^{232}Th(α,4nγ), ^{230}Th(α,2nγ) 1980Ja03,1985Ve06,1987Ze07

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

E(α)=40 MeV. γ Ge(Li), ce s Si(Li), $\gamma\gamma$ coin, ceγ coin (1980Ja03). ce in coin with pulsed beam (magnetic spectrometer) (1985Ve06). ceγ coin Ge(Li) magnetic spectrometer (1983Ha31). ^{230}Th(α,2nγ) E(α)=20 MeV; γ Ge(Li), ce iron-free spectrometer (1987Ze07). ^{232}Th(α,4nγ) E(α)=42 MeV, Ge(Li) array (1986El05).

^{232}Th(α,4nγ); E(α)=42 MeV. Measured γ rays in coincidence with conversion electrons from the 6^+ to 4^+ g.s. rotational band. Used four Compton-suppressed germanium detectors for γ rays and a magnetic orange spectrometer for conversion electrons (1993Ac02). Others: 1976WaZO, 1981JaZT.

^{232}U Levels

E(level)	J$^\pi$	E(level)	J$^\pi$	E(level)	J$^\pi$	E(level)	J$^\pi$
0[†]	0^+	691.1[#]	0^+	1111.7[†]	12^+	1828.5	16^+
47.6[†]	2^+	734.6[#]	2^+	1130.7[‡]	(9^-)	2023.4[‡]	(15^-)
156.6[†]	4^+	746.8[‡]	(5^-)	1187.3[#]	8^+	2231.7[†]	(18^+)
322.8[†]	6^+	806.0[†]	10^+	1391.0[‡]	11^-	2387.3[‡]	(17^-)
541.2[†]	8^+	832.0[#]	4^+	1434.9[#]	10^+	2659[†]	(20^+)
563.2[‡]	1^-	914.8[‡]	(7^-)	1454.0[†]	14^+		
629.0[‡]	3^-	985.2[#]	6^+	1689.4?[‡]	(13^-)		

[†] Band(A): K$^\pi$=0$^+$ g.s. rotational band (1981JaZT,1983Ha31,1986El05).
[‡] Band(B): K$^\pi$=0$^-$ Octupole vibrational band (1987Ze07).
[#] Band(C): K$^\pi$=0$^+$ Beta vibrational band (1985Ve06).

γ(^{232}U)

E$_\gamma$[†]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[#]	α[@]	I$_{(\gamma+ce)}$[‡]	Comments
47.6 *1*	47.6	2^+	0	0^+				
109.0 *1*	156.6	4^+	47.6	2^+				
166.3 *2*	322.8	6^+	156.6	4^+	E2	1.560	100	α(K)= 0.2038; α(L)= 0.983; α(M)= 0.272; α(N+..)= 0.1011
218.4 *1*	541.2	8^+	322.8	6^+	E2	0.554	85 *7*	α(K)= 0.1355; α(L)= 0.304; α(M)= 0.0834; α(N+..)= 0.0309
264.8 *1*	806.0	10^+	541.2	8^+	E2	0.286	66 *6*	α(K)= 0.0961; α(L)= 0.1384; α(M)= 0.0376; α(N+..)=0.01397
305.7 *1*	1111.7	12^+	806.0	10^+	E2	0.182	52 *6*	α(K)=0.073; α(L)=0.079
342.2 *2*	1454.0	14^+	1111.7	12^+	E2	0.1297	25 *5*	α(K)= 0.0593; α(L)= 0.0514; α(M)=0.01380; α(N+..)=0.00513
374.2 *5*	914.8	(7^-)	541.2	8^+				
374.4 *2*	1828.5	16^+	1454.0	14^+	E2	0.1007	20 *5*	α(K)= 0.0501; α(L)= 0.0370; α(M)=0.00990; α(N+..)=0.00367
403.4 *5*	2231.7	(18^+)	1828.5	16^+	E2		7 *2*	I$_{(\gamma+ce)}$: From 1983Ha31.
424.3 *5*	746.8	(5^-)	322.8	6^+				
428.2 *6*	2659	(20^+)	2231.7	(18^+)	(E2)			
472.4 *5*	629.0	3^-	156.6	4^+				
515.6 *5*	563.2	1^-	47.6	2^+				
558.8	2387.3	(17^-)	1828.5	16^+	[E1]			From 1993Ac02.
563.2 *5*	563.2	1^-	0	0^+				
569.4	2023.4	(15^-)	1454.0	14^+	[E1]			From 1993Ac02.
577.7[&] *5*	1689.4?	(13^-)	1111.7	12^+	[E1]			

Continued on next page (footnotes at end of table)

^{232}Th(α,4nγ), ^{230}Th(α,2nγ) 1980Ja03,1985Ve06,1987Ze07 (continued)

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

E_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [#]	Comments
581.4 *5*	629.0	3^-	47.6	2^+		
585.0 *5*	1391.0	11^-	806.0	10^+	[E1]	
590.0 *5*	1130.7	(9^-)	541.2	8^+	[E1]	
590.4 *5*	746.8	(5^-)	156.6	4^+		
592.4 *5*	914.8	(7^-)	322.8	6^+	[E1]	
628.4 *4*	1434.9	10^+	806.0	10^+	E0	ce(K)=35 *10*.
645.5 *3*	1187.3	8^+	541.2	8^+	E0	ce(K)=54 *10*.
662.2 *2*	985.2	6^+	322.8	6^+	E0	ce(K)=92 *10*.
676.5 *2*	832.0	4^+	156.6	4^+	E0	ce(K)=114 *10*.
686.6 *2*	734.6	2^+	47.6	2^+	E0	ce(K)=100 *15*.
691.3 *5*	691.1	0^+	0	0^+	E0	ce(K)=50 *10*.

† g.s. band from 1980Ja03, 1983Ha31, 1986El05. Data for β band from 1985Ve06 (^{232}Th(α,4nγ) E(α)=40 MeV, magnetic spectrometer). Octupole band from 1987Ze07, uncertainties of 0.5 keV estimated by evaluator.

‡ From sum of I(γ) and I(ce) normalized to 100 for the 6^+ to 4^+ transition at E(α)=40 MeV (1980Ja03). ce(K) values for E0 transitions from 1985Ve06, normalized to 100 for 686.6γ at E(α)=40 MeV.

Based on K/L, L12/L3 of 1980Ja03, and L-subshell ratios of 1983Ha31. E0 assignment from 1985Ve06 based on strong ce lines.

@ 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.

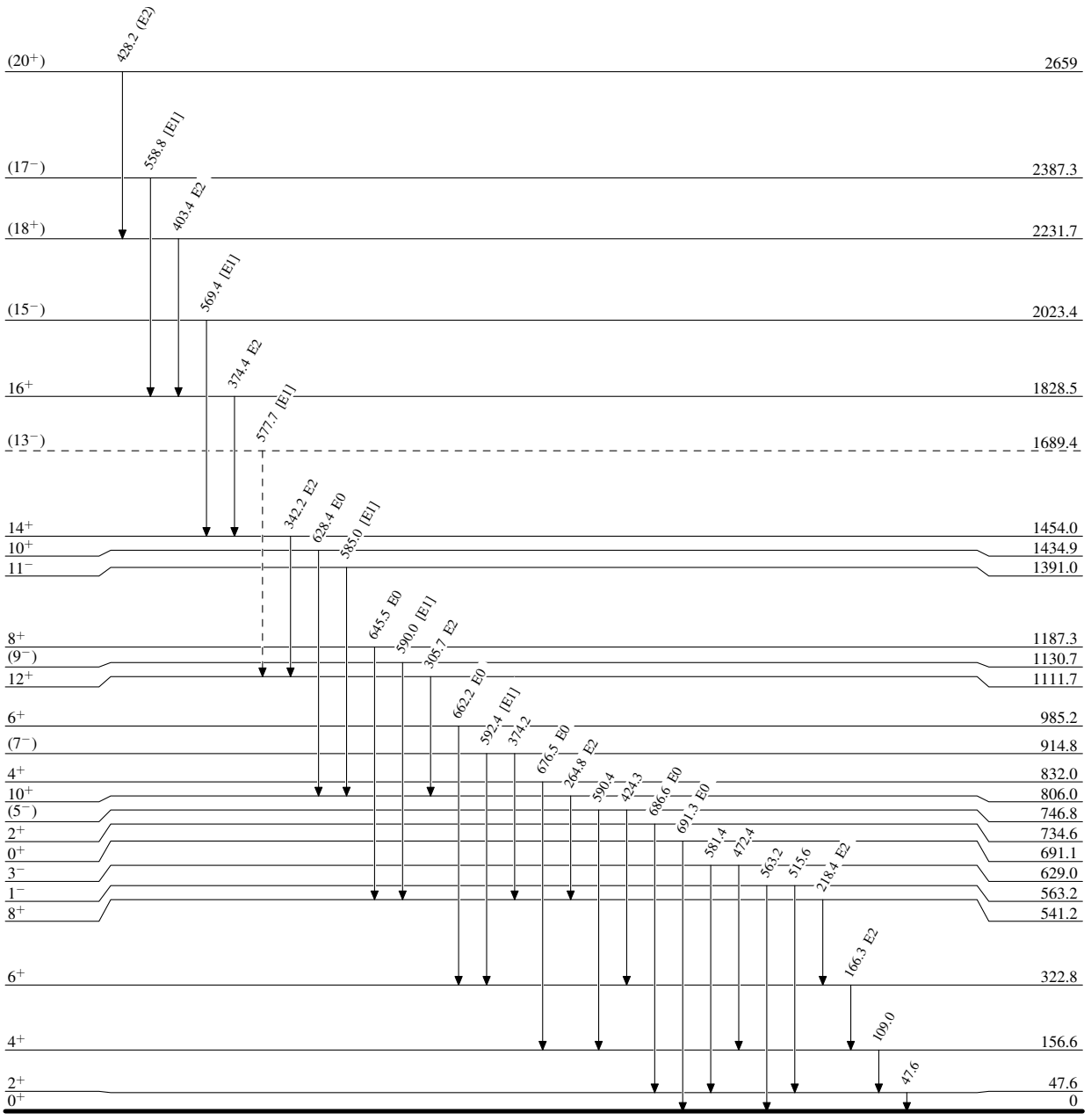
& Placement of transition in the level scheme is uncertain.

Legend

^{232}Th(α,4nγ), ^{230}Th(α,2nγ) 1980Ja03,1985Ve06,1987Ze07

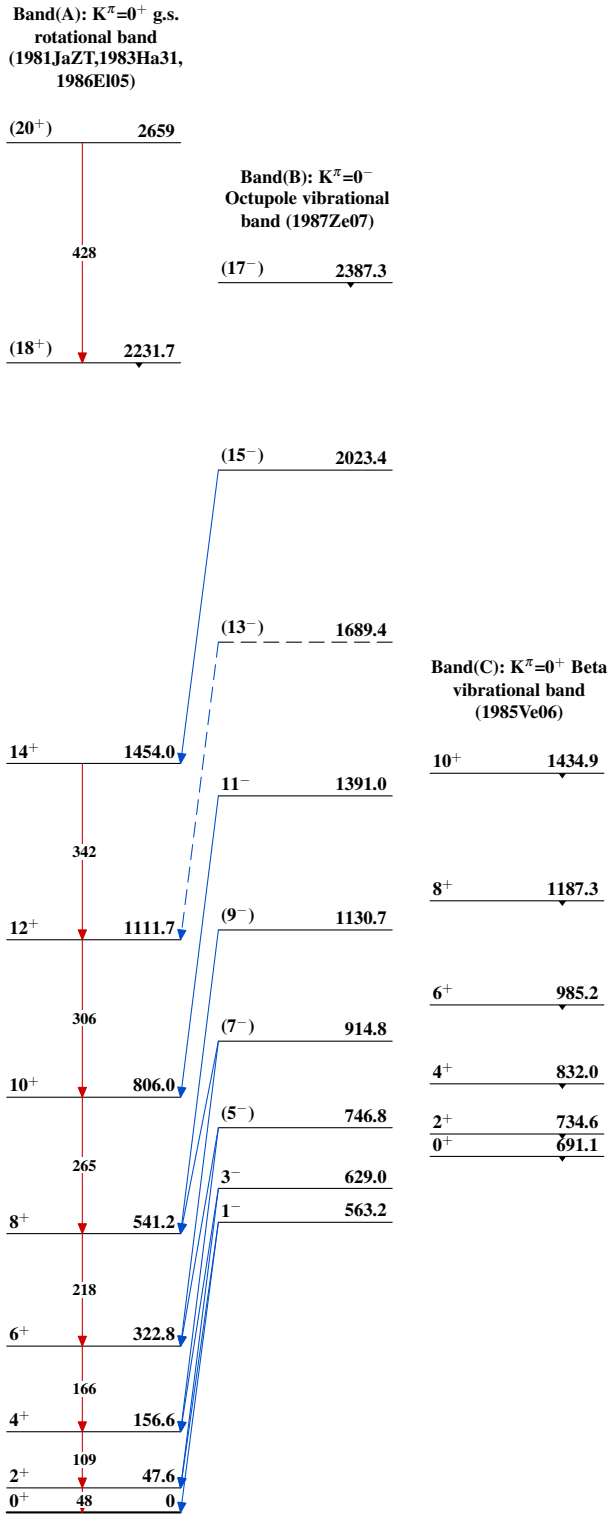
Level Scheme

γ Decay (Uncertain)



$^{232}_{92}U_{140}$

^{232}Th(α,4nγ), ^{230}Th(α,2nγ) 1980Ja03,1985Ve06,1987Ze07



$^{232}_{92}U_{140}$