^{141}Sm ε decay (22.6 min) 1972Ep01

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 187,1 (2023)	12-Oct-2022

Parent: ^{141}Sm: E=175.9 *3*; J$^{\pi}$=11/2$^-$; T$_{1/2}$=22.6 min *2*; Q(ε)=4589 *16*; %ε+%β^+ decay=99.69 *3*
^{141}Sm-Q(ε): From 2021Wa16.
Measured: γ, $\gamma\gamma$, γ(t), $\gamma^{\pm}\gamma^{\pm}\gamma$ coin (1972Ep01,1977Ke03), ce, $\beta\gamma$ (1977Ke03).
Isomeric transition was observed by 1976Ke06 (0.31% *3*); 1972Ep01 report an upper limit ≤0.2% for IT decay.

^{141}Pm Levels

E(level)†	J$^{\pi}$‡	T$_{1/2}$‡	Comments
0.0	5/2$^+$	20.90 min *5*	
196.86 *12*	7/2$^+$	0.23 ns *3*	
628.70 *9*	11/2$^-$	0.63 μs *2*	
804.72 *22*			
837.10 *20*	9/2$^+$		
974.06 *16*	11/2$^+$	<1.0 ns	
1108.29 *14*	9/2$^+$		
1166.95 *13*	(9/2)$^-$		
1313.18 *14*	13/2$^-$		
1414.69 *12*	(9/2$^-$)		Additional information 1.
1794.8 *3*			
1834.1 *4*			
1983.27 *15*	9/2$^-$		
2063.47 *15*			
2091.66 *14*	11/2$^-$		
2119.05 *12*	(9/2,11/2,13/2)$^-$		
2702.43 *22*			

† From least-squares fit to Eγ data.
‡ Adopted values.

ε,β^+ radiations

ε+β^+ feeding was determined from γ intensity balances and Iγ normalization assuming no ε+β^+ feeding to g.s. of ^{141}Pm.
1977Ke03 measured Eβ+=1600 *70*, 1670 *70*, 2090 *210*, F-K analysis; other measurements: 1969He10, 1970ArZQ, 1970Ar17.

E(decay)	E(level)	Iβ^+ †	Iε†	Log *ft*	I($\varepsilon+\beta^+$)†	Comments
(2063 *16*)	2702.43	0.10 *3*	1.7 *5*	6.36 *12*	1.8 *5*	av Eβ=473.5 *71*; εK=0.7973 *23*; εL=0.1154 *4*; εM+=0.03314 *11*
2620 *70*	2119.05	4.6 *5*	18.5 *20*	5.55 *5*	23.1 *25*	av Eβ=732.3 *72*; εK=0.674 *5*; εL=0.0968 *7*; εM+=0.02777 *19*
(2673 *16*)	2091.66	3.5 *4*	13.2 *14*	5.70 *5*	16.7 *18*	av Eβ=744.6 *72*; εK=0.667 *5*; εL=0.0957 *7*; εM+=0.02745 *19*
(2701 *16*)	2063.47	0.99 *13*	3.5 *5*	6.29 *6*	4.5 *6*	av Eβ=757.2 *72*; εK=0.659 *5*; εL=0.0946 *7*; εM+=0.02713 *19*
2690 *70*	1983.27	3.6 *4*	11.2 *11*	5.81 *5*	14.8 *15*	av Eβ=793.2 *72*; εK=0.637 *5*; εL=0.0913 *7*; εM+=0.02619 *19*
(2931 *16*)	1834.1	0.59 *9*	1.4 *2*	6.75 *7*	2.0 *3*	av Eβ=860.4 *73*; εK=0.594 *5*; εL=0.0851 *7*; εM+=0.02440 *20*
3.11×10^3 *21*	1414.69	2.5 *4*	3.1 *5*	6.52 *7*	5.6 *8*	av Eβ=1050.5 *73*; εK=0.475 *5*; εL=0.0677 *7*; εM+=0.01942 *19*
(3452 *16*)	1313.18	1.4 *5*	1.5 *5*	6.86 *15*	2.9 *10*	av Eβ=1096.8 *74*; εK=0.448 *5*; εL=0.0638 *7*; εM+=0.01829 *18*
(3598 *16*)	1166.95	1.6 *4*	1.5 *4*	6.91 *12*	3.1 *8*	av Eβ=1163.7 *74*; εK=0.410 *4*; εL=0.0584 *6*; εM+=0.01674 *17*
(3791 *16*)	974.06	3.2 *6*	2.4 *5*	6.75 *9*	5.6 *11*	av Eβ=1252.3 *74*; εK=0.364 *4*; εL=0.0518 *6*; εM+=0.01485 *15*

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^{141}Sm ε decay (22.6 min) 1972Ep01 (continued)

ϵ,β^+ radiations (continued)

E(decay)	E(level)	Iβ^+ †	Iε†	Log *ft*	I($\varepsilon+\beta^+$)†	Comments
(3928 *16*)	837.10	2.2 *2*	1.5 *2*	6.99 *5*	3.7 *4*	av Eβ=1315.4 *74*; εK=0.335 *4*; εL=0.0476 *5*; εM+=0.01363 *14*
(3960 *16*)	804.72	0.07 *12*	0.04 *7*	8.5 *8*	0.11 *19*	av Eβ=1330.4 *74*; εK=0.328 *4*; εL=0.0466 *5*; εM+=0.01335 *14*
(4136 *16*)	628.70	7.2 *20*	3.8 *10*	6.62 *12*	11 *3*	av Eβ=1411.7 *75*; εK=0.294 *3*; εL=0.0417 *5*; εM+=0.01195 *13*
(4568 *16*)	196.86	<4	<1	>7.2	<5	av Eβ=1612.4 *75*; εK=0.2248 *23*; εL=0.0319 *4*; εM+=0.00913 *9*

† Absolute intensity per 100 decays.

$\gamma(^{141}$Pm)

Iγ normalization: ΣI(γ+ce)(g.s.)=99.69% *3* assuming no ε or β^+ to g.s.
α(K)exp were normalized to α(K)(196.6)=0.200 (M1).

E$_\gamma$	I$_\gamma$[@]	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Mult.[†‡]	δ	α[#]	Comments
108.5 *3*	0.5 *1*	2091.66	11/2$^-$	1983.27	9/2$^-$	[M1,E2]		1.46 *23*	α(K)=1.00 *5*; α(L)=0.36 *21*; α(M)=0.08 *5* α(N)=0.018 *11*; α(O)=0.0024 *13*; α(P)=5.4$\times10^{-5}$ *13* %Iγ=0.20 *5*
149.1[&] *3*	0.7 *2*	1983.27	9/2$^-$	1834.1					%Iγ=0.28 *9*
196.6 *3*	184 *18*	196.86	7/2$^+$	0.0	5/2$^+$	(M1)		0.2322 *34*	α(K)=0.1974 *29*; α(L)=0.0274 *4*; α(M)=0.00585 *9* α(N)=0.001318 *19*; α(O)=0.0001991 *29*; α(P)=1.264$\times10^{-5}$ *18* %Iγ=74.5 *6* Mult.: α(K)exp=0.214 *15* normalized to α(K)=0.0914 for 661γ M4 in ^{137}Cs; $\delta\approx$+0.1 from (432γ)(196γ)(θ) A$_2$=−0.056 *40*, A$_4$=−0.040 *56* (1970ArZQ).
247.9 *2*	1.9 *4*	1414.69	(9/2$^-$)	1166.95	(9/2)$^-$	[M1,E2]		0.112 *12*	α(K)=0.091 *15*; α(L)=0.0165 *20*; α(M)=0.0036 *5* α(N)=0.00080 *10*; α(O)=0.000115 *9*; α(P)=5.4$\times10^{-6}$ *14* %Iγ=0.77 *18*
431.8 *1*	100 *5*	628.70	11/2$^-$	196.86	7/2$^+$	M2		0.0999 *14*	α(K)=0.0832 *12*; α(L)=0.01311 *18*; α(M)=0.00284 *4* α(N)=0.000642 *9*; α(O)=9.63$\times10^{-5}$ *14*; α(P)=5.90$\times10^{-6}$ *8* %Iγ=41 *4* Mult.: α(K)exp=0.082 *8*.
538.5 *3*	20.9 *14*	1166.95	(9/2)$^-$	628.70	11/2$^-$	M1		0.01648 *23*	α(K)=0.01408 *20*; α(L)=0.001893 *27*; α(M)=0.000403 *6* α(N)=9.08$\times10^{-5}$ *13*; α(O)=1.375$\times10^{-5}$ *19*; α(P)=8.87$\times10^{-7}$ *12* %Iγ=8.5 *10* Mult.: α(K)exp=0.0145 *14*.
577.8[&] *3*	2.2 *6*	1414.69	(9/2$^-$)	837.10	9/2$^+$	[E1]		0.00299 *4*	α(K)=0.00256 *4*; α(L)=0.000334 *5*; α(M)=7.08$\times10^{-5}$ *10* α(N)=1.590$\times10^{-5}$ *22*; α(O)=2.382$\times10^{-6}$ *33*; α(P)=1.480$\times10^{-7}$ *21* %Iγ=0.9 *3*
583.4[&] *3*	0.7 *2*	2702.43		2119.05	(9/2,11/2,13/2)$^-$				%Iγ=0.28 *9*
607.9 *2*	2.5 *3*	804.72		196.86	7/2$^+$				%Iγ=1.01 *15*
628.7 *1*	6.6 *2*	628.70	11/2$^-$	0.0	5/2$^+$	E3		0.01733 *24*	α(K)=0.01368 *19*; α(L)=0.00286 *4*; α(M)=0.000633 *9* α(N)=0.0001409 *20*; α(O)=2.003$\times10^{-5}$ *28*; α(P)=8.52$\times10^{-7}$ *12* %Iγ=2.7 *3*
648.7 *3*	0.9 *2*	2063.47		1414.69	(9/2$^-$)				%Iγ=0.36 *9*
676.8 *3*	3.4 *5*	2091.66	11/2$^-$	1414.69	(9/2$^-$)				%Iγ=1.38 *24*

$^{141}_{61}$Pm$_{80}$-3

^{141}Sm ε decay (22.6 min) 1972Ep01 (continued)

γ(^{141}Pm) (continued)

E_γ	I_γ[@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†‡]	δ	α[#]	Comments
684.6 *2*	19.6 *15*	1313.18	13/2$^-$	628.70	11/2$^-$	M1+E2	−0.87 *8*	0.00756 *20*	α(K)=0.00643 *17*; α(L)=0.000893 *20*; α(M)=0.000191 *4* α(N)=4.29×10^{-5} *10*; α(O)=6.43×10^{-6} *15*; α(P)=3.97×10^{-7} *11* %Iγ=7.9 *10* Mult.: α(K)exp=0.0049 *13*; δ from (p,2nγ) (1980Pi03). Other: δ=3.4 *15* (from α(K)exp).
704.2 *3*	1.1 *2*	2119.05	(9/2,11/2,13/2)$^-$	1414.69	(9/2$^-$)				%Iγ=0.45 *9*
725.7 *5*	3.6 *6*	1834.1		1108.29	9/2$^+$				%Iγ=1.5 *3*
750.3 *3*	3.9 *6*	2063.47		1313.18	13/2$^-$				%Iγ=1.6 *3*
^{x}764.3 *3*	0.4 *1*								%Iγ=0.16 *4*
^{x}768.2 *5*	0.4 *1*								%Iγ=0.16 *4*
777.4 *3*	50.3 *20*	974.06	11/2$^+$	196.86	7/2$^+$	E2		0.00411 *6*	α(K)=0.00347 *5*; α(L)=0.000508 *7*; α(M)=0.0001088 *15* α(N)=2.440×10^{-5} *34*; α(O)=3.61×10^{-6} *5*; α(P)=2.067×10^{-7} *29* %Iγ=20.4 *20* Mult.: α(K)exp=0.0024 *9* (1977Ke03), (777γ)(196γ)(θ): A_2=−0.09 *4*, A_4=−0.07 *9* (1970ArZQ).
785.9 *1*	16.9 *10*	1414.69	(9/2$^-$)	628.70	11/2$^-$	(M1+E2)	−0.19 *8*	0.00641 *12*	α(K)=0.00549 *11*; α(L)=0.000730 *13*; α(M)=0.0001550 *27* α(N)=3.50×10^{-5} *6*; α(O)=5.30×10^{-6} *10*; α(P)=3.43×10^{-7} *7* %Iγ=6.8 *8* Mult.: α(K)exp=0.0030 *10*; δ from (p,2nγ) (1980Pi03). Other: δ=0.0 *5* (from α(K)exp). Mult.: α(K)exp=0.0030 *10*, δ from (p,2nγ) (1980Pi03).
805.9 *1*	8.8 *16*	2119.05	(9/2,11/2,13/2)$^-$	1313.18	13/2$^-$				%Iγ=3.6 *7*
820.7[&] *3*	0.4 *1*	1794.8		974.06	11/2$^+$				%Iγ=0.16 *4*
837.1 *2*	8.9 *3*	837.10	9/2$^+$	0.0	5/2$^+$	E2		0.00348 *5*	α(K)=0.00294 *4*; α(L)=0.000423 *6*; α(M)=9.06×10^{-5} *13* α(N)=2.033×10^{-5} *28*; α(O)=3.02×10^{-6} *4*; α(P)=1.757×10^{-7} *25* %Iγ=3.6 *4*
875.0 *1*	3.1 *1*	1983.27	9/2$^-$	1108.29	9/2$^+$				%Iγ=1.26 *12*
^{x}882.0 *3*	0.4 *1*								%Iγ=0.16 *4*
896.5 *1*	3.6 *4*	2063.47		1166.95	(9/2)$^-$				%Iγ=1.46 *21*
911.3 *3*	22.8 *6*	1108.29	9/2$^+$	196.86	7/2$^+$	E2		0.00288 *4*	α(K)=0.002444 *34*; α(L)=0.000346 *5*; α(M)=7.39×10^{-5} *10* α(N)=1.659×10^{-5} *23*; α(O)=2.471×10^{-6} *35*; α(P)=1.463×10^{-7} *21* %Iγ=9.2 *9* Mult.: α(K)exp=0.0019 *7*.
924.7 *1*	5.7 *8*	2091.66	11/2$^-$	1166.95	(9/2)$^-$				%Iγ=2.3 *4*
952.1 *2*	2.2 *1*	2119.05	(9/2,11/2,13/2)$^-$	1166.95	(9/2)$^-$				%Iγ=0.89 *9*

$^{141}_{61}$Pm$_{80}$-4

γ(^{141}Pm) (continued)

E_γ	I_γ[@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[†‡]	α[#]	Comments
955.4 *5*	1.7 *1*	2063.47		1108.29	9/2$^+$			%Iγ=0.69 *8*
[x]974.1[&] *5*	0.5 *1*							%Iγ=0.20 *5*
983.3 *3*	18.0 *8*	2091.66	11/2$^-$	1108.29	9/2$^+$	E1	1.01×10^{-3} *1*	α(K)=0.000873 *12*; α(L)=0.0001114 *16*; α(M)=2.352×10^{-5} *33* α(N)=5.29×10^{-6} *7*; α(O)=7.98×10^{-7} *11*; α(P)=5.11×10^{-8} *7* %Iγ=7.3 *7* Mult.: α(K)exp≤0.0008.
995.8[&] *5*	0.9 *2*	1834.1		837.10	9/2$^+$			%Iγ=0.36 *9*
1009.1 *4*	7.2 *6*	1983.27	9/2$^-$	974.06	11/2$^+$			%Iγ=2.9 *4*
1029.6 *6*	1.3 *3*	1834.1		804.72				%Iγ=0.53 *13*
1108.4 *2*	3.1 *3*	1108.29	9/2$^+$	0.0	5/2$^+$			%Iγ=1.26 *17*
1117.6 *2*	8.0 *6*	2091.66	11/2$^-$	974.06	11/2$^+$			%Iγ=3.2 *4*
1145.1 *2*	21.6 *8*	2119.05	(9/2,11/2,13/2)$^-$	974.06	11/2$^+$			%Iγ=8.7 *9*
1287.6[&] *4*	0.7 *3*	2702.43		1414.69	(9/2$^-$)			%Iγ=0.28 *13*
[x]1380.9 *6*	0.5 *2*							%Iγ=0.20 *8*
1434.9 *4*	0.9 *3*	2063.47		628.70	11/2$^-$			%Iγ=0.36 *13*
1463.4 *6*	4.5 *8*	2091.66	11/2$^-$	628.70	11/2$^-$			%Iγ=1.8 *4*
1490.3 *1*	22.9 *15*	2119.05	(9/2,11/2,13/2)$^-$	628.70	11/2$^-$			%Iγ=9.3 *10*
1786.4 *4*	27.1 *11*	1983.27	9/2$^-$	196.86	7/2$^+$			%Iγ=11.0 *11*
1898.0 *10*	0.94 *15*	2702.43		804.72				%Iγ=0.38 *7*
[x]1979.6 *2*	0.99 *12*							%Iγ=0.40 *6*
2073.7 *2*	3.5 *12*	2702.43		628.70	11/2$^-$			%Iγ=1.4 *5*

[†] α(K)exp from 1977Ke03.
[‡] Adopted values.
[#] Additional information 2.
[@] For absolute intensity per 100 decays, multiply by 0.41 *4*.
[&] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

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Decay Scheme

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

Legend