

^{232}Np ϵ decay **1972We16**

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	E. Browne	NDS 107, 2579 (2006)	1-Nov-2004

Parent: ^{232}Np : E=0; $J^\pi=(4^+)$; $T_{1/2}=14.7$ min 3; $Q(\epsilon)=2750$ 99; $\% \epsilon + \% \beta^+$ decay=100.0

^{232}U Levels

E(level) [†]	J^π	E(level) [†]	J^π	E(level) [†]	J^π	E(level) [†]	J^π
0 [‡]	0 ⁺	867.1 [#] 2	2 ⁺	1051.2 [@] 4	3 ⁻	1173.6 ^a 4	(2) ⁻
47.57 [‡] 2	2 ⁺	911.9 [#] 3	3 ⁺	1098.1 [@] 4	4 ⁻	1194.3 2	(3 ⁺ , 4 ⁺)
156.52 [‡] 3	4 ⁺	971.3 [#] 2	(4 ⁺)	1133.0 ^{&} 3	(2 ⁺)	1983.6? 5	
321.5 [‡] 5	6 ⁺	1017.9 [@] 2	2 ⁻	1146.3 ^a 10	(1 ⁻)		

[†] Deduced by evaluator from a least-squares fit to γ -ray energies.

[‡] Band(A): $K^\pi=0^+$ g.s. rotational band.

[#] Band(B): $K^\pi=2^+$ γ vibrational band.

[@] Band(C): $K^\pi=2^-$.

[&] Band(D): $K^\pi=2^+$.

^a Band(E): $K^\pi=(1^-)$.

ϵ, β^+ radiations

$\% \beta^+ < 0.1\%$ from γ^\pm (1972We16).

E(decay)	E(level)	$I\beta^+$ [‡]	$I\epsilon$ [‡]	Log ft	$I(\epsilon + \beta^+)$ ^{†‡}	Comments
(7.7×10^2) [#] 10)	1983.6?		0.42 5	6.9	0.42 6	$\epsilon K=0.740$ 9; $\epsilon L=0.191$ 7; $\epsilon M+=0.068$ 3
(1.56×10^3) 10)	1194.3	0.04 4	94 4	5.2	94 4	av $E\beta=268$ 46; $\epsilon K=0.7676$ 15; $\epsilon L=0.1718$ 13; $\epsilon M+=0.0602$ 6
(1.58×10^3) 10)	1173.6		1.5 2	7.0	1.5 2	$\epsilon K=0.7679$ 15; $\epsilon L=0.1715$ 12; $\epsilon M+=0.0601$ 5
(1.62×10^3) [#] 10)	1133.0	0.0012 10	1.9 1	6.9	1.9 1	av $E\beta=295$ 45; $\epsilon K=0.7684$ 13; $\epsilon L=0.1711$ 12; $\epsilon M+=0.0599$ 5
(1.65×10^3) [#] 10)	1098.1	0.0012 10	1.6 3	7.0	1.6 3	av $E\beta=311$ 45; $\epsilon K=0.7688$ 12; $\epsilon L=0.1707$ 11; $\epsilon M+=0.0597$ 5
(1.78×10^3) [#] 10)	971.3	0.0027 18	1.7 5	7.1	1.7 5	av $E\beta=367$ 44; $\epsilon K=0.7698$; $\epsilon L=0.1694$ 10; $\epsilon M+=0.0592$ 4
(2.75×10^3) [#] 10)	0	0.01 1	<1	8.0	<1	av $E\beta=790$ 43; $\epsilon K=0.757$ 4; $\epsilon L=0.1601$ 12; $\epsilon M+=0.0556$ 5 $I\epsilon < 1\%$ to g.s. band of ^{232}U , based on K x ray of 1972We16 and $\alpha(K)$.

[†] Deduced by evaluator from decay-scheme transition intensity balance at each level.

[‡] Absolute intensity per 100 decays.

[#] Existence of this branch is questionable.

^{232}Np ε decay **1972We16** (continued) $\gamma(^{232}\text{U})$

I_γ normalization: Deduced by evaluator from sum of γ -ray transition intensities to g.s. = 99.5 % 5.

From **1972We16**. Other: **1970Ho27**.

K x ray=57.8% of intensity of all observed γ 's (**1970Ho27**).

E_γ^\dagger	$I_\gamma^\#$	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. ‡	$\alpha^\@$	Comments
(47.57 2)		47.57	2 ⁺	0	0 ⁺	E2	460	$\alpha(\text{L})= 339$; $\alpha(\text{M})= 93.6$
(108.95 2)		156.52	4 ⁺	47.57	2 ⁺	E2	9.1	E_γ : From Adopted Gammas. $\alpha(\text{L})= 6.62$; $\alpha(\text{M})= 1.838$; $\alpha(\text{N+..})= 0.692$
143.4 5	0.8 2	1194.3	(3 ⁺ ,4 ⁺)	1051.2	3 ⁻	[E1]	0.22	E_γ : From Adopted Gammas. $\alpha(\text{K})= 0.1686$; $\alpha(\text{L})= 0.0373$; $\alpha(\text{M})=0.00908$; $\alpha(\text{N+..})=0.00321$
165.0 5	0.6 2	321.5	6 ⁺	156.52	4 ⁺	E2	1.60	$\alpha(\text{K})= 0.2054$; $\alpha(\text{L})= 1.015$; $\alpha(\text{M})= 0.281$; $\alpha(\text{N+..})= 0.1044$
223.6 4	4.3 3	1194.3	(3 ⁺ ,4 ⁺)	971.3	(4 ⁺)	[E2]	0.51	$\alpha(\text{K})= 0.1302$; $\alpha(\text{L})= 0.276$; $\alpha(\text{M})= 0.0756$; $\alpha(\text{N+..})= 0.0280$
282.0 4	38 2	1194.3	(3 ⁺ ,4 ⁺)	911.9	3 ⁺	[E2]	0.23	$\alpha(\text{K})= 0.0855$; $\alpha(\text{L})= 0.1079$; $\alpha(\text{M})= 0.0292$; $\alpha(\text{N+..})=0.01086$
327.3 3	100	1194.3	(3 ⁺ ,4 ⁺)	867.1	2 ⁺	[E2]	0.148	$\alpha(\text{K})= 0.0646$; $\alpha(\text{L})= 0.0608$; $\alpha(\text{M})=0.01636$; $\alpha(\text{N+..})=0.00608$
^x 377.0 3	2.4 2							Additional information 1.
710.7 6	1.1 2	867.1	2 ⁺	156.52	4 ⁺	[E2]		
755.0 4	8.1 6	911.9	3 ⁺	156.52	4 ⁺	[M1+E2]		
814.8 4	7.9 6	971.3	(4 ⁺)	156.52	4 ⁺	[M1+E2]		
819.5 4	64 3	867.1	2 ⁺	47.57	2 ⁺	E2	0.017	$\alpha(\text{K})=0.01205$; $\alpha(\text{L})=0.00340$
864.3 5	39 2	911.9	3 ⁺	47.57	2 ⁺	E2	0.014	$\alpha(\text{K})=0.01097$; $\alpha(\text{L})=0.00297$
867.2 6	47 3	867.1	2 ⁺	0	0 ⁺	E2	0.015	$\alpha(\text{K})=0.01091$; $\alpha(\text{L})=0.00295$
895.1 5	1.6 2	1051.2	3 ⁻	156.52	4 ⁺	[E1]		
924.4 4	1.8 2	971.3	(4 ⁺)	47.57	2 ⁺	[E2]		
941.6 4	3.1 5	1098.1	4 ⁻	156.52	4 ⁺	[E1]		
970.9 3	0.6 1	1017.9	2 ⁻	47.57	2 ⁺	[E1]		
^x 1016.8 4	1.1 1							
1016.8 4		1017.9	2 ⁻	0	0 ⁺			I_γ : from ^{232}Pa β^- decay $I_\gamma(970.9)/I_\gamma(1016.8)=3000$.
1037.4 5	6.3 4	1194.3	(3 ⁺ ,4 ⁺)	156.52	4 ⁺			
1085.4 4	1.9 1	1133.0	(2 ⁺)	47.57	2 ⁺			
1126.0 4	2.8 3	1173.6	(2 ⁻)	47.57	2 ⁺	[E1]		
1133.1 4	1.7 2	1133.0	(2 ⁺)	0	0 ⁺			
1146.3 ^{&a}	0.7 ^{& l}	1146.3	(1 ⁻)	0	0 ⁺			
1146.3 ^{&a} 5	0.7 ^{& l}	1194.3	(3 ⁺ ,4 ⁺)	47.57	2 ⁺			
1193.9 ^a 6	0.7 2	1194.3	(3 ⁺ ,4 ⁺)	0	0 ⁺			
1936.0 ^a 5	0.8 1	1983.6?		47.57	2 ⁺			

† Comparison with ^{232}Pa β^- decay suggests that all E_γ 's in **1972We16** are ≈ 1 keV too high.

‡ From adopted gammas.

$^\#$ For absolute intensity per 100 decays, multiply by 0.53 2.

$^\@$ Total theoretical internal conversion coefficients, calculated using the BrIcc code (**2008Ki07**) with Frozen orbital approximation based on γ -ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

Continued on next page (footnotes at end of table)

${}^{232}\text{Np}$ ε decay **1972We16** (continued)

$\gamma({}^{232}\text{U})$ (continued)

& Multiply placed with undivided intensity.

^a Placement of transition in the level scheme is uncertain.

^x γ ray not placed in level scheme.

^{232}Np ϵ decay 1972We16

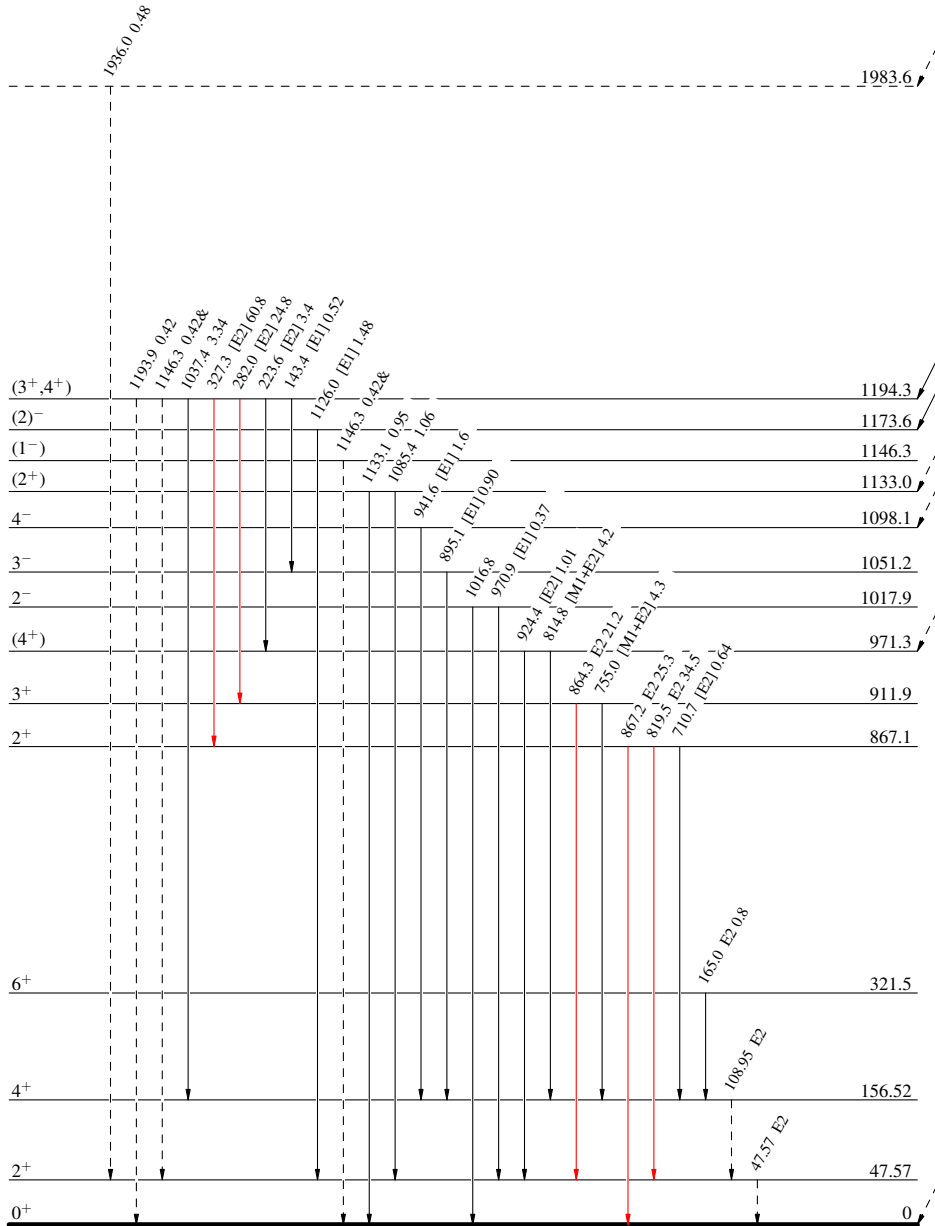
Decay Scheme

Legend

- $I_\gamma < 2\% \times I_\gamma^{\text{max}}$
- $I_\gamma < 10\% \times I_\gamma^{\text{max}}$
- $I_\gamma > 10\% \times I_\gamma^{\text{max}}$
- - - γ Decay (Uncertain)

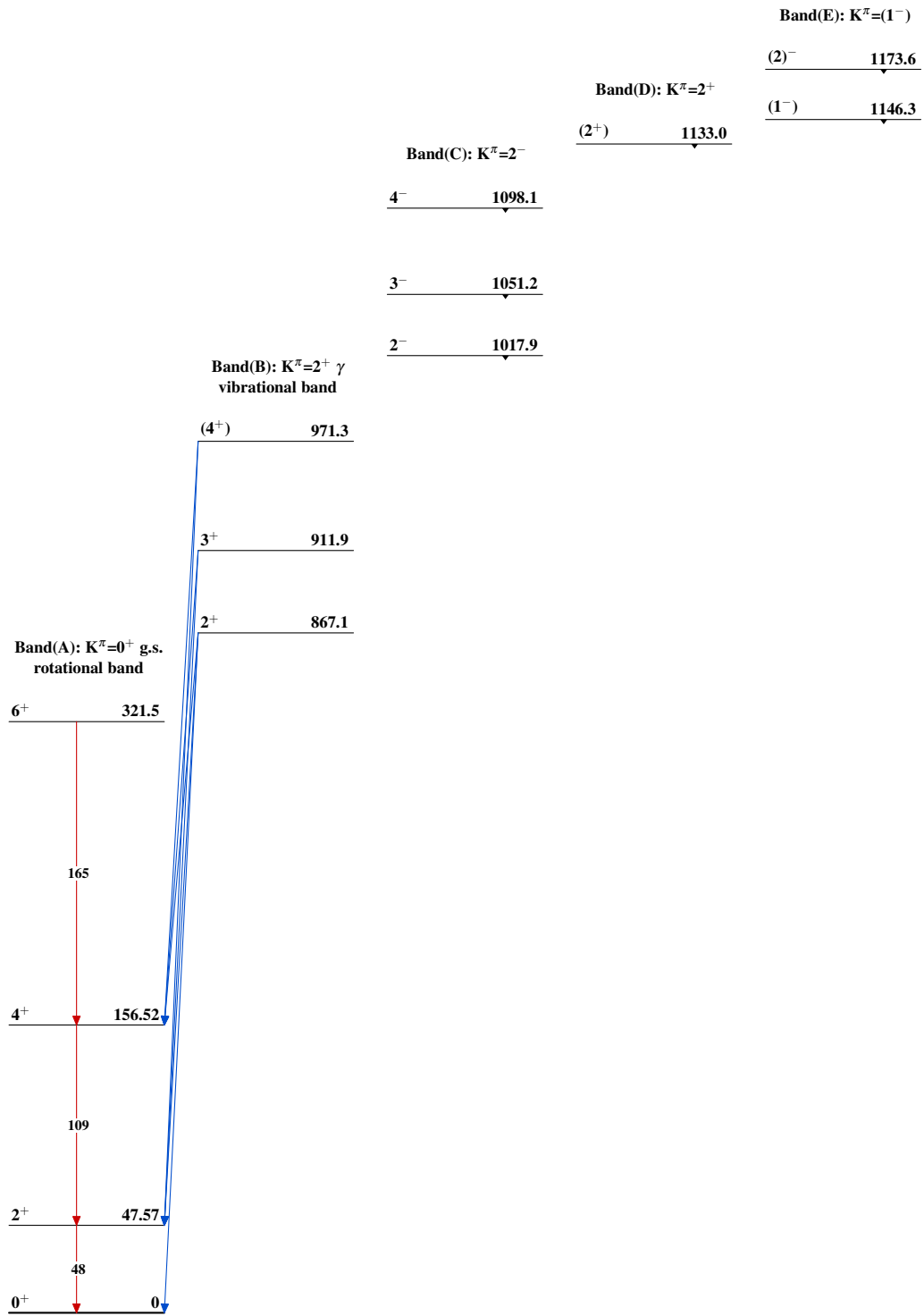
Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
& Multiply placed: undivided intensity given

$^{232}_{93}\text{Np}_{139}$ (4+) 0 14.7 min 3
 $Q_\epsilon = 2750.99$
 $\% \epsilon + \% \beta^+ = 100$



$I\beta^+$	$I\epsilon$	$\text{Log } ft$
	0.42	6.9
0.04	94	5.2
	1.5	7.0
0.0012	1.9	6.9
0.0012	1.6	7.0
0.0027	1.7	7.1
0.01	<1	8.0

$^{232}_{92}\text{U}_{140}$

^{232}Np ϵ decay 1972We16 $^{232}_{92}\text{U}_{140}$