^{152}Pm β^- decay (7.52 min) 1977Ya07

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

Parent: ^{152}Pm: E=1.5×10^2 *9*; J^π=4$^-$; $T_{1/2}$=7.52 min *8*; Q(β^-)=3508 *26*; %β^- decay=100.0
Measured: γ, $\gamma\gamma$ (1977Ya07,1973WiYY,1972Wa04,1971Da19), β^- (1971Da19,1972Wa04), $\beta\gamma$ (1972Wa04).

^{152}Sm Levels

E(level)	J^π†	E(level)	J^π†	E(level)	J^π†	E(level)	J^π†
0.0	0$^+$	1085.77 *9*	2$^+$	1756.86 *17*	4$^+$	2481.9? *3*	3,4,5
121.84 *9*	2$^+$	1233.94 *12*	3$^+$	1763.5 *4*	5$^-$	2567.07 *20*	4$^+$,5
366.52 *11*	4$^+$	1310.13 *20*	6$^+$	1803.91 *12*	5$^-$	2588.62 *21*	4$^+$,5
706.87 *12*	6$^+$	1371.63 *13*	4$^+$	2003.61 *20*	2$^+$,3,4$^+$	2895.45 *15*	4$^+$
810.19 *12*	2$^+$	1559.6?	5$^+$	2044.33 *13*	3,4$^+$	2898.4 *4*	
1023.01 *13*	4$^+$	1579.31 *19*	3$^-$	2320.4 *3*	4$^+$,5		
1041.08 *13*	3$^-$	1729.96 *19*	3$^-$	2402.14 *17*	3,4$^+$		

† From Adopted Levels.

β^- radiations

E(decay)	E(level)	Iβ^-†‡	Log *ft*	Comments
(7.6×10^2 *9*)	2898.4	0.57 *13*	6.15 *23*	av Eβ=246 *36*
(7.6×10^2 *9*)	2895.45	1.06 *17*	5.89 *22*	av Eβ=248 *36*
(1.07×10^3 *9*)	2588.62	0.46 *13*	6.78 *19*	av Eβ=368 *39*
(1.09×10^3 *9*)	2567.07	0.92 *15*	6.51 *16*	av Eβ=377 *39*
(1.18×10^3 *9*)	2481.9?	0.77 *13*	6.71 *16*	av Eβ=412 *39*
(1.26×10^3 *9*)	2402.14	0.77 *14*	6.81 *15*	av Eβ=445 *40*
(1.34×10^3 *9*)	2320.4	1.29 *16*	6.69 *13*	av Eβ=479 *40*
(1.61×10^3 *9*)	2044.33	8.1 *8*	6.21 *11*	av Eβ=597 *41*
(1.65×10^3 *9*)	2003.61	<0.4	>7.6	av Eβ=615 *41*
1850 *90*	1803.91	57 *5*	5.59 *10*	av Eβ=702 *42* E(decay): weighted average of 1950 *150* (1972Wa04) and 1800 *100* (1971Da19).
(1.89×10^3 *9*)	1763.5	0.57 *15*	7.63 *15*	av Eβ=720 *42*
(1.93×10^3 *9*)	1729.96	0.66 *12*	7.60 *12*	av Eβ=735 *42*
(2.08×10^3 *9*)	1579.31	1.35 *15*	7.42 *10*	av Eβ=802 *42*
(2.10×10^3 *9*)	1559.6?	<1.1	>7.5	av Eβ=810 *42*
(2.29×10^3 *9*)	1371.63	2.0 *3*	7.41 *10*	av Eβ=894 *43*
(2.35×10^3 *9*)	1310.13	0.44 *15*	9.30^{1u} *19*	av Eβ=911 *42*
(2.42×10^3 *9*)	1233.94	0.7 *5*	8.0 *4*	av Eβ=956 *43*
(2.57×10^3 *9*)	1085.77	1.7 *3*	8.95^{1u} *13*	av Eβ=1009 *42*
(2.62×10^3 *9*)	1041.08	1.61 *21*	7.74 *9*	av Eβ=1044 *43*
(2.63×10^3 *9*)	1023.01	<0.9	>8.0	av Eβ=1052 *43*
(2.85×10^3 *9*)	810.19	0.7 *4*	9.5^{1u} *3*	av Eβ=1132 *42*
(2.95×10^3 *9*)	706.87	<5	>8.8^{1u}	av Eβ=1178 *42*
(3.29×10^3 *9*)	366.52	19 *6*	7.08 *15*	av Eβ=1352 *43*

† From intensity balance in level scheme.
‡ Absolute intensity per 100 decays.

$\gamma(^{152}Sm)$

Iγ normalization: ΣI(γ+ce)(g.s.)=100.

E_γ	I_γ[@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	α[&]	Comments
121.8 *1*	157 *11*	121.84	2^+	0.0	0^+	E2	1.155	α(K)=0.678 *10*; α(L)=0.370 *6*; α(M)=0.0853 *13*; α(N+..)=0.0212 *3* α(N)=0.0187 *3*; α(O)=0.00239 *4*; α(P)=3.00×10^{-5} *5*
244.7 *1*	272 *14*	366.52	4^+	121.84	2^+	E2	0.1073	α(K)=0.0808 *12*; α(L)=0.0207 *3*; α(M)=0.00465 *7*; α(N+..)=0.001176 *17* α(N)=0.001032 *15*; α(O)=0.0001394 *20*; α(P)=4.18×10^{-6} *6*
340.4 *1*	109 *7*	706.87	6^+	366.52	4^+	E2	0.0382	α(K)=0.0303 *5*; α(L)=0.00622 *9*; α(M)=0.001380 *20*; α(N+..)=0.000352 *5* α(N)=0.000308 *5*; α(O)=4.28×10^{-5} *6*; α(P)=1.660×10^{-6} *24*
432.1 *2*	5.7 *4*	1803.91	5^-	1371.63	4^+			
443.6 *3*	3.1 *3*	810.19	2^+	366.52	4^+	E2	0.01772	α(K)=0.01444 *21*; α(L)=0.00260 *4*; α(M)=0.000571 *8*; α(N+..)=0.0001467 *21* α(N)=0.0001278 *18*; α(O)=1.81×10^{-5} *3*; α(P)=8.21×10^{-7} *12*
493.3 *2*	1.3 *3*	2895.45	4^+	2402.14	$3,4^+$			
[x]499.9 *3*	0.5 *3*							E_γ: Placed by 1977Ya07 from the 1310 level; however, this transition is not reported in (α,2nγ), (n,n′γ) or Coulomb excitation the spin change rules out such a transition.
516.3 *4*	3.0 *3*	2320.4	$4^+,5$	1803.91	5^-			
522.9 *2*	1.3 *3*	1756.86	4^+	1233.94	3^+			
584.8 *2*	1.3 *4*	2588.62	$4^+,5$	2003.61	$2^+,3,4^+$			
603.3 *2*	0.8 *3*	1310.13	6^+	706.87	6^+	E2+M1+E0	0.032 *4*	δ: δ(E2/M1)=+1.6 *3* (adopted gammas).
643.6 *4*	0.6 *2*	1729.96	3^-	1085.77	2^+			
645.7 *3*	3.3 *3*	2402.14	$3,4^+$	1756.86	4^+			
656.2 *3*	12.3 *7*	1023.01	4^+	366.52	4^+	E2+M1+E0	0.0568 *20*	
671.4 *3*	3.4 *6*	1756.86	4^+	1085.77	2^+			
674.1 *4*	1.8 *3*	1041.08	3^-	366.52	4^+	E1	0.00225 *4*	α=0.00225 *4*; α(K)=0.00193 *3*; α(L)=0.000252 *4*; α(M)=5.37×10^{-5} *8*; α(N+..)=1.405×10^{-5} *20* α(N)=1.213×10^{-5} *17*; α(O)=1.81×10^{-6} *3*; α(P)=1.108×10^{-7} *16*
688.3 *2*	7.9 *5*	810.19	2^+	121.84	2^+	E2+M1+E0	0.0434 *13*	
725.0 *2*	2.7 *4*	2481.9?	3,4,5	1756.86	4^+			
[x]746.3 *2*	0.8 *3*							
762.2 *3*	0.7 *3*	1803.91	5^-	1041.08	3^-			
780.8 *1*	14.7 *9*	1803.91	5^-	1023.01	4^+			
810.2[b] *2*	3.2[b] *5*	810.19	2^+	0.0	0^+	E2	0.00393 *6*	α=0.00393 *6*; α(K)=0.00331 *5*; α(L)=0.000488 *7*; α(M)=0.0001051 *15*; α(N+..)=2.74×10^{-5} *4* α(N)=2.37×10^{-5} *4*; α(O)=3.49×10^{-6} *5*; α(P)=1.96×10^{-7} *3*
810.2[b] *2*	14.8[b] *10*	2044.33	$3,4^+$	1233.94	3^+			
854.1 *3*	2.0 *4*	2898.4		2044.33	$3,4^+$			

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

E_γ	I_γ[@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	δ[†]	α[&]	Comments
867.2 *2*	4.3 *4*	1233.94	3^+	366.52	4^+	E2+M1	−6.5 *3*	0.00343 *5*	α=0.00343 *5*; α(K)=0.00290 *4*; α(L)=0.000419 *6*; α(M)=9.01×10^{-5} *13*; α(N+..)=2.35×10^{-5} *4* α(N)=2.03×10^{-5} *3*; α(O)=3.00×10^{-6} *5*; α(P)=1.720×10^{-7} *25*
901.1 *2*	6.3 *5*	1023.01	4^+	121.84	2^+	E2		0.00311 *5*	α=0.00311 *5*; α(K)=0.00263 *4*; α(L)=0.000378 *6*; α(M)=8.13×10^{-5} *12*; α(N+..)=2.12×10^{-5} *3* α(N)=1.84×10^{-5} *3*; α(O)=2.71×10^{-6} *4*; α(P)=1.559×10^{-7} *22*
919.2 *1*	4.5 *4*	1041.08	3^-	121.84	2^+	E1		0.001210 *17*	α=0.001210 *17*; α(K)=0.001040 *15*; α(L)=0.0001341 *19*; α(M)=2.85×10^{-5} *4*; α(N+..)=7.47×10^{-6} α(N)=6.45×10^{-6} *9*; α(O)=9.64×10^{-7} *14*; α(P)=6.01×10^{-8} *9*
[x]932.0 *3*	1.0 *3*								
943.5 *3*	0.7 *4*	1310.13	6^+	366.52	4^+	E2		0.00281 *4*	α=0.00281 *4*; α(K)=0.00238 *4*; α(L)=0.000340 *5*; α(M)=7.30×10^{-5} *11*; α(N+..)=1.91×10^{-5} *3* α(N)=1.648×10^{-5} *24*; α(O)=2.44×10^{-6} *4*; α(P)=1.414×10^{-7} *20*
964.2 *4*	5.9 *5*	1085.77	2^+	121.84	2^+	M1+E2	−9.3 *6*	0.00270 *4*	α(K)=0.00229 *4*; α(L)=0.000325 *5*
1005.1 *1*	10.1 *6*	1371.63	4^+	366.52	4^+	E2+M1	−3.1 *+3−2*	0.00259 *5*	α=0.00259 *5*; α(K)=0.00220 *4*; α(L)=0.000308 *6*; α(M)=6.60×10^{-5} *11*; α(N+..)=1.73×10^{-5} *3* α(N)=1.493×10^{-5} *25*; α(O)=2.22×10^{-6} *4*; α(P)=1.317×10^{-7} *24*
1021.4 *2*	4.1 *4*	2044.33	$3,4^+$	1023.01	4^+				
1056.6 *3*	2.0 *5*	1763.5	5^-	706.87	6^+				
1085.8 *1*	4.4 *4*	1085.77	2^+	0.0	0^+	E2		0.00209 *3*	α=0.00209 *3*; α(K)=0.001779 *25*; α(L)=0.000247 *4*; α(M)=5.30×10^{-5} *8*; α(N+..)=1.387×10^{-5} *20* α(N)=1.199×10^{-5} *17*; α(O)=1.780×10^{-6} *25*; α(P)=1.059×10^{-7} *15*
1097.1 *1*	100 *5*	1803.91	5^-	706.87	6^+	E1		0.000869 *13*	α=0.000869 *13*; α(K)=0.000747 *11*; α(L)=9.57×10^{-5} *14*; α(M)=2.03×10^{-5} *3*; α(N+..)=5.33×10^{-6} *8* α(N)=4.60×10^{-6} *7*; α(O)=6.89×10^{-7} *10*; α(P)=4.33×10^{-8} *6* δ: δ(M2/E1)=−0.03 *8* (Adopted Gammas).
1112.1 *1*	14.1 *9*	1233.94	3^+	121.84	2^+	E2+M1	−8.7 *6*	0.00201 *3*	α=0.00201 *3*; α(K)=0.001707 *24*; α(L)=0.000236 *4*; α(M)=5.06×10^{-5} *8*; α(N+..)=1.375×10^{-5} *20* α(N)=1.144×10^{-5} *16*; α(O)=1.701×10^{-6} *24*; α(P)=1.016×10^{-7} *15*; α(IPF)=5.03×10^{-7} *8*
1193.2[a#c] *2*	<3.6[a#]	1559.6?	5^+	366.52	4^+	E2+M1	−4.0 *8*	0.00178 *4*	α=0.00178 *4*; α(K)=0.00152 *4*; α(L)=0.000207 *4*; α(M)=4.43×10^{-5} *9*; α(N+..)=1.66×10^{-5} *3* α(N)=1.002×10^{-5} *20*; α(O)=1.49×10^{-6} *3*; α(P)=9.05×10^{-8} *20*; α(IPF)=5.02×10^{-6} *8*
1193.2[a#] *2*	<3.3[a#]	2003.61	$2^+,3,4^+$	810.19	2^+				
1212.9 *2*	3.5 *3*	1579.31	3^-	366.52	4^+	E1		0.000756 *11*	α=0.000756 *11*; α(K)=0.000624 *9*; α(L)=7.96×10^{-5} *12*; α(M)=1.689×10^{-5} *24*; α(N+..)=3.61×10^{-5} *6*

$^{152}_{62}Sm_{90}$-3

^{152}Pm β^- decay (7.52 min) 1977Ya07 (continued)

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

E_γ	I_γ[@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	α[&]	Comments
								α(N)=3.82×10^{-6} *6*; α(O)=5.74×10^{-7} *8*; α(P)=3.62×10^{-8} *5*; α(IPF)=3.16×10^{-5} *5*
1217.7 *4*	‡	2588.62	4$^+$,5	1371.63	4$^+$			
1234.2 *1*	10.0 *7*	2044.33	3,4$^+$	810.19	2$^+$			
1250.0 *2*	2.8 *3*	1371.63	4$^+$	121.84	2$^+$	E2	0.001586 *23*	α=0.001586 *23*; α(K)=0.001341 *19*; α(L)=0.000183 *3*; α(M)=3.91×10^{-5} *6*; α(N+..)=2.25×10^{-5} *4* α(N)=8.84×10^{-6} *13*; α(O)=1.318×10^{-6} *19*; α(P)=7.99×10^{-8} *12*; α(IPF)=1.223×10^{-5} *18*
1297.8 *5*	0.2 *2*	2320.4	4$^+$,5	1023.01	4$^+$			
1363.6 *2*	1.4 *3*	1729.96	3$^-$	366.52	4$^+$	(E1)		
1390.6 *4*	0.7 *1*	1756.86	4$^+$	366.52	4$^+$			
1437.5 *1*	79 *4*	1803.91	5$^-$	366.52	4$^+$	E1	0.000702 *10*	α=0.000702 *10*; α(K)=0.000464 *7*; α(L)=5.89×10^{-5} *9*; α(M)=1.249×10^{-5} *18*; α(N+..)=0.0001665 α(N)=2.83×10^{-6} *4*; α(O)=4.25×10^{-7} *6*; α(P)=2.70×10^{-8} *4*; α(IPF)=0.0001632 *23* δ: δ(M2/E1)=−0.07 *11* (Adopted Gammas).
1457.2 *3*	1.2 *2*	1579.31	3$^-$	121.84	2$^+$	E1	0.000703 *10*	α=0.000703 *10*; α(K)=0.000453 *7*; α(L)=5.75×10^{-5} *8*; α(M)=1.220×10^{-5} *17*; α(N+..)=0.000180 *3* α(N)=2.76×10^{-6} *4*; α(O)=4.15×10^{-7} *6*; α(P)=2.64×10^{-8} *4*; α(IPF)=0.0001772 *25* δ: δ(M2/E1)=0.00 *3* (Adopted Gammas).
[x]1515.5 *3*	0.4 *2*							
1524.5 *4*	0.2 *1*	2895.45	4$^+$	1371.63	4$^+$			
[x]1572.0 *3*	0.4 *1*							
1591.6 *3*	0.4 *1*	2402.14	3,4$^+$	810.19	2$^+$			
1608.0 *4*	0.3 *1*	1729.96	3$^-$	121.84	2$^+$	E1	0.000735 *11*	α=0.000735 *11*; α(K)=0.000384 *6*; α(L)=4.86×10^{-5} *7*; α(M)=1.030×10^{-5} *15*; α(N+..)=0.000292 *4* α(N)=2.33×10^{-6} *4*; α(O)=3.51×10^{-7} *5*; α(P)=2.23×10^{-8} *4*; α(IPF)=0.000289 *4*
1613.4 *6*	0.4 *1*	2320.4	4$^+$,5	706.87	6$^+$			
1677.6 *2*	1.4 *4*	2044.33	3,4$^+$	366.52	4$^+$			
1810.5 *4*	0.5 *3*	2895.45	4$^+$	1085.77	2$^+$			
1859.8 *3*	0.8 *2*	2567.07	4$^+$,5	706.87	6$^+$			
1881.8 *3*	0.3 *1*	2588.62	4$^+$,5	706.87	6$^+$			
1953.7 *4*	0.9 *2*	2320.4	4$^+$,5	366.52	4$^+$			
[x]2004.8 *2*	0.8 *2*							
[x]2064.7 *3*	0.2 *1*							
2188.6 *2*	0.7 *2*	2895.45	4$^+$	706.87	6$^+$			
2200.7 *2*	2.4 *4*	2567.07	4$^+$,5	366.52	4$^+$			
2280.2 *3*	0.3 *1*	2402.14	3,4$^+$	121.84	2$^+$			
[x]2283.0 *2*	0.7 *2*							
[x]2491.3 *3*	0.3 *1*							
[x]2511.9 *3*	0.8 *2*							
2528.5 *2*	1.0 *2*	2895.45	4$^+$	366.52	4$^+$			

$^{152}_{62}Sm_{90}$-4

^{152}Pm β^- decay (7.52 min) 1977Ya07 (continued)

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

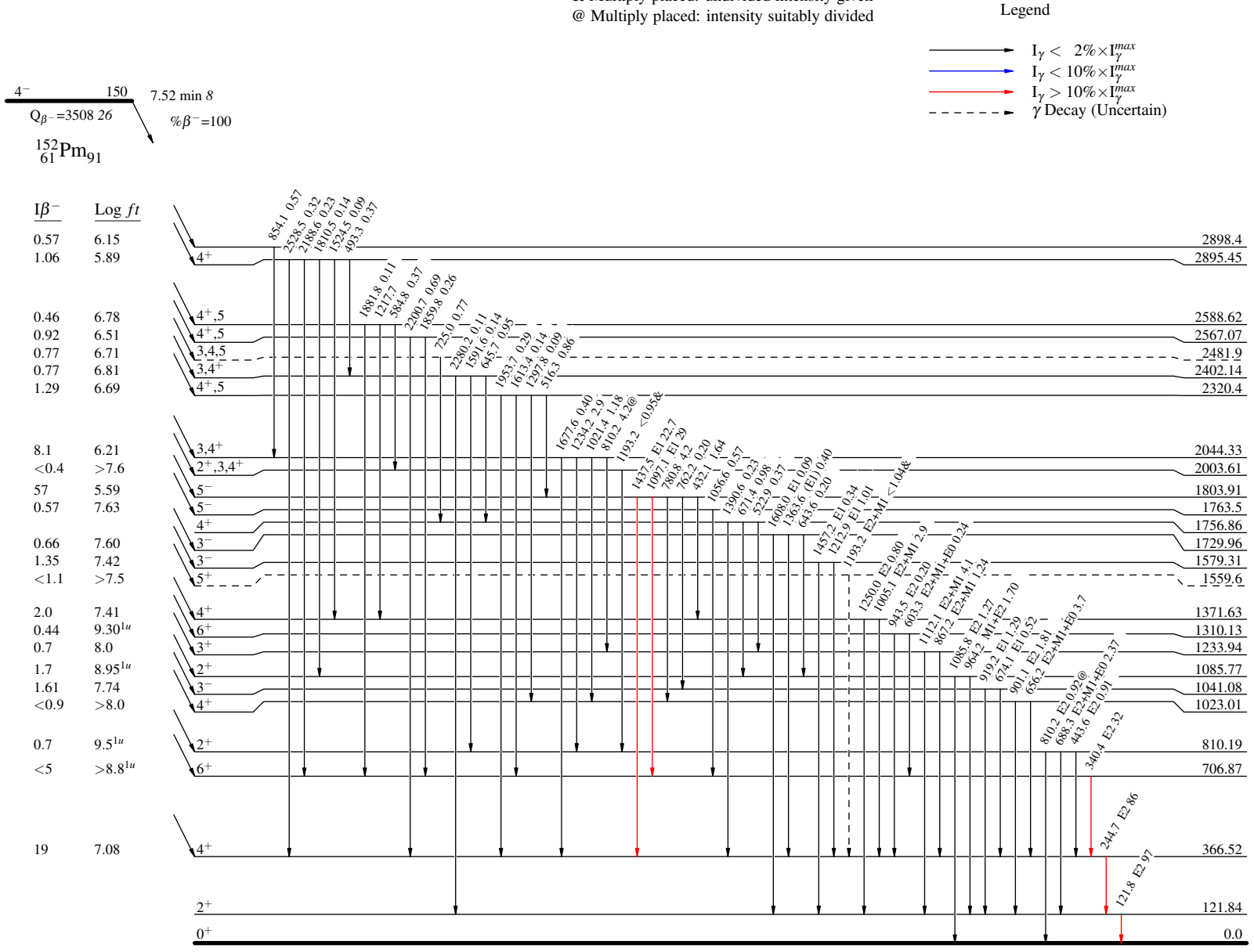
† From adopted gammas.
‡ Weak.
# 1977Ya07 report Eγ=1193.2 *2* with Iγ=3.3 *3* which, on the basis of $\gamma\gamma$, they place from a level at 2003. In (α,2nγ) and (n,n$'\gamma$) an 1193γ is placed deexciting the adopted 1559.6 *5*+ level. IT is possible that the 1193γ in Pm decay is a doublet and that the 1559.6 level is being populated in that decay.
@ For absolute intensity per 100 decays, multiply by 0.287 *21*.
& 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.
[x] γ ray not placed in level scheme.

$^{152}_{62}Sm_{90}$-5

^{152}Pm β^- decay (7.52 min) 1977Ya07

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided



$^{152}_{62}Sm_{90}$-6