^{234}Np ε decay

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, J. K. Tuli	NDS 108, 681 (2007)	1-Jun-2006

Parent: ^{234}Np: E=0.0; $J^{\pi}=(0^+)$; $T_{1/2}$=4.4 d *1*; Q(ε)=1810 *8*; %ε+%β^+ decay=100.0

Additional information 1.

^{234}U Levels

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
0.0	0^+	849.38 *5*	3^-	1085.29 *4*	2^+	1510.23 *12*	1
43.498 *21*	2^+	851.69 *4*	2^+	1237.261 *24*	1^-	1570.68 *3*	1^+
143.30 *4*	4^+	926.73 *3*	2^+	1435.37 *3*	1^-	1601.813 *25*	1^+
786.267 *25*	1^-	989.43 *3*	2^-	1457.1 *3*	(2^-)		
809.85 *4*	0^+	1044.53 *4*	0^+	1500.87 *8*	(1)		

† Deduced by the evaluators from a least-squares fit to γ-ray energies.

‡ From Adopted Levels.

ε,β^+ radiations

ε populations to all excited states are deduced from intensity balance at each level. For the ε branching to the ground state (26% 3) see comment on normalization factor.

1984Ya09 calculated a matrix element for 0^+ to 0^+, isospin-forbidden β transition as a function of the deformation parameter.

```
          β+ measurements:
Eβ+≈800, Iβ+=0.046 10 (absolute counting)      (s 1955Pr29);
Eβ+=790 10, Iβ+/ce(K)(composite 810γ)=0.060 6  (s 1967Ha04).
```

E(decay)	E(level)	Iβ+ ‡	Iε‡	Log *ft*	I(ε+β+)†‡	Comments
(208 *8*)	1601.813		29 *1*	6.2	29 *1*	εK=0.471 *24*; εL=0.377 *16*; εM+=0.153 *8*
(239 *8*)	1570.68		17.0 *9*	6.6	17.0 *9*	εK=0.540 *15*; εL=0.330 *11*; εM+=0.130 *5*
(300 *8*)	1510.23		0.055 *5*	9.4	0.055 *5*	εK=0.616 *8*; εL=0.277 *6*; εM+=0.1065 *24*
(309 *8*)	1500.87		0.051 *6*	9.4	0.051 *6*	εK=0.624 *7*; εL=0.272 *5*; εM+=0.1040 *22*
(353 *8*)	1457.1		0.024 *5*	9.9	0.024 *5*	εK=0.654 *5*; εL=0.251 *4*; εM+=0.0948 *15*
(375 *8*)	1435.37		8.7 *5*	7.4	8.7 *5*	εK=0.665 *4*; εL=0.244 *3*; εM+=0.0914 *12*
(573 *8*)	1237.261		10.2 *5*	7.8	10.2 *5*	εK=0.7190 *13*; εL=0.2061 *9*; εM+=0.0749 *4*
(765 *8*)	1044.53		1.6 *1*	8.9	1.6 *1*	εK=0.7403; εL=0.1912 *5*; εM+=0.06850 *19*
(821 *8*)	989.43		0.25 *11*	9.8	0.25 *11*	εK=0.7442; εL=0.1885 *4*; εM+=0.06731 *16*
(1000 *8*)	809.85		1.7 *2*	9.1	1.7 *2*	εK=0.7537; εL=0.18186 *24*; εM+=0.06448 *11*
(1024 *8*)	786.267		6.7 *4*	8.6	6.7 *4*	εK=0.7546; εL=0.18119 *23*; εM+=0.06419 *10*
1810 *8*	0.0	0.048 *6*	26 *3*	8.5	26 *3*	av Eβ=381 *4*; εK=0.7699; εL=0.1691; εM+=0.05909

† Deduced by the evaluators from a γ-ray transition intensity balance.

‡ Absolute intensity per 100 decays.

^{234}Np ε decay (continued)

γ(^{234}U)

Iγ normalization: The evaluators have deduced a normalization factor (N=NR x BR=0.988 *42*)and an electron capture plus positron decay to the g.s. of ^{234}U of 26.6 (40) (in relative units) from the decay scheme using the following quantities: I(K x ray)=64.0 (18), measured K x ray intensity (1993Ar13). Ice(K x ray)=1.46 *5*, kx-ray intensity deduced by the evaluators from K internal conversion electrons. ω(K)=0.970 *4*, atomic K-fluorescence yield (1996Sc06). r_0=I(ε(0)/I(β^+(0))=541, theoretical electron capture to positron ratio to g.s. of ^{234}U (1971Go40). P(ko)=0.7716 (20), theoretical K-capture to g.s. of ^{234}U probability (1995ScZY). Then, I(ε(0)+β^+(0))= 26.6 *4* x 0.988 *42*= 26% 3. This value may be compared with 25% 6, deduced from a measured I(β^+(0))=0.046% 10 (1955Pr29) and a theoretical ratio r_0=I(ε(0)/I(β^+(0))=541 (1971Go40). The agreement between these values confirms the completeness and consistency of the decay scheme.

γγ, γce: 1967Wa09.

x-rays:

E(x-ray) 1983Ar13	I(x-ray) 1983Ar13	I(x-ray) calculated	
94.64 5	18.5 9	19.1 15	Kα$_2$ x ray
98.43 5	31.0 15	31.0 25	Kα$_1$ x ray
111.24 6	10.7 6		Kβ$_1$′ x ray
114.48 6	3.77 23		Kβ$_2$′ x ray
		14.4 12	Kβ$_1$′ x ray+Kβ$_2$′ x ray
			L x ray/K x ray=0.7 (1953Ho49)

E$_γ$[†]	I$_γ$[‡a]	E$_i$(level)	J^π_i	E$_f$	J^π_f	Mult.[#]	δ	α[b]	Comments
43.49 *5*	0.067 *1*	43.498	2$^+$	0.0	0$^+$	E2		713	α(L)=520 *8*; α(M)=143.7 *22*; α(N+..)=49.3 *8* α(N)=38.9 *6*; α(O)=8.92 *14*; α(P)=1.442 *22*; α(Q)=0.00339 *5* E$_γ$: measurement of 1959Ga13. Eγ=43.498 *1* was measured in ^{238}Pu α decay. I$_γ$: deduced by the evaluators from intensity balance at the 43-keV level.
(62.70[@] *1*)	0.115[&] *11*	989.43	2$^-$	926.73	2$^+$	E1		0.426	α(L)=0.320 *5*; α(M)=0.0791 *11*; α(N+..)=0.0266 *4* α(N)=0.0209 *3*; α(O)=0.00481 *7*; α(P)=0.000795 *12*; α(Q)=3.22×10^{-5} *5* Mult.: from adopted gammas.
99.7 *1*	0.0318 *13*	143.30	4$^+$	43.498	2$^+$	E2		13.52	α(L)=9.84 *15*; α(M)=2.73 *4*; α(N+..)=0.940 *14* α(N)=0.741 *11*; α(O)=0.170 *3*; α(P)=0.0279 *5*; α(Q)=0.0001105 *16* E$_γ$: measurement of 1959Ga13. Eγ=99.853 *3* is adopted from measurements in ^{238}Pu α decay. I$_γ$: deduced by the evaluators from intensity balance at the 143-keV level. Mult.: from “Adopted Gammas”.
135.32 *8*	0.020 *2*	1570.68	1$^+$	1435.37	1$^-$	[E1]		0.247	α(K)=0.190 *3*; α(L)=0.0428 *6*; α(M)=0.01043 *15*; α(N+..)=0.00355 *5* α(N)=0.00278 *4*; α(O)=0.000653 *10*; α(P)=0.0001156 *17*; α(Q)=6.07×10^{-6} *9*

Continued on next page (footnotes at end of table)

^{234}Np ε decay (continued)

$\gamma(^{234}U)$ (continued)

E_γ [†]	I_γ [‡a]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [#]	δ	α [b]	Comments
140.1 *2*	0.029 *3*	989.43	2^-	849.38	3^-	M1+E2	1.3 *5*	5.1 *13*	α(K)=2.6 *16*; α(L)=1.79 *18*; α(M)=0.48 *6*; α(N+..)=0.165 *21* α(N)=0.130 *17*; α(O)=0.030 *4*; α(P)=0.0052 *5*; α(Q)=0.00014 *7* Mult.: from ^{234}Pa β^- decay (6.70 h).
166.5 *1*	0.006 *1*	1601.813	1^+	1435.37	1^-	[E1]		0.1514	α(K)=0.1179 *17*; α(L)=0.0253 *4*; α(M)=0.00613 *9*; α(N+..)=0.00210 *3* α(N)=0.001636 *23*; α(O)=0.000386 *6*; α(P)=6.92×10^{-5} *10*; α(Q)=3.85×10^{-6} *6*
^{x}171.41 *10*	0.011 *2*								
192.91[c] *7*	0.066[c] *7*	1044.53	0^+	851.69	2^+	[E2]		0.856	α(K)=0.1635 *23*; α(L)=0.505 *8*; α(M)=0.1391 *20*; α(N+..)=0.0480 *7* α(N)=0.0378 *6*; α(O)=0.00872 *13*; α(P)=0.001455 *21*; α(Q)=1.381×10^{-5} *20* Additional information 2.
192.91[c] *7*	0.066[c] *7*	1237.261	1^-	1044.53	0^+	[E1]		0.1072	α(K)=0.0840 *12*; α(L)=0.01746 *25*; α(M)=0.00423 *6*; α(N+..)=0.001449 *21* α(N)=0.001130 *16*; α(O)=0.000268 *4*; α(P)=4.84×10^{-5} *7*; α(Q)=2.80×10^{-6} *4* Additional information 3.
197.91 *15*	0.018 *4*	1435.37	1^-	1237.261	1^-	[M1,E2]		2.0 *12*	α(K)=1.3 *12*; α(L)=0.473 *22*; α(M)=0.122 *4*; α(N+..)=0.0423 *9* α(N)=0.0330 *10*; α(O)=0.00782 *12*; α(P)=0.00141 *11*; α(Q)=7.E−5 *6*
203.16 *7*	0.041 *4*	989.43	2^-	786.267	1^-	M1+E2	1.4 *4*	1.5 *4*	α(K)=0.9 *4*; α(L)=0.423 *11*; α(M)=0.1112 *16*; α(N+..)=0.0385 *6* α(N)=0.0301 *5*; α(O)=0.00708 *11*; α(P)=0.00125 *5*; α(Q)=4.6×10^{-5} *17* Mult.: from ^{234}Pa β^- decay (6.70 h).
233.6 *2*		1085.29	2^+	851.69	2^+				E_γ: from 1959Ga13. $I_{(\gamma+ce)}$: I(γ+ce)≈0.1%. Very weak K and L1 lines were observed by 1959Ga13. 1967Ha04 observed in their electron spectrum the 234-keV transition, corresponding to 233.6- and 234.6-keV transitions of 1959Ga13. Total ce intensities of 0.1% and 0.2% for these two transitions, respectively, were shown on the decay scheme of 1967Ha04; the method of dividing the observed intensity for 234-keV transition was not explained. Intensity balance at the 1085.4-keV level yields I(γ+ce)=0.04 *+7−4*, if there is no direct ε decay to the level.
234.6 *2*		1044.53	0^+	809.85	0^+	E0			ce(K)/(γ+ce)=0.78; ce(L)/(γ+ce)=0.15 E_γ: from 1959Ga13. Total Ice=0.165% 19 was calculated by the evaluator from [total Ice(234.6γ)]/Ice(K

Continued on next page (footnotes at end of table)

^{234}Np ε decay (continued)

γ(^{234}U) (continued)

E_γ[†]	I_γ[‡a]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	α[b]	Comments
								1001.05γ)=[87+9]/837 *10*, as measured in 1.17-min ^{234}Pa β^- decay. Extremely weak K- and L1 lines were observed by 1959Ga13. The 234.6-keV transition was also seen by 1967Ha04 and placed twice on the level scheme. The intensity of 0.2% shown on their decay scheme is consistent with the intensity deduced here.
235.62 *10*	0.012 *2*	1085.29	2^+	849.38	3^-	[E1]	0.0675	α(K)=0.0533 *8*; α(L)=0.01070 *15*; α(M)=0.00259 *4*; α(N+..)=0.000887 *13* α(N)=0.000691 *10*; α(O)=0.0001644 *23*; α(P)=3.00×10^{-5} *5*; α(Q)=1.82×10^{-6} *3*
^{x}238.6 *4*								E_γ: from 1959Ga13. An extremely weak line in electron spectrum was interpreted as K 238.6γ. This transition was placed by 1959Ga13 in the decay scheme to deexcite a level proposed at 1092 keV. This transition was not observed by 1983Ar13 and others.
247.79 *7*	0.109 *7*	1237.261	1^-	989.43	2^-	[M1,E2]	1.0 *7*	α(K)=0.7 *7*; α(L)=0.22 *5*; α(M)=0.056 *8*; α(N+..)=0.019 *3* α(N)=0.0151 *20*; α(O)=0.0036 *6*; α(P)=0.00066 *15*; α(Q)=4.E−5 *3*
258.19 *7*	0.119 *8*	1044.53	0^+	786.267	1^-	(E1)	0.0548	α(K)=0.0434 *6*; α(L)=0.00859 *12*; α(M)=0.00207 *3*; α(N+..)=0.000712 *10* α(N)=0.000555 *8*; α(O)=0.0001321 *19*; α(P)=2.42×10^{-5} *4*; α(Q)=1.499×10^{-6} *21* Mult.: from 1.17-min ^{234}Pa β^- decay.
^{x}265.8 *5*	<0.04							E_γ: from 1959Ga13. An extremely weak line in electron spectrum was assigned as K 265.8γ. This transition was placed by 1959Ga13 in the decay scheme to deexcite the 1602-keV level to a level proposed at 1340 keV. This transition was not observed by 1983Ar13 and others.
299.70 *10*	0.021 *2*	1085.29	2^+	786.267	1^-	[E1]	0.0393	α(K)=0.0313 *5*; α(L)=0.00605 *9*; α(M)=0.001459 *21*; α(N+..)=0.000502 *7* α(N)=0.000390 *6*; α(O)=9.32×10^{-5} *13*; α(P)=1.717×10^{-5} *24*; α(Q)=1.099×10^{-6} *16*
310.52 *10*	0.039 *4*	1237.261	1^-	926.73	2^+	[E1]	0.0364	α(K)=0.0290 *4*; α(L)=0.00558 *8*; α(M)=0.001344 *19*; α(N+..)=0.000462 *7* α(N)=0.000359 *5*; α(O)=8.58×10^{-5} *12*; α(P)=1.585×10^{-5} *23*; α(Q)=1.022×10^{-6} *15*
^{x}383.75 *10*	0.042 *5*							
387.94 *6*	0.208 *12*	1237.261	1^-	849.38	3^-	[E2]	0.0897	α(K)=0.0462 *7*; α(L)=0.0320 *5*; α(M)=0.00855 *12*; α(N+..)=0.00295 *5* α(N)=0.00232 *4*; α(O)=0.000542 *8*; α(P)=9.42×10^{-5} *14*; α(Q)=2.53×10^{-6} *4*
427.4 *2*	0.009 *2*	1237.261	1^-	809.85	0^+	[E1]	0.0185	α(K)=0.01488 *21*; α(L)=0.00274 *4*; α(M)=0.000657 *10*; α(N+..)=0.000226 *4* α(N)=0.0001758 *25*; α(O)=4.22×10^{-5} *6*; α(P)=7.88×10^{-6} *11*; α(Q)=5.40×10^{-7} *8*
445.91 *10*	0.020 *4*	1435.37	1^-	989.43	2^-	[M1,E2]	0.20 *14*	α(K)=0.15 *12*; α(L)=0.036 *16*; α(M)=0.009 *4*;

Continued on next page (footnotes at end of table)

^{234}Np ε decay (continued)

γ(^{234}U) (continued)

E_γ[†]	I_γ[‡a]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ	α[b]	Comments
									α(N+..)=0.0031 *13* α(N)=0.0024 *10*; α(O)=0.00058 *25*; α(P)=0.00011 *5*; α(Q)=7.E−6 *6*
450.93 *4*	1.15 *5*	1237.261	1⁻	786.267	1⁻	M1+E2	0.70	0.241	α(K)=0.187 *3*; α(L)=0.0400 *6*; α(M)=0.00980 *14*; α(N+..)=0.00341 *5* α(N)=0.00264 *4*; α(O)=0.000638 *9*; α(P)=0.0001213 *17*; α(Q)=8.79×10^{-6} *13*
485.44 *7*	0.089 *7*	1570.68	1⁺	1085.29	2⁺	[M1,E2]		0.16 *11*	α(K)=0.12 *10*; α(L)=0.028 *13*; α(M)=0.007 *3*; α(N+..)=0.0024 *11* α(N)=0.0019 *8*; α(O)=0.00045 *20*; α(P)=8.E−5 *4*; α(Q)=6.E−6 *5*
516.60 *6*	0.313 *19*	1601.813	1⁺	1085.29	2⁺	(M1)		0.228	α(K)=0.182 *3*; α(L)=0.0347 *5*; α(M)=0.00837 *12*; α(N+..)=0.00292 *4* α(N)=0.00226 *4*; α(O)=0.000548 *8*; α(P)=0.0001058 *15*; α(Q)=8.44×10^{-6} *12*
526.02 *10*	0.043 *5*	1570.68	1⁺	1044.53	0⁺	[M1]		0.217	α(K)=0.1732 *25*; α(L)=0.0331 *5*; α(M)=0.00797 *12*; α(N+..)=0.00278 *4* α(N)=0.00215 *3*; α(O)=0.000522 *8*; α(P)=0.0001007 *15*; α(Q)=8.04×10^{-6} *12*
557.24 *6*	0.214 *13*	1601.813	1⁺	1044.53	0⁺	(M1)		0.186	α(K)=0.1485 *21*; α(L)=0.0283 *4*; α(M)=0.00682 *10*; α(N+..)=0.00238 *4* α(N)=0.00184 *3*; α(O)=0.000447 *7*; α(P)=8.62×10^{-5} *12*; α(Q)=6.88×10^{-6} *10*
581.19 *10*	0.38 *4*	1570.68	1⁺	989.43	2⁻	[E1]		0.01006	α(K)=0.00815 *12*; α(L)=0.001445 *21*; α(M)=0.000345 *5*; α(N+..)=0.0001192 *17* α(N)=9.24×10^{-5} *13*; α(O)=2.23×10^{-5} *4*; α(P)=4.20×10^{-6} *6*; α(Q)=3.03×10^{-7} *5*
625.66 *7*	0.076 *7*	1435.37	1⁻	809.85	0⁺	[E1]		0.00875	α(K)=0.00710 *10*; α(L)=0.001248 *18*; α(M)=0.000298 *5*; α(N+..)=0.0001029 *15* α(N)=7.98×10^{-5} *12*; α(O)=1.92×10^{-5} *3*; α(P)=3.63×10^{-6} *5*; α(Q)=2.65×10^{-7} *4*
649.12[d] *10*	0.027[d] *6*	1435.37	1⁻	786.267	1⁻	[M1,E2]		0.07 *5*	α(K)=0.06 *4*; α(L)=0.012 *7*; α(M)=0.0031 *15*; α(N+..)=0.0011 *6* α(N)=0.0008 *4*; α(O)=0.00020 *10*; α(P)=3.8×10^{-5} *20*; α(Q)=2.7×10^{-6} *19*
649.12[d] *10*	≈0.005[d]	1500.87	(1)	851.69	2⁺				
(670.8[@] *10*)	0.0035[&] *11*	1457.1	(2⁻)	786.267	1⁻				
691.08 *10*	0.038 *4*	1500.87	(1)	809.85	0⁺				
[x]702.11 *20*	0.020 *4*								

Continued on next page (footnotes at end of table)

^{234}Np ε decay (continued)

γ(^{234}U) (continued)

E_γ[†]	I_γ[‡a]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	α[b]	Comments
706.04 10	0.153 9	849.38	3⁻	143.30	4⁺	[E1]	0.00698	α(K)=0.00568 8; α(L)=0.000986 14; α(M)=0.000235 4; α(N+..)=8.12×10^{-5} 12 α(N)=6.29×10^{-5} 9; α(O)=1.519×10^{-5} 22; α(P)=2.88×10^{-6} 4; α(Q)=2.13×10^{-7} 3
708.11 20	0.052 6	851.69	2⁺	143.30	4⁺	[E2]	0.0219	α(K)=0.01537 22; α(L)=0.00489 7; α(M)=0.001247 18; α(N+..)=0.000432 6 α(N)=0.000337 5; α(O)=8.00×10^{-5} 12; α(P)=1.459×10^{-5} 21; α(Q)=7.29×10^{-7} 11
719.01 7	0.122 7	1570.68	1⁺	851.69	2⁺	[M1+E2]	0.06 4	α(K)=0.05 3; α(L)=0.009 5; α(M)=0.0023 12; α(N+..)=0.0008 4 α(N)=0.0006 3; α(O)=0.00015 8; α(P)=2.9×10^{-5} 15; α(Q)=2.1×10^{-6} 14
742.78 4	5.27 21	786.267	1⁻	43.498	2⁺	E1	0.00636	α(K)=0.00518 8; α(L)=0.000895 13; α(M)=0.000213 3; α(N+..)=7.37×10^{-5} 11 α(N)=5.71×10^{-5} 8; α(O)=1.378×10^{-5} 20; α(P)=2.61×10^{-6} 4; α(Q)=1.95×10^{-7} 3
750.12 6	0.440 26	1601.813	1⁺	851.69	2⁺	(M1)	0.0841	α(K)=0.0672 10; α(L)=0.01272 18; α(M)=0.00306 5; α(N+..)=0.001067 15 α(N)=0.000825 12; α(O)=0.000201 3; α(P)=3.87×10^{-5} 6; α(Q)=3.09×10^{-6} 5
760.53 15	0.020 4	1570.68	1⁺	809.85	0⁺	[M1]	0.0811	α(K)=0.0648 9; α(L)=0.01226 18; α(M)=0.00295 5; α(N+..)=0.001029 15 α(N)=0.000795 12; α(O)=0.000193 3; α(P)=3.73×10^{-5} 6; α(Q)=2.98×10^{-6} 5
766.37 5	0.584 29	809.85	0⁺	43.498	2⁺	(E2)	0.0187	α(K)=0.01336 19; α(L)=0.00396 6; α(M)=0.001003 14; α(N+..)=0.000348 5 α(N)=0.000271 4; α(O)=6.45×10^{-5} 9; α(P)=1.182×10^{-5} 17; α(Q)=6.25×10^{-7} 9 Mult.: from 1.17-min ^{234}Pa β⁻ decay.
(783.42[@] 1)	0.0033[&] 4	926.73	2⁺	143.30	4⁺	[E2]	0.0179	α(K)=0.01285 18; α(L)=0.00374 6; α(M)=0.000946 14; α(N+..)=0.000328 5 α(N)=0.000255 4; α(O)=6.08×10^{-5} 9; α(P)=1.116×10^{-5} 16; α(Q)=5.99×10^{-7} 9 a peak reported in 1983Ar13 at 782.32 15 keV with Iγ=0.027 13 is assumed by the evaluators to be due mostly to an impurity.
786.28 4	3.19 13	786.267	1⁻	0.0	0⁺	(E1)	0.00573	α(K)=0.00467 7; α(L)=0.000804 12; α(M)=0.000191 3; α(N+..)=6.61×10^{-5} 10 α(N)=5.12×10^{-5} 8; α(O)=1.237×10^{-5} 18; α(P)=2.35×10^{-6} 4; α(Q)=1.766×10^{-7} 25 Mult.: from 1.17-min ^{234}Pa β⁻ decay.
791.94 5	0.254 15	1601.813	1⁺	809.85	0⁺	[M1]	0.0728	α(K)=0.0582 9; α(L)=0.01100 16; α(M)=0.00265 4; α(N+..)=0.000923 13 α(N)=0.000713 10; α(O)=0.0001735 25; α(P)=3.35×10^{-5} 5; α(Q)=2.68×10^{-6} 4
805.86 7	0.182 19	849.38	3⁻	43.498	2⁺	[E1]	0.00548	α(K)=0.00447 7; α(L)=0.000767 11; α(M)=0.000183 3; α(N+..)=6.31×10^{-5} 9 α(N)=4.89×10^{-5} 7; α(O)=1.181×10^{-5} 17; α(P)=2.24×10^{-6} 4; α(Q)=1.692×10^{-7} 24
808.13 10	0.101 10	851.69	2⁺	43.498	2⁺	E0+E2	4.2	α(K)=3.3; α(L)+=0.93 α: Ice(K 808.13γ)=0.33 from Ice(K 809 doublet)=1.67 (1967Wa09) and Ice(K 809.8)/Ice(K 808.13)=4 1 (1959Ga13). The

Continued on next page (footnotes at end of table)

^{234}Np ε decay (continued)

γ(^{234}U) (continued)

E_γ[†]	I_γ[‡a]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	α[b]	Comments
								ratio of K/LMN=3.5, as measured for 809.8 E0 transition in ^{238}Pu decay, is used to deduce the total ce intensity. [α(K)(E2; 808.13γ)=0.0123; therefore, the measured ce intensity is essentially due to the E0 part of the transition].
809.8		809.85	0$^+$	0.0	0$^+$	E0		ce(K)/(γ+ce)=0.78; ce(L)/(γ+ce)=0.15 E_γ: measurement of 1967Ha04. Ice(K)=1.34 for the 809.8-keV E0 transition from the measured intensity of Ice(K 809 doublet)=1.67 (1967Wa09) and Ice(K 809.8γ)/Ice(K 808.13γ)=4 *1* (1959Ga13). The ratio of K/LMN=3.5, as measured for 809.8 E0 transition in ^{238}Pu decay, is used to deduce the total ce intensity of≈1.7%.
851.77 *6*	0.167 *10*	851.69	2$^+$	0.0	0$^+$	[E2]	0.01513	α(K)=0.01109 *16*; α(L)=0.00302 *5*; α(M)=0.000759 *11*; α(N+..)=0.000263 *4* α(N)=0.000205 *3*; α(O)=4.89×10^{-5} *7*; α(P)=9.02×10^{-6} *13*; α(Q)=5.10×10^{-7} *8*
883.04 *15*	0.105 *10*	926.73	2$^+$	43.498	2$^+$	E2	0.01410	α(K)=0.01041 *15*; α(L)=0.00276 *4*; α(M)=0.000692 *10*; α(N+..)=0.000240 *4* α(N)=0.000187 *3*; α(O)=4.46×10^{-5} *7*; α(P)=8.25×10^{-6} *12*; α(Q)=4.76×10^{-7} *7* Mult.: from ^{234}Pa β$^-$ decay (6.70-h).
926.63 *10*	0.068 *7*	926.73	2$^+$	0.0	0$^+$	(E2)	0.01284	α(K)=0.00956 *14*; α(L)=0.00245 *4*; α(M)=0.000613 *9*; α(N+..)=0.000213 *3* α(N)=0.0001653 *24*; α(O)=3.96×10^{-5} *6*; α(P)=7.34×10^{-6} *11*; α(Q)=4.34×10^{-7} *6* Mult.: from ^{234}Pa β$^-$ decay (6.70-h).
941.93 *17*	0.248 *15*	1085.29	2$^+$	143.30	4$^+$	[E2]	0.01244	α(K)=0.00929 *13*; α(L)=0.00236 *4*; α(M)=0.000589 *9*; α(N+..)=0.000204 *3* α(N)=0.0001587 *23*; α(O)=3.80×10^{-5} *6*; α(P)=7.05×10^{-6} *10*; α(Q)=4.21×10^{-7} *6*
945.91 *5*	0.432 *26*	989.43	2$^-$	43.498	2$^+$	(E1)	0.00412	α(K)=0.00337 *5*; α(L)=0.000571 *8*; α(M)=0.0001355 *19*; α(N+..)=4.69×10^{-5} *7* α(N)=3.63×10^{-5} *5*; α(O)=8.79×10^{-6} *13*; α(P)=1.675×10^{-6} *24*; α(Q)=1.286×10^{-7} *18*
1001.05 *5*	1.59 *7*	1044.53	0$^+$	43.498	2$^+$	E2	0.01107	α(K)=0.00835 *12*; α(L)=0.00204 *3*; α(M)=0.000507 *8*; α(N+..)=0.0001759 *25* α(N)=0.0001367 *20*; α(O)=3.28×10^{-5} *5*; α(P)=6.10×10^{-6} *9*; α(Q)=3.76×10^{-7} *6*
1041.62 *10*	0.15 *2*	1085.29	2$^+$	43.498	2$^+$			
1085.45 *15*	0.019 *4*	1085.29	2$^+$	0.0	0$^+$			
[x]1105 *2*								E_γ: from 1959Ga13. An extremely weak ce line observed in the spectrum was assigned as K 1105γ. This transition was not observed by 1983Ar13 and others.
1193.78 *4*	6.02 *24*	1237.261	1$^-$	43.498	2$^+$	E1	0.00277	α(K)=0.00226 *4*; α(L)=0.000377 *6*; α(M)=8.92×10^{-5} *13*; α(N+..)=4.12×10^{-5} *6* α(N)=2.39×10^{-5} *4*; α(O)=5.80×10^{-6} *9*; α(P)=1.109×10^{-6} *16*; α(Q)=8.70×10^{-8} *13*; α(IPF)=1.027×10^{-5} *15*
[x]1220.38 *15*	0.040 *5*							
1237.22 *4*	2.30 *9*	1237.261	1$^-$	0.0	0$^+$	E1	0.00262	α(K)=0.00213 *3*; α(L)=0.000354 *5*; α(M)=8.38×10^{-5} *12*; α(N+..)=5.11×10^{-5} *8*

Continued on next page (footnotes at end of table)

^{234}Np ε decay (continued)

γ(^{234}U) (continued)

Eγ[†]	Iγ[‡a]	Ei(level)	J^{π}_i	Ef	J^{π}_f	Mult.[#]	α[b]	Comments
								α(N)=2.25×10^{-5} *4*; α(O)=5.44×10^{-6} *8*; α(P)=1.042×10^{-6} *15*; α(Q)=8.20×10^{-8} *12*; α(IPF)=2.21×10^{-5} *3*
1391.87 *4*	2.27 *9*	1435.37	1$^-$	43.498	2$^+$	E1	0.00221	α(K)=0.001745 *25*; α(L)=0.000288 *4*; α(M)=6.82×10^{-5} *10*; α(N+..)=0.0001116 *16* α(N)=1.83×10^{-5} *3*; α(O)=4.44×10^{-6} *7*; α(P)=8.51×10^{-7} *12*; α(Q)=6.76×10^{-8} *10*; α(IPF)=8.79×10^{-5} *13*
1413.6 *3*	0.021 *4*	1457.1	(2$^-$)	43.498	2$^+$			
1435.36 *4*	6.38 *25*	1435.37	1$^-$	0.0	0$^+$	E1	0.00213	α(K)=0.001658 *24*; α(L)=0.000274 *4*; α(M)=6.47×10^{-5} *9*; α(N+..)=0.0001355 *19* α(N)=1.734×10^{-5} *25*; α(O)=4.21×10^{-6} *6*; α(P)=8.07×10^{-7} *12*; α(Q)=6.43×10^{-8} *9*; α(IPF)=0.0001130 *16*
(1458.5[@] *15*)	0.009[&] *3*	1500.87	(1)	43.498	2$^+$			
1466.5 *2*	0.032 *3*	1510.23	1	43.498	2$^+$			
1510.35 *15*	0.024 *3*	1510.23	1	0.0	0$^+$			
1527.21 *4*	11.2 *5*	1570.68	1$^+$	43.498	2$^+$	E2+M1	0.009 *4*	α(K)=0.007 *4*; α(L)=0.0014 *6*; α(M)=0.00033 *14*; α(N+..)=0.00022 *10* α(N)=9.E−5 *4*; α(O)=2.1×10^{-5} *9*; α(P)=4.1×10^{-6} *17*; α(Q)=3.2×10^{-7} *15*; α(IPF)=0.00011 *5*
1558.31 *4*	18.72 *20*	1601.813	1$^+$	43.498	2$^+$	M1	0.01228	α(K)=0.00971 *14*; α(L)=0.00181 *3*; α(M)=0.000434 *6*; α(N+..)=0.000330 *5* α(N)=0.0001169 *17*; α(O)=2.84×10^{-5} *4*; α(P)=5.49×10^{-6} *8*; α(Q)=4.43×10^{-7} *7*; α(IPF)=0.0001783 *25*
1570.68 *4*	5.09 *21*	1570.68	1$^+$	0.0	0$^+$	M1	0.01204	α(K)=0.00951 *14*; α(L)=0.001769 *25*; α(M)=0.000425 *6*; α(N+..)=0.000335 *5* α(N)=0.0001145 *16*; α(O)=2.79×10^{-5} *4*; α(P)=5.38×10^{-6} *8*; α(Q)=4.33×10^{-7} *6*; α(IPF)=0.000187 *3*
1601.80 *4*	9.1 *4*	1601.813	1$^+$	0.0	0$^+$	(M1)		
[x]1738.0 *5*	0.003 *1*							

[†] Unless otherwise noted, measurements of 1983Ar13 are given. Other measurements: 1967Wa09, 1967Ha04, 1959Ga13. Earlier measurements: 1951Ok06, 1953Ho49, 1956Hu28, 1958Le73.

[‡] Measurements of 1983Ar13, unless otherwise noted.

[#] Adopted values from ce measurements of 1967Wa09 and 1959Ga13. For a tabulation of measured ce intensities, see 1970El22. The Ice's have been renormalized by the evaluators such that the K-conversion coefficient for the 1558.31γ is 0.00971. Multipolarities in square brackets are from level scheme.

[@] Transition was not observed in ^{234}Np ε decay. Eγ is from "Adopted Gammas".

[&] Calculated by the evaluator from Adopted Gammas branchings.

[a] For absolute intensity per 100 decays, multiply by 0.99 *4*.

[b] 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.

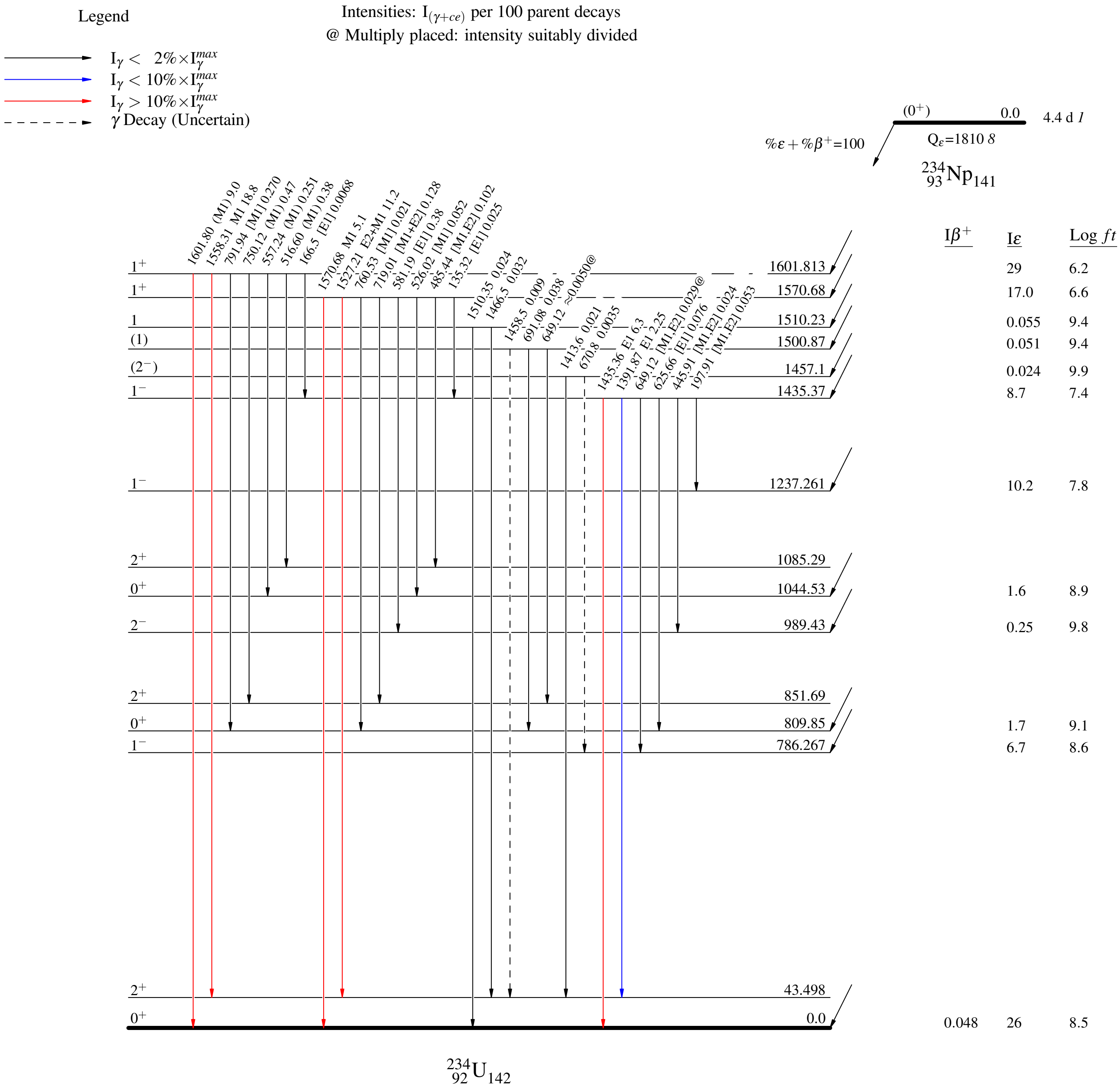
[c] Multiply placed with undivided intensity.

[d] Multiply placed with intensity suitably divided.

[x] γ ray not placed in level scheme.

^{234}Np ε decay

Decay Scheme

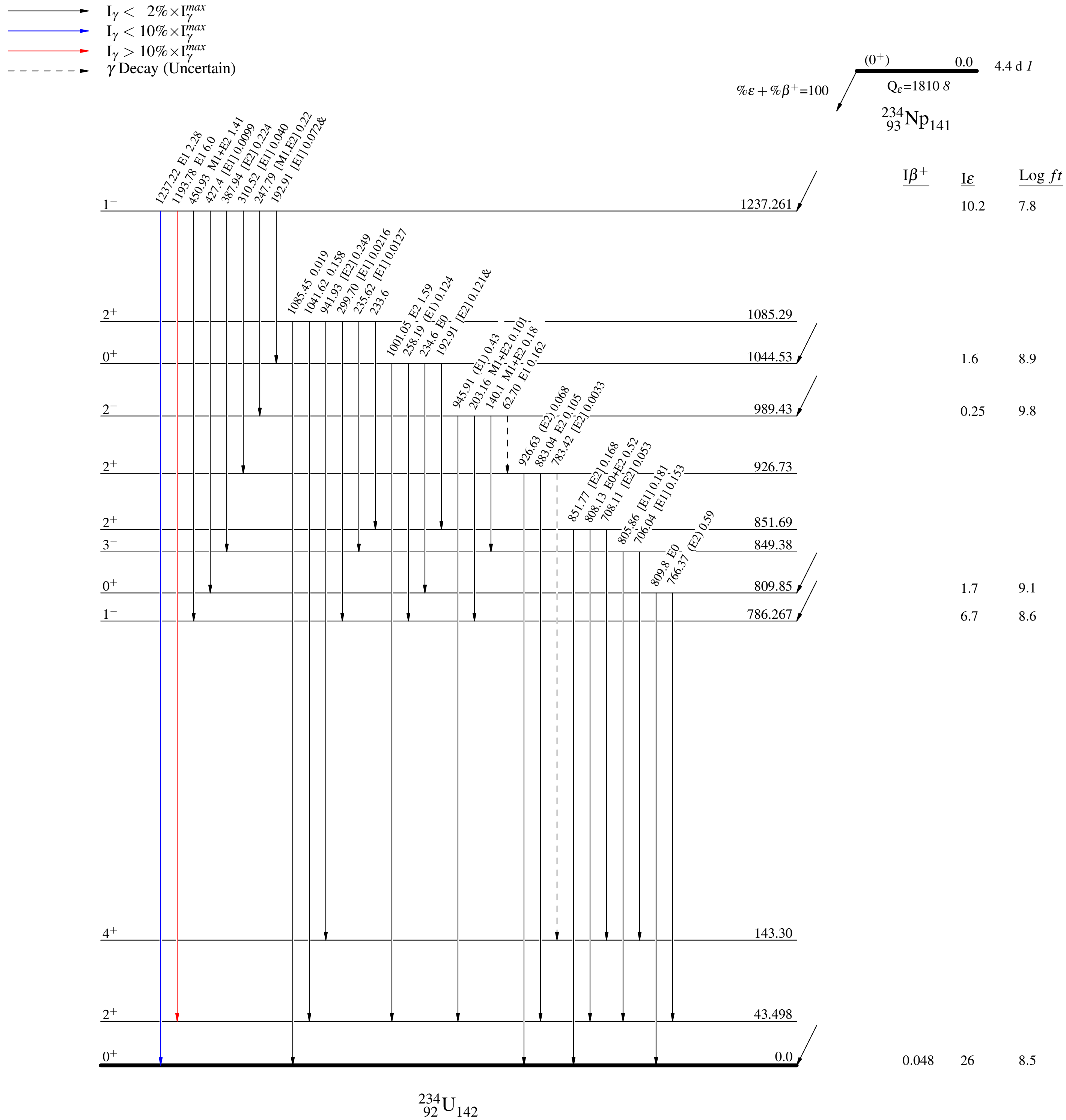


^{234}Np ε decay

Decay Scheme (continued)

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

Legend



^{234}Np ε decay

Decay Scheme (continued)

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