^{242}Np β^- decay (5.5 min) 1981Fr07

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+x; $J^\pi=(6^+)$; $T_{1/2}$=5.5 min *1*; Q(β^-)=2.70×10^3 *20*; %β^- decay=100.0
^{242}Np-Q(β^-): From 2021Wa16.
A partial decay scheme is presented as constructed by 1981Fr07.

^{242}Pu Levels

E(level)‡	J$^\pi$†	$T_{1/2}$	Comments
0.0	0^+	3.73×10^5 y *2*	
44.545 *9*	2^+	160 ps *3*	
147.35 *10*	4^+		
306.45 *13*	6^+		
1092.15 *13*	(6^+)		J$^\pi$: A two-neutron 6^+,(ν 5/2[622],ν 7/2[624]) assignment was proposed by 1981Fr07 in analogy to the 1040.3-keV level in ^{244}Cm.
1357.25? *17*			J$^\pi$: 1981Fr07 suggest that this level may be the lowest two-proton state with $J^\pi=K^\pi=5^-$ and configuration (π [642],π [523]) in analogy to the 1308 level in ^{244}Pu.

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

β^- radiations

E(decay)	E(level)	Comments
(1.34×10^3 *20*)	1357.25?	If the 265.1γ is the only transition deexciting the 1357 level, and if there is no feeding from higher levels, then I(β^- feeding the 1357 level) is 15% *2* if the 265.1γ is E1, and 38% *4* if M1. If one assumes that Q(β^-) for the 5.5-min isomer is the same as that of the gs, then Eβ^-(average)=448 *80*, with log*ft*=6.2 *3* or 5.8 *3* for mult(265.1γ)=E1 or M1, respectively.
(1.61×10^3 *20*)	1092.15	The intensity balance leads to a β^- feeding of 85% *4* if the 265.1γ feeding the level is E1, and 62% *5* if it is M1. If one assumes that Q(β^-) for the 5.5-min isomer is the same as that for the gs, then the β^- branch has E(average)=550 *83* with log*ft*=5.7 *2* or 5.8 *3* for mult(265.1γ)=E1 or E2, respectively.

^{242}Np β^- decay (5.5 min) 1981Fr07 (continued)

$\gamma(^{242}Pu)$

Iγ normalization: The normalization factor was obtained by requiring the sum of gamma transition intensities feeding the ground-state band (785.7 and 944.8 gammas) to be 100.

E_γ	I_γ[‡#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	δ	α[†]	$I_{(\gamma+ce)}$[#]	Comments
44.545 *9*	0.218 *10*	44.545	2^+	0.0	0^+	[E2]		748 *10*	163 *7*	ce(L)/(γ+ce)=0.726 *8*; ce(M)/(γ+ce)=0.202 *4* ce(N)/(γ+ce)=0.0556 *11*; ce(O)/(γ+ce)=0.01306 *26*; ce(P)/(γ+ce)=0.00204 *4*; ce(Q)/(γ+ce)=4.39×10^{-6} *9* 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* E_γ,$I_{(\gamma+ce)}$: Not observed in 5.5-min ^{242}Np β^- decay. Eγ is from Adopted Gammas. I(γ+ce)=I(γ+ce 102.8γ)from the decay scheme. Iγ is from I(γ+ce) and α.
102.8 *1*	11.0 *5*	147.35	4^+	44.545	2^+	[E2]		13.88 *20*	163 *7*	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_γ,$I_{(\gamma+ce)}$: Not observed in β$^-$ decay of ^{242}Np (5.5 min). Eγ is from Adopted Gammas. I(γ+ce)=I(γ+ce 159.1γ+944.8γ) from the decay scheme. Iγ is from I(γ+ce) and α.
159.1 *1*	32 *2*	306.45	6^+	147.35	4^+	[E2]		2.098 *30*		α(K)=0.1921 *27*; α(L)=1.384 *20*; α(M)=0.386 *6* α(N)=0.1062 *15*; α(O)=0.0251 *4*; α(P)=0.00406 *6*; α(Q)=2.430×10^{-5} *34*
265.1 *1*	24 *2*	1357.25?		1092.15	(6^+)					
785.7 *1*	100	1092.15	(6^+)	306.45	6^+	[(M1)+E2]	>1.0	0.037 *17*		α(K)=0.028 *14*; α(L)=0.0066 *23*; α(M)=0.0016 *5* α(N)=4.5×10^{-4} *15*; α(O)=1.1×10^{-4} *4*; α(P)=2.1×10^{-5} *7*; α(Q)=1.1×10^{-6} *5* Mult.: The requirement of an intensity balance at the 306 level gives α<0.055. For mult=M1+E2 this gives δ>1.0 and α=0.038 *18*.
944.8 *1*	63 *3*	1092.15	(6^+)	147.35	4^+	[E2]		0.01377 *19*		α(K)=0.01014 *14*; α(L)=0.00271 *4*; α(M)=0.000683 *10* α(N)=0.0001860 *26*; α(O)=4.55×10^{-5} *6*; α(P)=8.33×10^{-6} *12*; α(Q)=4.00×10^{-7} *6*
[x]1104.0 *10*	0.6 *2*									

$^{242}_{94}Pu_{148}$-2

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

† Additional information 1.
‡ Relative photon intensity from 1981Fr07.
# For absolute intensity per 100 decays, multiply by 0.595 *14*.
x γ ray not placed in level scheme.

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Decay Scheme

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