^{154}Sm(α,2nγ) 1981Ko03,2010Do13

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

Additional information 1.

Data are generally from 1981Ko03, which are more extensive than those of 2010Do13 (which involve only the g.s. and $K^{\pi}=1^{-}$ bands). Where the data from 2010Do13 are included, this is pointed out.

Other (α,2nγ) studies: 1966Lo11, 1966Mo01, 1968Ej01, 1969No05, and 1972WaZA. Other in-beam reaction studies: ^{154}Sm(^{7}Li,p4nγ), (^{7}Li,d3nγ), and (^{7}Li,t2nγ) by 1982Ha13 and ^{154}Sm(^{12}C,^{8}Be2nγ) by 1979ZoZY.

2010Do13: ^{154}Sm(α,2nγ), E(α)=27 MeV. Self-supporting ^{154}Sm target, 99.2% enrichment, 2 mg/cm^2 thick. γ radiation detected using the JUROGAM array, consisting of 43 Compton-suppressed HPGe detectors. Measured Eγ, Iγ, $\gamma\gamma\gamma$, $\gamma(\theta)$. Report information on the g.s. band and the α=0 and α=1 branches of the $K^{\pi}=1^{-}$ octupole band. Authors discuss the possible application of the concept of tetrahedral ($Y_3^{\pm 2}$) symmetry to ^{156}Gd.

2009Do08: Contains earlier and less complete information than that given in 2010Do13.

1981Ko03: ^{154}Sm(α,2nγ) on enriched (98.7%) target with E(α)=24, 26, 28 and 32 MeV. Studied γ's using Ge detectors and ce′s using a cooled SiLi detector and mini-orange filter. Measured γ singles, $\gamma\gamma$ and $\gamma(\theta)$. Report 116 γ's, 56 levels and 8 bands.

^{156}Gd Levels

E(level)[†]	J$^{\pi}$[‡]	Comments
0.0[&]	0$^+$	
89.06[&] 7	2$^+$	
288.28[&] 8	4$^+$	
584.82[&] 9	6$^+$	
965.21[&] 9	8$^+$	
1049.4[a] 4	0$^+$	
1129.29[a] 19	2$^+$	
1154.31[b] 11	2$^+$	
1168.0[c] 1	0$^+$	E(level): Reported by 1981Ko03, based on ce data for a 1168 transition. In the ^{156}Gd Adopted γ radiations, Ice(1168)/Iγ(1079)=0.0007. Since the 1079 γ is not reported in this (α,2nγ) study, either this level is not populated here, or the adopted data are incorrect.
1242.6[d] 3	1$^-$	
1248.19[b] 12	3$^+$	
1258.31[c] 11	2$^+$	
1276.2[d] 3	3$^-$	
1298.17[a] 16	4$^+$	
1320.16[e] 12	2$^-$	
1354.95[b] 11	4$^+$	
1366.6?[h] 14	1$^-$	
1408.2[d] 5	5$^-$	
1416.15[&] 9	10$^+$	
1461.99[c] 13	(4$^+$)	
1468.62[e] 13	4$^-$	
1476.3 5		Proposed by 1981Ko03. However, this level is not reported in any other of the studies of ^{156}Gd and its sole proposed deexciting γ may have all its intensity accomodated by decay of the 1276 level. The evaluator has not included this level in the Adopted Levels.
1506.99[b] 11	5$^+$	
1510.64[f] 9	4$^+$	
1538.9?[h] 3	3$^-$	
1540.34[a] 20	6$^+$	
1622.80[f] 9	5$^+$	

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^{154}Sm(α,2nγ) 1981Ko03,2010Do13 (continued)

^{156}Gd Levels (continued)

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$[#]	Comments
1638.11[d] *10*	7$^-$		
1643.88[b] *11*	6$^+$		
1705.91[e] *16*	6$^-$		
1753.72[f] *11*	6$^+$		
1765.73[c] *13*	(6$^+$)		
1848.41[a] *13*	8$^+$		
1850.07[b] *11*	(7$^+$)		
1909.36[f] *10*	7$^+$		
1924.55[&] *10*	12$^+$		
1958.51[d] *13*	9$^-$		
2011.18[b] *13*	8$^+$		
2027.73[e] *16*	8$^-$		
2079.51[f] *12*	8$^+$		
2134.41[c] *14*	(8$^+$)		
2137.69[g] *11*	7$^-$	1.3 μs *1*	T$_{1/2}$: From 1981Ko03. Other: 1969No05 report T$_{1/2}$=2.7 μs *1* for a level of unknown energy, but the reported delayed γ's indicate that it is this level.
2220.0[a] *3*	10$^+$		
2249.86[b] *11*	9$^+$		
2287.6 *4*			
2322.7 *10*			
2360.18[d] *13*	11$^-$		
2427.58[e] *16*	(10$^-$)		
2430.63 *14*			
2442.76[b] *17*	(10$^+$)		
2475.88[&] *11*	14$^+$		
2490.66 *22*			
2523.10[c] *21*	(10$^+$)		
2686.36[b] *15*	11$^+$		
2689.26? *22*			Level shown as questionable by the evaluator, since the only deexciting γ may be associated with the decay of the 2686 level. It is not included in the Adopted Levels.
2829.09[d] *18*	(13)$^-$		
2897.97[e] *22*	(12)$^-$		
3059.42[@&] *22*	16$^+$		
3350.41[d] *23*	(15$^-$)		New level for (α,2nγ), reported by 2010Do13.
3428.1[e] *3*	14$^-$		New level for (α,2nγ), reported by 2010Do13.
3673.4[&] *4*	18$^+$		New level for (α,2nγ), reported by 2010Do13.
3914.2[d] *9*	(17$^-$)		New level for (α,2nγ), reported by 2010Do13.
4004.1[e] *5*	16$^-$		New level for (α,2nγ), reported by 2010Do13.

[†] From a least-squares fit to the listed Eγ values.
[‡] From 1981Ko03. These assignments agree with those in the ^{156}Gd Adopted Levels, except for some parentheses. For the levels seen by 2010Do13 only, the values are based on the properties of the deexciting γ's and the expected rotational-band structure.
[#] Value given here is from in-beam measurements only; see ^{156}Gd Adopted Levels for all half-life measurements.
[@] Level reported by 1982Ha13 and 1972WaZA, but not by 1981Ko03.
[&] Band(A): K$^\pi$=0$^+$ g.s band.
[a] Band(B): First excited K$^\pi$=0$^+$ band.

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^{154}Sm(α,2nγ) 1981Ko03,2010Do13 (continued)

^{156}Gd Levels (continued)

[b] Band(C): $K^\pi=2^+$ γ-vibrational band.
[c] Band(D): $K^\pi=0^+$ band.
[d] Band(E): $K^\pi=1^-$ octupole-vibrational band, α=1 branch.
[e] Band(F): $K^\pi=1^-$ octupole-vibrational band, α=0 branch.
[f] Band(G): $K^\pi=4^+$ band. Dominant conf=π3/2[411]+π5/2[413].
[g] Band(H): $K^\pi=7^-$ band. Conf=ν3/2[651]+ν11/2[505] and/or ν3/2[402]+ν11/2[505].
[h] Band(I): Possible negative-parity band.

γ(^{156}Gd)

E_γ	I_γ †‡	E_i(level)	J_i^π	E_f	J_f^π	Mult.#@	δ@	Comments
89.00 *7*	45 *6*	89.06	2^+	0.0	0^+	E2		
112.0 *1*	0.9 *2*	1622.80	5^+	1510.64	4^+	M1+E2	0.29 *1*	
131.3 *3*	1.1 *3*	1753.72	6^+	1622.80	5^+	M1+E2	+0.40 *+43−19*	
[x]148.9 *3*	0.08 *3*							
155.70[i] *6*	0.19[i] *1*	1510.64	4^+	1354.95	4^+	M1+E2	0.48 *2*	I_γ: From Iγ(155)/Iγ(1222)=0.046 2, from ^{156}Gd Adopted γ radiations for the 1510 level and Iγ(1222).
155.70[i] *6*	1.4[i] *2*	1909.36	7^+	1753.72	6^+	(M1+E2)	+0.29 *11*	I_γ: Iγ=1.6 *2* for the composite peak. 0.19 units are assigned to the other placement, leaving 1.4 units here.
161.60[j] *5*	3.0[d] *3*	2011.18	8^+	1850.07	(7^+)			
170.25 *7*	1.2 *1*	2079.51	8^+	1909.36	7^+	M1+E2	+0.25 *+25−14*	
192.8[j] *1*	0.8 *1*	2442.76	(10^+)	2249.86	9^+			
199.21 *4*	100.0 *1*	288.28	4^+	89.06	2^+	E2		I_γ: Value used for normalization of the γ intensities.
228.35 *4*	2.28 *7*	2137.69	7^-	1909.36	7^+	E1		
229.9[c] *3*		1638.11	7^-	1408.2	5^-			
237.0 *3*	0.6 *1*	1705.91	6^-	1468.62	4^-			
238.5[j] *1*	1.5[e] *1*	2249.86	9^+	2011.18	8^+			
242.4 *2*	0.4 *1*	1753.72	6^+	1510.64	4^+			
244[&j]		2686.36	11^+	2442.76	(10^+)			
262.8[j] *2*	0.9 *2*	1510.64	4^+	1248.19	3^+	E2+M1	+8.4 *10*	
286.7 *1*	0.6 *1*	1909.36	7^+	1622.80	5^+	E2		
296.54 *3*	85 *1*	584.82	6^+	288.28	4^+	E2		
297.7[j] *3*		1705.91	6^-	1408.2	5^-			γ tentatively reported and placed here by 2010Do13.
320.0[c] *3*		1958.51	9^-	1638.11	7^-			
321.81 *4*	2.5[g] *3*	2027.73	8^-	1705.91	6^-	E2		
325.6 *1*	0.8 *1*	2079.51	8^+	1753.72	6^+	E2		
343.3 *1*	0.7 *3*	1850.07	(7^+)	1506.99	5^+			
356.32 *6*	0.9 *1*	1510.64	4^+	1154.31	2^+	E2		
380.35 *3*	52 *1*	965.21	8^+	584.82	6^+	E2		
383.93 *6*	1.1 *1*	2137.69	7^-	1753.72	6^+			
389.6 *3*	0.51[g] *5*	2027.73	8^-	1638.11	7^-	M1+E2	+0.44 *4*	E_γ: From 2010Do13. γ not reported by 1981Ko03. δ: From $\gamma(\theta)$, δ lies between +0.4 and 0.47 (2010Do13).
399.82[i] *7*	0.24[i] *5*	2249.86	9^+	1850.07	(7^+)	E2		I_γ: From Iγ(399γ)/Iγ(1284γ) in (^{13}C,α3nγ) and Iγ(1284γ). Mult.: Mult=E2 for this doubly placed γ. Both placements indicate E2.

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^{154}Sm(α,2nγ) 1981Ko03,2010Do13 (continued)

γ(^{156}Gd) (continued)

E_γ	I_γ[†‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#@]	Comments
399.82[i] 7	1.5[ig] 2	2427.58	(10$^-$)	2027.73	8$^-$	E2	I_γ: 1981Ko03 report Iγ=2.3 1 for the composite peak. After removal of the contribution from the other placement, Iγ=2.1 is computed. Mult.: γ is doubly placed, but both placements are consistent with E2.
401.6 7	0.2 1	2360.18	11$^-$	1958.51	9$^-$		E_γ: 2010Do13 report Eγ=403.2 and Iγ<0.02 for the 11−→9$^-$ transition, but show it as questionable.
431.7 2	0.6 1	2442.76	(10$^+$)	2011.18	8$^+$		
436.4 3	0.20[g] 2	2360.18	11$^-$	1924.55	12$^+$		E_γ: From 2010Do13. 1981Ko03 report Eγ=436.5 and show it as doubly placed. 2001Su06, (^{13}C,α3nγ), place this γ elsewhere in the level scheme.
436.5 1	1.6 1	2686.36	11$^+$	2249.86	9$^+$		E_γ: γ shown doubly placed by 1981Ko03, the other placement being from the 2360, 11$^-$ level. In the (^{13}C,α3nγ) data, all the intensity of this γ is placed from this (2686) level (see the comment for the other placement of this γ).
450.95 2	25 1	1416.15	10$^+$	965.21	8$^+$	E2	
468.3 3	0.32[g] 5	2829.09	(13)$^-$	2360.18	11$^-$		E_γ: From 2010Do13. 1981Ko03 report Eγ=469.6 and show it doubly placed, the other placement being from the 2897, (12)$^-$ level. Mult.: Mult determined to be E2 for doubly placed γ.
469.4 3	0.20[g] 2	2427.58	(10$^-$)	1958.51	9$^-$		E_γ: From 2010Do13. γ not reported by 1981Ko03.
470.3 2	1.4[g] 2	2897.97	(12)$^-$	2427.58	(10$^-$)		E_γ: From 2010Do13. 1981Ko03 report Eγ=469.6 and show it doubly placed, the other placement being from the 2829, (13)$^-$ level. I_γ: 1981Ko03 report Iγ=0.8 2 for their (doubly placed) γ. Mult.: Mult determined to be E2 for doubly placed γ.
508.41 3	17.2 4	1924.55	12$^+$	1416.15	10$^+$	E2	
521.3 3	0.13[g] 2	3350.41	(15$^-$)	2829.09	(13)$^-$		
530.1 2	1.4[g] 2	3428.1	14$^-$	2897.97	(12)$^-$		
538.0 3	0.11[g] 1	2897.97	(12)$^-$	2360.18	11$^-$		E_γ: From 2010Do13. 1981Ko03 do not report this γ.
543.0 3	0.2 1	1958.51	9$^-$	1416.15	10$^+$		
551.33 6	4.0[e] 1	2475.88	14$^+$	1924.55	12$^+$	E2	
563.6 3	0.05[g] 1	3914.2	(17$^-$)	3350.41	(15$^-$)		
576.0 3	0.13[g] 1	4004.1	16$^-$	3428.1	14$^-$		
583.6 2	1.96[g] 9	3059.42	16$^+$	2475.88	14$^+$	E2	E_γ: Value from 2010Do13. Mult.: γ shown to be E2 in (^{13}C,α3nγ).
614.0 3	0.27[g] 3	3673.4	18$^+$	3059.42	16$^+$		
672.9 1	1.0[f]	1638.11	7$^-$	965.21	8$^+$		
[x]770.2[i] 3	1.6[i] 2						I_γ: 1981Ko03 place all the strength of this γ peak from the 1355, 4$^+$ level. The evaluator was assigned only a small portion (0.014 5) of this peak intensity to this level, leaving the remainder unassigned.
770.2[i] 3	0.014[i] 5	1354.95	4$^+$	584.82	6$^+$		E_γ: 1981Ko03 place the full strength of this γ peak from this level. I_γ: Iγ=0.5 2 for the peak. The intensity associated with this placement was computed from Iγ(770γ)/Iγ(1067γ) in the ε decay and Iγ(1067γ) from the (α,2nγ) data. The remainder of this intensity is presently unplaced. From the relative intensities of the γ's from the even-spin members of γ-vibrational bands to members of ths g.s. band in other even-even deformed nuclei, it is expected that

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^{154}Sm(α,2nγ) 1981Ko03,2010Do13 (continued)

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

E_γ	I_γ[†‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#@]	δ[@]	Comments
								the ΔJ=−2 transition will be considerably weaker than the ΔJ=0 and ΔJ=+2 transitions.
[x]783.5 *3*	0.08 *4*							
[x]788.5 *1*	1.0 *1*							E_γ: Placed from the 1753, 6^+ level by 1981Ko03. However, from (n,γ), 1993Kl03 place a 788.35 γ from a 2256.7 level.
803.9 *3*	0.3 *1*	2220.0	10^+	1416.15	10^+	E0+E2		
[x]810.8 *1*	0.5 *1*							
823.4 *7*	0.59[g] *6*	1408.2	5^-	584.82	6^+	E1		
≈833.4[j]	<3.3	2249.86	9^+	1416.15	10^+			I_γ: Iγ of 3.3 includes contribution from ^{72}Ge.
854.9 *3*	0.07[g] *1*	3914.2	(17^-)	3059.42	16^+			
874.4 *3*	0.54[g] *6*	3350.41	(15^-)	2475.88	14^+			
877.0[j] *3*	0.4 *1*	1461.99	(4^+)	584.82	6^+	E2		
883.2 *1*	0.5 *1*	1848.41	8^+	965.21	8^+	E0+E2		
884.7 *1*	0.9 *1*	1850.07	(7^+)	965.21	8^+	E2(+M1)		
904.8 *2*	2.0 *2*	2829.09	$(13)^-$	1924.55	12^+	D		E_γ: From 2010Do13. 1981Ko03 report Eγ=905.1.
922.3 *2*	1.0 *2*	1506.99	5^+	584.82	6^+	E2		
925.7 *6*	0.4 *1*	1510.64	4^+	584.82	6^+	E2		
[x]929.9 *3*	0.4 *1*							
943.9 *1*	0.4[f]	1909.36	7^+	965.21	8^+			
943.9 *1*	3.2[g] *2*	2360.18	11^-	1416.15	10^+	E1		
955.7 *4*	0.4 *2*	1540.34	6^+	584.82	6^+	E0+E2		
960.1[hj] *3*	0.5[h] *2*	1049.4	0^+	89.06	2^+	E2		
960.1[h] *3*	0.5[h] *2*	1248.19	3^+	288.28	4^+	E2+M1	−12 *+3−5*	
969.8 *2*	0.6 *1*	1258.31	2^+	288.28	4^+	E2		
987.6 *3*	0.4 *1*	1276.2	3^-	288.28	4^+	E1		
993.3 *1*	2.9 *1*	1958.51	9^-	965.21	8^+	E1		
[x]998.0[a] *4*	<0.3							
1010.0 *2*	0.8 *1*	1298.17	4^+	288.28	4^+	E0+E2,M1		
1012 *1*	0.39[g] *4*	2427.58	(10^-)	1416.15	10^+			E_γ: 2010Do13 list Eγ=1013.4 *3* in their table of γ-ray data, but show 1011 in their level scheme.
1014.5 *1*	9 *1*	2430.63		1416.15	10^+			
1026.5 *2*	0.7 *1*	2442.76	(10^+)	1416.15	10^+			
1038.06 *5*	1.0 *1*	1622.80	5^+	584.82	6^+	E2+M1	−7 *+3−21*	
1040.2 *2*	0.7 *2*	1129.29	2^+	89.06	2^+	E2+E0+M1	−5.9 *+14−28*	
1046.0 *1*	1.7 *1*	2011.18	8^+	965.21	8^+	E2(+M1)		
1049.4 *4*		1049.4	0^+	0.0	0^+	E0		
[x]1051 *1*	0.3							
1053.27 *5*	3.0 *1*	1638.11	7^-	584.82	6^+	E1		
1058.92 *8*	1.4 *1*	1643.88	6^+	584.82	6^+	E2		
1062.5 *3*	3.6[g] *3*	2027.73	8^-	965.21	8^+			
1064.2 *5*	2.0 *7*	1154.31	2^+	89.06	2^+	E2+M1	−16 *5*	
1067.0 *4*	1.6 *2*	1354.95	4^+	288.28	4^+	E2+M1	−4.0 *+9−16*	
1074.5 *2*	0.4 *1*	2490.66		1416.15	10^+			
[x]1099.9 *2*	0.5 *1*							
1107.0 *2*	0.8 *1*	2523.10	(10^+)	1416.15	10^+	E0(+E2,M1)		
1114.0 *3*	1.4[f]	2079.51	8^+	965.21	8^+			
1119.9 *5*	0.53[g] *5*	1408.2	5^-	288.28	4^+	E1		I_γ: 1981Ko03 report Iγ(823.4γ)/Iγ(1119.9γ)=0.2,

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^{154}Sm(α,2nγ) 1981Ko03,2010Do13 (continued)

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

E_γ	I_γ[†‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#@]	δ[@]	Comments
								with the latter value estimated from $\gamma\gamma$ coin data. In the Adopted Gammas, this ratio is 0.3.
1120.8 *3*	4.4[f]	1705.91	6^-	584.82	6^+	E1		
1129.4 *4*	0.4 *1*	1129.29	2^+	0.0	0^+	E2		
1153.4 *3*	1.5 *1*	1242.6	1^-	89.06	2^+	E1		I_γ: Value is for Iγ(1153.4+1154.2). From γ branching from 1154 and 1242 levels in the ^{156}Gd Adopted γ radiations, one would have 2.3 for this combined intensity and Iγ(1153)=0.4.
1154.2[j] *1*	1.5 *1*	1154.31	2^+	0.0	0^+	E2		I_γ: Value is for Iγ(1153.4+1154.2). From γ branching from 1154 and 1242 levels in the ^{156}Gd Adopted γ radiations, one would have 2.3 for this combined intensity and Iγ(1154)=1.9.
1159.1 *1*	2.1 *2*	1248.19	3^+	89.06	2^+	E2+M1	−11.8 *+6−7*	
1168.0[j] *1*		1168.0	0^+	0.0	0^+	E0		
1169.2[i] *1*	0.4[i] *1*	1258.31	2^+	89.06	2^+	E2+M1(+E0)	+0.38 *6*	I_γ: Iγ=5.0 *1* for this peak. Value is from Iγ(1169γ)/Iγ(969γ) in β^- decay and Iγ(969γ) in (α,2nγ). 1981Ko03 place a 1169 γ from two other places in the level scheme as well, namely from the 6^+ level at 1753 and from the (8^+) level at 2134. The evaluator has questioned the existence of significant γ strength from the 1753 level and has placed the remaining Iγ from the 2134 level.
1169.2[i,j] *1*	[i]	1753.72	6^+	584.82	6^+	E2+M1(+E0)		I_γ: From comparison of the relative γ branching from the (n,γ) reaction and in β^- decay, all the intensity of this γ in (n,γ) can be accounted for by the deexcitation of the 1258 level, leaving none for this level. The evaluator has thus shown this placement as questionable and assigned Iγ=0 for it.
1169.2[i] *1*	4.6[i] *1*	2134.41	(8^+)	965.21	8^+	E2+M1(+E0)		I_γ: Iγ=5.0 *1* for the composite peak. 0.4 units are assigned to deexcitation of the 1258 level. 1981Ko03 assign a portion of this peak to the deexcitation of the 1753, 6^+ level. However, the evaluator has not accepted such a placement, leaving the remaining intensity to be associated with the deexcitation of this 2134 level.
1173.7 *1*	0.7[f]	1461.99	(4^+)	288.28	4^+	M1(+E2,E0)		
1180.3 *1*	1.4[f]	1468.62	4^-	288.28	4^+	E1		
1180.9 *1*	1.4[f]	1765.73	(6^+)	584.82	6^+			
1188.0[h] *5*	1.4[h] *9*	1276.2	3^-	89.06	2^+	E1		γ not reported by 2010Do13. I_γ: From adopted γ branchings, Iγ=0.9.
1188.0[h] *5*	1.4[h] *9*	1476.3		288.28	4^+			I_γ: From adopted γ branchings at 1276 level, this Iγ=0.5 with an uncertainty that includes 0.0.
1209.0 *2*	1.0 *2*	1298.17	4^+	89.06	2^+	E2		
1218.9 *1*	3.1 *1*	1506.99	5^+	288.28	4^+	E2		
1222.21 *6*	4.1 *2*	1510.64	4^+	288.28	4^+	E2+M1	−1.7 *2*	

Continued on next page (footnotes at end of table)

^{154}Sm(α,2nγ) 1981Ko03,2010Do13 (continued)

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

E_γ	I_γ[†‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#@]	δ[@]	Comments
1231.1 *1*	1.5 *1*	1320.16	2^-	89.06	2^+	E1		
1242.9 *5*	0.4 *1*	1242.6	1^-	0.0	0^+	E1		
1252.0 *2*	2.8 *5*	1540.34	6^+	288.28	4^+	E2		
1254.8 *5*	≤2.6	2220.0	10^+	965.21	8^+			I_γ: Iγ=2.3 *3* for the composite 1254.8+1256.1 peak.
[x]1256.1 *3*	≤2.6							I_γ: Iγ=2.3 *3* for the composite 1254.8+1256.1 peak.
[x]1259.2[i] *3*	1.6[i] *5*					E2		I_γ: A small portion of the intensity in this peak is placed from the 1258 level. See the comment there.
1259.2[i] *3*	0.15[i] *2*	1258.31	2^+	0.0	0^+	E2		E_γ: Note that this energy is more than 1 keV larger that the corresponding level-energy difference. Only a small fraction of this peak is associated with this placement, however. I_γ: Iγ=1.8 *5* for this peak. Value is from Iγ(1259γ)/Iγ(969γ) in β^- decay and Iγ(969γ) in (α,2nγ). The evaluator has shown the remaining Iγ as unplaced.
1263.5 *5*	≤3.5[f]	1848.41	8^+	584.82	6^+			I_γ: Iγ=3.5 from $\gamma\gamma$ coincidence data for 1263.5+1264.6.
1264.6 *5*	≤3.5[f]	1850.07	(7^+)	584.82	6^+			I_γ: Iγ=3.5 from $\gamma\gamma$ coincidence data for 1263.5+1264.6.
[x]1265.0[b] *2*	13.0[f]							
1266.4 *10*	0.6[f]	1354.95	4^+	89.06	2^+	E2		
1273.1 *2*	0.8[f]	2689.26?		1416.15	10^+			E_γ: This Iγ value is near that expected, from the (^{13}C,α3nγ) data, for the $11^+ \rightarrow 10^+$ transition. In the Adopted Gammas, the evaluator has placed this γ from the 2686, 11^+ level.
1284.6 *1*	1.3 *1*	2249.86	9^+	965.21	8^+	E2(+M1)		
[x]1291.7 *2*	0.7 *1*							E_γ: Placed from a 2707, (12^+) level by 1981Ko03 and assigned by them as a member of the first excited $K^\pi=0^+$ band. However, 2011Su15, in Coul. ex., place this 12^+ level elsewhere in the level scheme.
1322.4 *3*	1.1 *2*	2287.6		965.21	8^+			
1324.8 *1*	4.6 *3*	1909.36	7^+	584.82	6^+	E2		
1334.5 *2*	2.5 *3*	1622.80	5^+	288.28	4^+	E2+M1	−3.6 *3*	
1356.4 *2*	1.3 *1*	1643.88	6^+	288.28	4^+			
1357.5 *10*	0.4 *1*	2322.7		965.21	8^+			
1366.6[j] *14*	0.4 *4*	1366.6?	1^-	0.0	0^+	E1		
1374.7[j] *4*	0.4 *1*	1461.99	(4^+)	89.06	2^+	E2		
1421.9 *2*	1.1 *1*	1510.64	4^+	89.06	2^+	E2		
1426[&j]		2011.18	8^+	584.82	6^+			
1449.8[j] *3*	0.8 *2*	1538.9?	3^-	89.06	2^+	E1		
1464.6 *6*	≤0.5	2430.63		965.21	8^+			I_γ: Iγ=0.3 *2* for the composite 1464.6+1465.6 peak.
1465.6[j] *6*	≤0.5	1753.72	6^+	288.28	4^+			I_γ: Iγ=0.3 *2* for the composite 1464.6+1465.6 peak.
1477[&j]		1765.73	(6^+)	288.28	4^+			
1477[&]		2442.76	(10^+)	965.21	8^+			
1557.5 *5*	0.3 *1*	2523.10	(10^+)	965.21	8^+			

Continued on next page (footnotes at end of table)

^{154}Sm(α,2nγ) 1981Ko03,2010Do13 (continued)

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

† Listed values are those reported by the respective authors. While the individual studies were carried out at somewhat different E(α) values, and thus the two sets of Iγ values are not strictly comparable, the evaluator has assumed that these differences are small.
‡ Iγ(annihilation radiation)=53 *1*.
# The normalization of the γ and ce spectra to deduce α(K)exp values for the γ transitions was done by 1981Ko03, for the low-energy region, using the theoretical values for the 296.54, 6+→4$^+$ E2 transition and, for the high-energy region, the 1222.21, 4+→4$^+$ transition. The authors do not state what mult and δ values they assumed for this latter transition.
@ From ^{156}Gd Adopted γ radiations.
& γ shown in level scheme (1981Ko03), but not listed in table.
[a] Existence is from ce data.
[b] γ follows a level with a half-life of 2 ns *1* (1981Ko03).
[c] γ listed in the listing of γ properties by 2010Do13, but without an Iγ value. It is also not shown on their level scheme. In the summary of the 2010Do13 data in the XUNDL data file, it is stated that the authors do not observe this transition.
[d] May include contribution from ^{154}Gd.
[e] May include contribution from ^{155}Gd.
[f] Estimated from $\gamma\gamma$ coincidence data.
[g] Value from 2010Do13.
[h] Multiply placed with undivided intensity.
[i] Multiply placed with intensity suitably divided.
[j] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

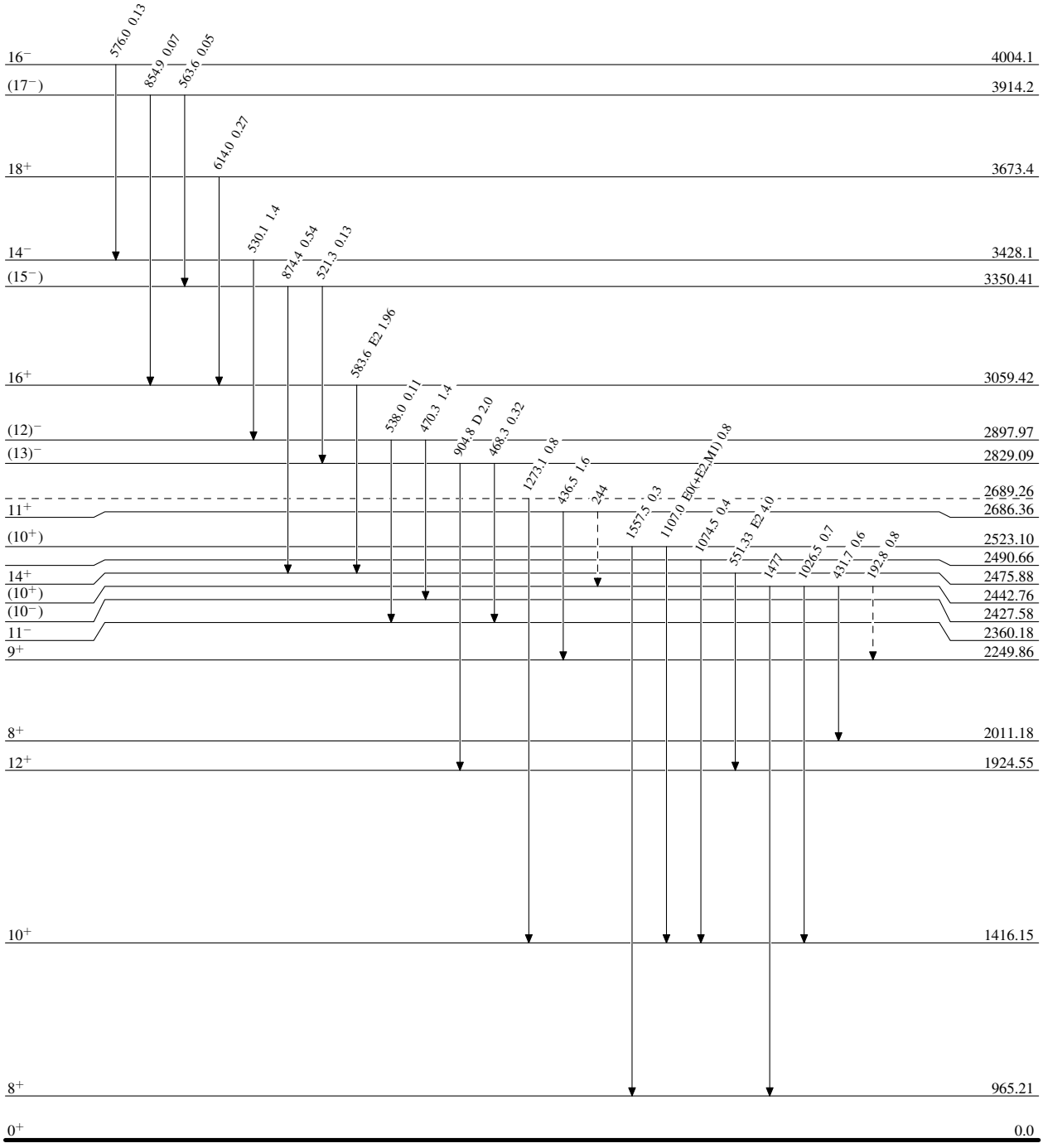
^{154}Sm(α,2nγ) 1981Ko03,2010Do13

Level Scheme

Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)

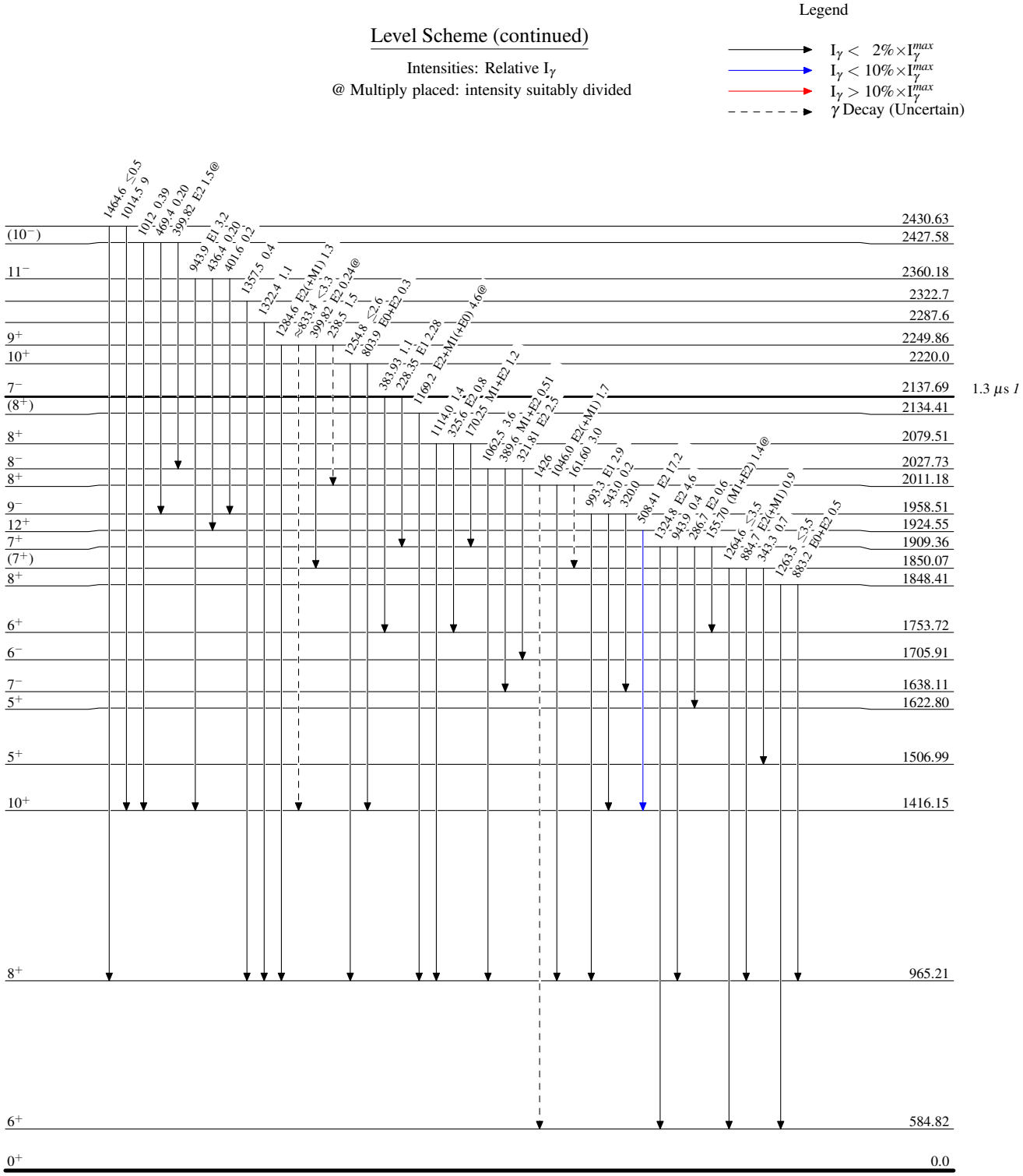


$^{156}_{64}Gd_{92}$

^{154}Sm(α,2nγ) 1981Ko03,2010Do13

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided



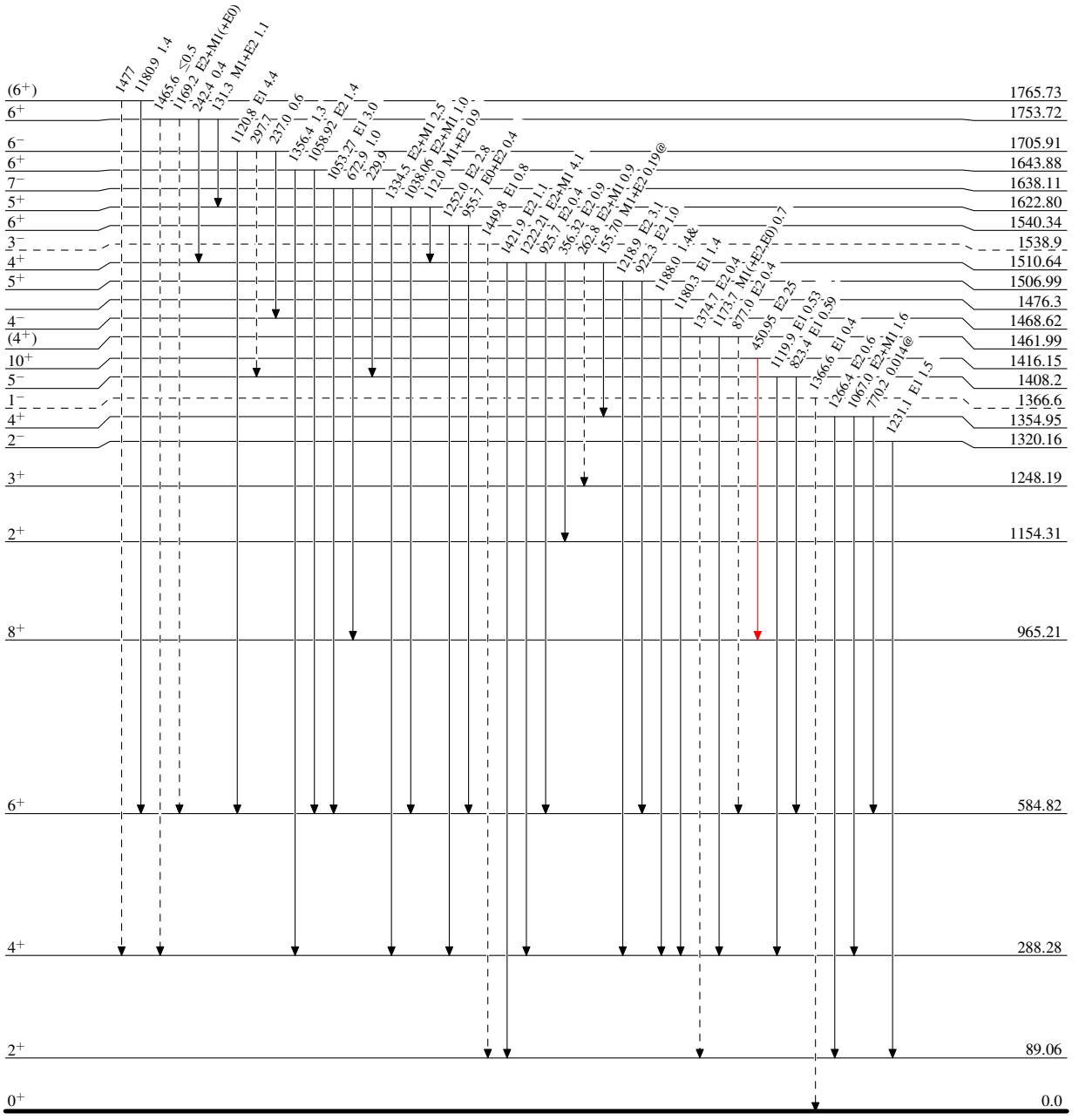
$^{156}_{64}Gd_{92}$

^{154}Sm(α,2nγ) 1981Ko03,2010Do13

Level Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)

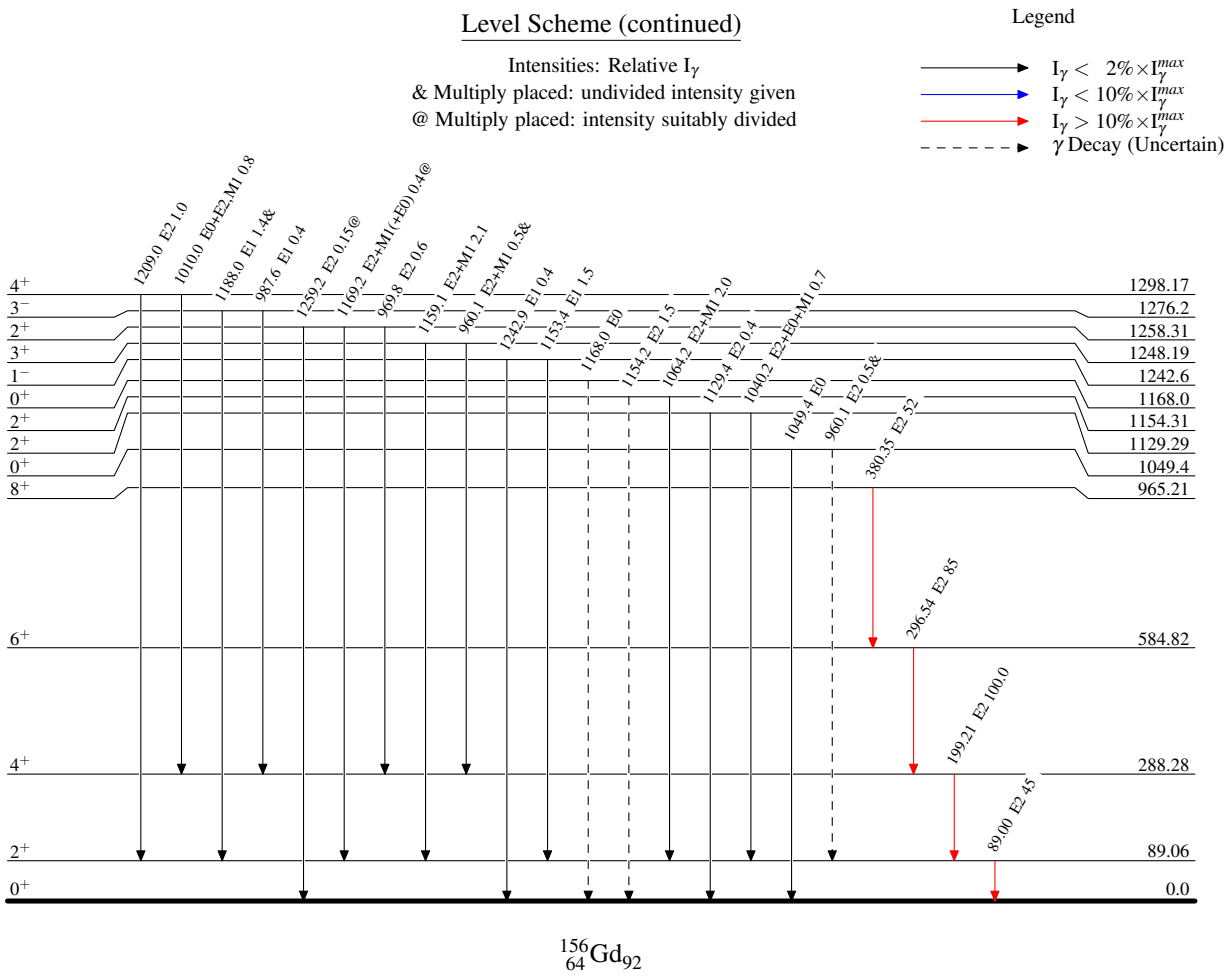


$^{156}_{64}Gd_{92}$

^{154}Sm(α,2nγ) 1981Ko03,2010Do13

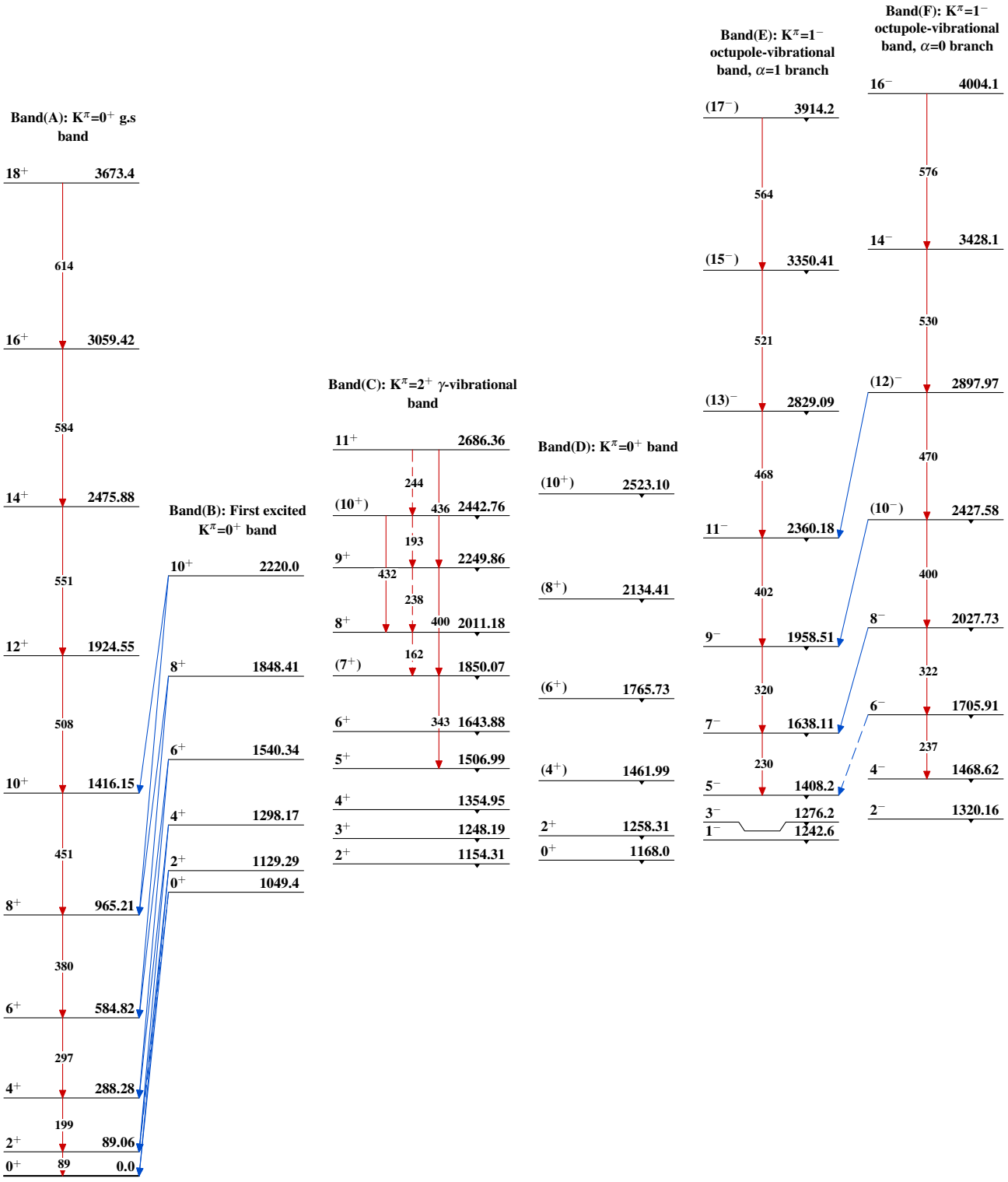
Level Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided



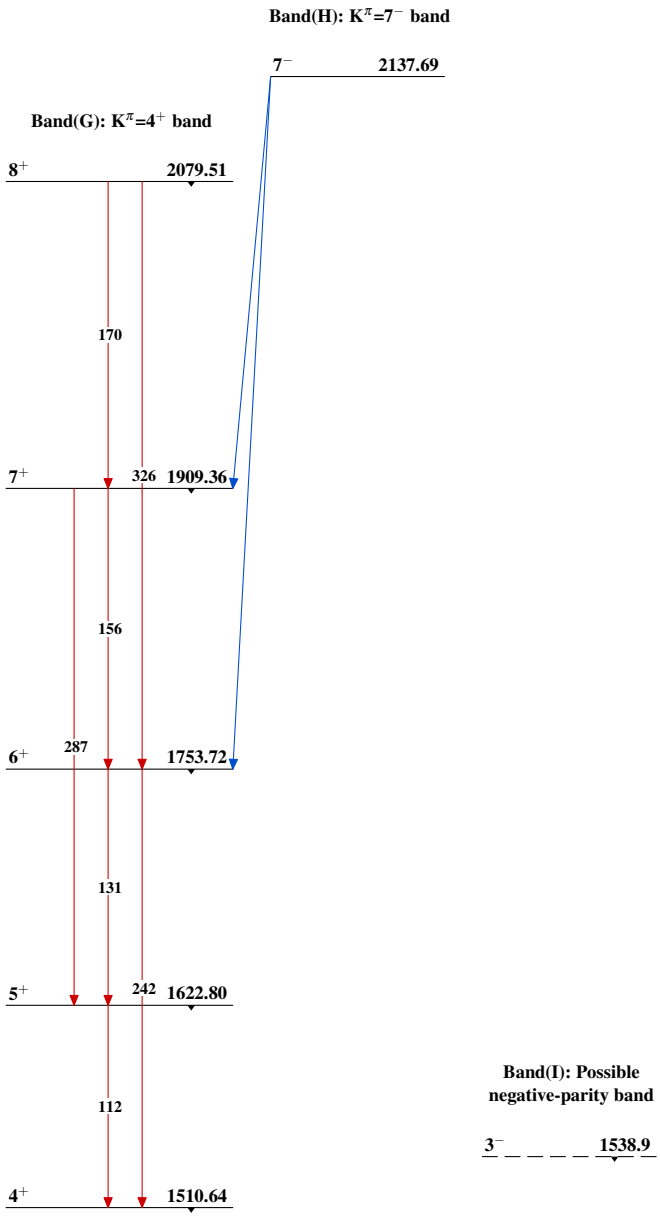
$^{156}_{64}Gd_{92}$

^{154}Sm(α,2nγ) 1981Ko03,2010Do13



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

^{154}Sm(α,2nγ) 1981Ko03,2010Do13 (continued)



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