^{231}Np ε decay (48.8 min) 1973We08

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh, Jagdish K. Tuli, and Edgardo Browne	NDS 185, 560 (2022)	31-Aug-2022

Parent: ^{231}Np: E=0; J^π=(5/2$^-$); $T_{1/2}$=48.8 min *2*; Q(ε)=1820 *50*; %ε+%$β^+$ decay≈98.0

^{231}Np-J^π,$T_{1/2}$: From ^{231}Np Adopted Levels.

^{231}Np-Q(ε): From 2021Wa16.

^{231}Np-%ε+%$β^+$ decay: %α≈2 and %ε+%$β^+$≈98 from ^{231}Np Adopted Levels.

1973We08: ^{231}Np produced in ^{233}U(d,p3n),E=28 MeV at the Karlsruhe Isochronous Cyclotron, followed by chemical separation. Measured Eγ, Iγ using a Ge(Li) detector. Also deduced I($β^+$)/I(ε)<0.001 from limit on $γ^±$.

Evaluator's note: the decay scheme is incomplete, with no spectral information about the multipolarities and mixing ratios of γ transitions, including that for a low energy 45.1-keV transition.

^{231}U Levels

9/2$^-$ member of configuration=ν5/2[752] (1973We08) is expected at 102 keV from rotational energy formula.

E(level)†	J^π	$T_{1/2}$	Comments
0.0	(5/2$^-$)	4.2 d *1*	Configuration=ν5/2[752] (1973We08).
45.1 *3*	(7/2$^-$)		E(level): ≈42 keV from analogy with the neighboring even-odd nuclei ^{233}U, ^{229}Th and ^{231}Th. J^π: 7/2 member of configuration=ν5/2[752] (1973We08).
416.1 *3*			
421.1 *4*			
481.7 *4*			
1153.5 *4*			
1268.1 *4*			

† From least-squares fit to Eγ values.

ε,$β^+$ radiations

E(decay)	E(level)	Iβ+ †	Iε†	Log *ft*	I(ε+$β^+$)†	Comments
(1.82×10^3 *5*)	0.0	≈0.1	≈90	≈5.9	≈90	E(decay): ≈1700. Iβ+: from measured I(K x ray)/Iγ, 1973We08 deduced that at least 90% of ε feeds the ground state, and I($β^+$)/I(ε)<0.001 from limit on $γ^±$. Other: I($β^+$)=0.19% *5* from I($β^+$)/I(ε) (theory) from LOGFT code.

† Absolute intensity per 100 decays.

γ(^{231}U)

$E_γ$†	$I_γ$†	E_i(level)	J^π_i	E_f	J^π_f	Comments
(45.1 *3*)		45.1	(7/2$^-$)	0.0	(5/2$^-$)	$E_γ$: γ not observed, energy from level-energy difference.
x263.8 *3*	29 *1*					
x348.4 *3*	37 *2*					
370.9 *3*	100	416.1		45.1	(7/2$^-$)	
376.3 *4*	6.5 *3*	421.1		45.1	(7/2$^-$)	
416.3 *3*	2.9 *6*	416.1		0.0	(5/2$^-$)	
420.7 *4*	10.7 *11*	421.1		0.0	(5/2$^-$)	
436.9 *4*	2.9 *6*	481.7		45.1	(7/2$^-$)	

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^{231}Np ε decay (48.8 min) 1973We08 (continued)

γ(^{231}U) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	E_γ †	I_γ †	E_i(level)	E_f	J_f^π
481.6 *5*	6.2 *12*	481.7		0.0	(5/2$^-$)	786.6 *3*	1.9 *1*	1268.1	481.7	
x484.7 *5*	16.6 *32*					x837.3 *4*	4.1 *6*			
x715.5 *4*	2.5 *3*					851.6 *5*	7.1 *3*	1268.1	416.1	
737.8 *3*	12.6 *7*	1153.5		416.1		1108.1 *3*	5.5 *5*	1153.5	45.1	(7/2$^-$)

† From 1973We08.
x γ ray not placed in level scheme.

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Decay Scheme

Intensities: Relative I_γ