000368 *6*; α(L)=4.84×10^{-5} *7*; α(M)=1.040×10^{-5} *15* α(N)=2.39×10^{-6} *4*; α(O)=3.74×10^{-7} *6*; α(P)=2.61×10^{-8} *4*; α(IPF)=0.000773 *11*
2999.2	1	2924 *1*	36 *12*	75.263	2^+			
		2999 *1*	100	0.0	0^+	D		
3008.7	16^+	630.8[b]	100	2377.9	14^+	[E2]	0.00775	α(K)=0.00641 *9*; α(L)=0.001049 *15*; α(M)=0.000231 *4* α(N)=5.27×10^{-5} *8*; α(O)=7.91×10^{-6} *11*; α(P)=4.37×10^{-7} *7*
3032.2	1^-	2957[c] *1*	100 *11*	75.263	2^+	[E1]	1.35×10^{-3}	B(E1)(W.u.)=3.7×10^{-04} *6* α(K)=0.0001622 *23*; α(L)=2.05×10^{-5} *3*; α(M)=4.39×10^{-6} *7* α(N)=1.010×10^{-6} *15*; α(O)=1.575×10^{-7} *22*; α(P)=1.097×10^{-8} *16*; α(IPF)=0.001160 *17*
		3032[c] *1*	67	0.0	0^+	E1	1.38×10^{-3}	B(E1)(W.u.)=2.3×10^{-04} *3* α(K)=0.0001563 *22*; α(L)=1.98×10^{-5} *3*; α(M)=4.23×10^{-6} *6* α(N)=9.72×10^{-7} *14*; α(O)=1.517×10^{-7} *22*; α(P)=1.057×10^{-8} *15*; α(IPF)=0.001199 *17*
3131.2	1^-	3056[c] *1*	84 *7*	75.263	2^+	[E1]	1.39×10^{-3}	B(E1)(W.u.)=3.5×10^{-04} *7* α(K)=0.0001545 *22*; α(L)=1.95×10^{-5} *3*; α(M)=4.18×10^{-6} *6* α(N)=9.61×10^{-7} *14*; α(O)=1.499×10^{-7} *21*; α(P)=1.045×10^{-8} *15*; α(IPF)=0.001213 *17*
		3131[c] *1*	100	0.0	0^+	E1	1.43×10^{-3}	B(E1)(W.u.)=3.8×10^{-04} *4* α(K)=0.0001491 *21*; α(L)=1.88×10^{-5} *3*; α(M)=4.03×10^{-6} *6* α(N)=9.27×10^{-7} *13*; α(O)=1.446×10^{-7} *21*; α(P)=1.008×10^{-8} *15*; α(IPF)=0.001256 *18*
3166.2	$1^{(-)}$	3091[c] *1*	64 *11*	75.263	2^+	[E1]	1.41×10^{-3}	B(E1)(W.u.)=2.7×10^{-04} *6* α(K)=0.0001520 *22*; α(L)=1.92×10^{-5} *3*; α(M)=4.11×10^{-6} *6* α(N)=9.45×10^{-7} *14*; α(O)=1.474×10^{-7} *21*; α(P)=1.027×10^{-8} *15*; α(IPF)=0.001233 *18*
		3166[c] *1*	100	0.0	0^+	(E1)	1.45×10^{-3}	B(E1)(W.u.)=4.0×10^{-04} *5* α(K)=0.0001467 *21*; α(L)=1.85×10^{-5} *3*; α(M)=3.97×10^{-6} *6* α(N)=9.12×10^{-7} *13*; α(O)=1.422×10^{-7} *20*; α(P)=9.92×10^{-9} *14*; α(IPF)=0.001275 *18*
3170.2	1^+	3095[d] *1*	60 *6*	75.263	2^+	[M1]	1.26×10^{-3}	B(M1)(W.u.)=0.049 *7* α(K)=0.000302 *5*; α(L)=3.95×10^{-5} *6*; α(M)=8.50×10^{-6} *12* α(N)=1.96×10^{-6} *3*; α(O)=3.06×10^{-7} *5*; α(P)=2.13×10^{-8} *3*; α(IPF)=0.000911 *13*
		3170[d] *1*	100	0.0	0^+	M1	1.28×10^{-3}	B(M1)(W.u.)=0.077 *8*

Adopted Levels, Gammas (continued)

$\gamma(^{160}Gd)$ (continued)

E_i(level)	J_i^π	E_γ[†‡]	I_γ[#]	E_f	J_f^π	Mult.[&]	α[g]	Comments
								α(K)=0.000287 *4*; α(L)=3.76×10^{-5} *6*; α(M)=8.07×10^{-6} *12* α(N)=1.86×10^{-6} *3*; α(O)=2.90×10^{-7} *4*; α(P)=2.03×10^{-8} *3*; α(IPF)=0.000948 *14*
3228.2	1	3153 *1*	100 *19*	75.263	2$^+$			
		3228 *1*	96	0.0	0$^+$	D		
3277.2	1$^+$	3202[d] *1*	53 *4*	75.263	2$^+$	[M1]	1.29×10^{-3}	B(M1)(W.u.)=0.061 *5* α(K)=0.000281 *4*; α(L)=3.68×10^{-5} *6*; α(M)=7.90×10^{-6} *11* α(N)=1.82×10^{-6} *3*; α(O)=2.84×10^{-7} *4*; α(P)=1.99×10^{-8} *3*; α(IPF)=0.000964 *14*
		3277[d] *1*	100	0.0	0$^+$	M1	1.31×10^{-3}	B(M1)(W.u.)=0.106 *8* α(K)=0.000267 *4*; α(L)=3.50×10^{-5} *5*; α(M)=7.52×10^{-6} *11* α(N)=1.731×10^{-6} *25*; α(O)=2.71×10^{-7} *4*; α(P)=1.89×10^{-8} *3*; α(IPF)=0.001002 *14*
3292.2	1	3217 *1*	31 *9*	75.263	2$^+$			
		3292 *1*	100	0.0	0$^+$	D		
3308.2	1$^+$	3233[d] *1*	58 *3*	75.263	2$^+$	[M1]	1.30×10^{-3}	B(M1)(W.u.)=0.050 *5* α(K)=0.000275 *4*; α(L)=3.60×10^{-5} *5*; α(M)=7.74×10^{-6} *11* α(N)=1.782×10^{-6} *25*; α(O)=2.78×10^{-7} *4*; α(P)=1.94×10^{-8} *3*; α(IPF)=0.000980 *14*
		3308[d] *1*	100	0.0	0$^+$	M1	1.32×10^{-3}	B(M1)(W.u.)=0.080 *7* α(K)=0.000262 *4*; α(L)=3.43×10^{-5} *5*; α(M)=7.37×10^{-6} *11* α(N)=1.697×10^{-6} *24*; α(O)=2.65×10^{-7} *4*; α(P)=1.85×10^{-8} *3*; α(IPF)=0.001017 *15*
3328.2	1	3253 *1*		75.263	2$^+$			I_γ: see the comment for this transition in the (γ,γ') data set.
		3328 *1*		0.0	0$^+$	D		I_γ: see the comment for this transition in the (γ,γ') data set.
3331.2	1$^+$	3256[d] *1*	46 *5*	75.263	2$^+$			
		3331[d] *1*	100	0.0	0$^+$	M1	1.33×10^{-3}	α(K)=0.000258 *4*; α(L)=3.38×10^{-5} *5*; α(M)=7.26×10^{-6} *11* α(N)=1.672×10^{-6} *24*; α(O)=2.61×10^{-7} *4*; α(P)=1.83×10^{-8} *3*; α(IPF)=0.001028 *15*
3340.2	1$^+$	3265[d] *1*	59 *5*	75.263	2$^+$	[M1]	1.31×10^{-3}	B(M1)(W.u.)=0.029 *4* α(K)=0.000269 *4*; α(L)=3.53×10^{-5} *5*; α(M)=7.58×10^{-6} *11* α(N)=1.745×10^{-6} *25*; α(O)=2.73×10^{-7} *4*; α(P)=1.90×10^{-8} *3*; α(IPF)=0.000996 *14*
		3340[d] *1*	100	0.0	0$^+$	M1	1.33×10^{-3}	B(M1)(W.u.)=0.047 *5* α(K)=0.000257 *4*; α(L)=3.36×10^{-5} *5*; α(M)=7.22×10^{-6} *11* α(N)=1.662×10^{-6} *24*; α(O)=2.60×10^{-7} *4*; α(P)=1.82×10^{-8} *3*; α(IPF)=0.001033 *15*
3357.2	1	3282 *1*	40 *6*	75.263	2$^+$			
		3357 *1*	100	0.0	0$^+$	D		
3376.2	1	3301 *1*	43 *5*	75.263	2$^+$			
		3376 *1*	100	0.0	0$^+$	D		
3415.2	1$^-$	3340[c] *1*	47 *3*	75.263	2$^+$	[E1]	1.51×10^{-3}	B(E1)(W.u.)=3.6×10^{-04} *4* α(K)=0.0001357 *19*; α(L)=1.713×10^{-5} *24*; α(M)=3.66×10^{-6} *6* α(N)=8.42×10^{-7} *12*; α(O)=1.314×10^{-7} *19*; α(P)=9.17×10^{-9} *13*; α(IPF)=0.001357 *19*
		3415[c] *1*	100	0.0	0$^+$	E1	1.54×10^{-3}	B(E1)(W.u.)=7.2×10^{-4} *7* α(K)=0.0001314 *19*; α(L)=1.658×10^{-5} *24*; α(M)=3.55×10^{-6} *5* α(N)=8.15×10^{-7} *12*; α(O)=1.272×10^{-7} *18*; α(P)=8.88×10^{-9} *13*; α(IPF)=0.001388 *20*
3460.2	1$^-$	3385[c] *1*	40 *3*	75.263	2$^+$	[E1]	1.53×10^{-3}	B(E1)(W.u.)=2.6×10^{-04} *4*

γ(^{160}Gd) (continued)

E_i(level)	J^π_i	E_γ[†‡]	I_γ[#]	E_f	J^π_f	Mult.[&]	α[g]	Comments
								α(K)=0.0001331 *19*; α(L)=1.680×10^{-5} *24*; α(M)=3.59×10^{-6} *5* α(N)=8.26×10^{-7} *12*; α(O)=1.289×10^{-7} *18*; α(P)=8.99×10^{-9} *13*; α(IPF)=0.001376 *20*
3460.2	1$^-$	3460 *1*	100	0.0	0$^+$	E1	1.56×10^{-3}	B(E1)(W.u.)=6.0×10^{-04} *7* α(K)=0.0001290 *18*; α(L)=1.627×10^{-5} *23*; α(M)=3.48×10^{-6} *5* α(N)=8.00×10^{-7} *12*; α(O)=1.248×10^{-7} *18*; α(P)=8.71×10^{-9} *13*; α(IPF)=0.001408 *20*
3477.2	1$^{(+)}$	3402[d] *1*	43 *4*	75.263	2$^+$	[M1]	1.35×10^{-3}	B(M1)(W.u.)=0.028 *5* α(K)=0.000247 *4*; α(L)=3.23×10^{-5} *5*; α(M)=6.94×10^{-6} *10* α(N)=1.599×10^{-6} *23*; α(O)=2.50×10^{-7} *4*; α(P)=1.746×10^{-8} *25*; α(IPF)=0.001061 *15*
		3477[d] *1*	100	0.0	0$^+$	(M1)	1.37×10^{-3}	B(M1)(W.u.)=0.060 *10* α(K)=0.000236 *4*; α(L)=3.09×10^{-5} *5*; α(M)=6.63×10^{-6} *10* α(N)=1.526×10^{-6} *22*; α(O)=2.39×10^{-7} *4*; α(P)=1.667×10^{-8} *24*; α(IPF)=0.001092 *16*
3537.2	1	3462 *1*	47 *5*	75.263	2$^+$			
		3537 *1*	100	0.0	0$^+$	D		
3550.2	1	3475 *1*	40 *7*	75.263	2$^+$			
		3550 *1*	100	0.0	0$^+$	D		

† From (n,n′γ), except as noted.

‡ 2020Ur03 measured the following values for the γ rays from 8$^+$ to g.s. of the g.s. band: 70.70 *20*, 173.86 *5*, 267.10 *5*, 353.15 *5*.

From (n,n′γ), 2009Go33 (reported originally as relative intensities) unless noted otherwise.

@ From (n,n′γ), 2017Le04 (reported originally as relative photon branching from each level, reason for which they could not be listed together with the relative intensities from 2009Go33 in (n,n′γ) but being more precise are adopted here).

& From (n,n′γ), except as noted, measured by 2009Go33 and 2017Le04 based on angular distribution measurements combined with multiplet analysis and intensity arguments. Based on these arguments they assigned E2 for ΔJ=2 transitions, and used the values of measured ΔJ=2 mixing ratios of the D+Q transitions to distinguish in between M1 and E1 character (high mixing ratio values implying M1 rather than E1).

a Doublet or multiplet.

b Calculated by the evaluator from the level-energy differences reported by 1993Su16, in Coulomb excitation. These authors report Eγ to only the nearest keV, but report level energies to the nearest 0.1 keV. This allows the level-energy spacings within the g.s. band given by 1993Su16 to be retained here.

c B(E1)(W.u.) value computed by the evaluator from $\Gamma_{\gamma 0}$ in (γ,γ') and the listed γ branching.

d B(M1)(W.u.) value computed by the evaluator from $\Gamma_{\gamma 0}$ in (γ,γ') and the listed γ branching.

e From β^- decay (42.6 s).

f From β^- decay (30.8 s).

g Additional information 6.

h Additional information 7.

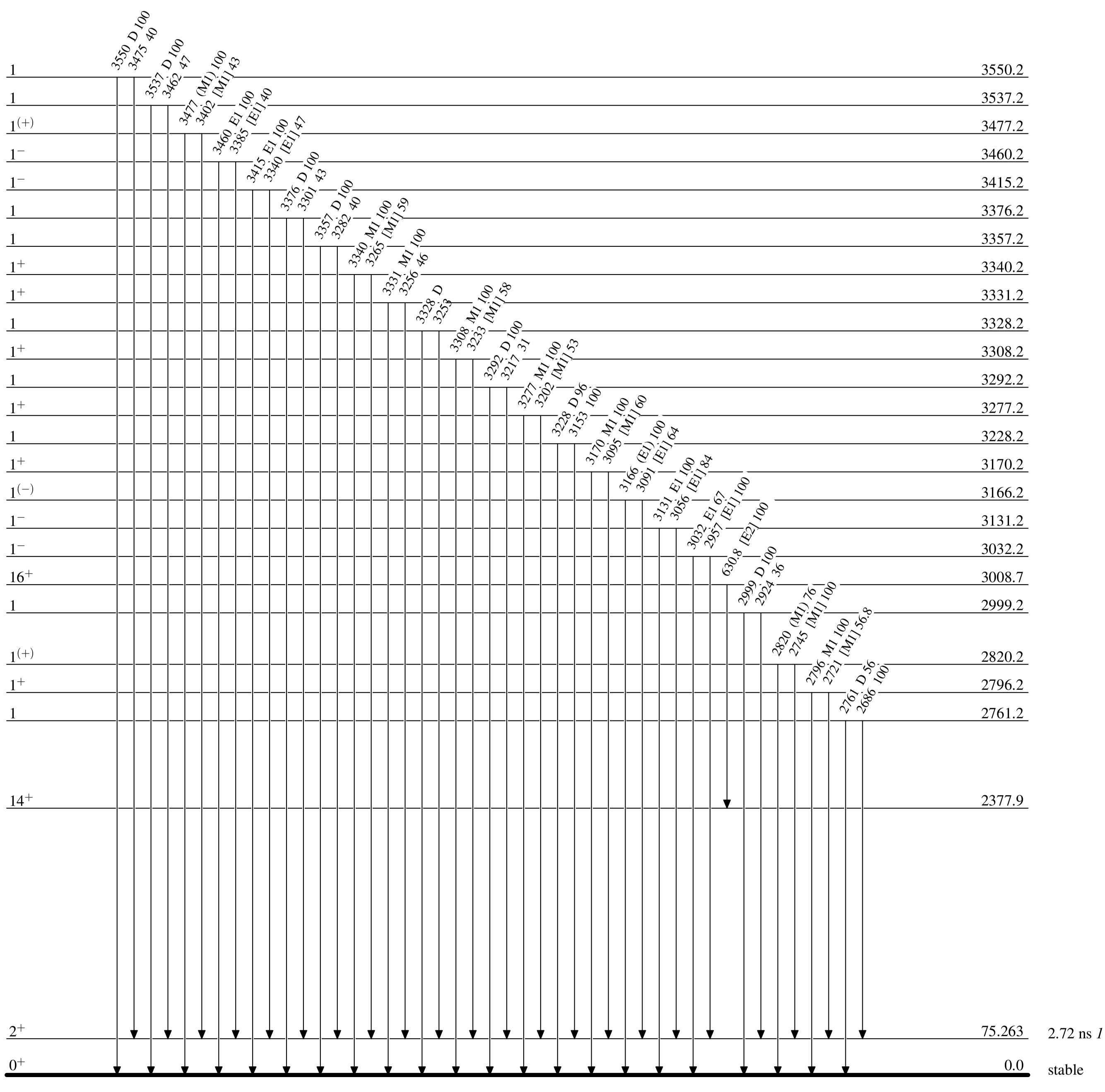
i Multiply placed with undivided intensity.

j Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



$^{160}_{64}Gd_{96}$

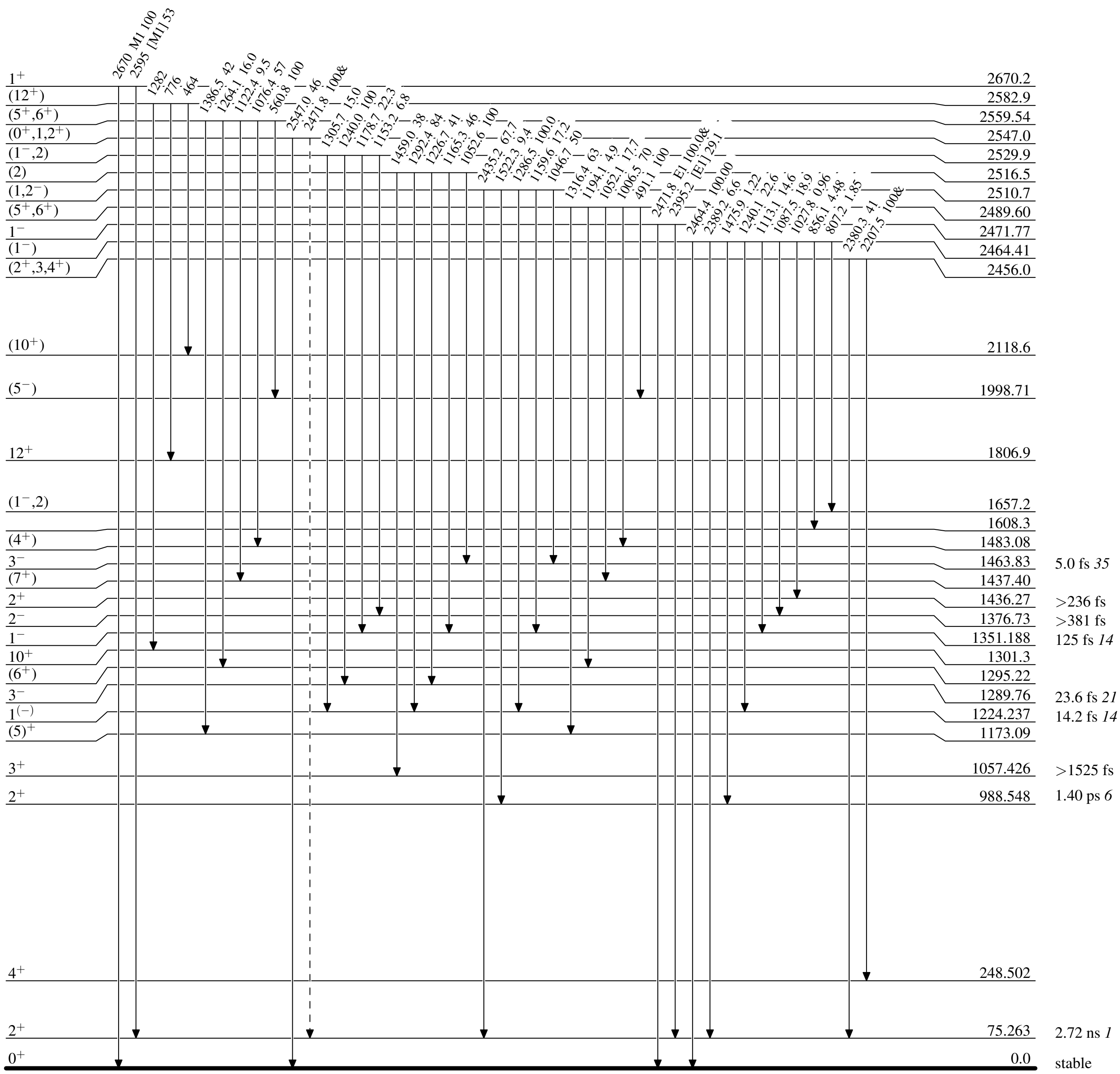
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

Legend

γ Decay (Uncertain)



$^{160}_{64}Gd_{96}$

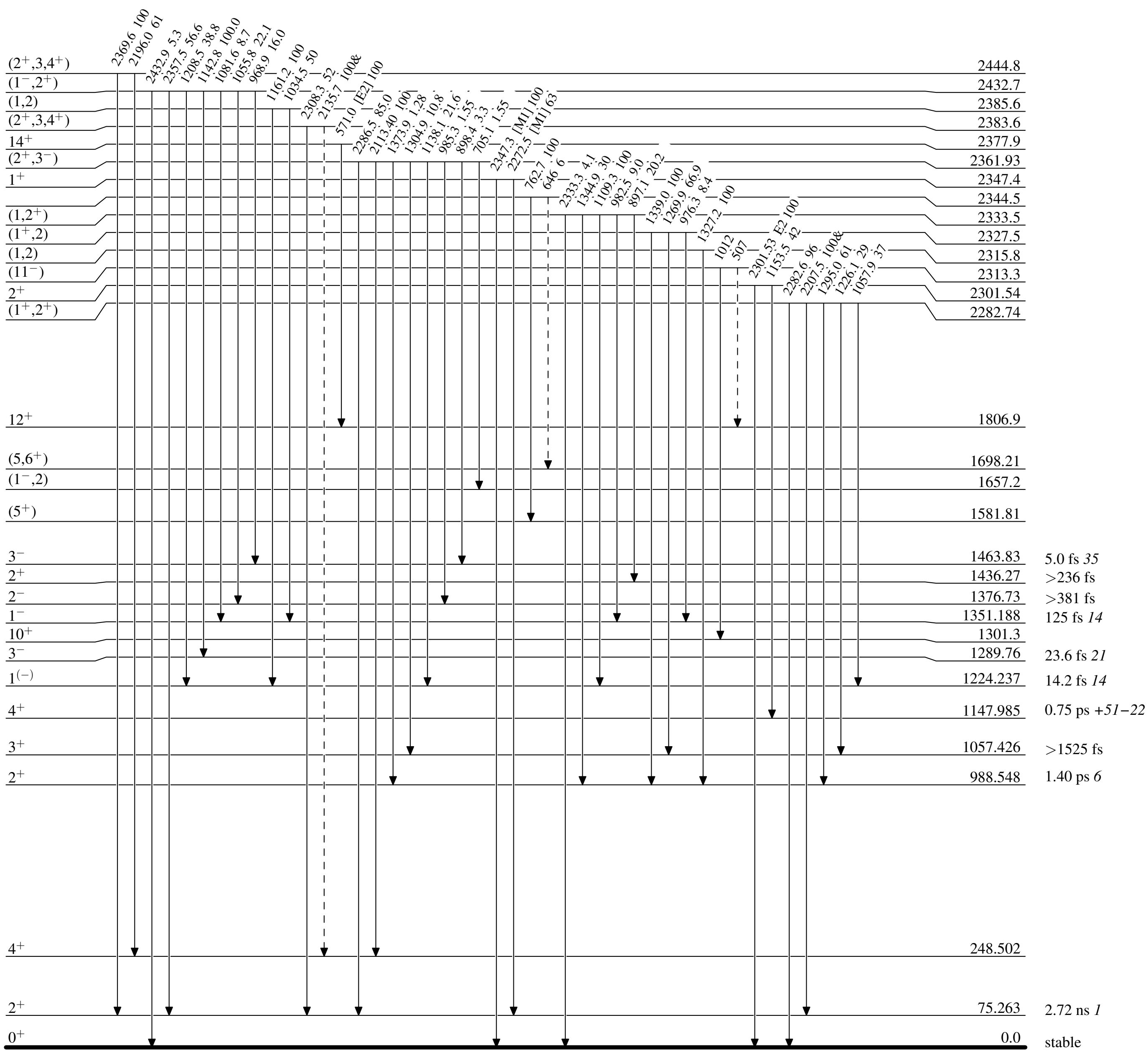
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

γ Decay (Uncertain)

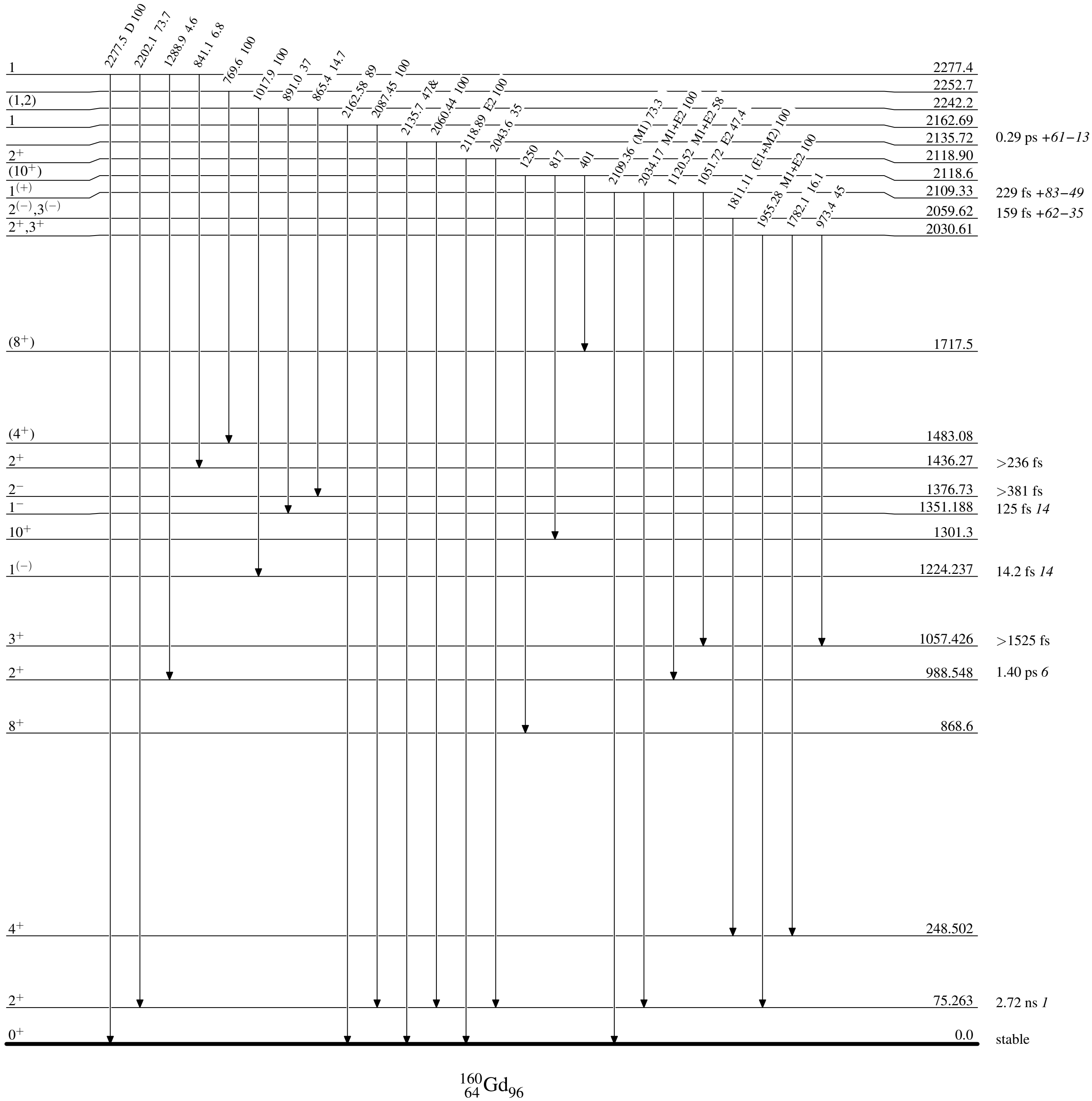


$^{160}_{64}Gd_{96}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

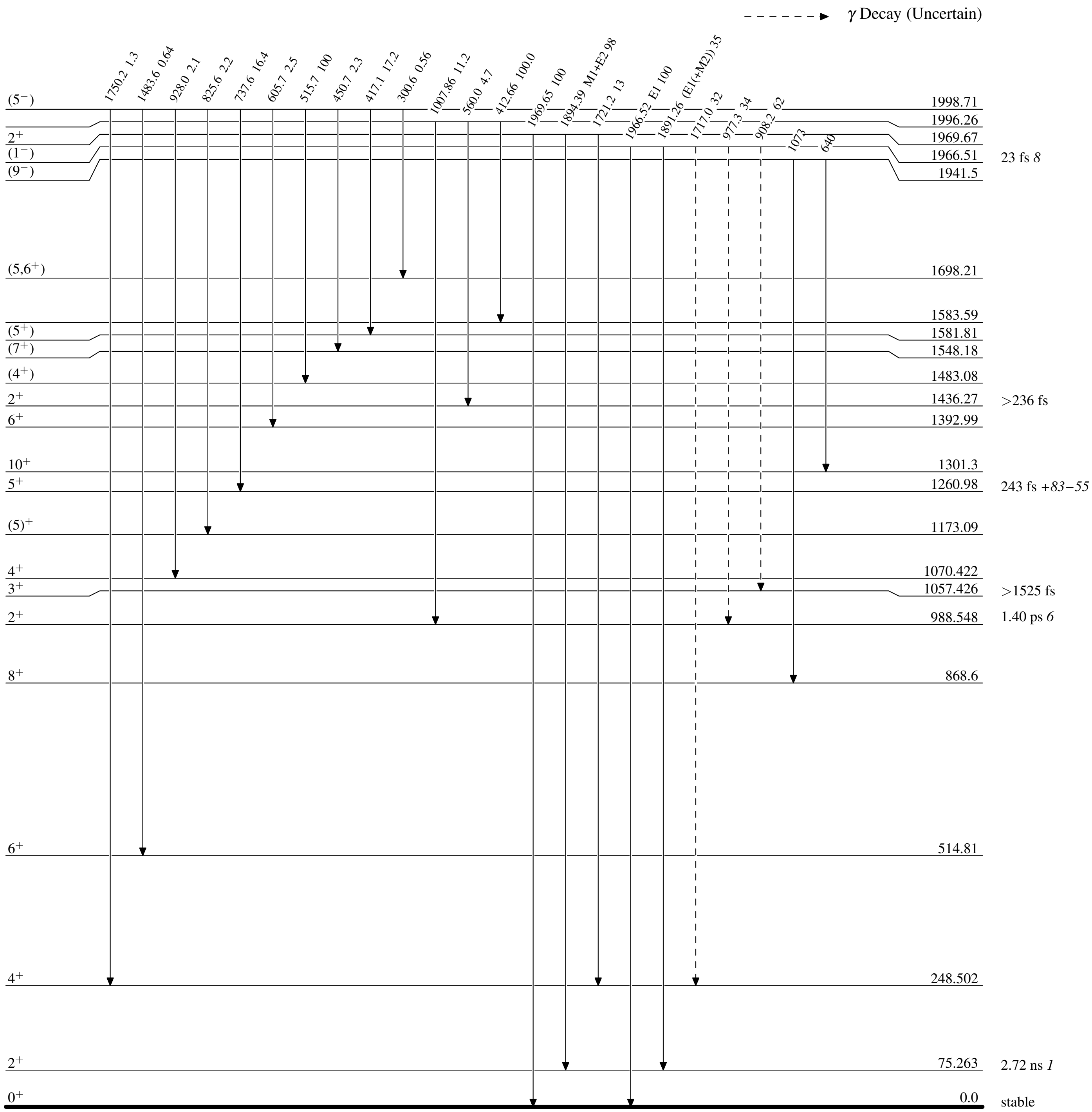


Adopted Levels, Gammas

Level Scheme (continued)

Legend

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

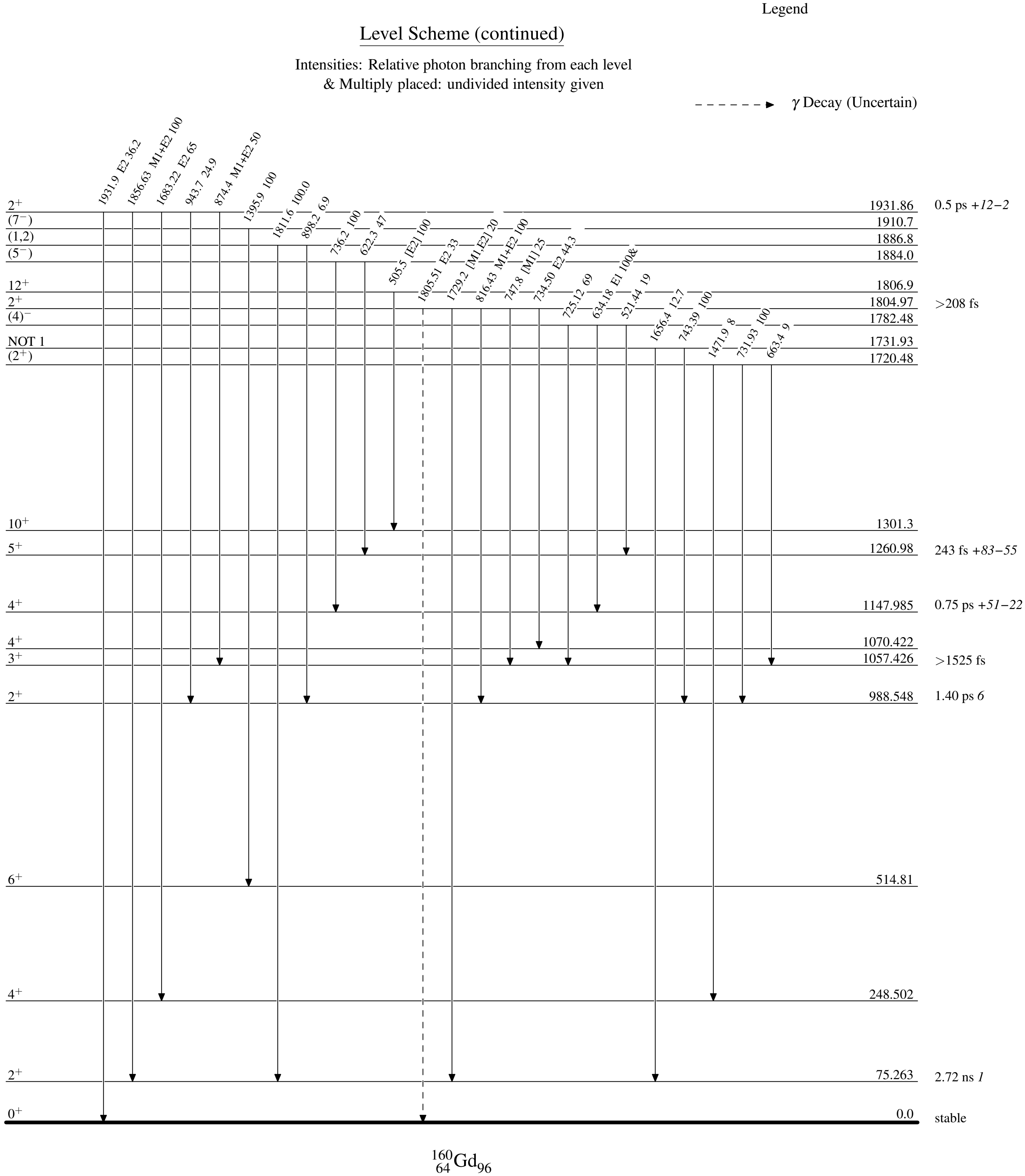


$^{160}_{64}Gd_{96}$

Adopted Levels, Gammas

Level Scheme (continued)

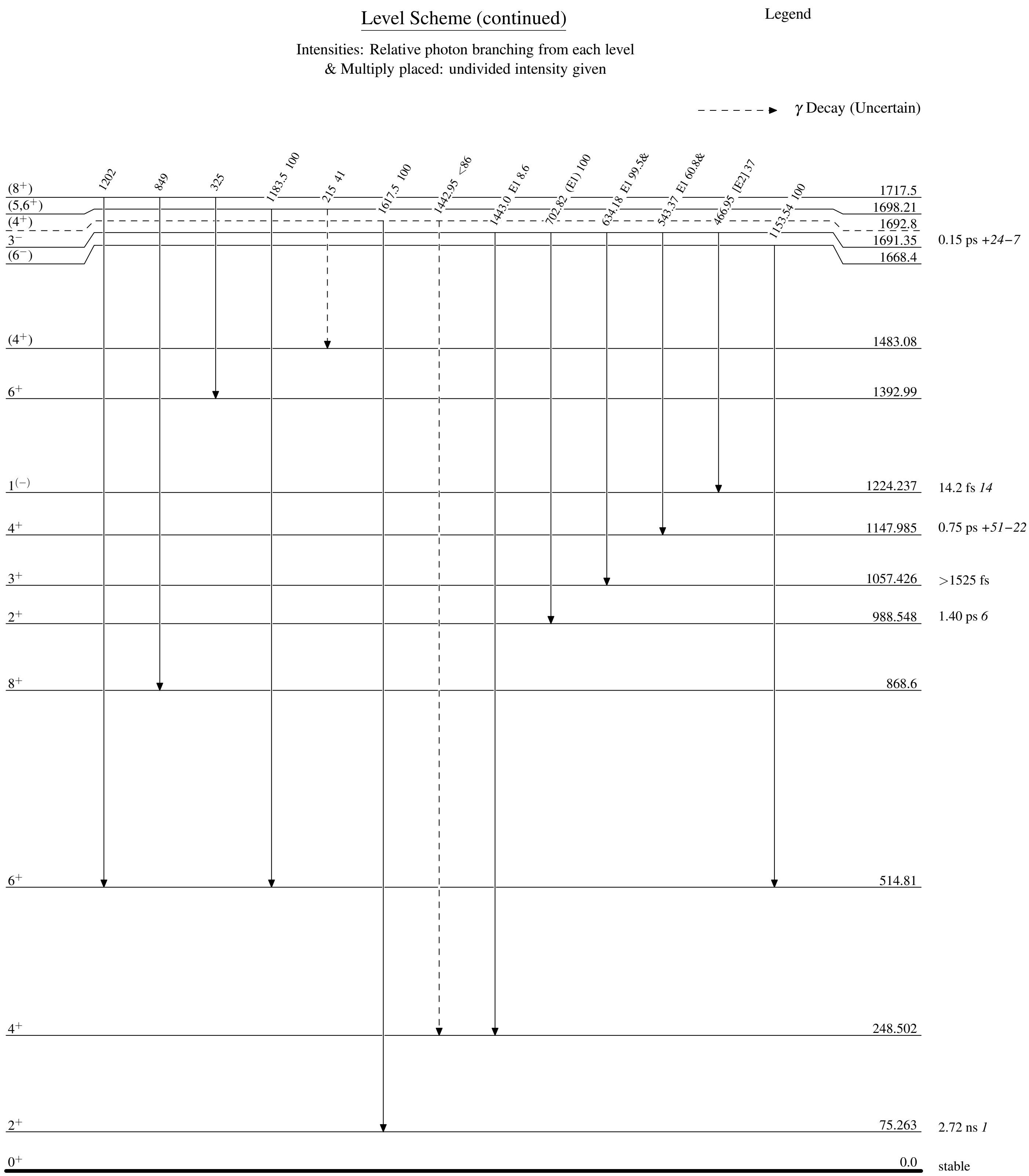
Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

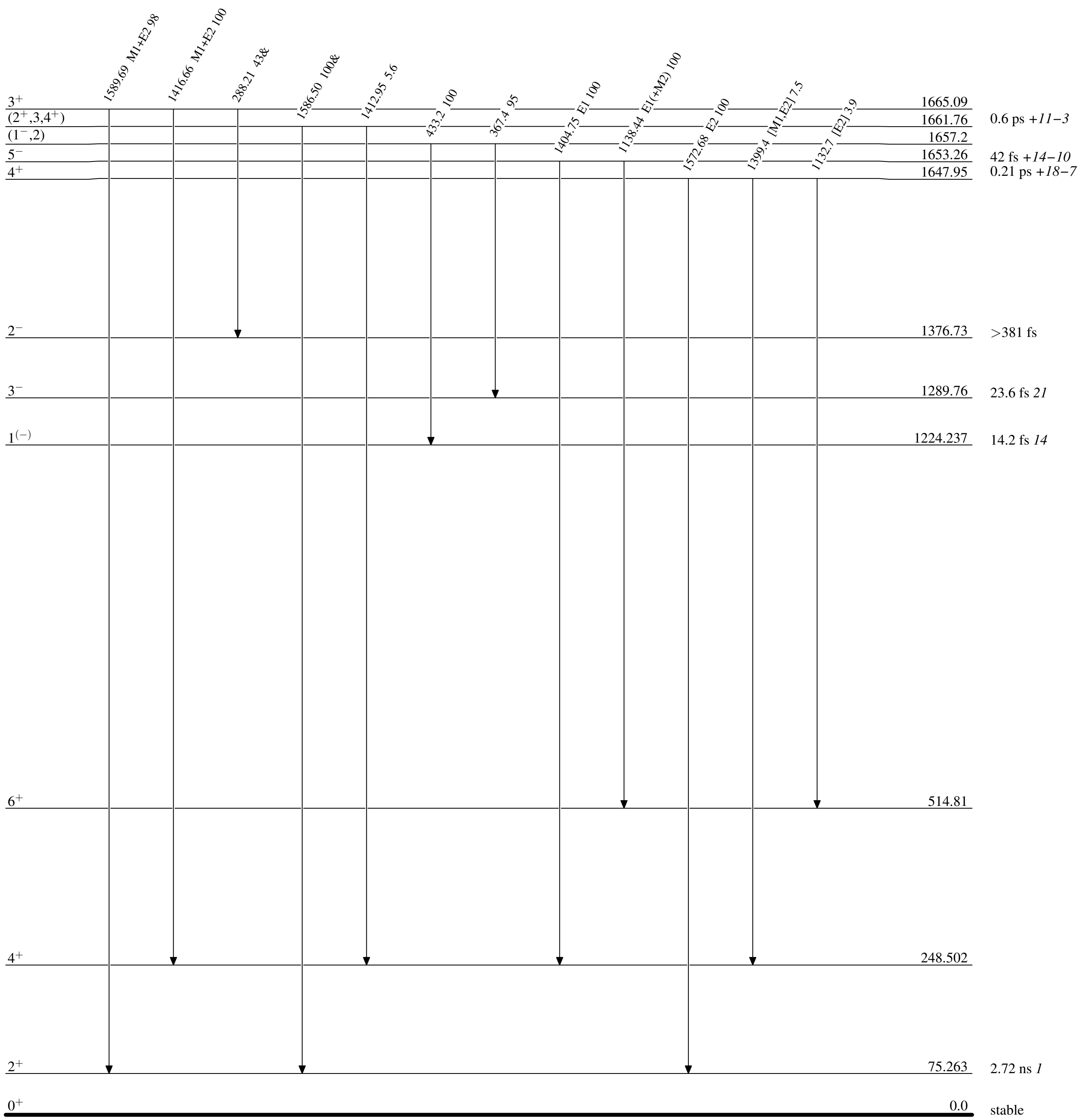


$^{160}_{64}Gd_{96}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given



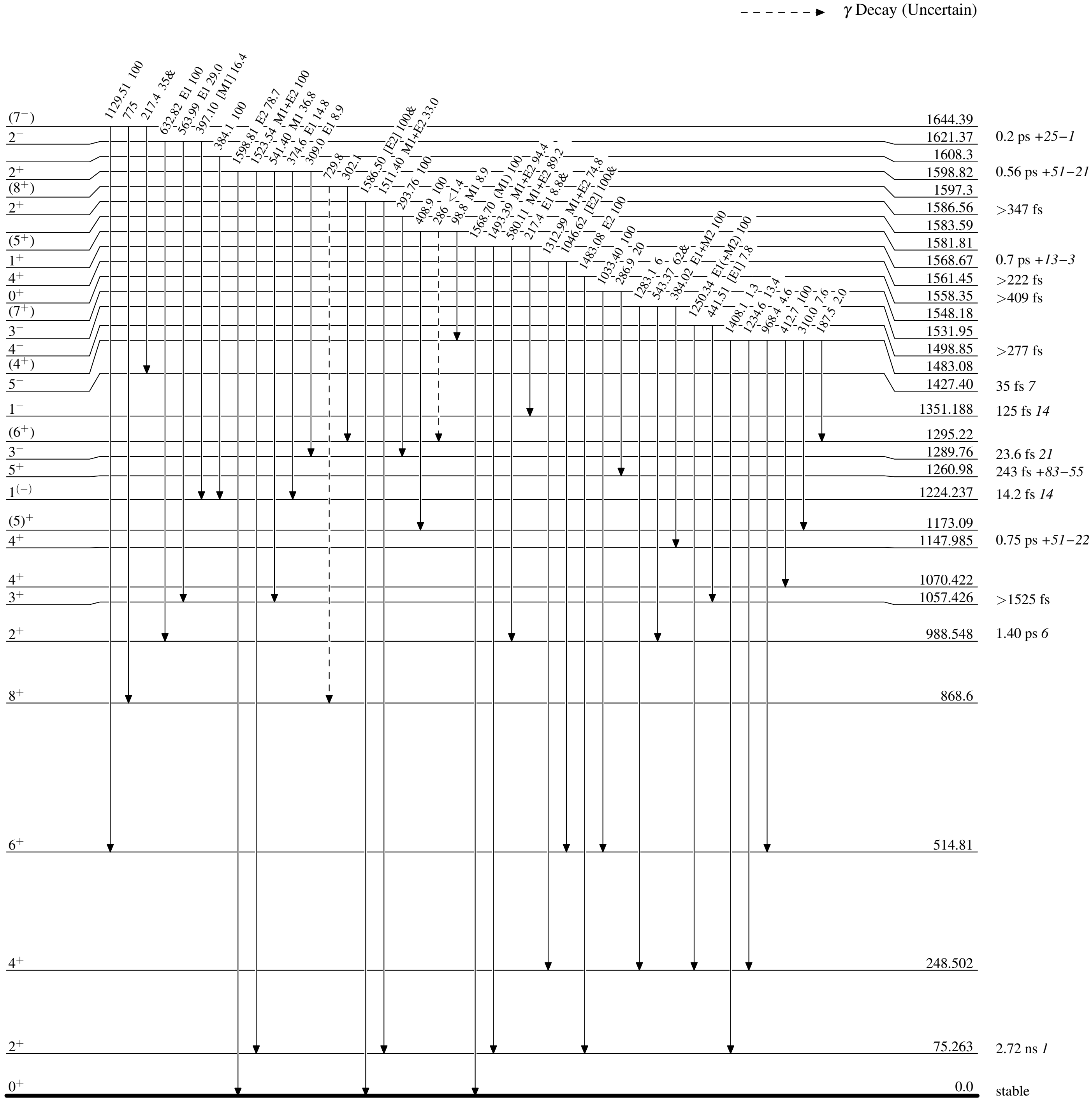
$^{160}_{64}Gd_{96}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

Legend



$^{160}_{64}Gd_{96}$

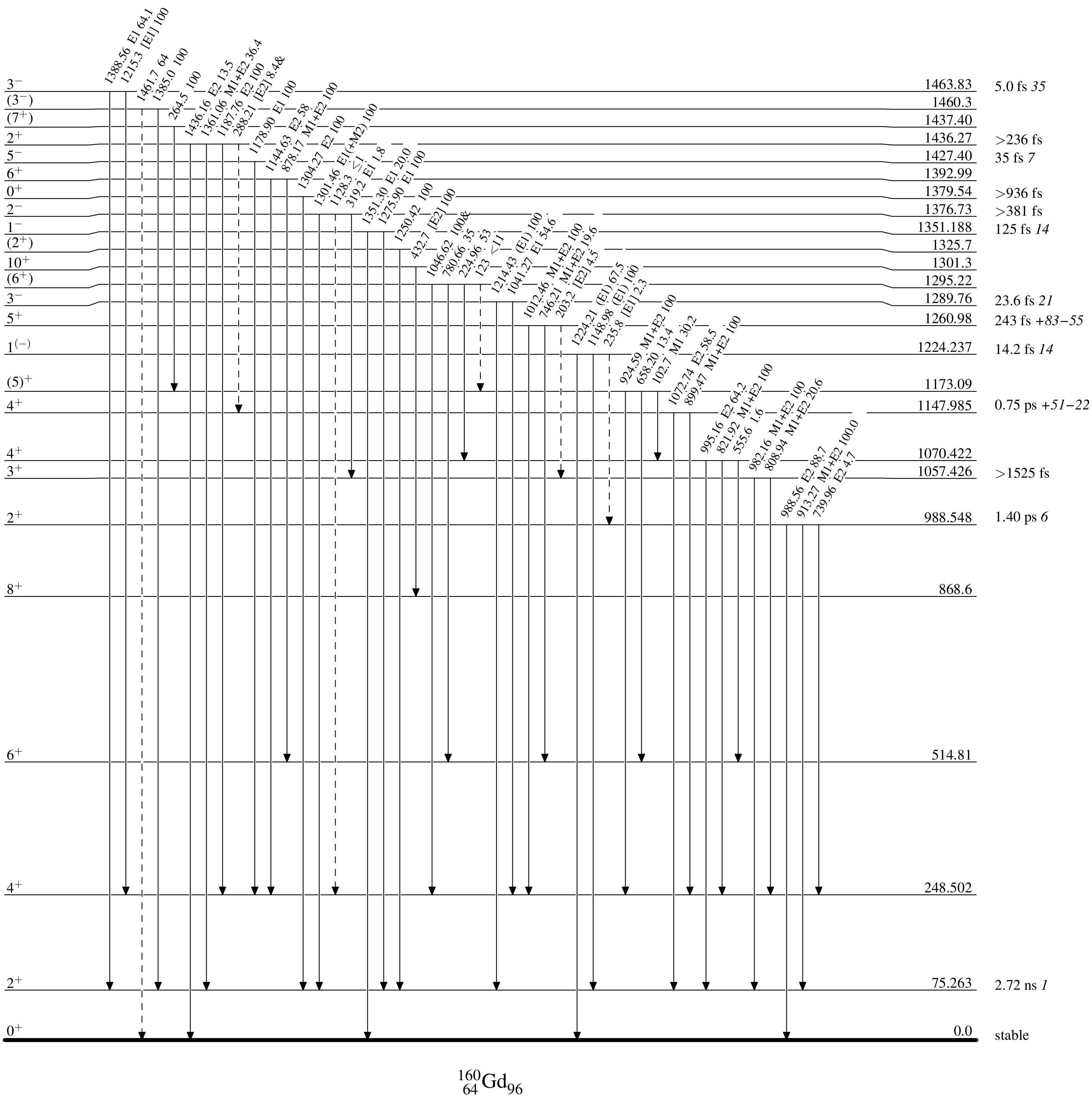
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

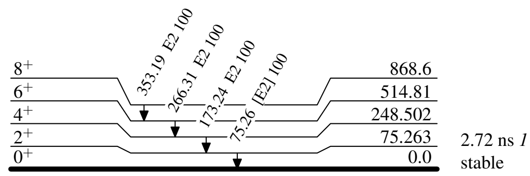
- - - - - ► γ Decay (Uncertain)



Adopted Levels, Gammas

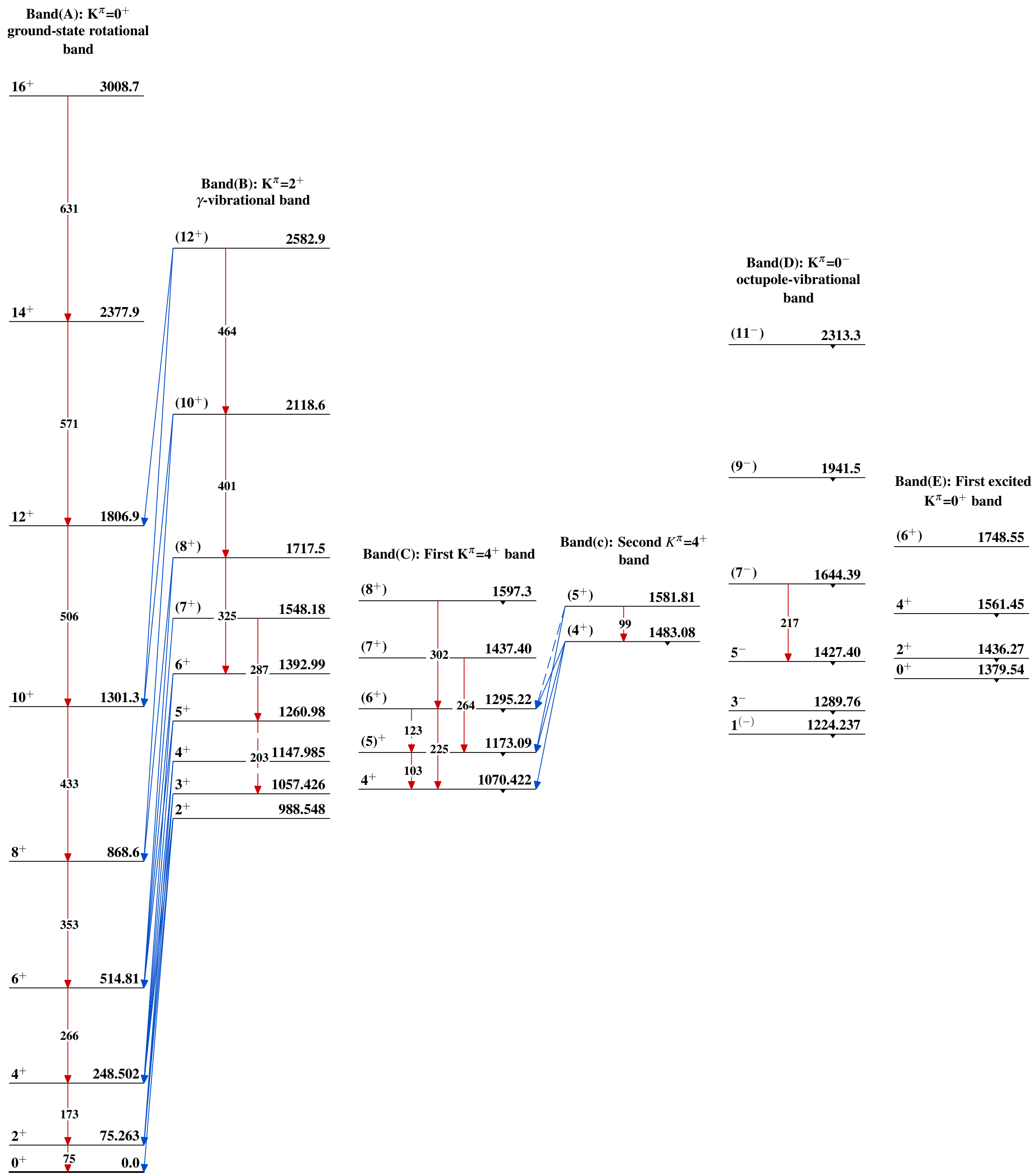
Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given



$^{160}_{64}Gd_{96}$

Adopted Levels, Gammas



$^{160}_{64}Gd_{96}$

Adopted Levels, Gammas (continued)