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 ($Y_3^{\pm 2}$) 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^π=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)†	Jπ‡	$T_{1/2}$	XREF	Comments
				optical, muonic-atom, and electromagnetic interactions for a number of Gd isotope pairs involving ^{156}Gd. These values are as follows: Δ<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), Δ<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), Δ<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, Δ<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. Jπ: 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* Jπ: 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* Jπ: 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)[†]	Jπ[‡]	T1/2	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. Jπ: γ to g.s., γ to 3+ level indicate Jπ=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 Jπ=1+. In these latter data sets, this level is assigned as the bandhead of a Kπ=1+ band, as it is here.
2367.44 4	2+		BCD IJ	XREF: J(2365). Jπ: γ's to 0+ and 4+ levels, and E0 component in γ to 2+.
2375 5	4+		K n	XREF: n(2377). Jπ: From L=4 in (p,p′).
2382.471[y] 11	2+[#]		BCD IJ Mn	XREF: J(2383)n(2377). Jπ: 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. Jπ: From γ(θ) in (γ,γ′), J=1. From resonance-averaged n capture, π=+. T1/2: From width data in (γ,γ′).
2406.1	1−,3−[#]		CD j	XREF: j(2404.7).
2415.490[y] 24	3+[#]		BCD J	Jπ: M1 components in γ's to 2+ levels indicate Jπ=1+,2+,3+. If γ to 4− is E1, then Jπ=1+,2+ are eliminated.
2423.0	0+,3+[#]		CD	
2427.43[f] 8	10−		FG	Jπ: 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	Jπ: From γ's to 8+ and 10+ levels and expected band structure.
2446.16 3	2+		BCD J n	XREF: n(2441). Jπ: 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	Jπ: E2 γ to 12+ level and expected band structure.
2478.6	3+[#]		BCD	XREF: B(2477).
2484	6+		M	Jπ: L=6 in (p,t).
2490.57[1] 20	J		FG	Jπ: From (^{13}C,α3nγ), Jπ=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	Jπ: 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,α3nγ).
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^{π}: γ to 16⁻ level and expected band structure.
4857.4[l]	(J+10)	G	J^{π}: γ to J+8 level and expected band structure. J^{π}=20⁺,21⁺ is suggested by 2001Su06 (^{13}C,α3nγ).
5026.0[@]	22⁺	G	J^{π}: E2 γ to 20⁺ level and expected band structure.
5182.6[e]	(21⁻)	G	J^{π}: E2 γ to 19⁻ and expected band structure.
5778.7[@]	24⁺	G	J^{π}: E2 γ to 22⁺ level and expected band structure.
6582.6[@]	(26⁺)	G	J^{π}: 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^{π}'s assumed and thereby provide supporting evidence for these J^{π}'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^{π} values of these authors without further comment.

@ Band(A): K^{π}=0⁺, g.s. band. α=15.01 keV, β=−30 eV.

& Band(B): First excited K^{π}=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^{π}=0⁺ band. α=15.10 keV, β=−19.7 eV.

d Band(d): Sequence based on 12⁺.

e Band(E): K^{π}=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^{π}=1⁻ octupole-vibrational band, α=0 branch. At the higher spins, these states may be predominantly two-quasiparticle in nature.

g Band(F): K^{π}=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^{π}=7⁻ bandhead. Conf=ν3/2[651]+ν11/2[505] and/or conf=ν3/2[402]+ν11/2[505].

i Band(H): K^{π}=0⁻ octupole-vibrational band. α=17.24 keV.

j Band(I): K^{π}=0⁺ band. α=9.49 keV, β=−29 eV.

k Band(J): K^{π}=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^{π}=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^{π}=0⁺ band. α=10.60 keV.

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

o Band(N): K^{π}=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

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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 $\rho^2(E0)$ 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^π_i	E_γ†	I_γ†	E_f	J^π_f	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*	$\rho^2(E0)\times10^3$=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^-

From ENSDF

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
									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)).

$^{156}_{64}Gd_{92}$-15

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&	$I_{(\gamma+ce)}$	Comments
1168.186	0^+	118.71 *3*		1049.487	0^+	E0			0.18	ρ^2(E0)×10^3=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)×10^3=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.

$^{156}_{64}Gd_{92}$-16

γ(^{156}Gd) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	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

$\gamma(^{156}Gd)$ (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 γγ(θ) 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 γ(θ) and γγ(θ) (1975Ul01,1983Li06), ε decay. Other: from γγ(θ) 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 γ(θ) 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

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
								(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_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	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 γγ(θ) 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 γ(θ) and γγ(θ), δ=+9.2 *+7−6* (1975Ul01) and from γ(θ), δ=+7.6 *+6−5* (1979Ri17) in ε decay. Other: from γγ(θ), 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 γ(θ) 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 γ(θ) 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 γ(θ) 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),

From ENSDF

$^{156}_{64}Gd_{92}$-20

γ(^{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).

$^{156}_{64}Gd_{92}$-21

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 [&]	$I_{(\gamma+ce)}$	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);

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&	$I_{(\gamma+ce)}$	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*	ρ^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$\times10^{-5}$ *+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$\times10^{-5}$ *+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$\times10^{-5}$ *+23−12* Mult.: From α(K)exp<0.0062, 1982Ba28 deduce

$^{156}_{64}Gd_{92}$-23

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

$\gamma(^{156}Gd)$ (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 $\gamma(\theta)$ 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.

$\gamma(^{156}Gd)$ (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: γγ(θ) δ=0.03 *8* (1967Ke15) and ≤0.1 (1968We17); and from γ(θ) 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: γ(θ) δ=−0.030 *5* (1975Ul01) and −0.008 *25* (1979Ri17); and from γγ(θ) 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 γγ(θ) 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).

$\gamma(^{156}Gd)$ (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 γγ(θ) 0.050 *11* (1970Ru09) and −0.075 *25* (1977Co22), from β⁻ decay. Other: from γγ(θ) 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 γγ(θ) 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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γ(^{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.

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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
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 γ(θ), 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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γ(^{156}Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡#]	α[&]	Comments
								δ: From γγ(θ), δ(M2/E1)=−0.03 +*15*−*13* (1967Ke15), −0.09 *1* (1968We17), and +0.06 *2* (1975Ul01). Other γγ(θ): 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^+			

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γ(^{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 γ(θ) in (α,2nγ).
		325.6 1	67 8	1753.653	6+	E2		0.0469	Mult.: α(K)exp=0.032 8 and γ(θ), 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 γ(θ), 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)).

From ENSDF

$^{156}_{64}$Gd$_{92}$-35

γ(^{156}Gd) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡#]	α[&]	Comments
								δ: From $\gamma(\theta)$, 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).

From ENSDF

$^{156}_{64}$Gd$_{92}$-36

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
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 γγ(θ), 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 γγ(θ), 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.

$^{156}_{64}Gd_{92}$-37

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

γ(^{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×(α/α(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⁺			

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

Adopted Levels, Gammas (continued)

γ(^{156}Gd) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	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_γ: 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 γ(θ), 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

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
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 γγ(θ) (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⁺			

$^{156}_{64}$Gd$_{92}$-42

γ(^{156}Gd) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	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).

$\gamma(^{156}Gd)$ (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 γ(θ) 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*

$^{156}_{64}Gd_{92}$-44

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

Adopted Levels, Gammas (continued)

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

E$_i$(level)	J$^\pi_i$	E$_\gamma$[†]	I$_\gamma$[†]	E$_f$	J$^\pi_f$	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.

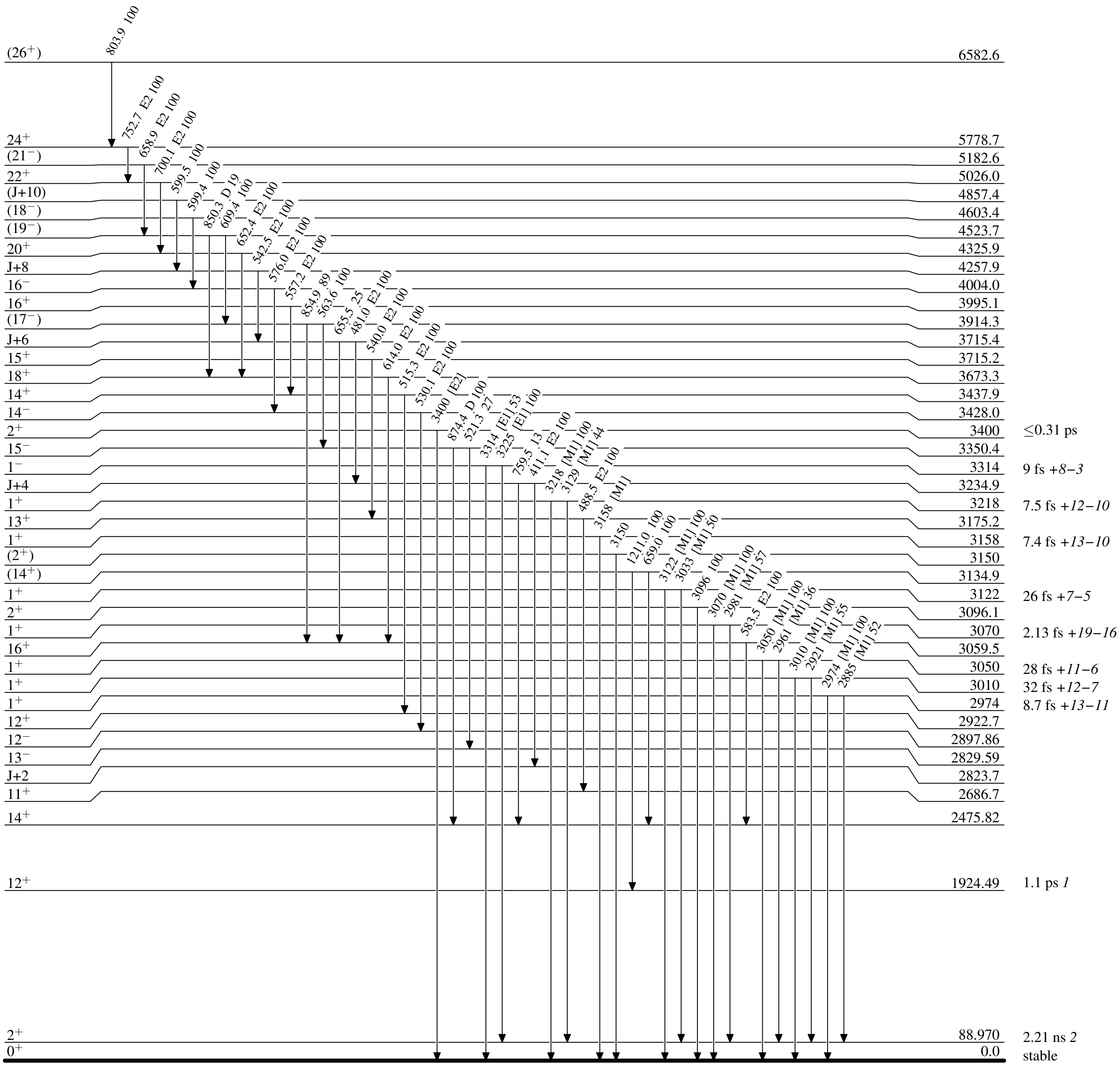
[c] Placement of transition in the level scheme is uncertain.

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

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



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

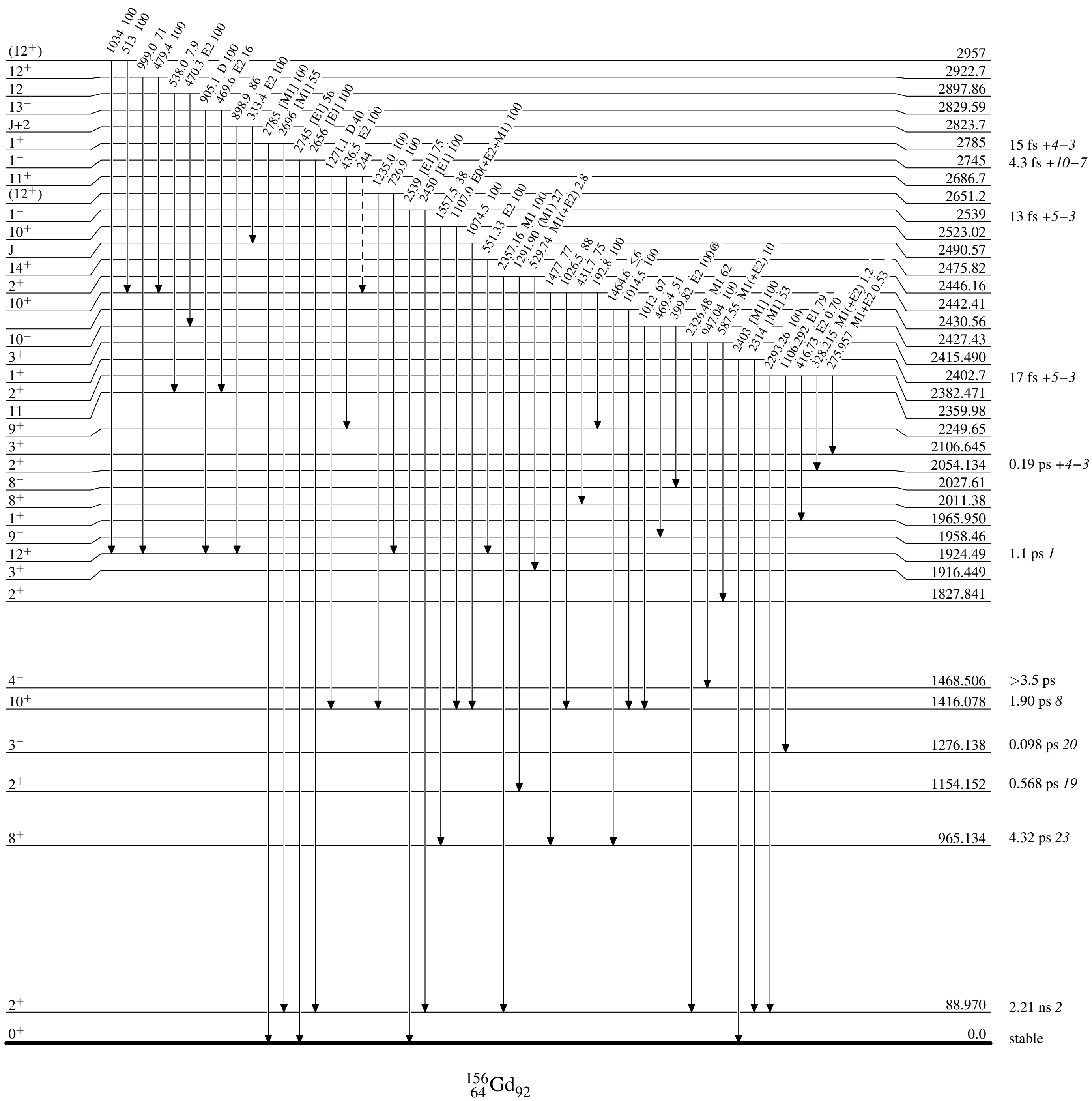
Adopted Levels, Gammas

Legend

Level Scheme (continued)

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

- - - - - -▶ γ Decay (Uncertain)



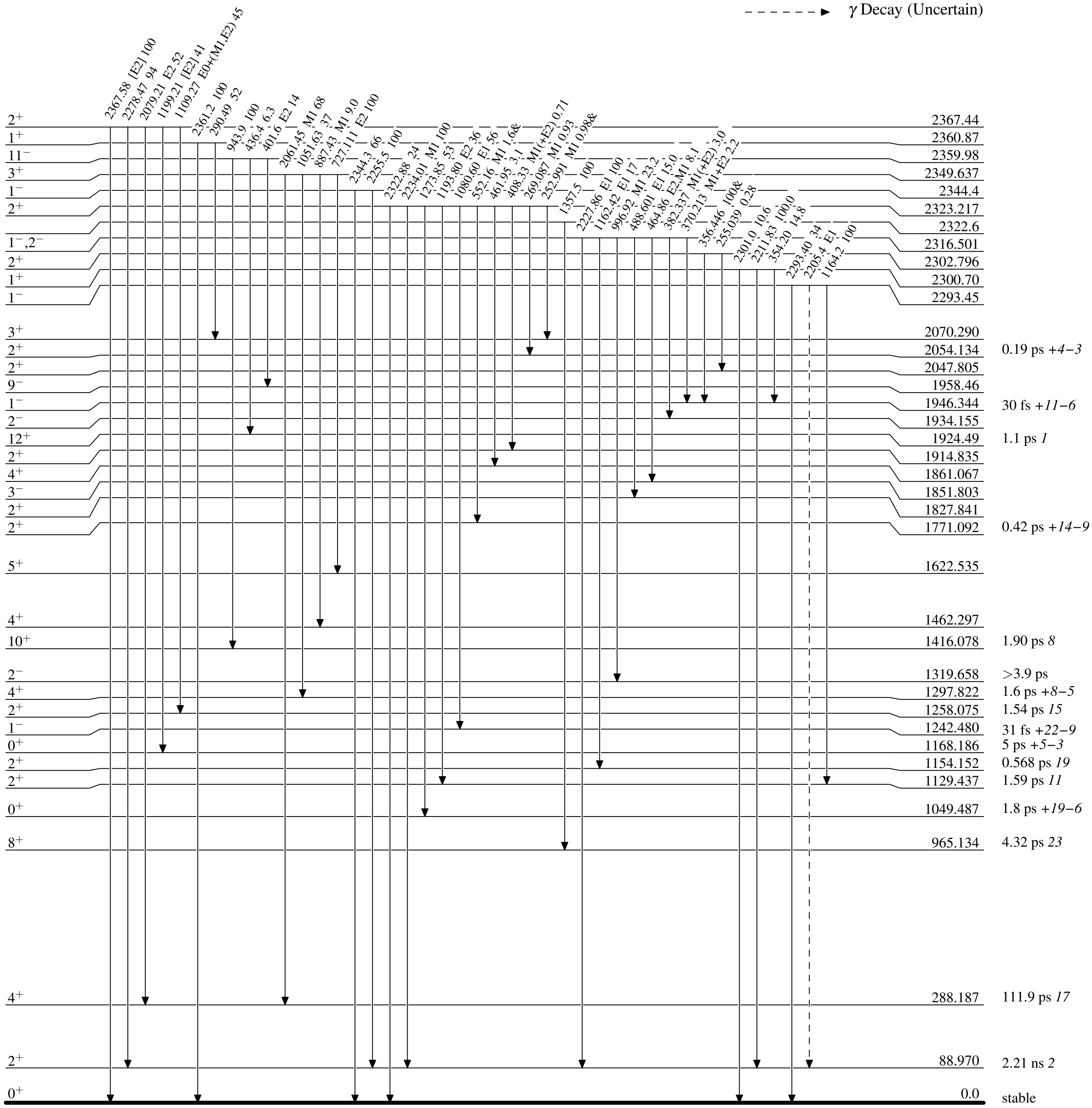
Adopted Levels, Gammas

Level Scheme (continued)

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

Legend

γ Decay (Uncertain)



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

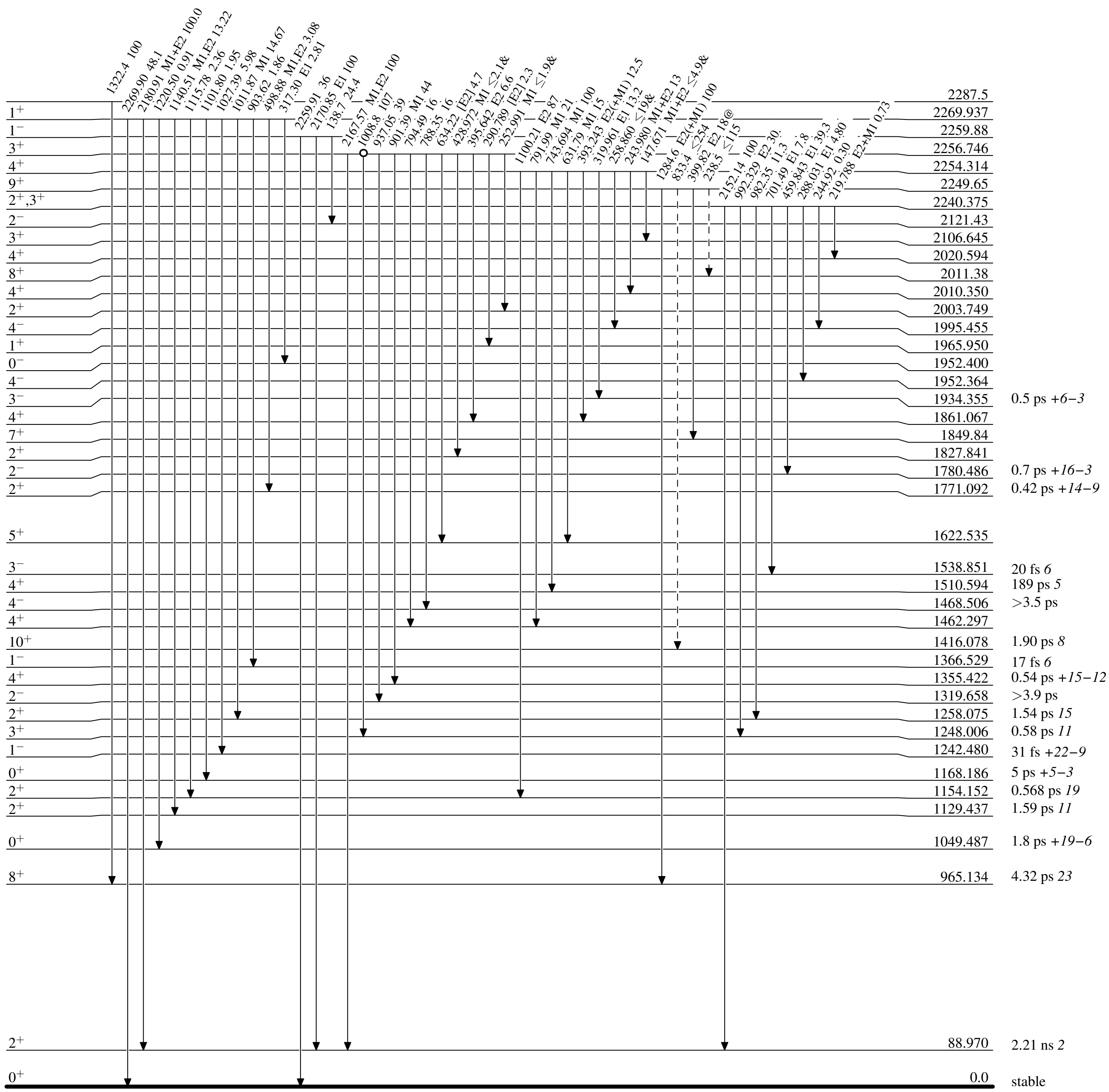
Adopted Levels, Gammas

Legend

Level Scheme (continued)

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

γ Decay (Uncertain)
● Coincidence
○ Coincidence (Uncertain)

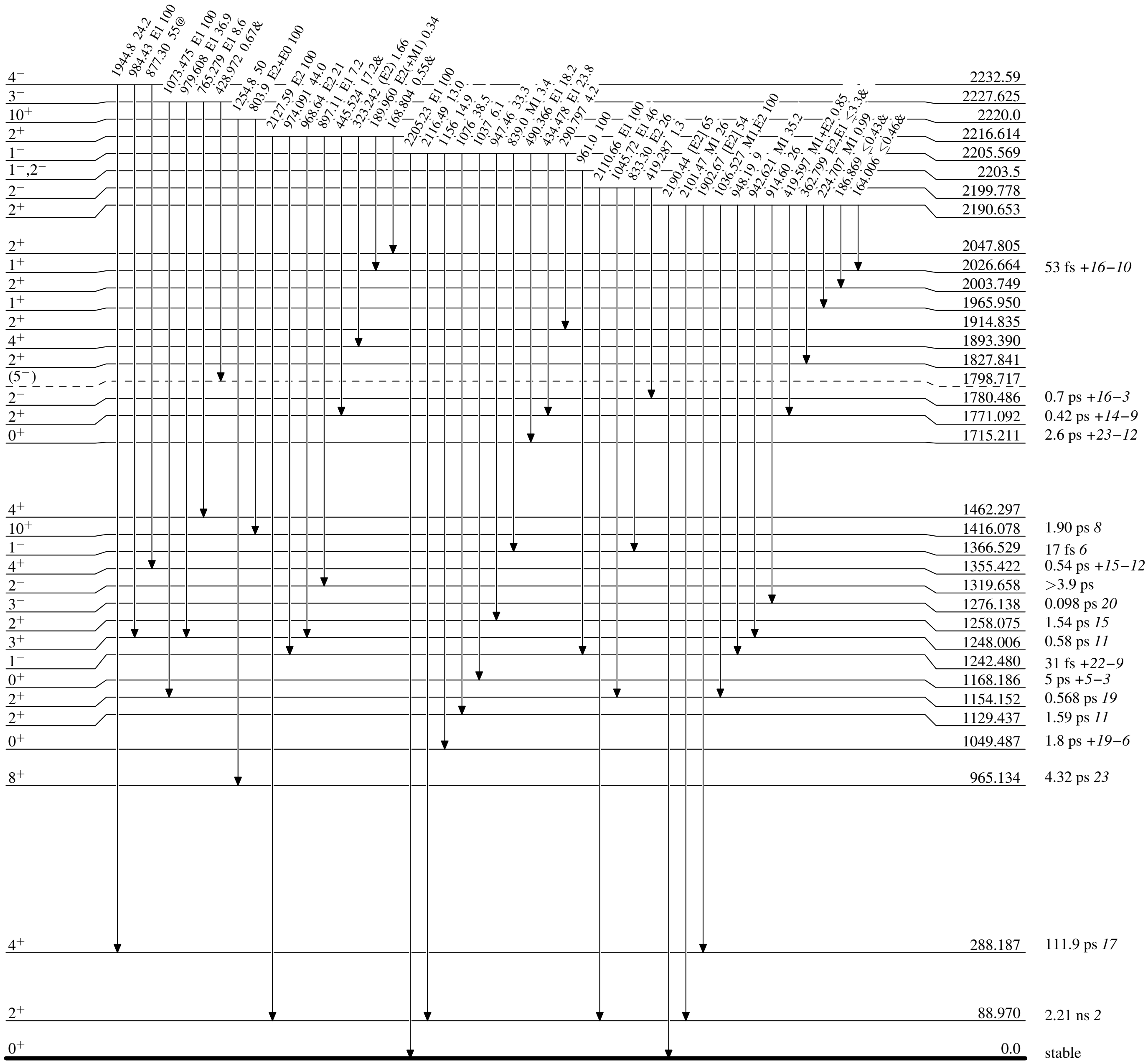


$^{156}_{64}Gd_{92}$

Adopted Levels, Gammas

Level Scheme (continued)

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



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

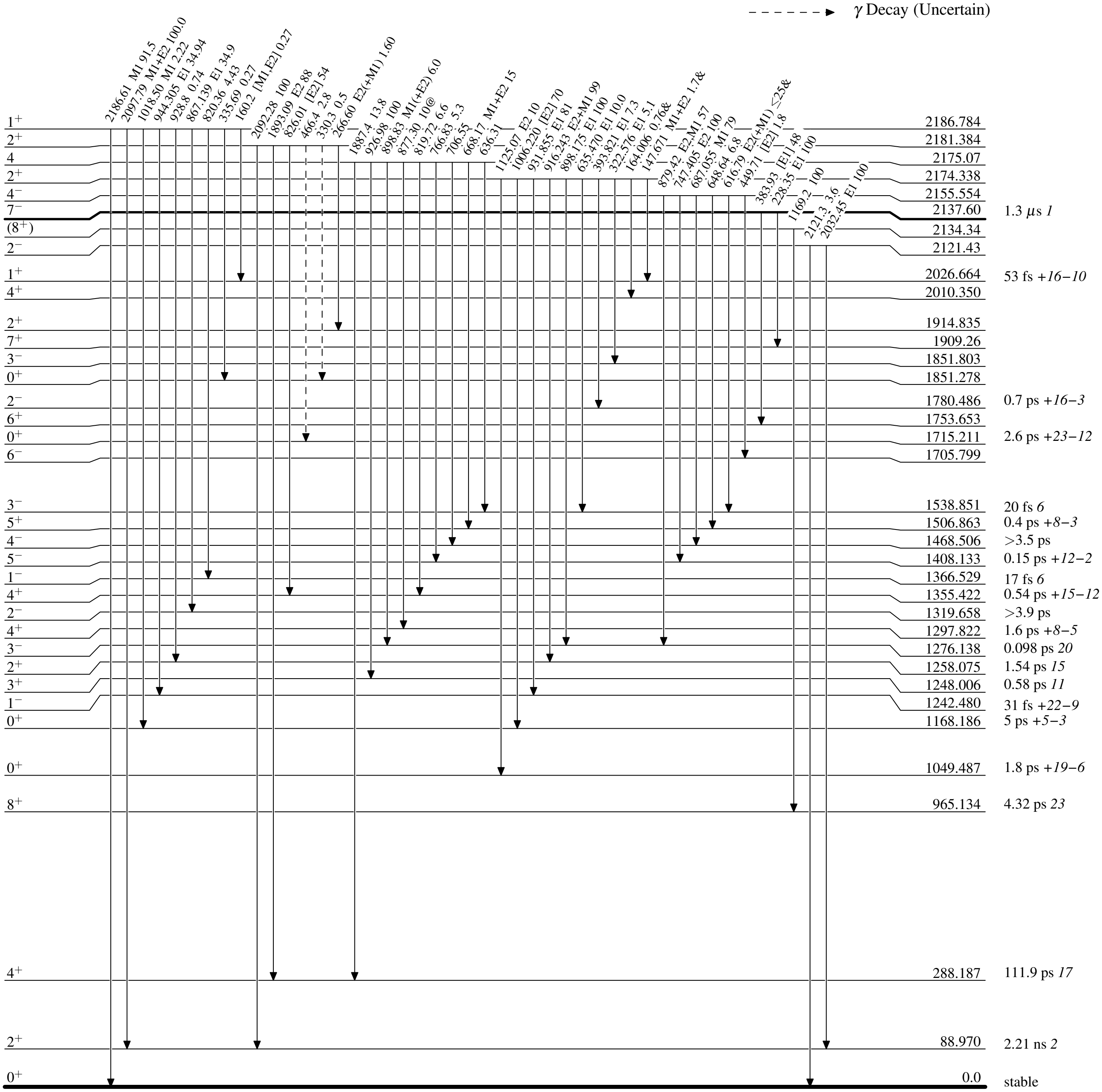
Adopted Levels, Gammas

Level Scheme (continued)

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

Legend

γ Decay (Uncertain)



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

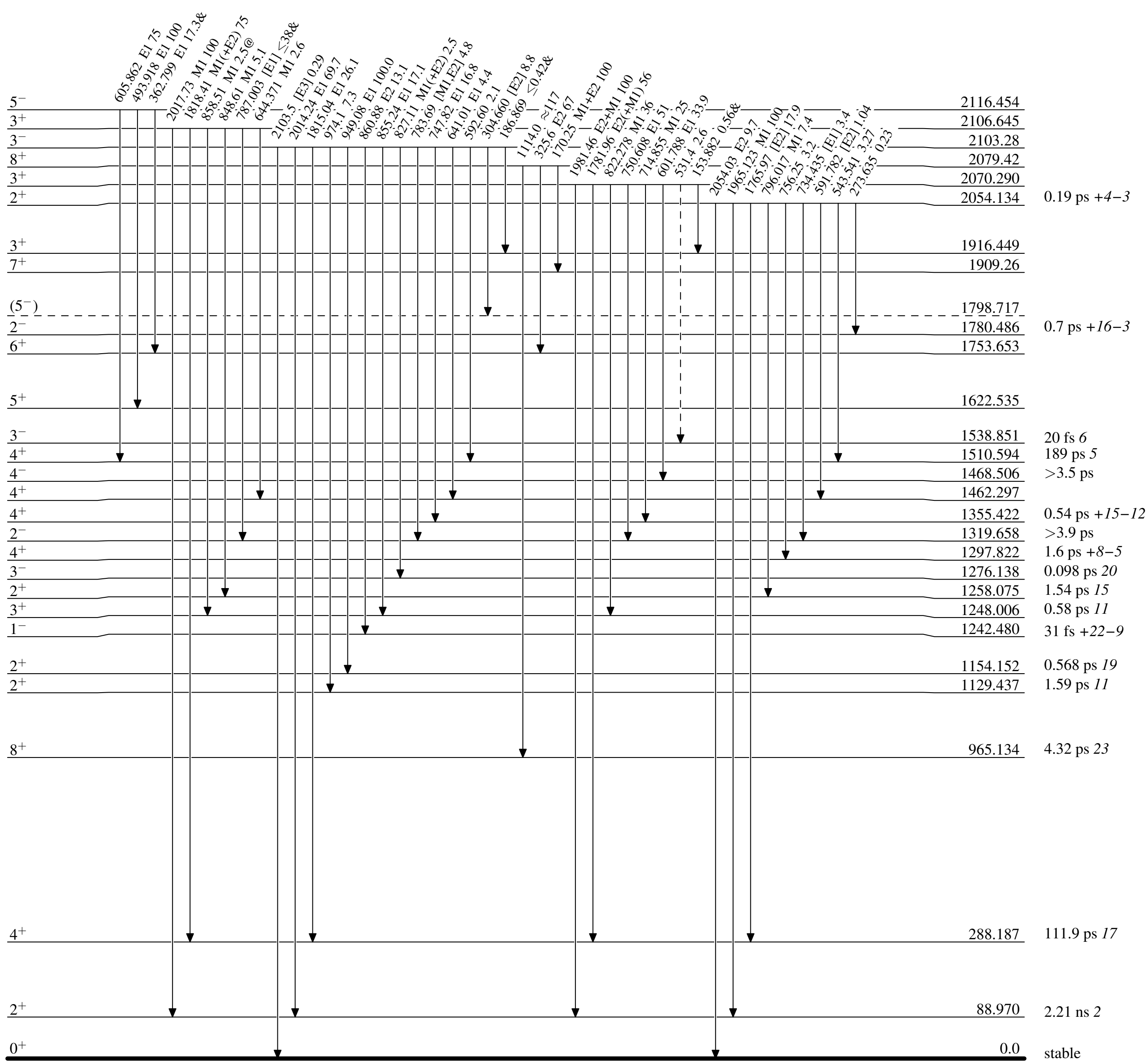
Adopted Levels, Gammas

Level Scheme (continued)

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

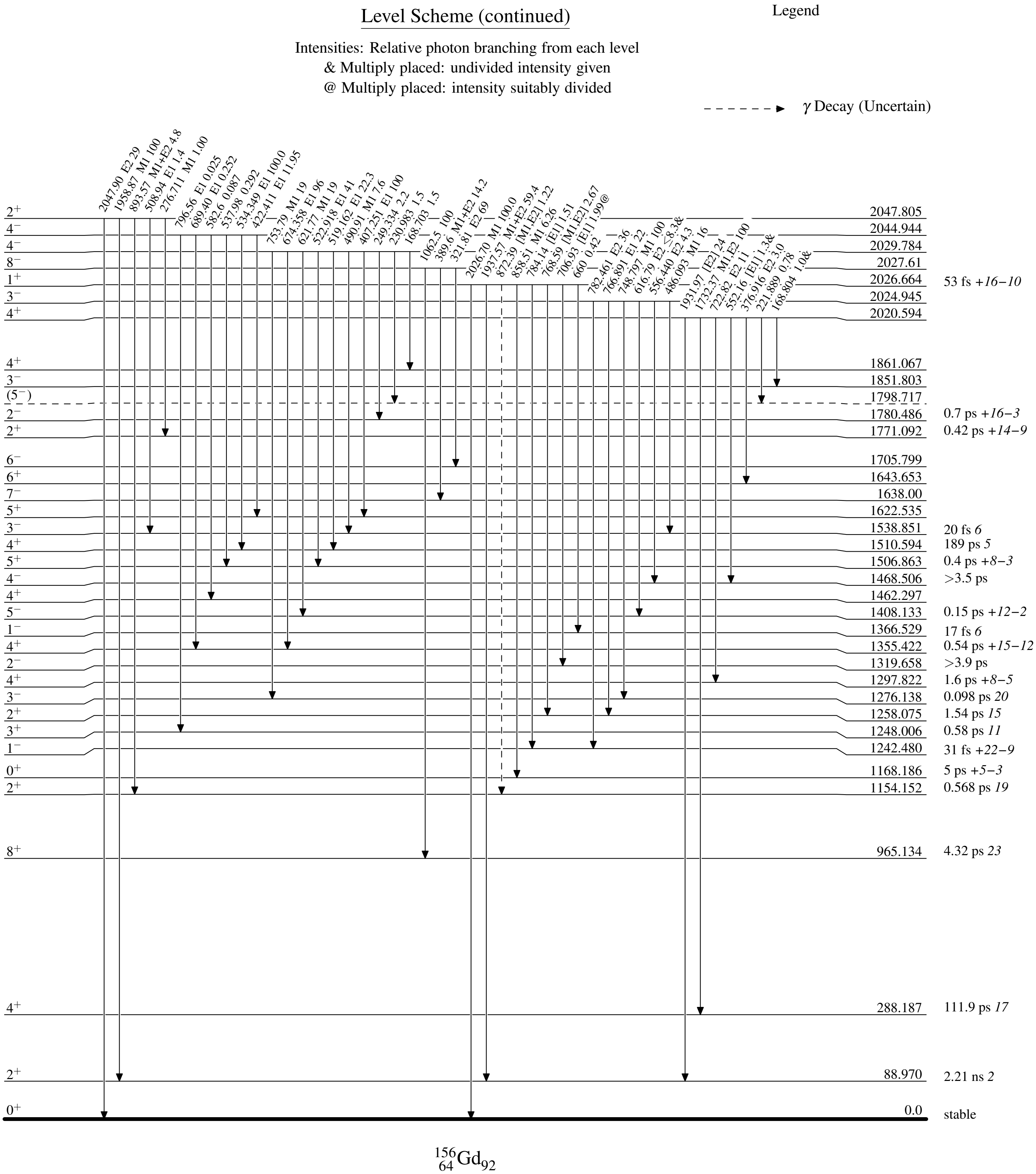
Legend

γ Decay (Uncertain)



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

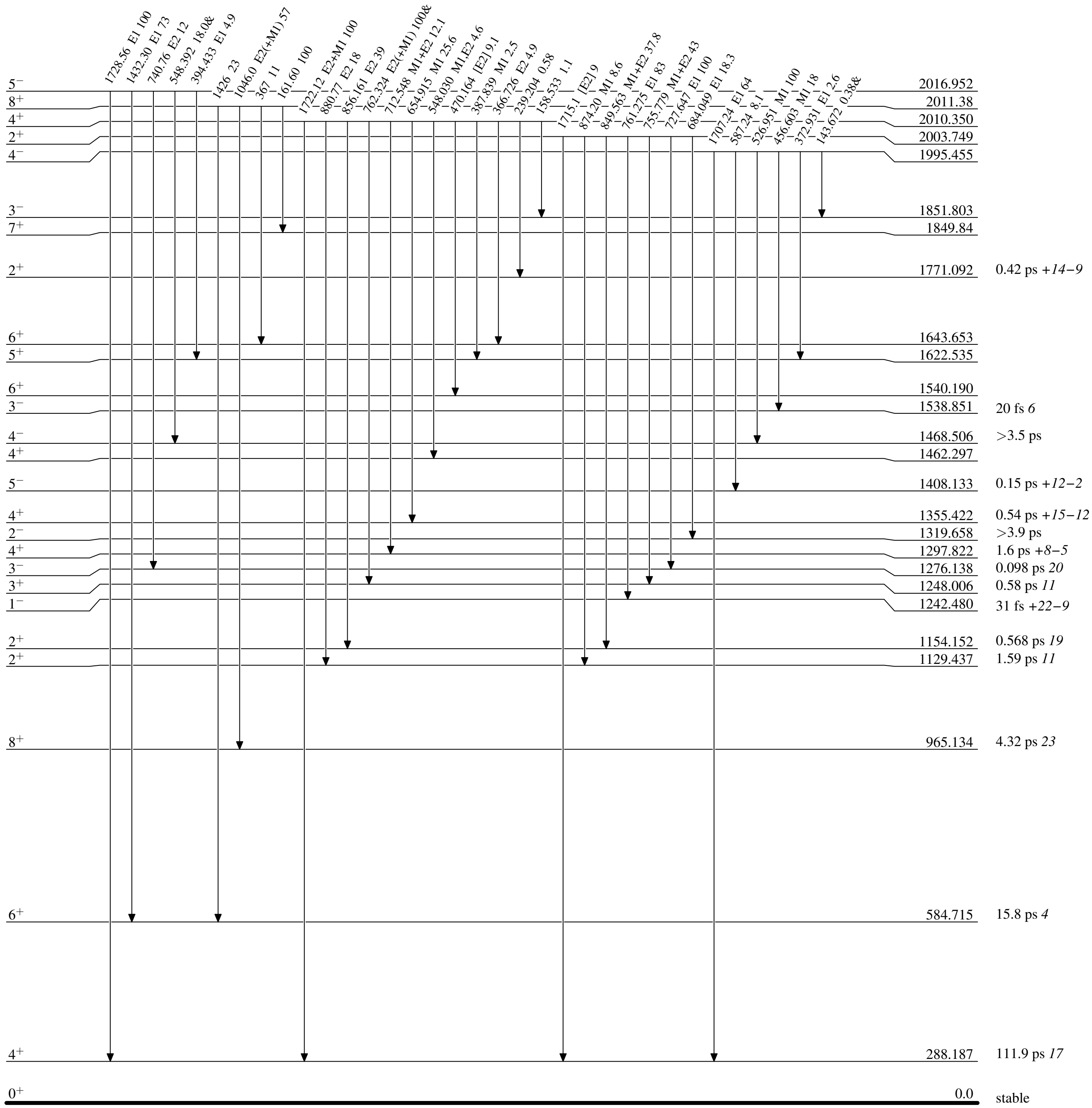
Adopted Levels, Gammas



Adopted Levels, Gammas

Level Scheme (continued)

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

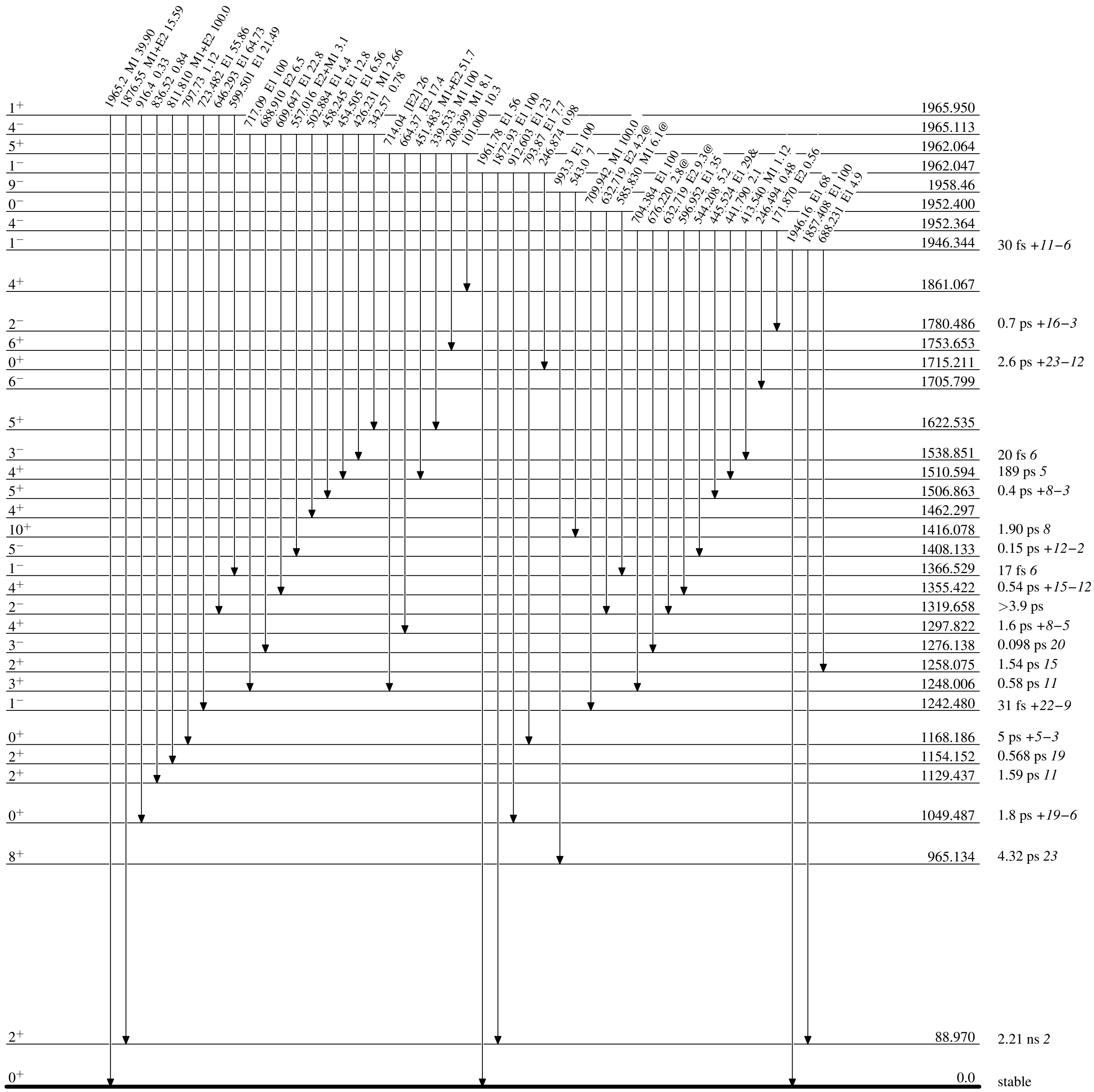


$^{156}_{64}Gd_{92}$

Adopted Levels, Gammas

Level Scheme (continued)

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



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

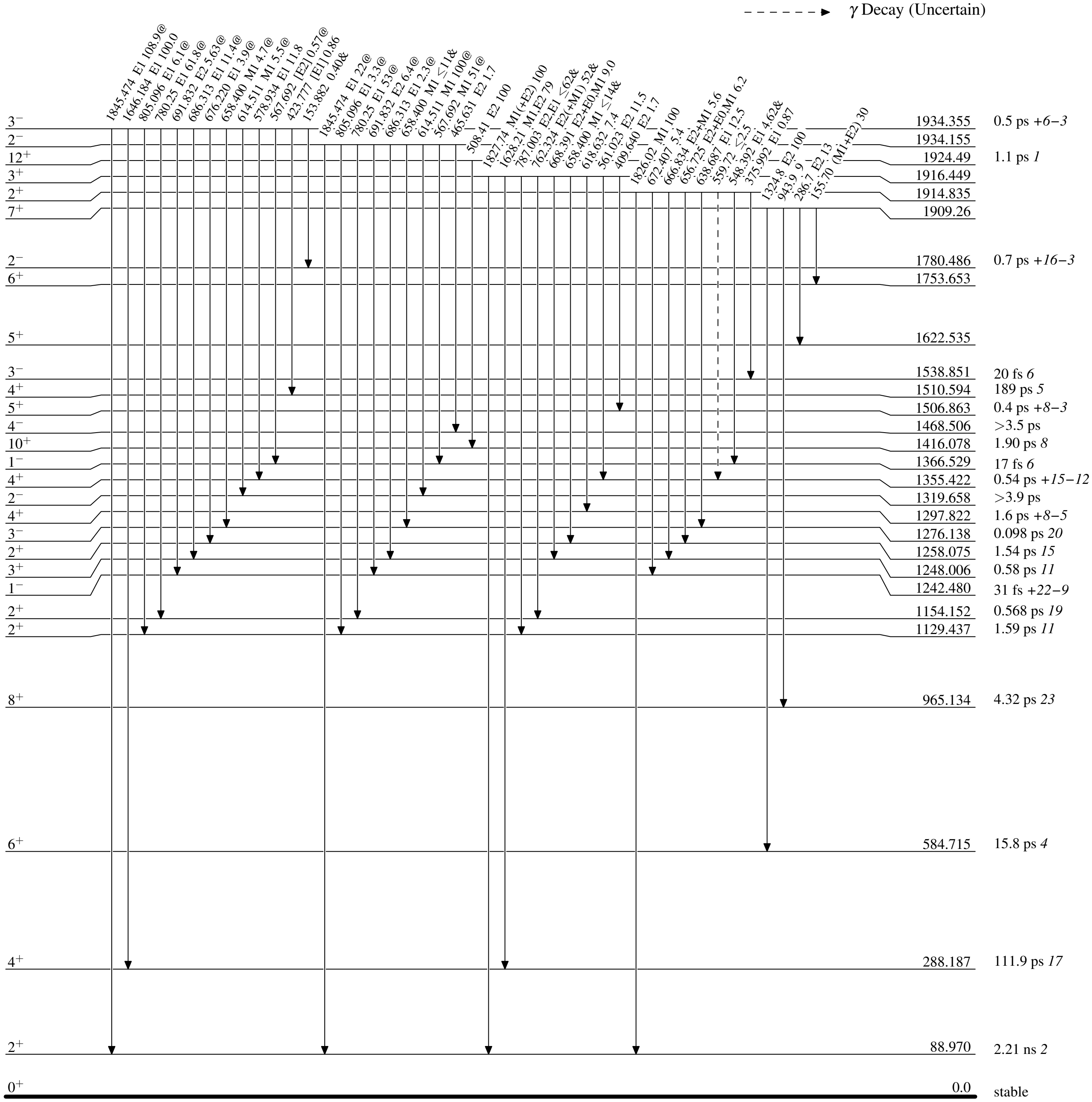
Adopted Levels, Gammas

Level Scheme (continued)

Legend

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

γ Decay (Uncertain)



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

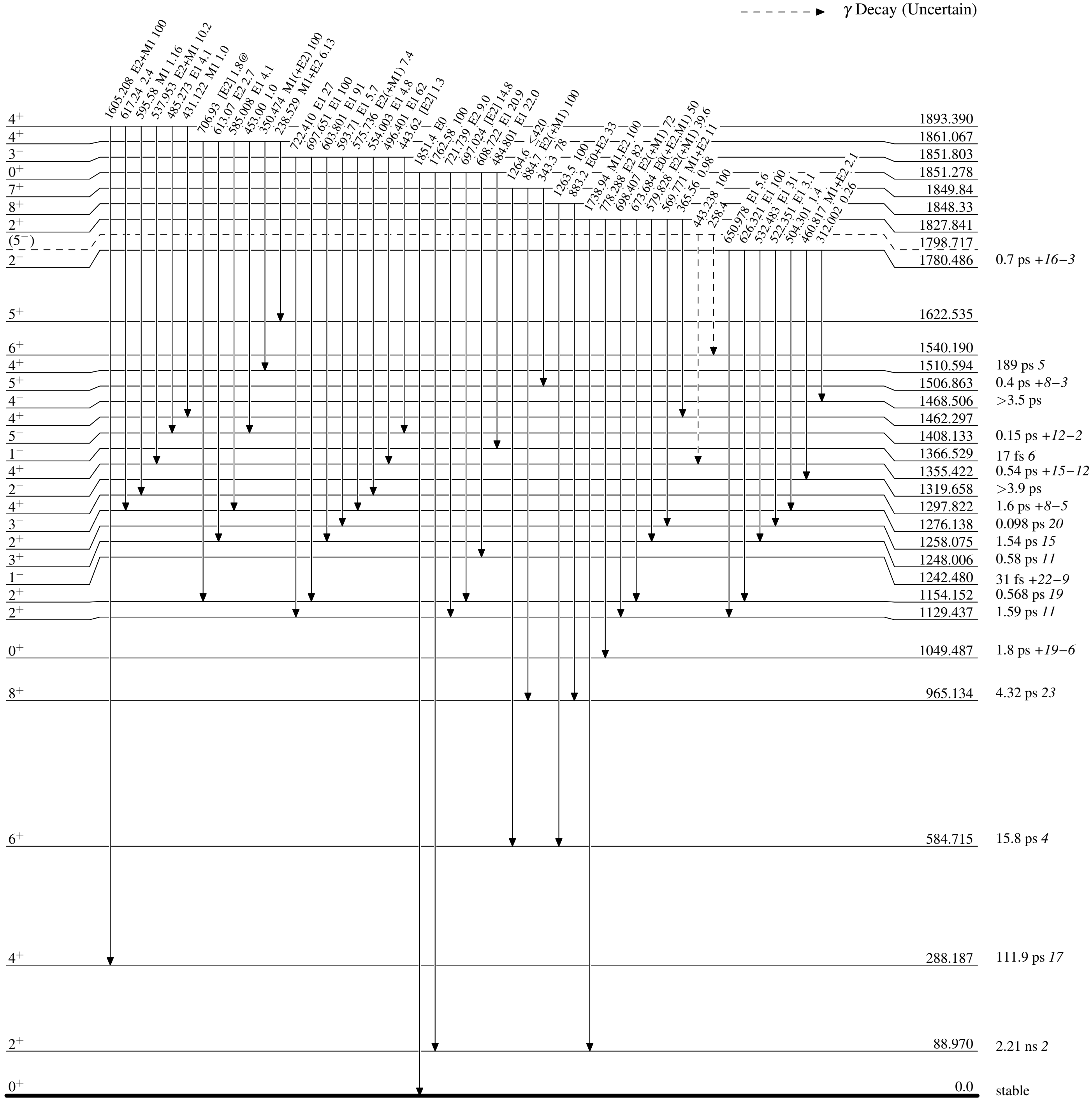
Adopted Levels, Gammas

Level Scheme (continued)

Legend

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

- - - - - - ► γ Decay (Uncertain)



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

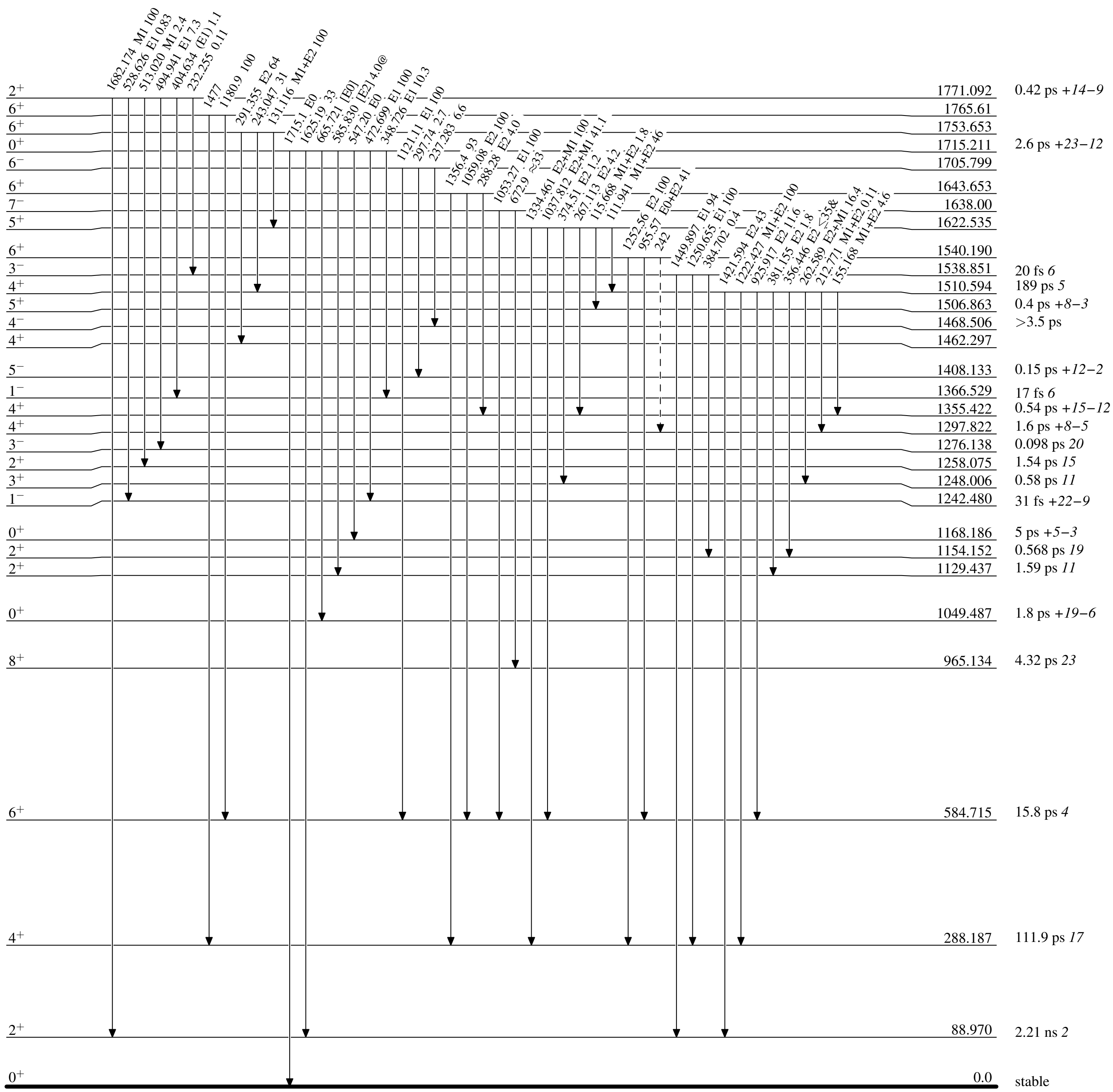
Adopted Levels, Gammas

Level Scheme (continued)

Legend

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

- - - - - - ► γ Decay (Uncertain)



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

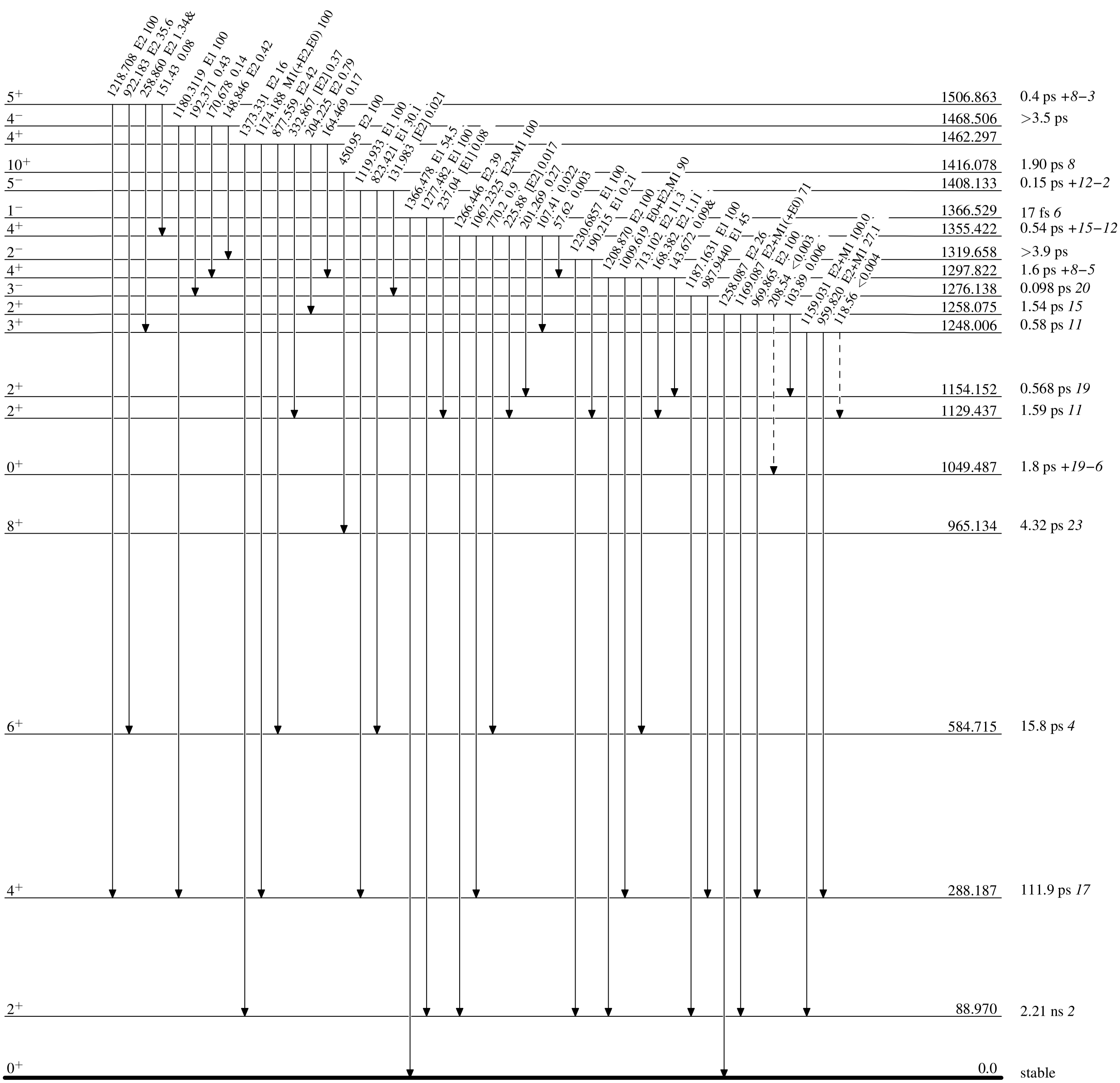
Adopted Levels, Gammas

Level Scheme (continued)

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

Legend

γ Decay (Uncertain)

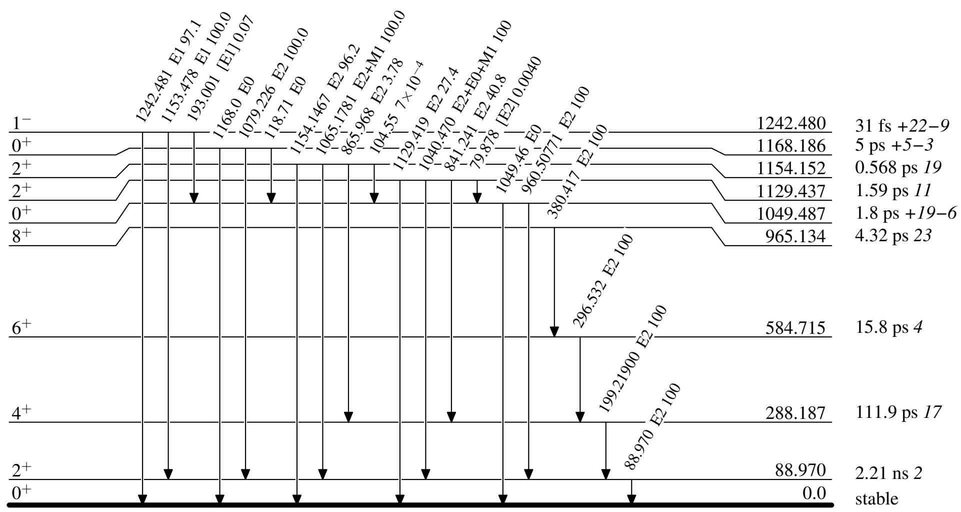


$^{156}_{64}Gd_{92}$

Adopted Levels, Gammas

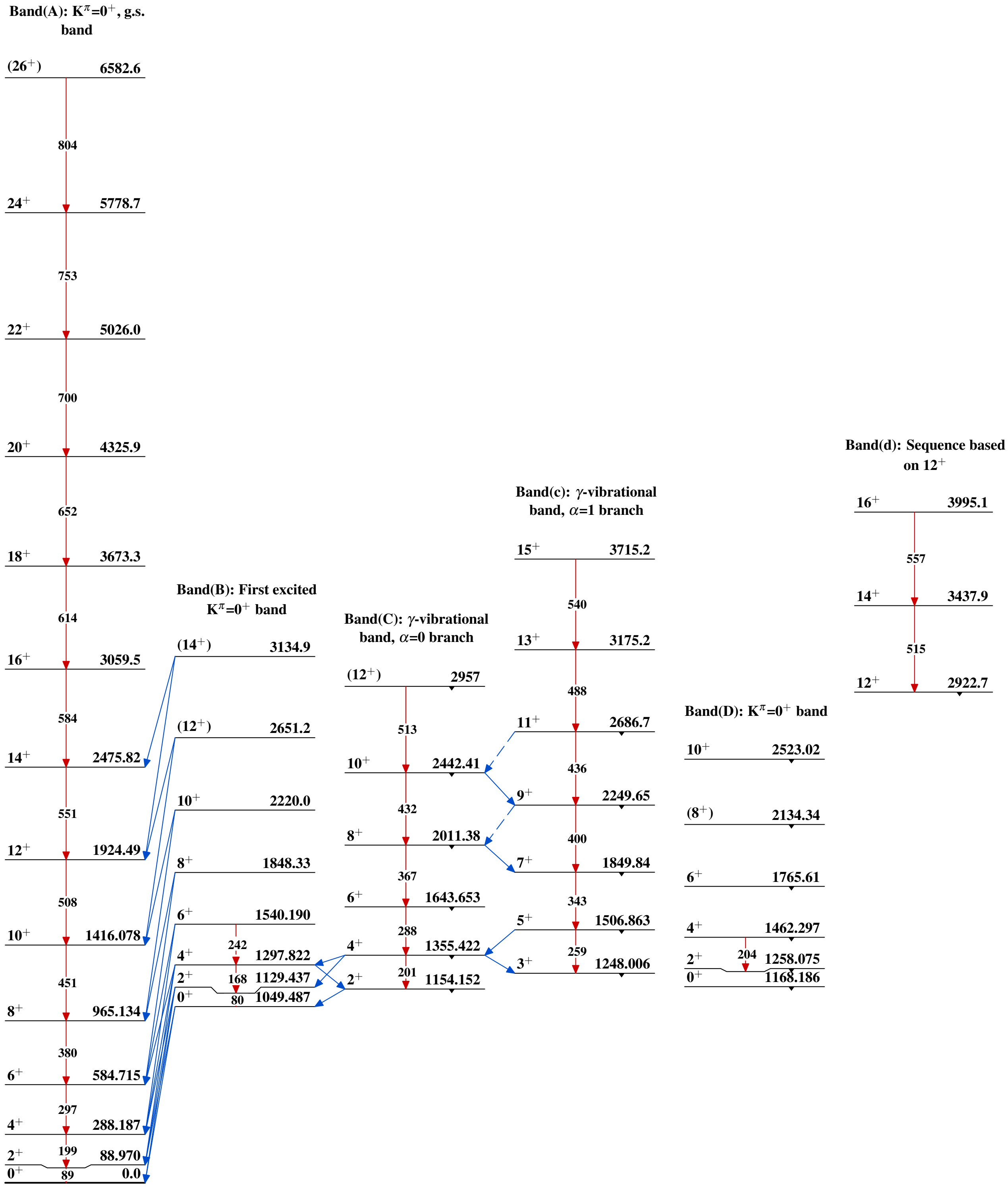
Level Scheme (continued)

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



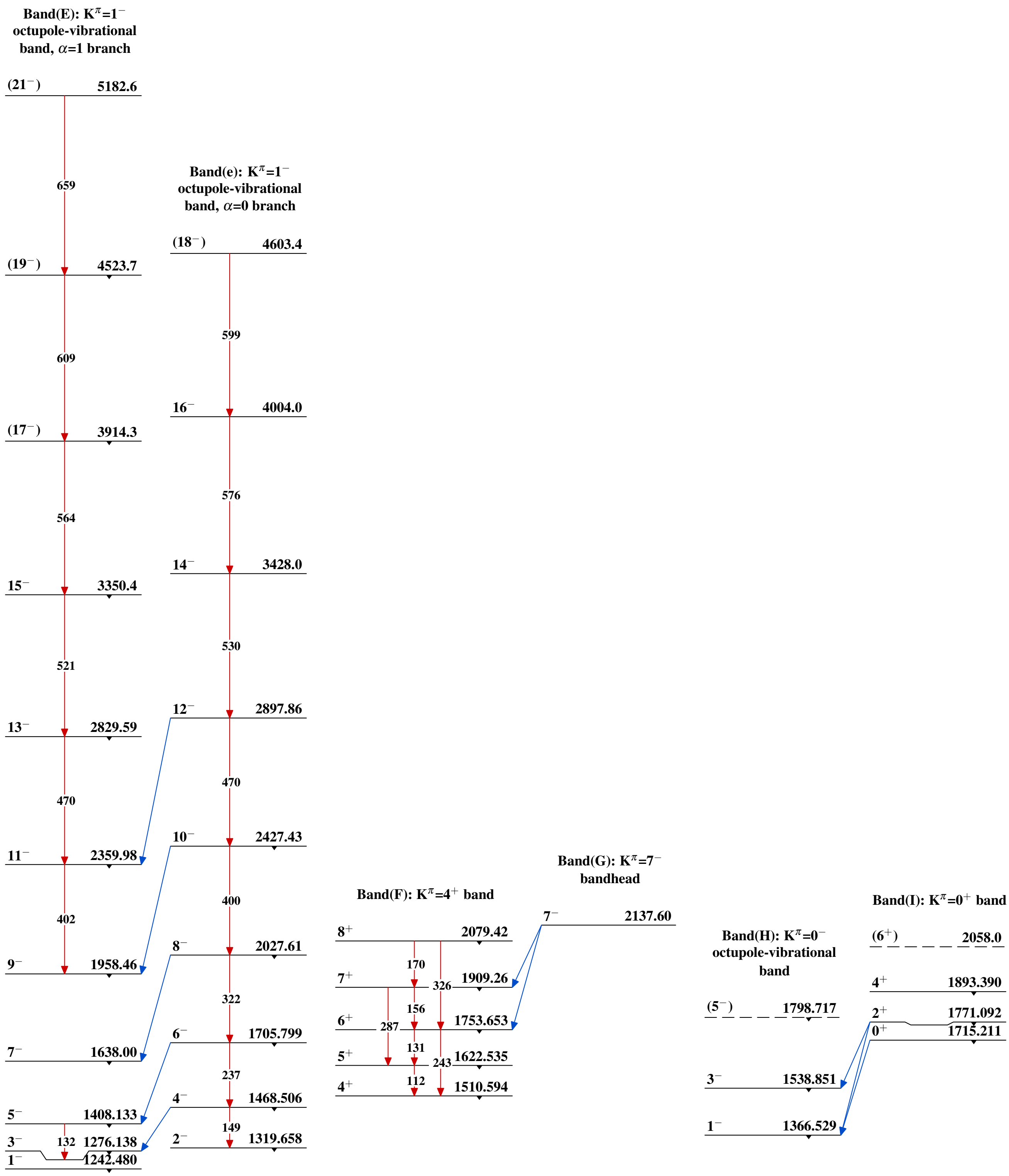
$^{156}_{64}Gd_{92}$

Adopted Levels, Gammas



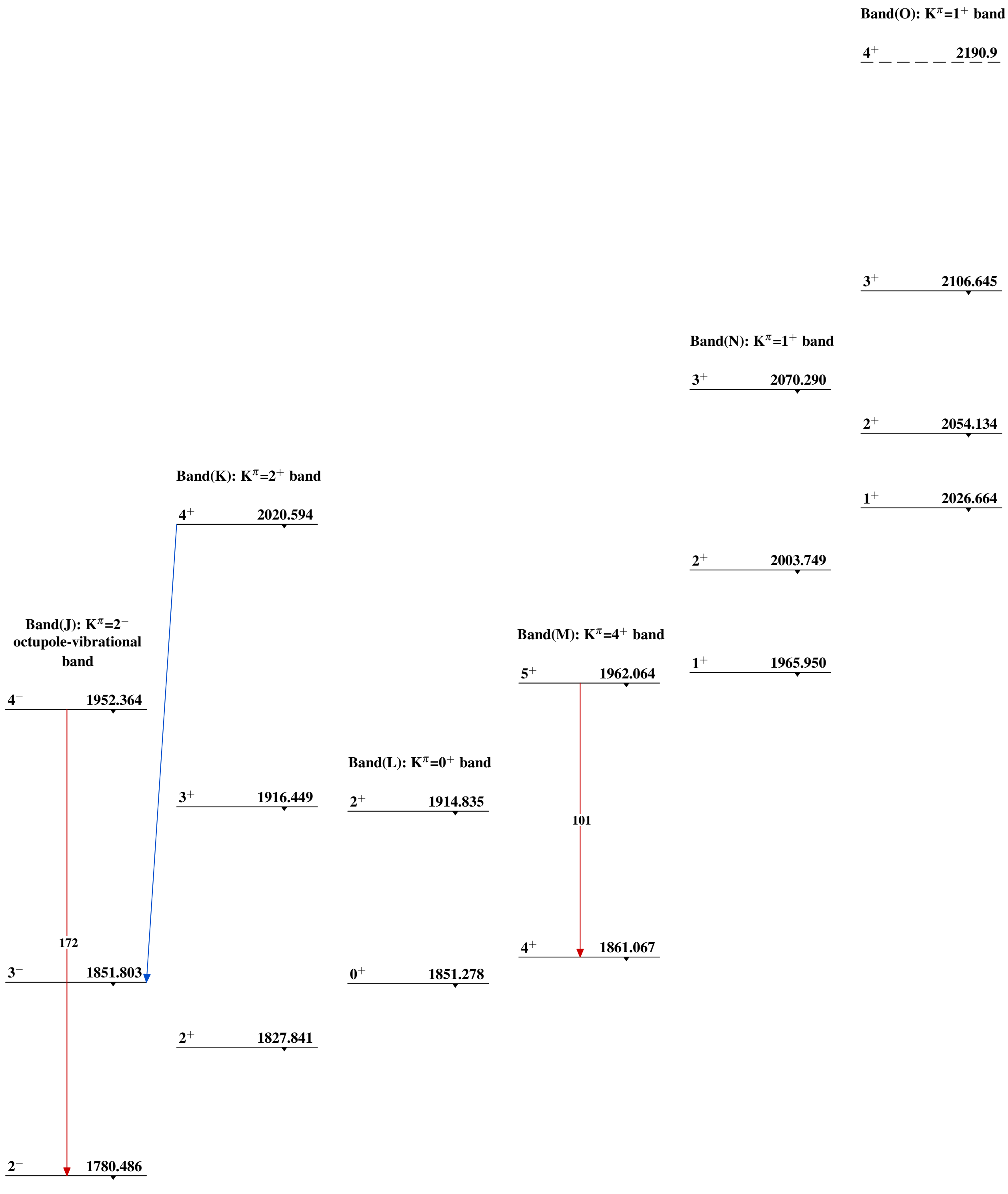
$^{156}_{64}Gd_{92}$

Adopted Levels, Gammas (continued)



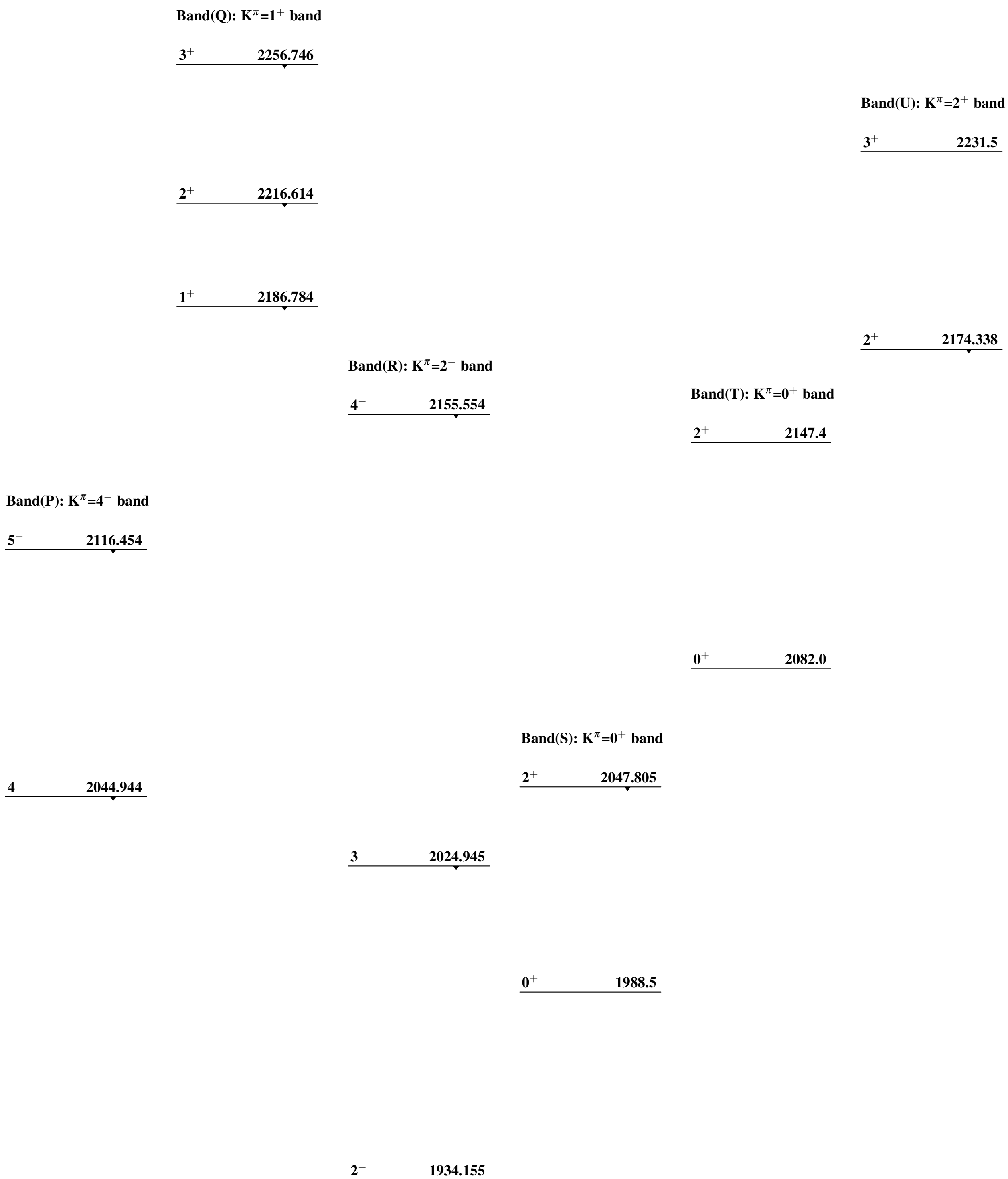
$^{156}_{64}Gd_{92}$

Adopted Levels, Gammas (continued)



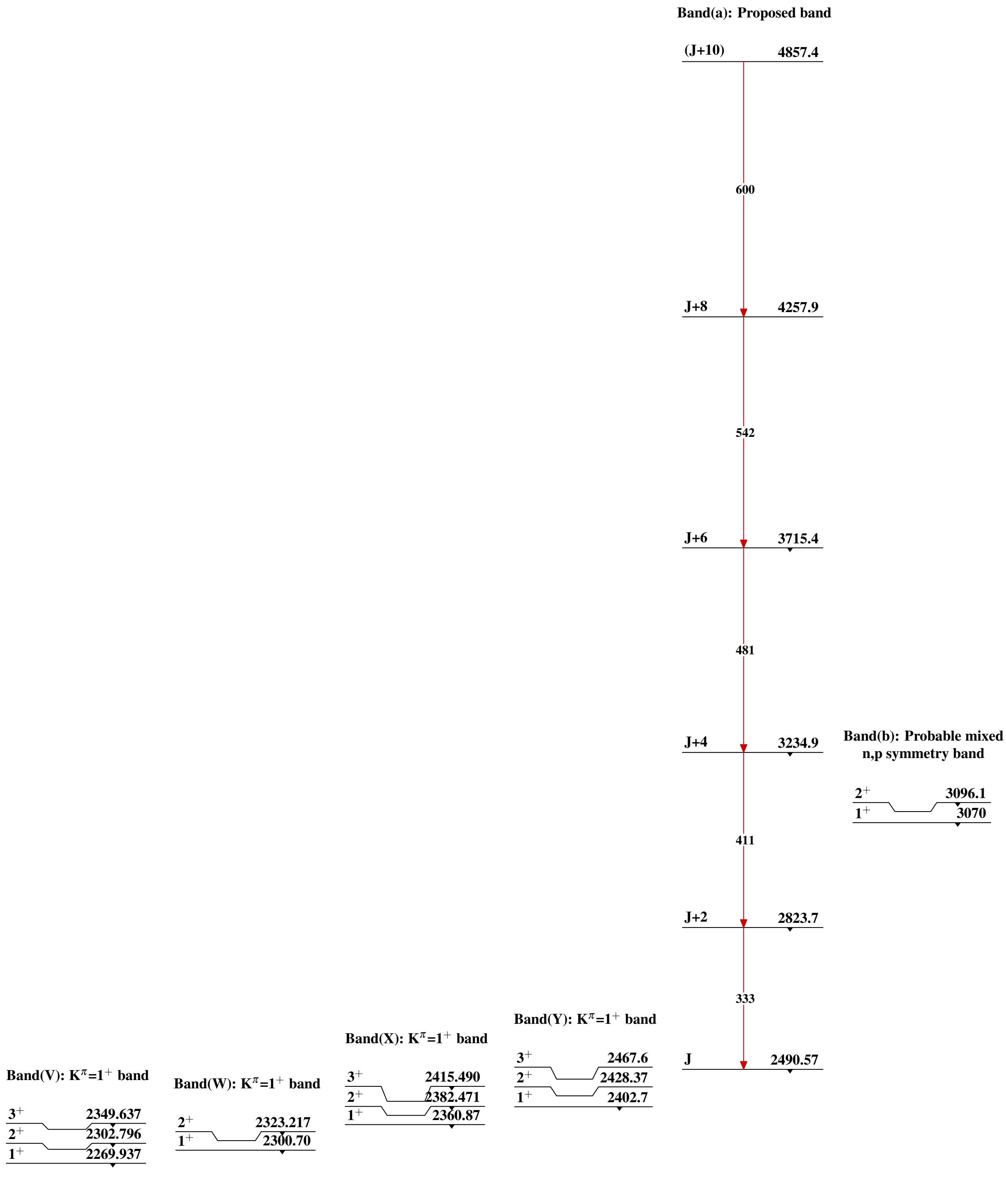
$^{156}_{64}Gd_{92}$

Adopted Levels, Gammas (continued)



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

Adopted Levels, Gammas (continued)



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