^{242}Np β^- decay (2.2 min) 1979Ha26

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. J. Martin, C. D. Nesaraja	NDS 186, 261 (2022)	31-Dec-2021

Parent: ^{242}Np: E=0.0; $J^\pi=(1^+)$; $T_{1/2}$=2.2 min *2*; Q(β^-)=2.70×10^3 *20*; %β^- decay=100.0
^{242}Np-Q(β^-): From 2021Wa16.

^{242}Pu Levels

E(level)†	Jπ‡	$T_{1/2}$	E(level)†	Jπ‡	E(level)†	Jπ‡
0.0	0^+	3.73×10^5 y *2*	1154.6 *2*	$(2^+,3^-)$	1903.6 *2*	
44.545 *9*	2^+	160 ps *3*	1181.6 *1*	(2^+)	1949.8 *2*	$(1,2^+)$
147.35 *9*	4^+		1401.1? *1*	$(0,1^+)$	1969.9 *2*	$(1,2^+)$
780.46 *4*	1^-		1428.0 *3*	(2^-)	2246.1 *4*	$(1,2^+)$
832.3 *2*	3^-		1517.6 *1*	(1^-)	2331.3 *1*	(2^+)
992.6? *2*	(2^+)		1871.5 *3*			
1039.2? *3*	$(1,2^+)$		1874.0 *1*			

† From a least-squares fit to the Eγ data.
‡ From Adopted Levels.

β^- radiations

E(decay)	E(level)	Iβ$^-$†‡	Log *ft*	Comments
(3.7×10^2 *20*)	2331.3	1.5 *5*	4.9 *11*	av Eβ=104 *65*
(4.5×10^2 *20*)	2246.1	0.10 *4*	6.4 *9*	av Eβ=131 *67*
(7.3×10^2 *20*)	1969.9	0.78 *25*	6.1 *5*	av Eβ=224 *71*
(7.5×10^2 *20*)	1949.8	1.0 *3*	6.1 *5*	av Eβ=231 *72*
(8.0×10^2 *20*)	1903.6	0.78 *25*	6.3 *5*	av Eβ=247 *72*
(8.3×10^2 *20*)	1874.0	1.4 *5*	6.1 *5*	av Eβ=257 *73*
(8.3×10^2 *20*)	1871.5	0.18 *7*	7.0 *5*	av Eβ=258 *73*
(1.18×10^3 *20*)	1517.6	2.2 *7*	6.4 *4*	av Eβ=388 *76*
(1.27×10^3 *20*)	1428.0	0.39 *14*	7.3 *3*	av Eβ=421 *77*
(1.30×10^3# *20*)	1401.1?	0.9 *3*	7.0 *3*	av Eβ=432 *77*
(1.52×10^3 *20*)	1181.6	1.6 *5*	7.0 *3*	av Eβ=516 *79*
(1.55×10^3 *20*)	1154.6	0.49 *16*	8.3^{1u} *4*	av Eβ=501 *74*
(1.66×10^3# *20*)	1039.2?	0.07 *4*	8.5 *4*	av Eβ=572 *79*
(1.71×10^3# *20*)	992.6?	0.09 *4*	8.4 *3*	av Eβ=590 *80*
(1.87×10^3 *20*)	832.3	0.66 *22*	8.6^{1u} *3*	av Eβ=620 *98*
(1.92×10^3 *20*)	780.46	4.7 *15*	6.85 *23*	av Eβ=674 *81*
2.7×10^3 *2*	44.545	≤88	≥6.1	av Eβ=972 *82* Iβ$^-$: See comment on the g.s. β^- group.
2.7×10^3 *2*	0.0	≤88	≥6.1	av Eβ=990 *82* Iβ$^-$: I(β^-=83 *5* has been measured for the g.s. + 44.5 level).

† The fraction of all ^{242}Np β^- decay to the 0^+ ground state and the 2^+, 44.5-keV level was determined by 1979Ha26 as 83% *5* from comparison of the total absolute intensity of the 2700-keV β with analogous spectrum of ^{144}Pr. All other Iβ′s are from intensity balances.
‡ Absolute intensity per 100 decays.
# Existence of this branch is questionable.

$\gamma(^{242}Pu)$

Iγ normalization: From $\sum(\gamma$+ce to gs+44 level)=17 *5* given that $\sum(\beta^-$ to gs +44 level)=83% *5*.

E_γ[‡]	I_γ[#&]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	α[†]	$I_{(\gamma+ce)}$[&]	Comments
(44.545 *9*)		44.545	2^+	0.0	0^+	E2	748 *10*		α(L)=543 *8*; α(M)=151.5 *21* α(N)=41.6 *6*; α(O)=9.78 *14*; α(P)=1.529 *21*; α(Q)=0.00328 *5*
(102.8 *1*)	1.04 *10*	147.35	4^+	44.545	2^+	[E2]	13.88 *20*	15.5 *15*	E$_\gamma$,Mult.: The transition was not observed in 2.2 min β^- decay. Eγ and multipolarity are from Adopted Gammas. ce(L)/(γ+ce)=0.677 *7*; ce(M)/(γ+ce)=0.1895 *34* ce(N)/(γ+ce)=0.0521 *10*; ce(O)/(γ+ce)=0.01228 *25*; ce(P)/(γ+ce)=0.00196 *4*; ce(Q)/(γ+ce)=7.10×10^{-6} *14* α(L)=10.07 *15*; α(M)=2.82 *4* α(N)=0.775 *11*; α(O)=0.1827 *27*; α(P)=0.0291 *4*; α(Q)=0.0001056 *15* E$_\gamma$,I$_{(\gamma+ce)}$: Transition not observed in 2.2-min ^{242}Np β^- decay. Eγ is from Adopted Gammas and I(γ+ce) is from an intensity balance at the 147 level. Iγ is from I(γ+ce) and α.
620.6 *1*	18 *2*	1401.1?	$(0,1^+)$	780.46	1^-				
647.4 *3*	5.5 *5*	1428.0	(2^-)	780.46	1^-				
[x]681.4 *4*	2.9 *10*								
685.0 *1*	7 *1*	832.3	3^-	147.35	4^+				
735.93 *7*	100	780.46	1^-	44.545	2^+	[E1]	0.00696 *10*		α(K)=0.00564 *8*; α(L)=0.000999 *14*; α(M)=0.0002391 *33* α(N)=6.47×10^{-5} *9*; α(O)=1.597×10^{-5} *22*; α(P)=2.98×10^{-6} *4*; α(Q)=1.811×10^{-7} *25*
780.44 *5*	53 *1*	780.46	1^-	0.0	0^+	[E1]	0.00626 *9*		α(K)=0.00508 *7*; α(L)=0.000895 *13*; α(M)=0.0002139 *30* α(N)=5.79×10^{-5} *8*; α(O)=1.430×10^{-5} *20*; α(P)=2.67×10^{-6} *4*; α(Q)=1.636×10^{-7} *23*
(787.8)	7.9 *CA*	832.3	3^-	44.545	2^+				E$_\gamma$: Obscured by the 789.6γ of ^{240}Np. Eγ is from the level energy difference. I$_\gamma$: From the Alaga rule. From (n,γ): E=secondary γ's, from the level scheme of 1972MaYS, Iγ(787.8γ) is shown as being slightly larger that Iγ(685.0γ), consistent with the value given by the Alaga rule.
813.6 *1*	24 *2*	2331.3	(2^+)	1517.6	(1^-)				
948.0 *2*	1.7 *5*	992.6?	(2^+)	44.545	2^+	[M1,E2]	0.033 *20*		α(K)=0.026 *16*; α(L)=0.0054 *28*; α(M)=0.0013 *7* α(N)=3.6×10^{-4} *18*; α(O)=9.E−5 *4*; α(P)=1.7×10^{-5} *9*; α(Q)=1.0×10^{-6} *6*
1007.3 *2*	3.0 *5*	1154.6	$(2^+,3^-)$	147.35	4^+				
1034.2 *2*	5.5 *10*	1181.6	(2^+)	147.35	4^+				
1039.2[a] *3*	<2.7[a]	1039.2?	$(1,2^+)$	0.0	0^+				I$_\gamma$: Iγ<2.2 5 was measured for the doubly placed 1039γ.
1039.2[a] *3*	<2.7[a]	1871.5		832.3	3^-				I$_\gamma$: Iγ<2.2 5 was measured for the doubly placed 1039γ.

^{242}Np β^- decay (2.2 min) 1979Ha26 (continued)

$\gamma(^{242}Pu)$ (continued)

E_γ ‡	I_γ #&	E_i(level)	J_i^π	E_f	J_f^π	Comments
1093.5 *1*	23 *2*	1874.0		780.46	1^-	
1110.0 *2*	7 *1*	1154.6	$(2^+,3^-)$	44.545	2^+	
1123.1 *2*	5 *1*	1903.6		780.46	1^-	
1137.1 *1*	25 *1*	1181.6	(2^+)	44.545	2^+	I_γ: 1979Ha26 point out that Iγ relative to the other intensities deexciting the 1181.6 level is much higher than expected based on the Alaga rule. They suggest that the 1137.1γ might be a doublet with a second and stronger component as yet unplaced.
[x]1172.0 *3*	2.9 *6*					
1181.6 *2*	3.0 *5*	1181.6	(2^+)	0.0	0^+	
[x]1239.9 *1*	4.9 *5*					
1383.6 *4*	2.5 *10*	1428.0	(2^-)	44.545	2^+	
1473.1 *1*	45 *1*	1517.6	(1^-)	44.545	2^+	
1517.6 *1*	24 *1*	1517.6	(1^-)	0.0	0^+	
1550.9 *1*	7 *1*	2331.3	(2^+)	780.46	1^-	
[x]1813.7 *2*	3.5 *5*					
1826.9 *3*	2.3 *5*	1871.5		44.545	2^+	
1859.2 *3*	11.0 *5*	1903.6		44.545	2^+	
1874.5 *3*	5 *1*	1874.0		0.0	0^+	
1905.1 *2*	5.5 *5*	1949.8	$(1,2^+)$	44.545	2^+	
1925.4 *2*	4.5 *5*	1969.9	$(1,2^+)$	44.545	2^+	
1949.9 *2*	14.8 *5*	1949.8	$(1,2^+)$	0.0	0^+	
1969.9 *2*	10.5 *5*	1969.9	$(1,2^+)$	0.0	0^+	
[x]1984.5 *5*	1.0 *2*					
[x]1992.1 *3*	4.0 *2*					
[x]2042.4 *7*	0.8 *2*					
[x]2061.1 *10*	0.6 *2*					
[x]2076.8 *5*	1.3 *3*					
2201.6 *5*	1.2 *3*	2246.1	$(1,2^+)$	44.545	2^+	
2246.0 *5*	0.9 *3*	2246.1	$(1,2^+)$	0.0	0^+	
[x]2357.9 *5*	1.0 *5*					
[x]2370.5 *5*	1.0 *5*					

† Additional information 1.
‡ From 1979Ha26.
# Relative photon intensity from 1979Ha26.
@ From Adopted Gammas. Multipolarities in square brackets are from level scheme; they have not been determined experimentally.
& For absolute intensity per 100 decays, multiply by 0.049 *15*.
[a] Multiply placed with undivided intensity.
[x] γ ray not placed in level scheme.

$^{242}_{94}Pu_{148}$-3

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Decay Scheme

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