^{155}Pm β^- decay 1982Gr13,1997Gr09

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 160, 1 (2019)	21-Oct-2019

Parent: ^{155}Pm: E=0.0; $J^\pi=5/2^-$; $T_{1/2}$=41.5 s *2*; Q(β^-)=3251 *5*; %β^- decay=100.0

Additional information 1.

Production: nuclide obtained as a product of spontaneous fission of ^{252}Cf. 1982Gr13 carried out rapid chemical separation using high-performance liquid chromatography and assigned this activity to ^{155}Pm based on observation of the grow-in of the 22.3-min ^{155}Sm daughter activity and the agreement between the measured γ-ray energies and those measured by 1982Sc03 in the ^{154}Sm(n,γ) reaction. 1988GrZY used on-line isotope separation and assigned this activity to ^{155}Pm based on its presence in the mass-155 peak and the observation of the appropriate K x-rays.

From analysis of total-absorption γ-ray spectra, 1997Gr09 deduce β feeding intensities to the excited states of ^{155}Sm. These authors state that these data are consistent with those from their measured γ spectra, but these latter data remain unpublished.

Level scheme is incomplete.

^{155}Sm Levels

E(level)	J^π‡	Comments
0.0	$3/2^-$	
16.6	$5/2^+$	
53.2	$5/2^-$	
76.3	$7/2^+$	
127.7	$7/2^-$	
152.4	$9/2^+$	
220.6	$9/2^-$	
426.4	$5/2^-$	
500.0	$7/2^-$	
617.5	$3/2^+$	
658.3	$5/2^+$	
778.6	$3/2^-$	
821.3	$5/2^-$	
844.1	$3/2^-$	
882.1	$5/2^+$	
903.4	$(1/2)^+$	
919.0	$(7/2)^-$	Level not reported in other studies of the ^{155}Sm level scheme. Assigned as the $7/2^-$ member of the $3/2^-$[532] band, whose $3/2^-$ and $5/2^-$ members are at 778.6 and 821.3, respectively.
930.6	$3/2^-$	
962.4	$7/2^-$	
1020?†		
1106.6	$3/2^+$	
1168.7	$3/2^-$	
1180?†		
1250?†		
1327.5	$5/2^+$	
1362.1	$3/2^+$	
1490?†		
1550?†		
1670?†		
1730?†		
1850?†		
1940?†		
2050?†		
2150?†		

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^{155}Pm β^- decay 1982Gr13,1997Gr09 (continued)

^{155}Sm Levels (continued)

E(level)
2250?†
2350?†
2450?†
2550?†
2650?†

† "Pseudo-level" introduced to account for β^- feeding to this region of excitation, where no individual levels are reported. Since these levels do not correspond to any specific actual level, their existence is questioned and they are not included in the Adopted Levels.

‡ From the Adopted Values. For the excited states reported in total-absorption γ spectroscopy (1997Gr09), the J^π values are those for the levels presumed to correspond to previously established ones.

β^- radiations

E(decay)	E(level)	Iβ^-†#	Log *ft*	Comments
(601 *5*)	2650?	0.028		
(701 *5*)	2550?	0.136		
(801 *5*)	2450?	0.39		
(901 *5*)	2350?	0.30		
(1001 *5*)	2250?	0.65		
(1101 *5*)	2150?	0.43		
(1201 *5*)	2050?	0.32		
(1311 *5*)	1940?	1.29		
(1401 *5*)	1850?	0.57		
(1521 *5*)	1730?	0.65		
(1581 *5*)	1670?	0.65		
(1701 *5*)	1550?	0.37		
(1761 *5*)	1490?	1.10		
(1889 *5*)	1362.1	2.94	5.9	av Eβ=717.0 *22*
(1924 *5*)	1327.5	1.48	6.2	av Eβ=732.3 *22*
(2001 *5*)	1250?	0.37		
(2071 *5*)	1180?	1.40		
(2082 *5*)	1168.7	0.25	7.1	av Eβ=802.7 *23*
(2144 *5*)	1106.6	0.42	6.9	av Eβ=830.4 *23*
(2231 *5*)	1020?	0.45		
(2289 *5*)	962.4	0.173	7.4	av Eβ=895.0 *23*
(2320 *5*)	930.6	0.150	7.5	av Eβ=909.3 *23*
(2332 *5*)	919.0	2.66	6.3	av Eβ=914.5 *23*
(2348 *5*)	903.4	0.161		av Eβ=921.5 *23*
(2369 *5*)	882.1	0.018	8.5	av Eβ=931.1 *23*
(2407 *5*)	844.1	0.0		
(2430 *5*)	821.3	6.43	6.0	av Eβ=958.5 *23*
(2472 *5*)	778.6	27.06	5.4	av Eβ=977.8 *23*
(2593 *5*)	658.3	0.61	7.1	av Eβ=1032.2 *23*
(2634 *5*)	617.5	0.27	7.5	av Eβ=1050.7 *23*
(2751 *5*)	500.0	0.91	7.0	av Eβ=1104.1 *23*
(2825 *5*)	426.4	4.50	6.4	av Eβ=1137.6 *23*
(3030 *5*)	220.6	0.0		
(3099 *5*)	152.4	0.84		av Eβ=1262.9 *23*
(3123 *5*)	127.7	1.35	7.1	av Eβ=1274.2 *23*
(3175 *5*)	76.3	‡		av Eβ=1297.7 *23*

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^{155}Pm β^- decay 1982Gr13,1997Gr09 (continued)

β^- radiations (continued)

E(decay)	E(level)	Iβ^-[†#]	Comments
(3198 *5*)	53.2	[‡]	av Eβ=1308.3 *23*
(3234 *5*)	16.6	[‡]	av Eβ=1325.1 *23*
(3251 *5*)	0.0	40.7[‡] *21*	av Eβ=1332.7 *23* Iβ^-: from γ transition-intensity imbalances, 1995Gr19 deduce Iβ=7.9±5.2% for the β^- transition to the g.s.

† From total-absorption γ-ray spectroscopy (1997Gr09).
‡ Iβ=40.7±2.1% for the summed intensity to the four lowest states in ^{155}Sm (1995Gr19).
# Absolute intensity per 100 decays.

$\gamma(^{155}Sm)$

Iγ normalization: Deduced from the intensities of the Pm-decay γ rays relative to that of the 104.3 γ from ^{155}Sm decay, assuming that this latter value is 74.6 *37* γ's per 100 ^{155}Sm decays. Based on Iγ(104.3)=70 *6* γ's per 100 decays of ^{155}Sm, 1982Gr13 deduce Iγ normalization=0.073 *17*. The resulting I_γ values are somewhat smaller than those implied by the total-absorption γ spectroscopy data.

E_γ[†]	I_γ[†@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	α[#]	Comments
53.1 *5*	12 *2*	53.2	5/2$^-$	0.0	3/2$^-$	M1+E2	0.167 *4*	11.0 *4*	%Iγ=0.94 *27* α(K)=8.8 *3*; α(L)=1.72 *7*; α(M)=0.379 *15* α(N)=0.085 *4*; α(O)=0.0120 *5*; α(P)=0.000563 *18*
409.8 *2*	28 *2*	426.4	5/2$^-$	16.6	5/2$^+$	E1		0.00684	%Iγ=2.2 *5* α(K)=0.00585 *9*; α(L)=0.000782 *11*; α(M)=0.0001668 *24* α(N)=3.76×10^{-5} *6*; α(O)=5.56×10^{-6} *8*; α(P)=3.29×10^{-7} *5*
725.4 *2*	68 *3*	778.6	3/2$^-$	53.2	5/2$^-$	M1		0.00853	%Iγ=5.3 *12* α(K)=0.00729 *11*; α(L)=0.000979 *14*; α(M)=0.000209 *3* α(N)=4.75×10^{-5} *7*; α(O)=7.15×10^{-6} *10*; α(P)=4.53×10^{-7} *7*
762.0 *3*	19 *4*	778.6	3/2$^-$	16.6	5/2$^+$				%Iγ=1.5 *5*
778.6 *2*	100	778.6	3/2$^-$	0.0	3/2$^-$	M1+E2	1.1 *+8−4*	0.0056 *7*	%Iγ=7.8 *18* α(K)=0.0048 *6*; α(L)=0.00067 *7*; α(M)=0.000143 *15* α(N)=3.2×10^{-5} *4*; α(O)=4.8×10^{-6} *6*; α(P)=2.9×10^{-7} *4*

† From 1982Gr13.
‡ Reported by 1982Sc03 from ^{154}Sm(n,γ) (same values as in Adopted Levels, Gammas dataset).
# Additional information 2.
@ For absolute intensity per 100 decays, multiply by 0.078 *18*.

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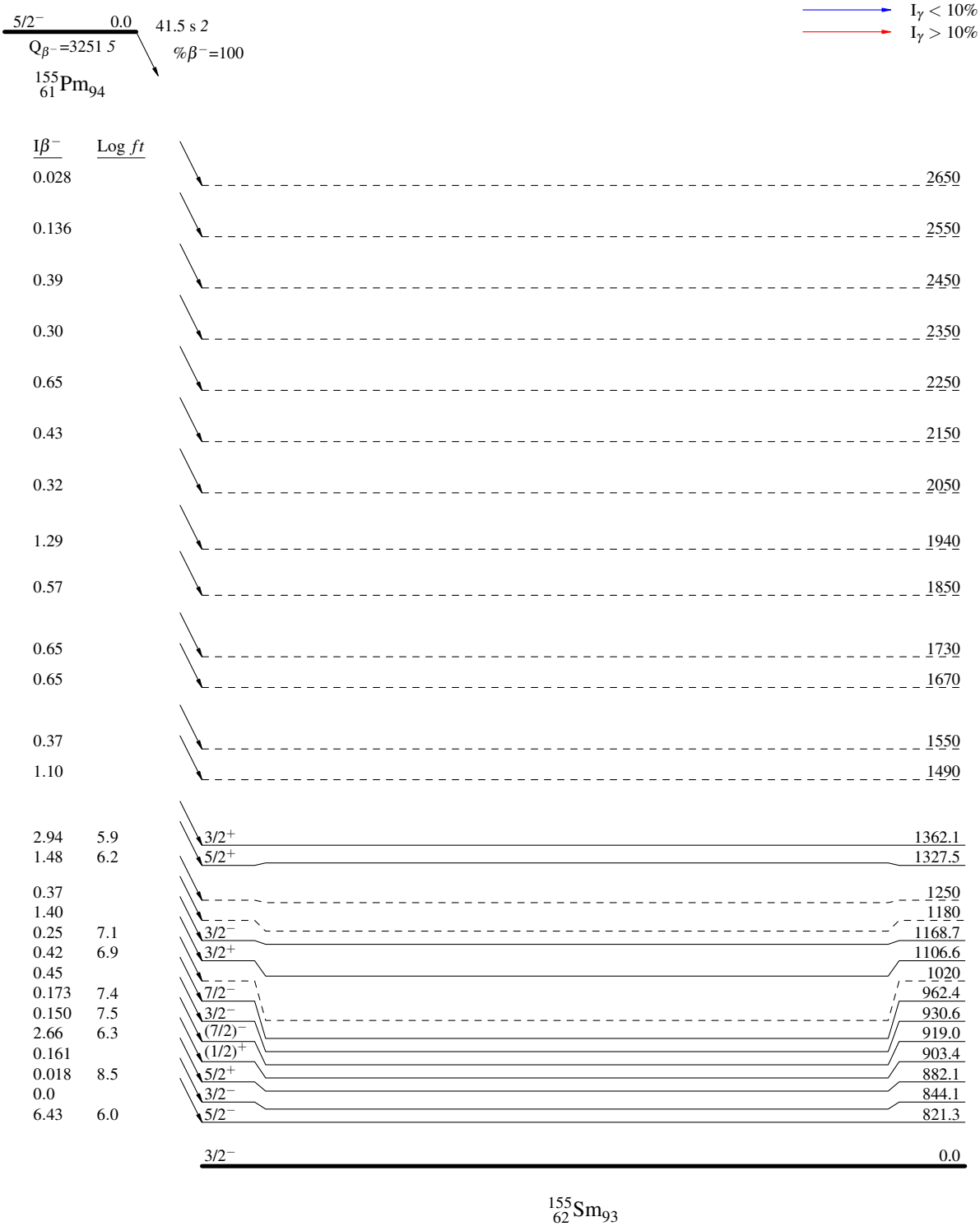
Decay Scheme

Intensities: I_γ per 100 parent decays

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



^{155}Pm β^- decay 1982Gr13,1997Gr09

Decay Scheme (continued)

Intensities: I_γ per 100 parent decays