^{148}Pm β^- decay (5.368 d) 1977Ka14

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

Parent: ^{148}Pm: E=0.0; $J^\pi=1^-$; $T_{1/2}$=5.368 d *7*; Q(β^-)=2471 *6*; %β^- decay=100.0

Measured: γ (1984LaZZ,1977Ka14,1971Mo04,1971Ca23,1963Ba31), $\gamma\gamma$ (1984LaZZ,1977Ka14,1963Ba31,1962Sc04,1962Re04,1959Bh95), $\gamma\gamma(\theta)$ (1977Ka14,1968Wy02,1964Ha17,1963Ba31,1962Re03,1962Sc04), $\beta\gamma$ (1963Ba31,1962Sc04,1962Re03,1961El02,1959Bh95), ce (1963Ba31), analysis of non-unique β^- spectra (1983Ro06).

Decay scheme is that of 1977Ka14.

Observed β groups: 2480 *30* (50%), 1930 *30* (10%), 1020 *30* (40%) (1963Ba31), see also 1962Sc04, 1962Re03, 1930$\beta^-\gamma(\theta)$ (1971Sh08,1970Gr09,1968Wy02,1968Am03,1967Na03,1963Ba31), 2480β shape factor (1972AmZX,1963Ba06).

^{148}Sm Levels

E(level)†	J^π‡	Comments
0.0	0^+	
550.274 *17*	2^+	J=2 (1977Ka14).
1161.537 *24*	3^-	J=3 (1963Ba31).
1424.46 *4*	0^+	J=0 (1977Ka14).
1454.217 *23*	2^+	J=2, most probably (1977Ka14).
1465.129 *19*	1^-	J=1 or 3; J=3 ruled out by γ to 0^+ (1977Ka14).
1664.160 *21*	2^+	J=2, strongly preferred (1977Ka14).
1921.58 *20*	0^+	
2057.961 *22*	2^-	J=2 (1977Ka14).
2284.405 *21*	$(1,2^+)$	J=1, most probably (1977Ka14).
2314.01 *15*	2^+	J=2 (1977Ka14).

† From a least-squares fit to Eγ data.

‡ Adopted values; supporting assignments from this data set are given in comments.

β^- radiations

E(decay)	E(level)	Iβ^-†‡	Log *ft*	Comments
(157 *6*)	2314.01	0.0091 *15*	8.71 *9*	av Eβ=42.1 *18*
(187 *6*)	2284.405	0.096 *4*	7.92 *5*	av Eβ=50.7 *18*
(413 *6*)	2057.961	1.36 *4*	7.885 *25*	av Eβ=121.9 *21*
(549 *6*)	1921.58	0.0138 *14*	10.29 *5*	av Eβ=169.0 *22*
(807 *6*)	1664.160	0.018 *4*	10.76 *10*	av Eβ=264.4 *23*
1020 *30*	1465.129	33.4 *8*	7.834 *14*	av Eβ=342.7 *24*
(1017 *6*)	1454.217	0.093 *4*	10.406 *21*	av Eβ=347.1 *25*
(1047 *6*)	1424.46	0.236 *9*	10.048 *19*	av Eβ=359.1 *25*
1930 *30*	550.274	9.4 *3*	9.450 *15*	av Eβ=731.6 *27*
2480 *30*	0.0	55.5 *11*	9.117 *10*	av Eβ=977.7 *28*

† From I(γ+ce) imbalance at each level.

‡ Absolute intensity per 100 decays.

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$\gamma(^{148}Sm)$

Iγ normalization: from the measurement of the emission probability of the 1465g=22.2% 5 (1971Ca23) using β^-, γ and $4\pi\beta\gamma$ coin counting.

α(K)exp were normalized to α(K)(550γ)=0.00825 (1963Ba31), and to α(K)(630γ)=0.0060 (1970GrYP), assuming both gammas to be E2.

E_γ[‡]	I_γ[#b]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	δ[&]	α[†]	Comments
303.59 *3*	1.7 *2*	1465.129	1^-	1161.537	3^-				
362.8[c] *2*	<0.1	2284.405	$(1,2^+)$	1921.58	0^+				
393.80 *3*	0.7 *1*	2057.961	2^-	1664.160	2^+				
550.27 *3*	991 *7*	550.274	2^+	0.0	0^+	E2[a]		0.00998 *14*	α=0.00998 *14*; α(K)=0.00825 *12*; α(L)=0.001360 *19*; α(M)=0.000296 *5*; α(N+..)=7.67×10^{-5} *11* α(N)=6.66×10^{-5} *10*; α(O)=9.59×10^{-6} *14*; α(P)=4.78×10^{-7} *7* α(K)exp=7.9×10^{-3} *6* (1970GrYP).
592.83 *3*	15.9 *3*	2057.961	2^-	1465.129	1^-	M1+E2		0.011 *3*	α(K)=0.009 *3*; α(L)=0.0014 *3*; α(M)=0.00029 *6*; α(N+..)=7.7×10^{-5} *15* α(N)=6.6×10^{-5} *13*; α(O)=9.8×10^{-6} *21*; α(P)=5.7×10^{-7} *18* δ: +11 *+11−4* or −0.20 *5* (1977Ka14).
611.26 *3*	46.0 *5*	1161.537	3^-	550.274	2^+	E1[a]		0.00277 *4*	α=0.00277 *4*; α(K)=0.00237 *4*; α(L)=0.000312 *5*; α(M)=6.63×10^{-5} *10*; α(N+..)=1.735×10^{-5} *25* α(N)=1.499×10^{-5} *21*; α(O)=2.23×10^{-6} *4*; α(P)=1.358×10^{-7} *19* α(K)exp=2.5×10^{-3} *8* (1970GrYP). δ: +0.026 *13* (1977Ka14); δ≤0.18 from≤3%, M2 mixing (1970GrYP).
819.27 *3*	0.6 *1*	2284.405	$(1,2^+)$	1465.129	1^-				
874.18 *3*	10.6 *3*	1424.46	0^+	550.274	2^+	E2		0.00332 *5*	α=0.00332 *5*; α(K)=0.00280 *4*; α(L)=0.000406 *6*; α(M)=8.74×10^{-5} *13*; α(N+..)=2.28×10^{-5} *4* α(N)=1.97×10^{-5} *3*; α(O)=2.91×10^{-6} *4*; α(P)=1.663×10^{-7} *24*
896.42 *3*	44.2 *4*	2057.961	2^-	1161.537	3^-	M1+E2	+1.32 *9*	0.00386 *9*	α=0.00386 *9*; α(K)=0.00328 *8*; α(L)=0.000456 *10*; α(M)=9.77×10^{-5} *20*; α(N+..)=2.56×10^{-5} *6* α(N)=2.21×10^{-5} *5*; α(O)=3.29×10^{-6} *7*; α(P)=1.99×10^{-7} *5* δ: from 1977Ka14.
903.94 *3*	1.9 *1*	1454.217	2^+	550.274	2^+	M1+E2	+2.32 *10*	0.00339 *6*	α=0.00339 *6*; α(K)=0.00287 *5*;

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

E_γ[‡]	I_γ[#b]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	δ[&]	α[†]	Comments
									α(L)=0.000406 *7*; α(M)=8.72×10^{-5} *14*; α(N+..)=2.28×10^{-5} *4* α(N)=1.97×10^{-5} *3*; α(O)=2.92×10^{-6} *5*; α(P)=1.72×10^{-7} *3*
914.85 *3*	516 *4*	1465.129	1$^-$	550.274	2$^+$	E1[a]		0.001221 *17*	α=0.001221 *17*; α(K)=0.001050 *15*; α(L)=0.0001354 *19*; α(M)=2.88×10^{-5} *4*; α(N+..)=7.54×10^{-6} α(N)=6.51×10^{-6} *10*; α(O)=9.73×10^{-7} *14*; α(P)=6.07×10^{-8} *9* α(K)exp=6.8×10^{-4} *19* (1963Ba31). δ: δ(M2/E1)=0.000 *4* (1977Ka14).
1113.88 *3*	1.0 *1*	1664.160	2$^+$	550.274	2$^+$	M1+E2	−0.565 *21*	0.00279 *5*	α=0.00279 *5*; α(K)=0.00239 *4*; α(L)=0.000319 *5*; α(M)=6.81×10^{-5} *10*; α(N+..)=1.85×10^{-5} *3* α(N)=1.544×10^{-5} *23*; α(O)=2.32×10^{-6} *4*; α(P)=1.466×10^{-7} *23*; α(IPF)=5.65×10^{-7} *8*
1152.5 *2*	0.13 *6*	2314.01	2$^+$	1161.537	3$^-$	E1+M2	−0.10 *9*	0.00086 *15*	α=0.00086 *15*; α(K)=0.00073 *13*; α(L)=9.5×10^{-5} *18*; α(M)=2.0×10^{-5} *4*; α(N+..)=1.51×10^{-5} *8* α(N)=4.5×10^{-6} *9*; α(O)=6.8×10^{-7} *14*; α(P)=4.3×10^{-8} *9*; α(IPF)=9.8×10^{-6} *3*
1371.3 *2*	0.62 *6*	1921.58	0$^+$	550.274	2$^+$				
1454.21 *3*	2.3 *1*	1454.217	2$^+$	0.0	0$^+$	E2		0.001230 *18*	α=0.001230 *18*; α(K)=0.001000 *14*; α(L)=0.0001338 *19*; α(M)=2.86×10^{-5} *4*; α(N+..)=6.78×10^{-5} α(N)=6.46×10^{-6} *9*; α(O)=9.66×10^{-7} *14*; α(P)=5.96×10^{-8} *9*; α(IPF)=6.03×10^{-5} *9*
1465.12 *3*	1000	1465.129	1$^-$	0.0	0$^+$	E1		0.000704 *10*	α=0.000704 *10*; α(K)=0.000449 *7*; α(L)=5.70×10^{-5} *8*; α(M)=1.208×10^{-5} *17*; α(N+..)=0.000186 *3* α(N)=2.74×10^{-6} *4*; α(O)=4.11×10^{-7} *6*; α(P)=2.61×10^{-8} *4*; α(IPF)=0.000183 *3* I_γ: absolute Iγ=22.2% 5 (1971Ca23), 24.3% 25

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

E_γ[‡]	I_γ[#b]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	δ[&]	α[†]	Comments
									(1971Mo04), 24% 2 (1962Re03), 23% 5 (1963Ba31). α(K)exp=4.7×10^{-4} *14* (1963Ba31).
1507.68 *3*	0.25 *4*	2057.961	2$^-$	550.274	2$^+$				
1664.15 *3*	0.51 *5*	1664.160	2$^+$	0.0	0$^+$	E2		0.001042 *15*	α=0.001042 *15*; α(K)=0.000775 *11*; α(L)=0.0001024 *15*; α(M)=2.18×10^{-5} *3*; α(N+..)=0.000143 α(N)=4.94×10^{-6} *7*; α(O)=7.40×10^{-7} *11*; α(P)=4.62×10^{-8} *7*; α(IPF)=0.0001375 *20*
1734.12 *3*	1.74 *3*	2284.405	(1,2$^+$)	550.274	2$^+$				
1763.7 *2*	0.28 *3*	2314.01	2$^+$	550.274	2$^+$	M1+E2	+2.2 *5*	0.00104 *3*	α=0.00104 *3*; α(K)=0.000732 *22*; α(L)=9.6×10^{-5} *3*; α(M)=2.05×10^{-5} *6*; α(N+..)=0.000189 *4* α(N)=4.64×10^{-6} *14*; α(O)=6.97×10^{-7} *21*; α(P)=4.39×10^{-8} *14*; α(IPF)=0.000183 *3*
2284.39 *3*	2.0 *1*	2284.405	(1,2$^+$)	0.0	0$^+$	D			
2314.0[c] *2*	<0.01	2314.01	2$^+$	0.0	0$^+$				

† Additional information 1.
‡ From 1977Ka14.
# Relative intensity from 1977Ka14.
@ From adopted gammas. Supporting data from this decay are given in comments.
& From adopted gammas.
a From α(K)exp.
b For absolute intensity per 100 decays, multiply by 0.0222 *5*.
c Placement of transition in the level scheme is uncertain.

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Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays