^{150}Nd(α,2nγ) 2005Ga47,1982Ko03

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

All data are from 1982Ko03, except where noted otherwise. The $K^{\pi}=4^{+}$ band is proposed by 2005Ga47.
2005Ga47: E=22.5 MeV. Measured Eγ, $\gamma\gamma$.
1978CoZV: E=27 MeV. Measured Eγ, Iγ, $\gamma\gamma$.
1972Ha75: E=16.5-38.4 MeV. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma(\theta)$.
1966Lo11: E=20.5 MeV. Measured Eγ, Iγ.

1982Ko03: E=21-26 MeV. Measured Eγ, Iγ, Ice, $\gamma(\theta)$, γ(t), $\gamma\gamma$(t), γ(linear pol), excit

^{152}Sm Levels

E(level)	J^{π}[†]	E(level)	J^{π}[†]	$T_{1/2}$
0.0[#]	0^+	1945.80[b] *9*	7^+	
121.73[#] *5*	2^+	2003.51[c] *16*	7^-	
366.38[#] *7*	4^+	2040[e]	6^+	
685.2[@] *5*	0^+	2045.99 *16*	4^+,5,6,7^+	
706.83[#] *8*	6^+	2055.7 *10*		
810.38[@] *10*	2^+	2057.46[g] *9*	7^-	
963.90[&] *20*	1^-	2079.59[@] *11*	10^+	
1022.85[@] *8*	4^+	2120.92[j] *10*	7^-	2.4 ns *2*
1040.73[&] *11*	3^-	2139.67[a] *23*	8^+	
1085.67[a] *14*	2^+	2148.40[#] *19*	12^+	
1125.29[#] *9*	8^+	2201.42[d] *11*	8^-	
1221.39[&] *12*	5^-	2206[f]	7^+	
1233.84[b] *9*	3^+	2214.92[h] *10*	8^-	
1293.4? *3*	2^+	2269.82[j] *11*	8^-	
1310.42[@] *9*	6^+	2290.43[c] *19*	9^-	
1371.36[a] *11*	4^+	2308.5 *4*		
1505.53[&] *12*	7^-	2326.91[&] *16*	11^-	
1529.9[d] *3*	2^-	2348.8 *8*	6^+,7,8,9^-	
1559.55[b] *8*	5^+	2359.7 *4*		
1578.4[c] *10*	3^-	2375.47[b] *12*	9^+	
1609.17[#] *11*	10^+	2388.76[g] *11*	9^-	
1666.31[@] *10*	8^+	2393[e]	8^+	
1681.99[d] *21*	4^-	2424.31[j] *11*	9^-	
1728.15[a] *11*	6^+	2510.56[d] *12*	10^-	
1756.80[e] *24*	4^+	2516.41 *22*	8^+,9,10,11^-	
1764.4[c] *3*	5^-	2525.68[@] *13*	12^+	
1803.92[g] *9*	5^-	2576.24[h] *12*	10^-	
1821.09 *21*	(4^-)	2588[f]	9^+	
1878.99[&] *11*	9^-	2590.62[j] *12*	10^-	
1890.90[f] *12*	5^+	2641.11[c] *16*	11^-	
1920.41[h] *10*	6^-	2712.4 *4*		
1930.09[d] *11*	6^-	2735.90[#] *21*	14^+	

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^{150}Nd(α,2nγ) 2005Ga47,1982Ko03 (continued)

^{152}Sm Levels (continued)

E(level)	J$^{\pi}$[†]	Comments
2751.45[‡] *13*	11$^-$	
2810[e]	(10$^+$)	
2833.0[&] *3*	13$^-$	
2841.5 *4*	10$^+$,11,12,13$^-$	
2901.36[d] *16*	12$^-$	
2976.78[i] *17*	14$^+$	E(level): Assigned by the authors as the 14$^+$ member of the K$^{\pi}$=0$^+$ β band. In Coulomb excitation, this band member is found at 3292 and the 2976 level is assigned as the 14$^+$ member of a band with unknown K.
3027[f]	11$^+$	
3079.5[c] *3*	13$^-$	
3361.9[#] *4*	16$^+$	
3378.4[d] *3*	14$^-$	
3383.1 *4*	15$^-$	

[†] From Adopted Levels.
[‡] This level could be a member of either the K^{π}=5$^-$ or K^{π}=7$^-$ band.
[#] Band(A): K$^{\pi}$=0$^+$ g.s. band.
[@] Band(B): K$^{\pi}$=0$^+$ β band.
[&] Band(C): K$^{\pi}$=0$^-$ band.
[a] Band(D): K$^{\pi}$=2$^+$ γ band (even).
[b] Band(E): K$^{\pi}$=2$^+$ γ band (odd).
[c] Band(F): K$^{\pi}$=1$^-$ band (odd).
[d] Band(G): K$^{\pi}$=1$^-$ band (even).
[e] Band(H): K$^{\pi}$=4$^+$ band (even).
[f] Band(I): K$^{\pi}$=4$^+$ band (odd).
[g] Band(J): K$^{\pi}$=5$^-$ band (odd).
[h] Band(K): K$^{\pi}$=5$^-$ band (even).
[i] Band(L): K$^{\pi}$=?
[j] Band(M): K$^{\pi}$=7$^-$ band.

γ(^{152}Sm)

E_γ	I_γ	E_i(level)	J^π_i	E_f	J^π_f	Mult.[x]	δ	α[†]	Comments
63.51 *5*	0.8[#] *1*	2120.92	7^-	2057.46	7^-				
116.51 *6*	1.51 *15*	1920.41	6^-	1803.92	5^-	M1+E2	+0.21 *7*	1.104 *18*	Mult.: A_2=+0.09 *4*, A_4=+0.03 *7*.
121.75 *5*	61 *6*	121.73	2^+	0.0	0^+	E2		1.156	Mult.: A_2=+0.13 *3*, A_4=−0.08 *4*.
134[w]		1890.90	5^+	1756.80	4^+				
135.13 *5*	0.98 *10*	2510.56	10^-	2375.47	9^+	D(+Q)	−0.11 *+11−7*	0.19 *11*	Mult.: A_2=−0.33 *5*, A_4=+0.04 *8*.
137.08 *5*	2.3 *2*	2057.46	7^-	1920.41	6^-	M1+E2	+0.18 *+3−4*	0.692	Mult.: A_2=+0.05 *3*, A_4=+0.03 *5*.
148.95 *5*	2.5 *3*	2269.82	8^-	2120.92	7^-	M1+E2	−0.18 *8*	0.547	Mult.: A_2=−0.40 *9*, A_4=−0.20 *11*.
149[w]		2040	6^+	1890.90	5^+				
152.1 *1*	0.56 *6*	2576.24	10^-	2424.31	9^-	D(+Q)	+0.07 *+7−10*		Mult.: A_2=−0.12 *7*, A_4=−0.21 *12*.
154.6 *1*	1.31 *13*	2424.31	9^-	2269.82	8^-	M1+E2	−0.25 *+9−15*	0.493	Mult.: A_2=−0.55 *4*, A_4=−0.12 *6*.
157.3 *1*	1.23 *12*	2214.92	8^-	2057.46	7^-	M1+E2	+0.36 *6*	0.469	Mult.: A_2=+0.29 *4*, A_4=−0.08 *6*.
160.8[yo] *2*	<1.01[yo]	1666.31	8^+	1505.53	7^-	[o]			
160.8[yo] *2*	<1.01[yo]	2751.45	11^-	2590.62	10^-	[o]			
166.2 *1*	0.44 *5*	2590.62	10^-	2424.31	9^-	D(+Q)	−0.11 *11*		Mult.: A_2=−0.40 *10*, A_4=+0.12 *14*.
173.8 *1*	1.23[l] *16*	2388.76	9^-	2214.92	8^-	[l]			
174.1 *2*	0.26[l] *5*	2375.47	9^+	2201.42	8^-	[l]			
175.1 *1*	<1.0[#]	2751.45	11^-	2576.24	10^-				I_γ: Iγ=0.7 *3* for the 175.1γ and an impurity line.
187.6[ym] *2*	≤1.49[ym]	2388.76	9^-	2201.42	8^-	[m]			
187.6[ym] *2*	≤1.49[ym]	2576.24	10^-	2388.76	9^-	[m]			
195[w]		2588	9^+	2393	8^+				
198.4[n] *2*	0.2[np]	2525.68	12^+	2326.91	11^-				
200.6[zk] *1*	0.3[zk]	2079.59	10^+	1878.99	9^-	[k]			
200.6[zk] *1*	1.2[zk]	2120.92	7^-	1920.41	6^-	[k]			
202.0 *2*	0.8[#] *2*	2590.62	10^-	2388.76	9^-				
212.4 *1*	0.52 *3*	1022.85	4^+	810.38	2^+	E2		0.1707	Mult.: A_2=+0.29 *6*, A_4=+0.01 *11*.
217.6 *3*	0.3[p]	1945.80	7^+	1728.15	6^+				
235.8 *2*	0.3[p]	2375.47	9^+	2139.67	8^+				
244.67 *5*	100	366.38	4^+	121.73	2^+	E2		0.1074	Mult.: A_2=+0.253 *13*, A_4=−0.05 *2*; lin pol=+0.50 *4*.
253.2 *2*	0.4[i]	2057.46	7^-	1803.92	5^-	[i]			
255.6 *1*	2.77 *9*	2201.42	8^-	1945.80	7^+	E1+(M2)	−0.03 *3*	0.0227 *16*	Mult.: A_2=−0.28 *2*, A_4=+0.01 *3*, lin pol=+0.44 *9*.
260[w]		2206	7^+	1945.80	7^+				
269.0[d] *1*	0.9[d]	2214.92	8^-	1945.80	7^+	[d]			
269.8[d] *4*	0.9[d]	1878.99	9^-	1609.17	10^+	[d]			
[x]271.3[zv] *1*	1.1[zv]								
271.3[zv] *1*	0.5[zv]	2201.42	8^-	1930.09	6^-				
276[w]		2040	6^+	1764.4	5^-				
276[w]		2206	7^+	1930.09	6^-				

γ(^{152}Sm) (continued)

E_γ	I_γ	E_i(level)	J^π_i	E_f	J^π_f	Mult.[x]	α[†]	Comments
287.5 *1*	3.22 *10*	1310.42	6^+	1022.85	4^+	E2	0.0642	Mult.: A_2=+0.30 *2*, A_4=−0.04 *3*; lin pol=+0.54 *8*.
294.4 *1*	1.1[p]	2214.92	8^-	1920.41	6^-	E2	0.0596	I_γ,Mult.: The authors report Iγ=1.32 *5* and A_2=+0.35 *4*, A_4=−0.16 *5*, lin pol=+1.0 *2* for the 294γ and an impurity line.
303.5 *1*	0.5[p]	2424.31	9^-	2120.92	7^-			I_γ,Mult.: For the 303.5γ and an impurity line, Iγ=0.46 *3* and A_2=+0.04 *13*, A_4=−0.07 *19*.
309.0 *1*	1.28 *5*	2510.56	10^-	2201.42	8^-	E2	0.0513	Mult.: A_2=+0.29 *3*, A_4=−0.09 *5*.
312[w]		2040	6^+	1728.15	6^+			
314.3 *1*	0.69 *3*	2641.11	11^-	2326.91	11^-	D+Q		Mult.,δ: A_2=−0.02 *6*, A_4=−0.10 *9*; δ=+1.75 *5* or −0.90 *3*.
[x]316.3[z]	0.39[zc] *3*							
316.3[z]	0.222[zc] *12*	1022.85	4^+	706.83	6^+	(E2)	0.0478	
320.9 *1*	0.17[#] *5*	2590.62	10^-	2269.82	8^-			Mult.: for the 320.9γ+322.2γ doublet: A_2=−0.19 *11*, A_4=+0.26 *18*.
322.2[1] *1*	0.17[#] *5*	2201.42	8^-	1878.99	9^-			Mult.: for the 320.0γ+322.2γ doublet: A_2=−0.19 *11*, A_4=+0.26 *18*.
325.6 *1*	0.17 *5*	1559.55	5^+	1233.84	3^+	(Q)[@]		
327.3 *1*	0.98 *7*	2751.45	11^-	2424.31	9^-	[@]		
329.4 *1*	0.32 *3*	2057.46	7^-	1728.15	6^+			Mult.: A_2=−0.08 *14*, A_4=−0.4 *3*.
331.3[ze] *1*	0.13[ze] *13*	1890.90	5^+	1559.55	5^+	[e]		
331.3[ze] *1*	1.2[ze]	2388.76	9^-	2057.46	7^-	[e]		
340.47 *4*	≤82.5	706.83	6^+	366.38	4^+	E2	0.0382	I_γ,Mult.: Iγ =82.5 *25* for a peak that includes a ^{150}Nd impurity line. α(K)exp=0.036 *6*, A_2=0.289 *14*, A_4=−0.04 *2*, and lin pol=+0.50 *4* for the doublet. The impurity line is a 6^+ to 4^+ transition, presumably with mult=E2.
355.9 *1*	6.5[p]	1666.31	8^+	1310.42	6^+	E2	0.0334	Mult.: A_2=+0.32 *3*, A_4=−0.08 *5*; lin pol=+0.54 *5*; α(K)exp=0.016 *11*.
361.0 *1*	0.6[f]	2576.24	10^-	2214.92	8^-	[f]		
361.5 *3*	2.3[f] *5*	1920.41	6^-	1559.55	5^+	[f]		
362.4 *3*	0.66[f] *10*	2751.45	11^-	2388.76	9^-	[f]		
370.5 *1*	0.98 *4*	1930.09	6^-	1559.55	5^+	E1	0.00872	Mult.,δ: A_2=−0.18 *5*, A_4=−0.03 *7*; lin pol=+0.15 *12*; δ=0.00 *7*.
375.5 *3*	1.0[#] *3*	2590.62	10^-	2214.92	8^-			I_γ,Mult.: for 375.5γ+impurity doublet: Iγ=5.76 *18*, A_2=+0.36 *2*, A_4=−0.06 *3*; lin pol=+0.35 *16*.
380.6	0.7	1505.53	7^-	1125.29	8^+	D		E_γ,I_γ,Mult.: The authors report Eγ=380.6 *2* with Iγ=0.90 *4*. Iγ=0.7 is assigned to the 1506 level from $\gamma\gamma$, and Iγ=0.2 is assigned as an impurity line. A_2=−0.17 *9* and A_4=−0.03 *10*, lin pol=+0.06 *14* are determined for the composite peak.
385[w]		1756.80	4^+	1371.36	4^+			
386.2 *1*	0.88 *4*	1945.80	7^+	1559.55	5^+			
390.8 *1*	0.96 *4*	2901.36	12^-	2510.56	10^-	E2	0.0254	Mult.: A_2=+0.39 *4*, A_4=−0.09 *7*; lin pol=+0.81 *20*.
[x]411.1 *1*	0.92 *4*							Mult.: A_2=+0.33 *6*, A_4=+0.09 *10*.
413.3 *1*	5.17 *16*	2079.59	10^+	1666.31	8^+	E2	0.0217	Mult.: A_2=+0.268 *14*, A_4=−0.05 *2*; lin pol=+0.55 *5*; α(K)exp=0.018 *6*.

γ(^{152}Sm) (continued)

E_γ	I_γ	E_i(level)	J^π_i	E_f	J^π_f	Mult.[x]	α[†]	Comments
418.45 *5*	46.1 *14*	1125.29	8$^+$	706.83	6$^+$	E2	0.0209	Mult.: A_2=+0.311 *15*, A_4=−0.08 *2*; lin pol=+0.57 *4*; α(K)exp=0.017 *2*.
427		2040	6$^+$	1609.17	10$^+$			
430.2 *2*	0.75[p] *8*	2375.47	9$^+$	1945.80	7$^+$			I_γ,Mult.: The authors report Iγ=2.82 *9* and A_2=+0.29 *2*, A_4=−0.02 *4*, lin pol=+0.59 *10* for the 430.2γ and an impurity line.
432.5 *2*	0.38 *3*	1803.92	5$^-$	1371.36	4$^+$			Mult.: A_2=+0.25 *14*, A_4=+0.06 *19*.
440[w]		3027	11$^+$	2588	9$^+$			
[x]444.4[zu]	0.12[zu] *6*							
444.4[zu]	0.266[zu] *17*	810.38	2$^+$	366.38	4$^+$			
444.4[zu]	0.08[zu] *3*	1529.9	2$^-$	1085.67	2$^+$			
446.1 *1*	2.91 *9*	2525.68	12$^+$	2079.59	10$^+$	E2	0.01749	Mult.: A_2=+0.29 *2*, A_4=−0.10 *3*; lin pol=+0.51 *8*.
451.1 *1*	1.05 *4*	2976.78	14$^+$	2525.68	12$^+$	E2	0.01696	Mult.: A_2=+0.29 *4*, A_4=−0.12 *7*; lin pol=+0.5 *4*.
470.2 *2*	0.49 *7*	2079.59	10$^+$	1609.17	10$^+$	M1(+E0)	0.0251 *5*	Mult.: A_2=+0.49 *11*, A_4=−0.19 *16*; α(K)exp=0.039 *17*; δ=+0.3 *5* gives mult=M1+(E2). α(K)(M1)=0.0214 compared with α(K)exp=0.039 *17* suggests the possibility of an E0 component. α: From Adopted Gammas for mult=M1.
477.0 *2*	0.5 *1*	3378.4	14$^-$	2901.36	12$^-$			Mult.: A_2=+0.10 *16*, A_4=+0.1 *3*.
478[w]		2206	7$^+$	1728.15	6$^+$			
483.9 *1*	21.1 *7*	1609.17	10$^+$	1125.29	8$^+$	E2	0.01400	Mult.: A_2=+0.329 *14*, A_4=−0.09 *2*; lin pol=+0.59 *4*; α(K)exp=0.011 *2*.
486.2 *2*	0.64 *4*	2045.99	4$^+$,5,6,7$^+$	1559.55	5$^+$			Mult.: A_2=−0.09 *6*, A_4=−0.14 *16*.
493.0 *2*	0.5 *2*	2641.11	11$^-$	2148.40	12$^+$			
506.6[ya]	<0.3[ya]	1728.15	6$^+$	1221.39	5$^-$			
506.6[ya]	<0.3[ya]	2833.0	13$^-$	2326.91	11$^-$			
514.6[zn]	1.0[zn]	1221.39	5$^-$	706.83	6$^+$			
514.6[zn]	0.5[zn]	2841.5	10$^+$,11,12,13$^-$	2326.91	11$^-$			
519.7 *2*	0.2 *2*	1890.90	5$^+$	1371.36	4$^+$			
[x]523.5[r]	1.03[r] *7*							
523.5[r]	0.62[r] *4*	1756.80	4$^+$	1233.84	3$^+$			
539.5 *2*	7.6 *2*	2148.40	12$^+$	1609.17	10$^+$	E2	0.01050	Mult.: A_2=+0.29 *2*, A_4=−0.04 *3*; α(K)exp=0.00867, the E2 theory value, is used for normalization of Iγ and Ice(K).
540.9 *3*	1.89 *7*	1666.31	8$^+$	1125.29	8$^+$	E0+M1+(E2)	0.066 *10*	Mult.: A_2=+0.27 *5*, A_4=−0.05 *8*; −0.45<δ(Q/D)<+1.0; α(K)exp=0.058 *9*. α: From Adopted Gammas.
560.9 *3*	0.2[p]	2641.11	11$^-$	2079.59	10$^+$			E_γ: peak contains an impurity.
563.5[‡] *5*		685.2	0$^+$	121.73	2$^+$			
587.3[b]	0.27[b] *14*	1821.09	(4$^-$)	1233.84	3$^+$			
587.5[b] *1*	1.65[b] *16*	2735.90	14$^+$	2148.40	12$^+$			

γ(^{152}Sm) (continued)

$E_γ$	$I_γ$	E_i(level)	$J^π_i$	E_f	$J^π_f$	Mult.[x]	δ	α[†]	Comments
603.6 *1*	3.35 *11*	1310.42	6^+	706.83	6^+	E0+M1+E2		0.032 *4*	Mult.,δ: A_2=+0.08 *2*, A_4=−0.11 *3*; lin pol=−0.20 *8*; α(K)exp=0.027 *3*. δ(Q/D)=+1.6 *3* gives α(K)=0.0080 *4*. α: From Adopted Gammas.
623.9	0.13 *4*	2290.43	9^-	1666.31	8^+				
626.0[‡] *3*	0.82	3361.9	16^+	2735.90	14^+				$E_γ$: Eγ=628.82 *3* in Coulomb excitation.
631.5 *3*	<0.6	2510.56	10^-	1878.99	9^-				
634.1[n]	0.2[np]	2139.67	8^+	1505.53	7^-				$E_γ$,$I_γ$: Includes an impurity peak. Iγ is from γγ.
637.9 *7*	0.13 *3*	2516.41	8^+,9,10,11^-	1878.99	9^-				Mult.: A_2=−0.2 *4*, A_4=−0.4 *6*.
647.2[‡] *3*	0.67	3383.1	15^-	2735.90	14^+				
656.5 *2*	3.26 *11*	1022.85	4^+	366.38	4^+	E0+M1+E2		0.0568 *20*	Mult.,δ: A_2=−0.07 *2*, A_4=−0.06 *3*; α(K)exp=0.041 *6*; lin pol=−0.28 *6*; δ(E2/M1)=+6 *+9−2* gives α(K)=0.055 *1*. α: From Adopted Gammas.
657[w]		1890.90	5^+	1233.84	3^+				
671.1 *2*	1.14	1756.80	4^+	1085.67	2^+				Mult.: The data are conflicting. The authors suggest mult=E2 and/or M1 from A_2=+0.39 *4*, A_4=+0.06 *6*, lin. pol=+0.8 *2*, and α(K)exp=0.0077 *19*. from Adopted Levels, $J^π$ is 4^+, requiring mult=E2.
674.3 *2*	0.63 *3*	1040.73	3^-	366.38	4^+	E1+M2	+1.2 *+60−9*	0.018 *14*	Mult.: A_2=−0.43 *8*, A_4=+0.14 *12*; lin pol=+0.12 *19*.
681.6 *3*	0.27 *3*	2290.43	9^-	1609.17	10^+	D+Q			Mult.: A_2=−0.2 *2*, A_4=−0.3 *4*; lin pol=+0.5 *5*.
684.6 *2*	0.99 *4*	2833.0	13^-	2148.40	12^+	E1+(M2)	−0.03 *3*	0.00220 *8*	Mult.: A_2=−0.33 *7*, A_4=+0.06 *9*; lin pol=+0.4 *2*; α(K)exp<0.003 for the 684.6γ and the known 684.7 E0 transition from the 684.7 level. α(K)=0.00486 for E2.
688.6 *2*	0.78 *3*	810.38	2^+	121.73	2^+	E0+M1+E2		0.0434 *13*	Mult.: A_2=−0.16 *8*, A_4=−0.01 *12*; α(K)exp=0.036 *7*. α: From Adopted Gammas.
693.1 *3*	0.2[p] *1*	2841.5	10^+,11,12,13^-	2148.40	12^+				
717.9 *3*	2.2 *3*	2326.91	11^-	1609.17	10^+	E1		0.00198	$I_γ$,Mult.: The authors report Iγ=4.1 *3* and A_2=−0.15 *6*, A_4=+0.10 *18*, lin pol=+0.48 *7*, and α(K)exp=0.0021 *5* for the 717γ and an impurity line. The impurity line is E2, so α(K)exp is consistent only with mult(717.9γ)=E1.
719.1	0.0140 *11*	1085.67	2^+	366.38	4^+				$I_γ$: From Iγ/(1086γ)=0.0246 *9* in Adopted Gammas.
727[w]		2393	8^+	1666.31	8^+				
730[w]		2810	(10^+)	2079.59	10^+				
747.1 *2*	0.4[p] *2*	2057.46	7^-	1310.42	6^+				
753.7 *1*	6.02 *19*	1878.99	9^-	1125.29	8^+	E1+(M2)	−0.03 *3*	0.00181 *6*	Mult.: A_2=−0.30 *2*, A_4=+0.03 *3*; lin pol=+0.31 *5*; α(K)exp=0.0012 *3*.
766.3 *2*	0.57 *3*	2375.47	9^+	1609.17	10^+	M1+E2	−1.0 *4*	0.0060 *8*	Mult.: A_2=+0.71 *9*, A_2=+0.14 *16*; lin pol=−1.7 *6*.
780.9 *3*	0.40 *10*	1803.92	5^-	1022.85	4^+				

γ(^{152}Sm) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[x]	δ	α[†]	Comments
798.7 *1*	5.84 *19*	1505.53	7⁻	706.83	6⁺	E1		1.59×10⁻³	Mult.: A_2=−0.19 *2*, A_4=+0.02 *4*; lin pol=+0.26 *5*; α(K)exp=0.0016 *4*.
[x]810.1[zt]	0.6[zt]								
810.1[zt] *2*	0.4[zt]	810.38	2⁺	0.0	0⁺				
819[w]		2040	6⁺	1221.39	5⁻				
820.6 *1*	2.09 *7*	1945.80	7⁺	1125.29	8⁺	M1+E2	−1.6 *4*	0.0045 *4*	Mult.: A_2=+0.35 *4*, A_4=+0.14 *5*; lin pol=−0.79 *16*; α(K)exp=0.0043 *12*.
841.6[‡1] *4*	0.52 *10*	963.90	1⁻	121.73	2⁺				I_γ: From Iγ/Iγ(963γ)=1.18 *5* in Adopted Gammas.
843.7	<3.8	2348.8	6⁺,7,8,9⁻	1505.53	7⁻				E_γ,I_γ: The authors determine Eγ=843.7 with Iγ=3.8 for this placement from the 2348 level and an impurity line.
852.8 *1*	2.44 *7*	1559.55	5⁺	706.83	6⁺	M1+E2		0.0046 *12*	Mult.,δ: A_2=+0.28 *3*, A_4=−0.02 *5*; α(K)exp=0.0053 *15*. From γ(θ), δ=−0.5 *2* or −1.6 *4*. From α(K)exp, δ<1.2 so the small solution is favored.
855.0 *1*	3.30 *11*	1221.39	5⁻	366.38	4⁺	E1+(M2)	−0.11 *7*	0.0016 *3*	Mult.: A_2=−0.30 *3*, A_4=+0.05 *3*; α(K)exp<0.001.
867.0 *2*	0.63 *11*	1233.84	3⁺	366.38	4⁺	M1,E2		0.0045 *11*	Mult.: α(K)exp=0.005 *2*.
878.1 *2*	0.6 *2*	2003.51	7⁻	1125.29	8⁺				
887[w]		2393	8⁺	1505.53	7⁻				
901.1 *1*	1.79 *6*	1022.85	4⁺	121.73	2⁺	E2		0.00311	Mult.: A_2=+0.33 *4*, A_4=−0.05 *5*; lin pol=+0.64 *19*.
907.2 *2*	0.54 *5*	2516.41	8⁺,9,10,11⁻	1609.17	10⁺				Mult.: A_2=+0.09 *13*, A_4=−0.1 *3*.
916.8 *2*	0.39 *6*	2525.68	12⁺	1609.17	10⁺				Mult.: A_2=+1.1 *3*, A_4=+0.01 *4*.
919.0 *1*	1.56 *6*	1040.73	3⁻	121.73	2⁺	E1(+M2)	−0.07 *+9−14*	0.0013 *5*	Mult.: A_2=−0.26 *4*, A_4=+0.11 *7*; lin pol=+0.09 *13*.
931[w]		2810	(10⁺)	1878.99	9⁻				
931.1 *2*	0.7[j] *3*	3079.5	13⁻	2148.40	12⁺	[j]			
931.9 *2*	1.5[j] *3*	2057.46	7⁻	1125.29	8⁺	[j]			
944.1 *1*	2.0 *4*	1310.42	6⁺	366.38	4⁺	E2		0.00281	I_γ: The authors report Iγ=2.44 *7* in singles, and 2.0 *4* in γγ so there is possibly a small part of this intensity that could belong elsewhere. Mult.,I_γ: A_2=+0.21 *3*, A_4=0.00 *5*; lin pol=+0.44 *16*;
954.2 *3*	0.77 *7*	2079.59	10⁺	1125.29	8⁺				Mult.: A_2=−0.02 *17*, A_4=0.0 *2*.
959.5 *1*	1.04 *4*	1666.31	8⁺	706.83	6⁺	(E2)		0.00271	Mult.: Mult=Q from A_2=+0.43 *7*, A_4=−0.05 *11*. Placement in the decay scheme requires Δπ=no.
963.9[zs] *2*	0.44[zs] *8*	963.90	1⁻	0.0	0⁺				
963.9[zs] *2*	0.81[zs] *6*	1085.67	2⁺	121.73	2⁺				

γ(^{152}Sm) (continued)

E_γ	I_γ	E_i(level)	J^π_i	E_f	J^π_f	Mult.[x]	δ	α[†]	Comments
1005.0 *1*	2.01 *9*	1371.36	4+	366.38	4+	E2		0.00246	Mult.: A_2=−0.15 *5*, A_4=+0.01 *8*; lin pol=−0.30 *12*; α(K)=0.00210 (E2 theory) used as a calibration point.
1014.4[n]	2.0[np]	2139.67	8+	1125.29	8+				E_γ,I_γ: Includes an impurity peak. Iγ is from γγ.
1021.4 *1*	1.64 *6*	1728.15	6+	706.83	6+	M1+E2	−1.4 *+4−7*	0.00284 *23*	Mult.: A_2=−0.15 *4*, A_4=−0.01 *6*; lin pol=−0.11 *12*; α(K)exp=0.0026 *8*.
1031.5 *2*	0.85 *4*	2641.11	11−	1609.17	10+	E1+(M2)	+0.03 *8*	0.00098 *9*	Mult.: A_2=−0.16 *8*, A_4=+0.10 *11*; lin pol=−0.3 *5*; α(K)exp<0.0013.
1057.3 *3*	0.3 *1*	1764.4	5−	706.83	6+				
1075[1] *1*	0.2 *1*	2201.42	8−	1125.29	8+				
1081[w]		2206	7+	1125.29	8+				
1085.7 *2*	0.57 *4*	1085.67	2+	0.0	0+	Q			Mult.: A_2=+0.25 *15*, A_4=+0.2 *2*.
1097.1 *1*	2.01 *8*	1803.92	5−	706.83	6+	E1+(M2)	−0.03 *8*	0.00087 *8*	Mult.: A_2=−0.07 *4*, A_4=+0.09 *7*; lin pol=+0.20 *13*.
1103.2 *3*	0.58 *11*	2712.4		1609.17	10+				Mult.: A_2=+0.3 *3*, A_4=+0.3 *4*.
1112.1 *1*	1.97 *8*	1233.84	3+	121.73	2+	E2+M1	−7 *+2−7*	0.00202 *4*	Mult.: A_2=−0.09 *4*, A_4=−0.05 *7*; lin pol=+0.16 *14*.
1165.0 *2*	0.99 *5*	2290.43	9−	1125.29	8+	E1+(M2)	−0.05 *11*	0.00081 *13*	Mult.: A_2=−0.32 *6*, A_4=+0.10 *9*; lin pol=+0.4 *4*; α(K)exp<0.0017.
1183.2 *4*	0.43 *4*	2308.5		1125.29	8+				Mult.: A_2=+0.53 *7*, A_4=+0.3 *2*.
1193.1 *1*	4.33 *14*	1559.55	5+	366.38	4+	M1+E2	−4.0 *8*	0.00178 *4*	Mult.: A_2=−0.34 *2*, A_4=+0.17 *4*; lin pol=+0.32 *10*; α(K)=0.0015 (E2 theory) used as a calibration point.
1212.0[&] *10*	0.6[&] *3*	1578.4	3−	366.38	4+	[&]			
1213.4[&] *3*	1.7[&] *4*	1920.41	6−	706.83	6+	[&]			
1223.1[zg]	0.8[zg] *2*	1930.09	6−	706.83	6+	[g]			
1223.1[zg]	0.8[zg] *2*	2348.8	6+,7,8,9−	1125.29	8+	[g]			
1234.4 *3*	0.7[p]	2359.7		1125.29	8+				I_γ: The authors determine Iγ=1.47 *6* for the 1234γ and an impurity line.
1238.9 *1*	3.96 *13*	1945.80	7+	706.83	6+	M1+E2	−1.7 *2*	0.00181 *5*	Mult.: A_2=−0.74 *3*, A_4=+0.23 *4*.
1250.1[zq]	0.6[zq] *2*	1371.36	4+	121.73	2+				
1250.1[zq]	0.9[zq] *3*	2375.47	9+	1125.29	8+				
1267[w]		2393	8+	1125.29	8+				
1293.4[1] *3*	0.19 *9*	1293.4?	2+	0.0	0+				
1296.8 *2*	0.84 *6*	2003.51	7−	706.83	6+	E1		7.17×10^{-4}	Mult.: A_2=−0.18 *10*, A_4=+0.17 *17*; lin pol=+0.2 *5*.
1315.6 *2*	0.57 *5*	1681.99	4−	366.38	4+				Mult.: A_2=+0.47 *16*, A_4=+0.2 *2*; lin pol=+0.6 *7*.
1333[w]		2040	6+	706.83	6+				
1339.4 *2*	0.57 *7*	2045.99	4+,5,6,7+	706.83	6+				
1348.9 *10*	0.7[h]	2055.7		706.83	6+	[h]	[h]		
1350.9 *4*	1.0[h] *3*	2057.46	7−	706.83	6+	[h]	[h]		
1361.7[1] *6*	0.3 *1*	1728.15	6+	366.38	4+				

γ(^{152}Sm) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[x]	δ	α[†]	Comments
1391[w]		1756.80	4^+	366.38	4^+				
1398.6 *5*	0.2 *1*	1764.4	5^-	366.38	4^+				
1408.1 *3*	0.6 *2*	1529.9	2^-	121.73	2^+				
1437.4 *2*	0.33 *13*	1803.92	5^-	366.38	4^+	E1+(M2)	−0.07 *11*	0.00072 *9*	Mult.: A_2=−0.26 *6*, A_4=+0.11 *9*; lin pol=−0.4 *4*.
1454.7 *2*	1.52 *15*	1821.09	(4^-)	366.38	4^+				Mult.: From A_2=−0.49 *6*, A_4=+0.24 *10* the authors assign mult=M1+E2, with δ=−2.8 *+12−7*. This assignment is in conflict with the adopted J^π=(4^-) for the 1821 level.
1463[w]		2588	9^+	1125.29	8^+				
1499[w]		2206	7^+	706.83	6^+				
1525[w]		1890.90	5^+	366.38	4^+				
1635[w]		1756.80	4^+	121.73	2^+				
1672[w]		2040	6^+	366.38	4^+				

[†] Additional information 1.

[‡] Observed only by 1978CoZV.

[#] A 90° value; not corrected for anisotropy.

[@] The 325.6γ from the 1560 level and the 327.3γ from the 2752 level are unresolved in γ(θ). A_2=+0.38 *4* and A_4=+0.02 *6* for the combined transitions.

[&] The authors report Iγ=2.34 *8* for the 1212.0 from the 1580 level and the 1213.4γ from the 1920 level. They give divided intensities as shown, but do not state how these were obtained. A_2=0.19 *3*, A_4=−0.01 *5* and lin pol=−0.6 *2* for the doublet.

[a] The authors report Eγ=506.6 *3* with Iγ=0.2 *1* doubly placed from the 1728 and 2833 levels.

[b] The authors report Eγ=587.5 *1* with Iγ=1.92 *7* doubly placed from the 1821 and 2736 levels. A_2=+0.31 *3*, A_4=−0.17 and lin pol=+0.87 *19* for the doublet. From Iγ/Iγ(1455γ)=0.18 *9* for the 1821 level from Adopted Gammas, one gets Iγ(587γ)=0.27 *14* for placement from the 1821 level, leaving Iγ=1.65 *16* for placement from the 2736 level. The Eγ value for the 1821 level is from the level energy difference.

[c] 1982Ko03 report Eγ=316.3 *1* with Iγ=0.61 *3* placed in part from the 1023 level. From Iγ/Iγ(656γ + 901γ)=0.0440 *20* from Adopted Gammas, one expects Iγ(316γ)=0.222 *12* for the 1023 level. This leaves Iγ=0.39 *3* as unplaced. The authors measure A_2=+0.39 *6* and A_4=−0.03 *11* for the multiplet.

[d] The authors report Iγ=1.91 *7* for the 269.0 *1* + 269.8 *4* γ′s placed from the 1879 and 2215 levels, respectively. the 269.0γ has an impurity component. The Iγ values shown are from γγ. A_2=−0.16 *2*, A_4=+0.04 *4* and lin pol=+0.03 *3* for the multiplet.

[e] The authors report Iγ=1.96 *7* with A_2=+0.11 *2* and A_4=+0.03 *4* for Eγ=331.3 *1* doubly placed from the 1891 and 2389 levels and Eγ=331.6 *2*, an impurity line. Iγ=1.4 is determined from γγ for the doubly placed 331.3γ. From Iγ/Iγ(520γ)=0.65 *20* in Coulomb excitation for the 1891 level, one gets Iγ(331γ)=0.13 *13* for placement from the 1891 level, leaving Iγ=1.2 for placement from the 2389 level.

[f] The authors report Iγ=2.90 *10* and A_2=−0.14 *3*, A_4=−0.00 *4* for the 361.0 and 361.5 γ′s from the 2577 and 1920 levels, respectively. Lin pol=+0.30 *5* for these γ′s combined with the 362.4γ from the 2752 level. The intensities shown for the 361.0 and 361.5 γ′s are from γγ.

[g] The authors report Eγ=1223.1 *3* doubly placed from the 1930 and 2348 levels. A_2=+0.15 *4*, A_4=−0.13 *7* and lin pol=−0.3 *3* for the doublet. The Iγ values shown are from γγ.

[h] The authors report Iγ=1.70 *7* and A_2=−0.25 *5*, A_4=+0.04 *7* for the 1348.9γ+1350.9γ placed from the 2056 and 2058 levels, respectively. Iγ=1.0 *3* is determined from γγ for the 1350.9γ, and Iγ for the 1348.9γ is taken to be what remains. δ=−0.03 *5* or −5.7 *+17−38* for the doublet.

[i] The authors report Iγ=0.83 *3* and A_2=+0.05 *4*, A_4=+0.07 *7* for the 253.8γ from the 2057 level and an impurity line. Iγ shown is from γγ. Lin pol=+0.46 *6* for the

γ(^{152}Sm) (continued)

253.8γ and two impurity lines.

[j] The authors report Iγ=2.13 *7* and A_2=−0.19 *4*, A_4=+0.06 *6* and lin pol=+0.10 *14* for the 931.1γ and 931.9γ from the 3080 and 2057 levels, respectively. The Iγ values shown are from $\gamma\gamma$.

[k] The authors report Eγ=200.6 *1* with Iγ=1.6 *3* doubly placed from the 2080 and 2121 levels. The Iγ shown are from $\gamma\gamma$. A_2=+0.07 *3*, A_4=+0.01 *4*, lin pol=−0.4 *2* for the doublet.

[l] The authors report Iγ=1.49 *15* for the 174.1γ from the 2376 level and 173.8γ from the 2389 level. A_2=−0.04 *3*, A_4=+0.02 *5* and δ=+0.11 *5* are determined for the doublet. From Coulomb excitation, one has Iγ/Iγ(430γ+766γ+1250γ)=0.117 *11* for placement from the 2376 level, leaving Iγ=1.23 *16* for placement from the 2389 level.

[m] The authors report Eγ=187.6 *3* with Iγ=1.49 *15* doubly placed from the 2389 and 2577 levels. A_2=−0.12 *3*, A_4=+0.08 *5* for the doublet.

[n] The authors report Eγ=514.6 with Iγ=1.6 *16* doubly placed from the 1221 and 2842 levels. Iγ=1.0 and 0.5 are determined from $\gamma\gamma$ for these two placements, respectively.

[o] The authors report Eγ=160.8 *2* with Iγ=0.92 *9* doubly placed from the 1666 and 2752 levels. A_2=−0.40 *5*, A_4=−0.12 *9*, and δ=−0.14 *11* for the doublet.

[p] From $\gamma\gamma$.

[q] The authors report Eγ=1250.1 *2* with Iγ=1.49 *7* doubly placed from the 1372 and 2375 levels. From $\gamma\gamma$ the intensities for these two placements are 0.6 *2* and 0.9 *3*, respectively.

[r] The authors report Eγ=523.5 *2* with Iγ=1.65 *6* placed from the 1758 level. From Iγ/Iγ(671γ)=0.55 *3* in Adopted Gammas, one expects Iγ=0.62 *4*. This leaves Iγ=1.03 *7* unplaced. A_2=+0.41 *13* and A_4=+0.08 *17* for the multiplet.

[s] The authors report Eγ=963.9 *2* with Iγ=1.25 *5* doubly placed from the 963 and 1086 levels. From Iγ/Iγ(1086γ)=1.416 *4* from Adopted Gammas for the 1086 level, one deduces Iγ=0.81 *6* for placement from the 1086 and thus Iγ=0.44 *8* for placement from the 963 level. A_2=−0.19 *6* and A_4=+0.06 *10* for the doublet.

[t] Iγ=1.03 *4* in singles for Eγ=810.1 *2*. Iγ=0.4 from $\gamma\gamma$ is deduced for placement from the 810 level. This leaves Iγ=0.6 for additional placement(S) of this transition. The authors determine A_2=0.05 *10* and A_4=−0.26 *10* and also lin pol=−0.4 *3* for the multiplet.

[u] Iγ=0.47 *4* in singles for Eγ=444.4 *2*. From branching in Adopted Gammas, one gets Iγ=0.266 *17* and 0.08 *3* for placement from the 810 and 1529 levels, respectively. This leaves Iγ=0.12 *6* for a possible unplaced component. The authors give A_2=−0.23 *10* and A_4=−0.02 *15* for the multiplet.

[v] Iγ=1.59 *6* in singles for Eγ=271.3 *1*. Iγ=0.5 from $\gamma\gamma$ is deduced for placement from the 2201 level. This leaves Iγ=1.1 for additional placement(S) of this transition. A_2=+0.14 *3*, A_4=−0.06 *4* for the multiplet.

[w] From 2005Ga47. No uncertainty is given by the authors.

[x] From α(K)exp, $\gamma(\theta)$, and γ(linear pol). The α(K)exp are from relative Iγ and Ice(K) normalized to α(K)=0.00867 (E2 theory) for the 539.5γ, assigned as the 12^+ to 10^+ member of the g.s. rotational band. mult (539γ) is determined from $\gamma(\theta)$. This normalization results in E2 assignments for the 10^+ to 8^+ 483.9γ, the 8^+ to 6^+ 418.4γ, and the 6^+ to 4^+ 340.5γ in the g.s. rotational band. The mult=E2 character of these transitions is established by $\gamma(\theta)$ and γ(linear pol). In the absence of polarization data, mult=Q from large positive A_2 is assumed to be E2. For low−energy transitions mult=D+Q with large δ is assumed to be M1+E2.

[y] Multiply placed with undivided intensity.

[z] Multiply placed with intensity suitably divided.

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

[x] γ ray not placed in level scheme.

$^{152}_{62}$Sm$_{90}$-10

^{150}Nd(α,2nγ) 2005Ga47,1982Ko03

Level Scheme

Intensities: Relative I_γ

& Multiply placed: undivided intensity given

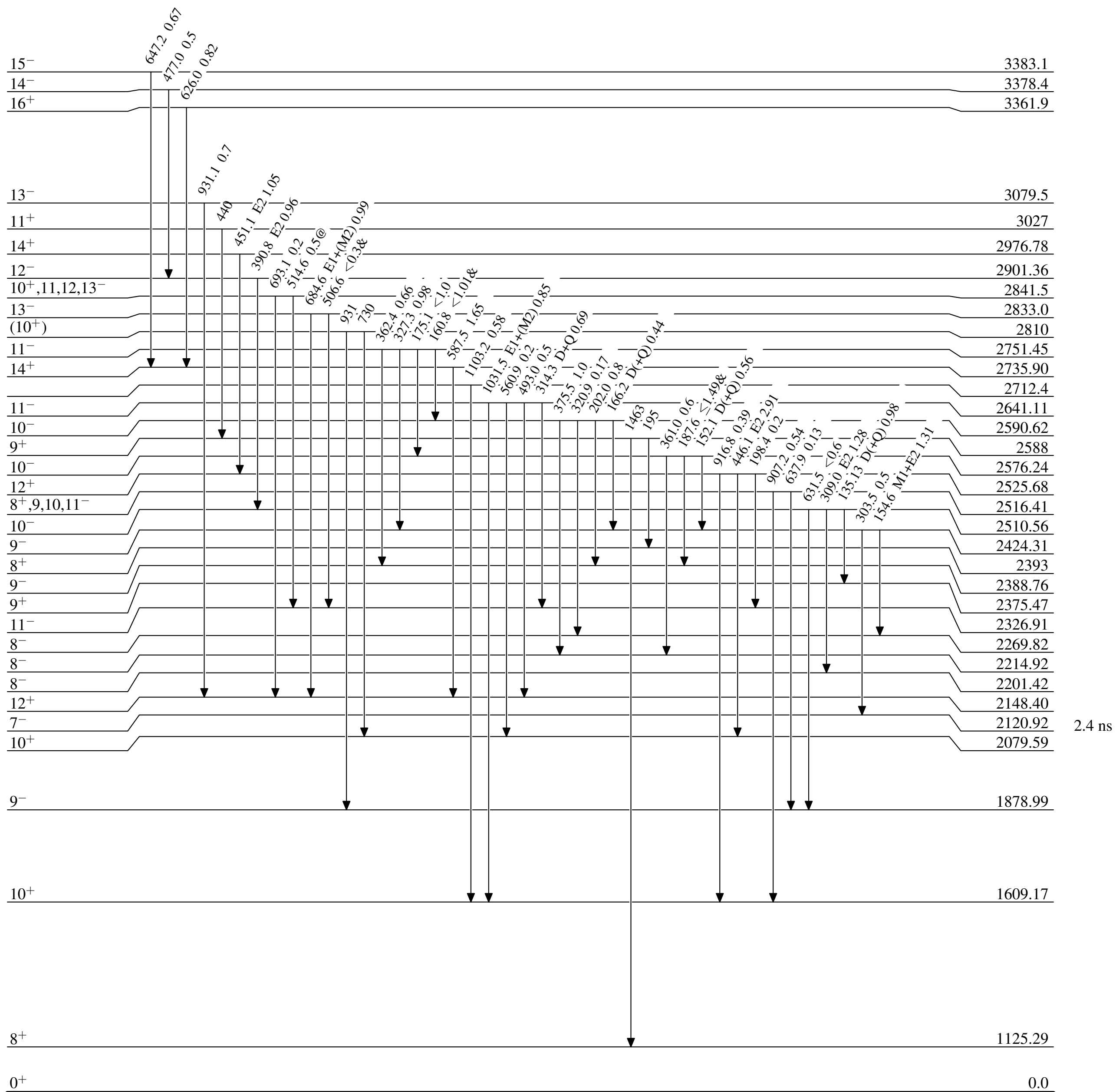
@ Multiply placed: intensity suitably divided

Legend

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

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

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



$^{152}_{62}Sm_{90}$

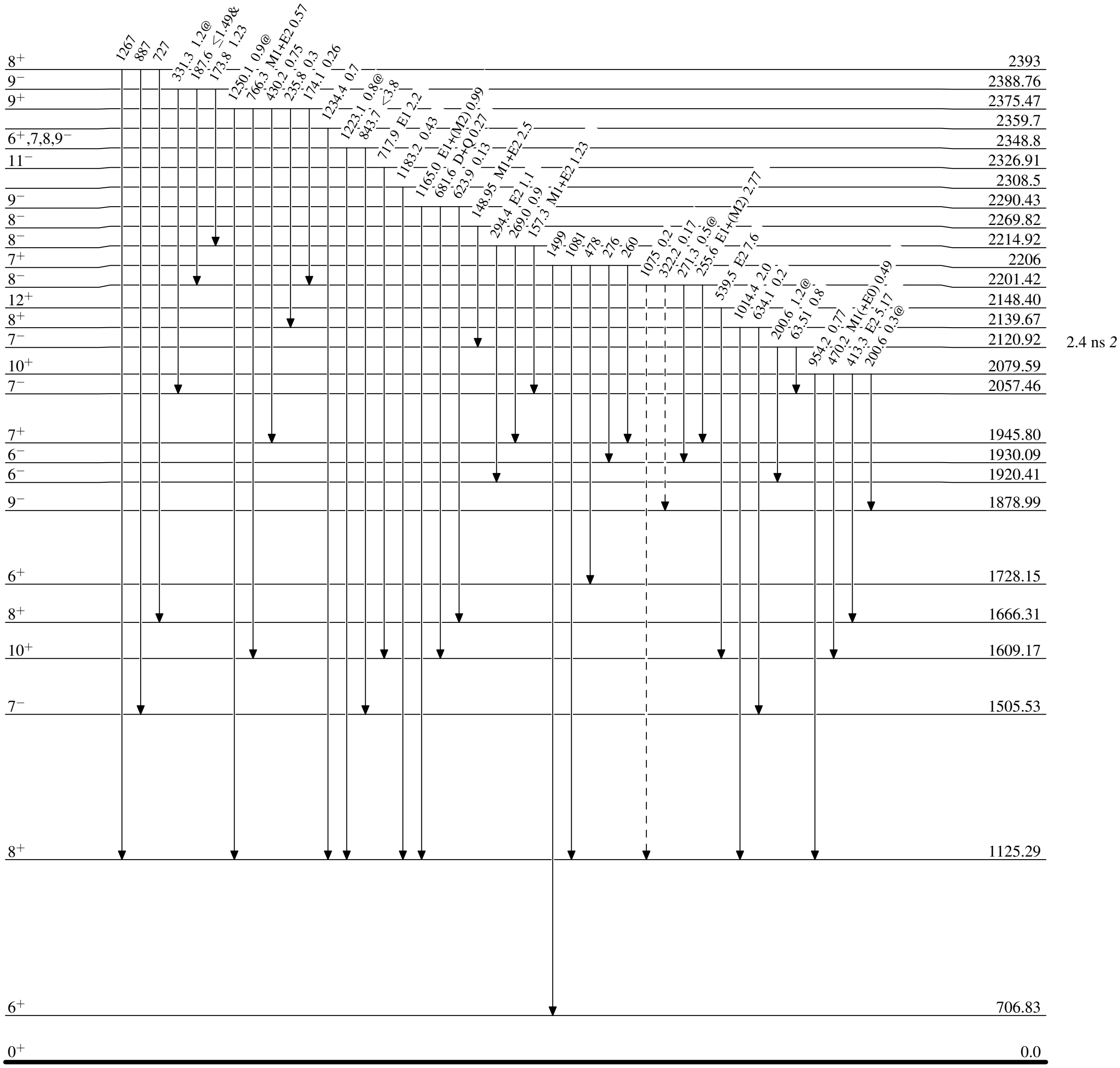
^{150}Nd(α,2nγ) 2005Ga47,1982Ko03

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)



$^{152}_{62}Sm_{90}$

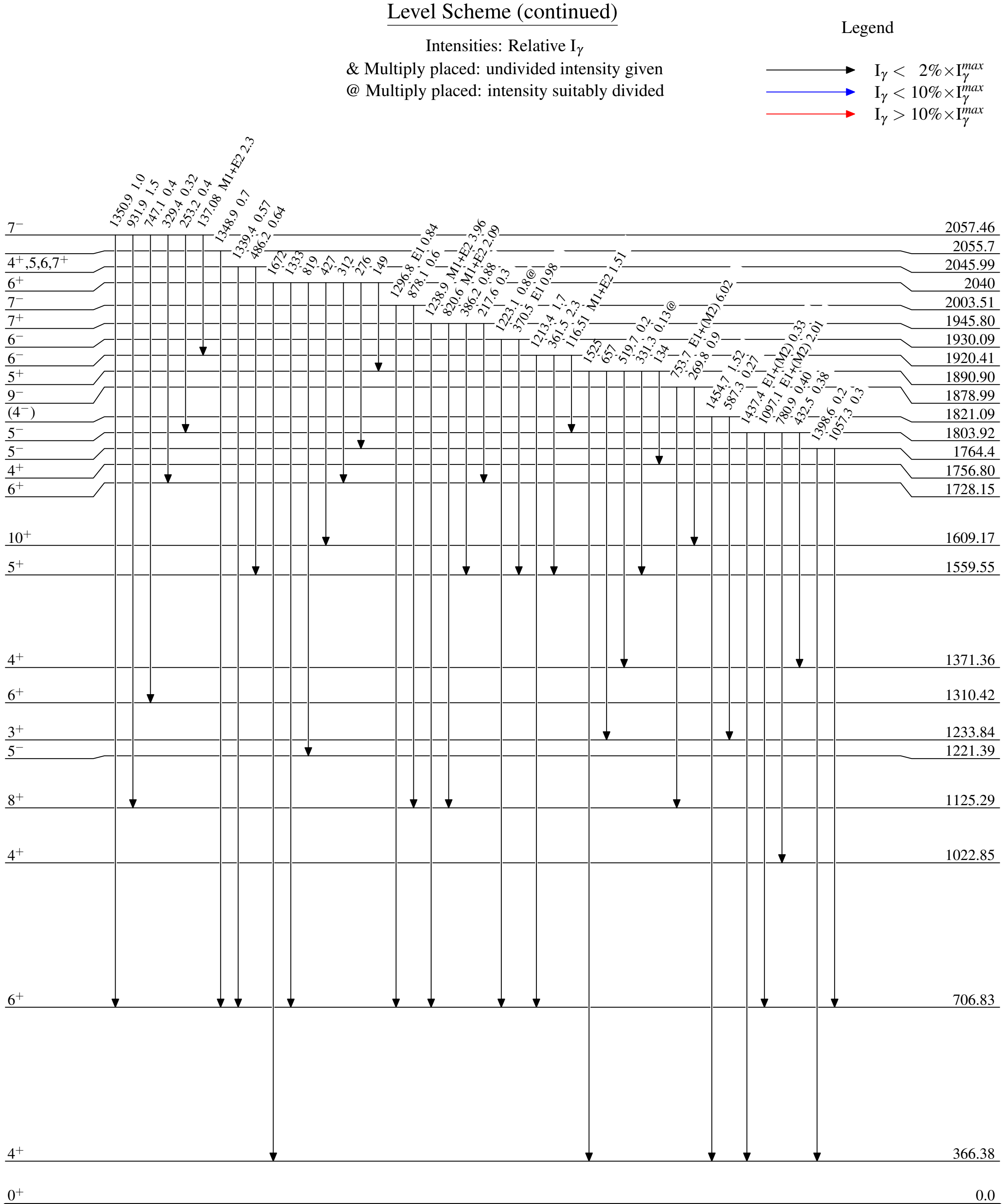
^{150}Nd(α,2nγ) 2005Ga47,1982Ko03

Level Scheme (continued)

Intensities: Relative I_γ

& Multiply placed: undivided intensity given

@ Multiply placed: intensity suitably divided



$^{152}_{62}Sm_{90}$

^{150}Nd(α,2nγ) 2005Ga47,1982Ko03

Level Scheme (continued)

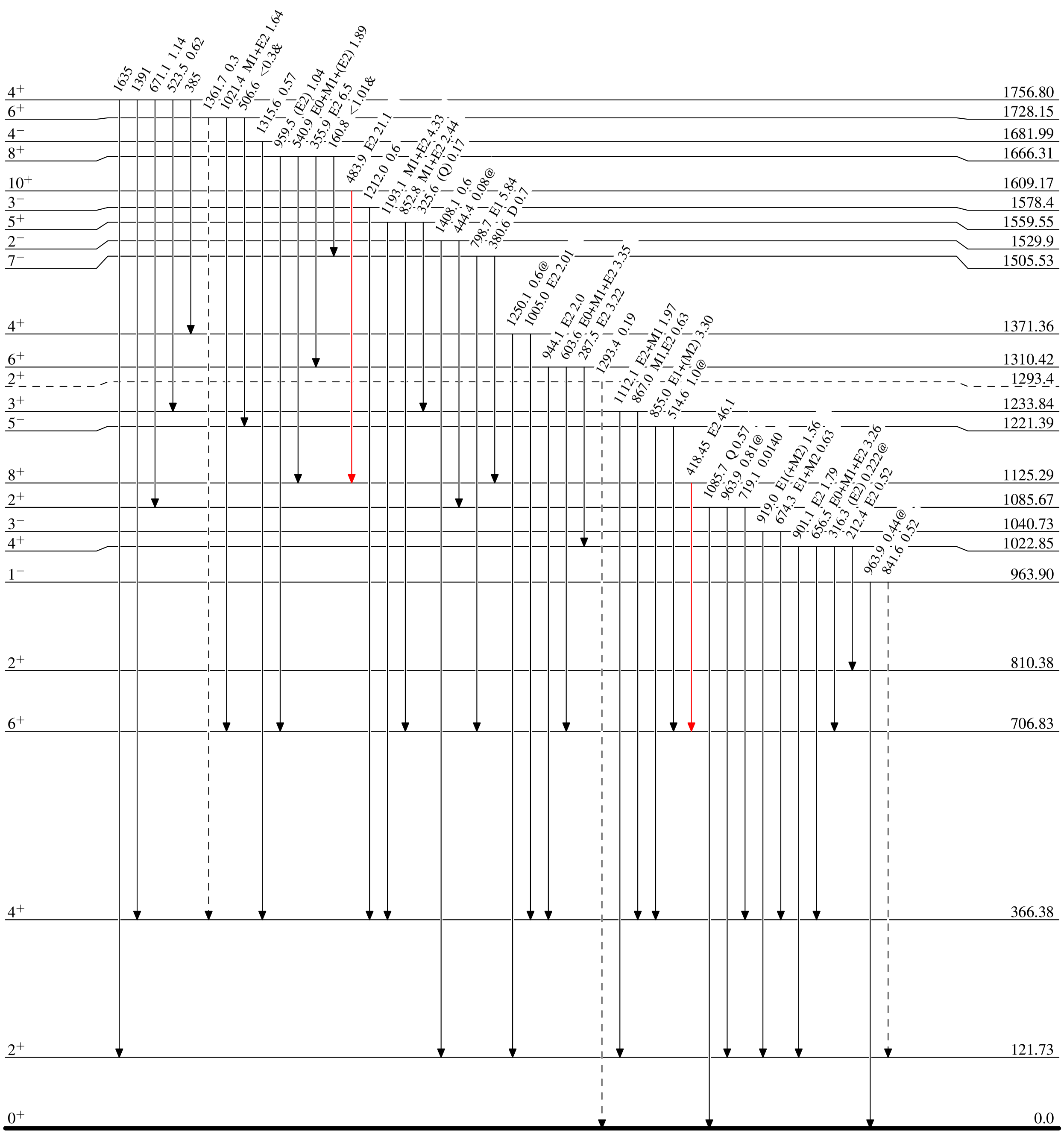
Intensities: Relative I_γ

& 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)

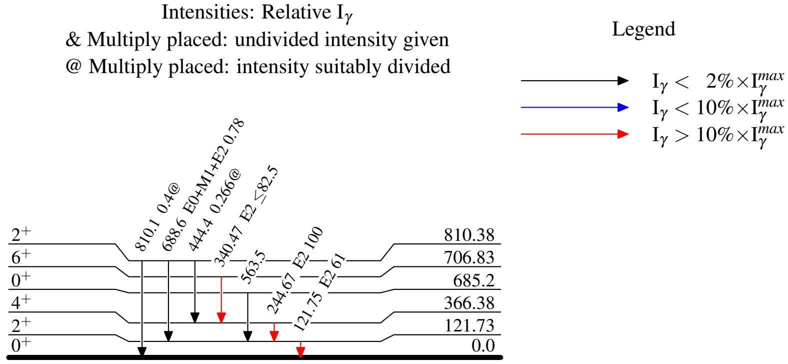


$^{152}_{62}Sm_{90}$

^{150}Nd(α,2nγ) 2005Ga47,1982Ko03

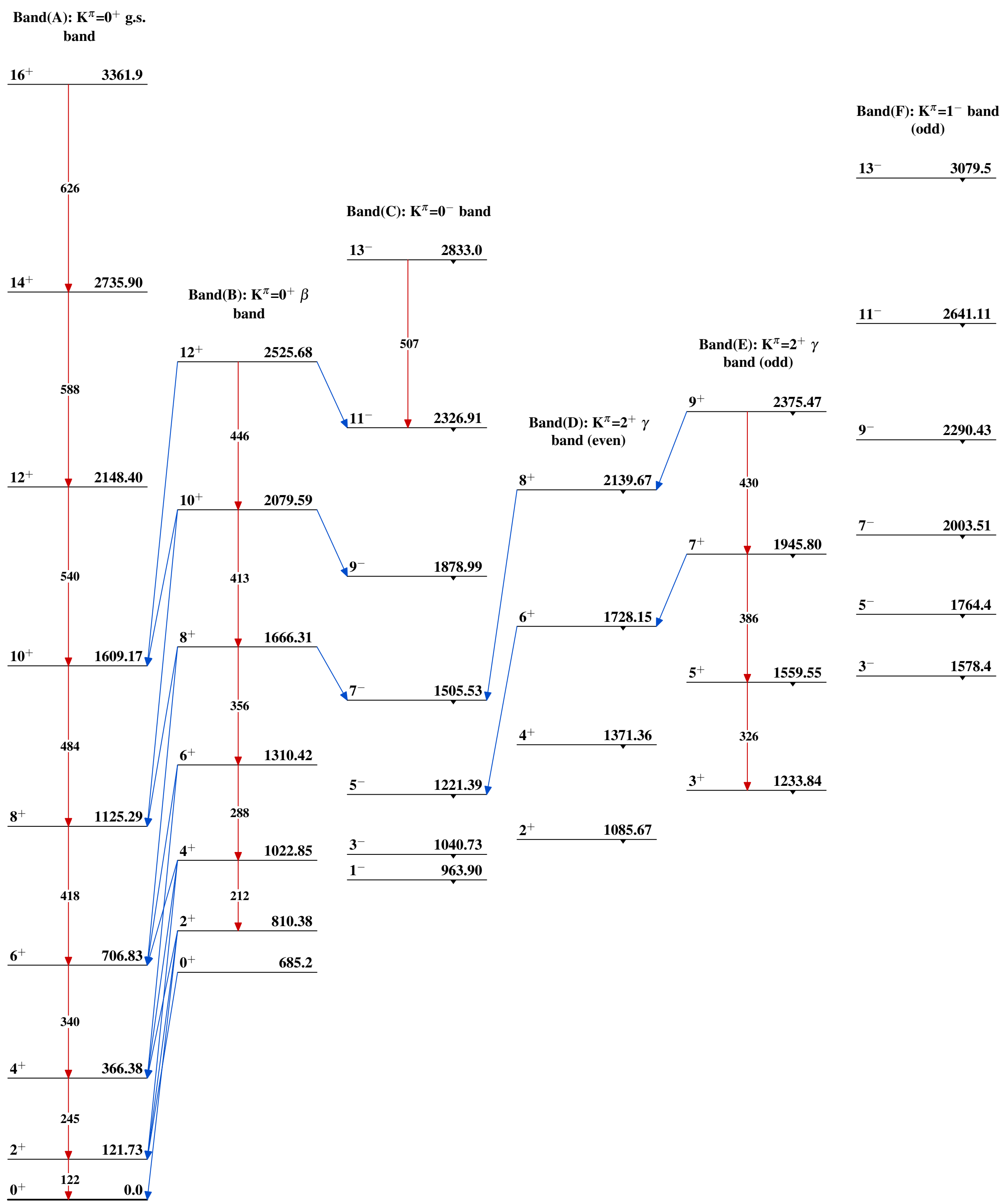
Level Scheme (continued)

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



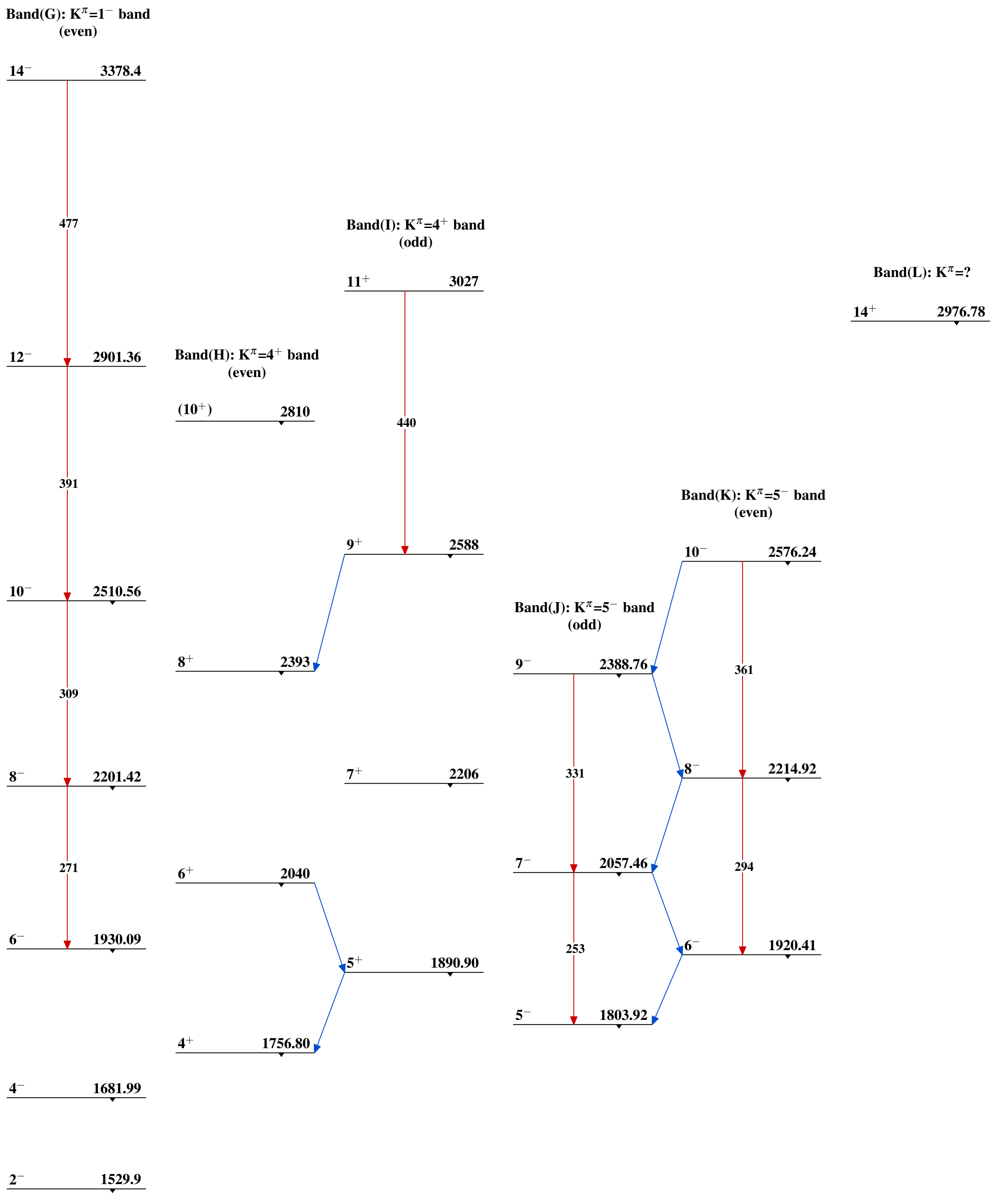
$^{152}_{62}Sm_{90}$

^{150}Nd(α,2nγ) 2005Ga47,1982Ko03



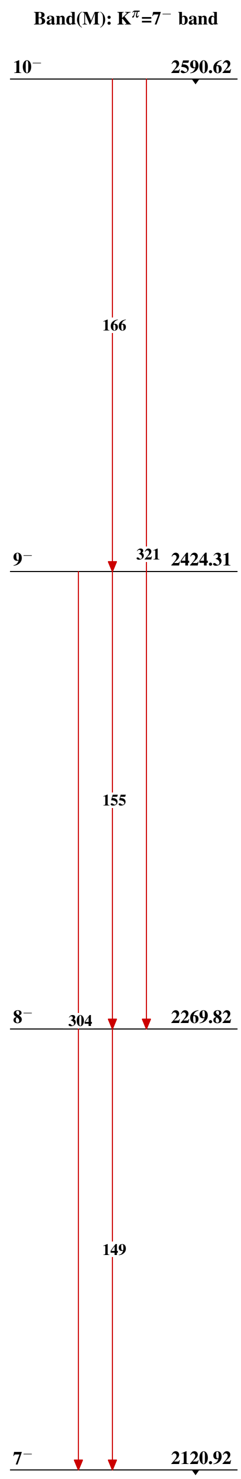
$^{152}_{62}Sm_{90}$

^{150}Nd(α,2nγ) 2005Ga47,1982Ko03 (continued)



$^{152}_{62}Sm_{90}$

^{150}Nd(α,2nγ) 2005Ga47,1982Ko03 (continued)



$^{152}_{62}Sm_{90}$