^{232}U α decay 1977Ku15,1986LoZT

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Khalifeh Abusaleem	NDS 116, 163 (2014)	31-Dec-2012

Parent: ^{232}U: E=0; $J^\pi=0^+$; $T_{1/2}$=68.9 y *4*; Q(α)=5413.63 *9*; %α decay=100.0
^{232}U-Q(α): From 2012Wa38.

^{228}Th Levels

E(level)†	J^π†	$T_{1/2}$	Comments
0.0	0^+		
57.78 *5*	2^+	0.406 ns *7*	$T_{1/2}$: weighted average of 0.409 ns *10* (1970To08) and 0.402 ns *10* (1965Ne03); other: 0.40 ns *3* (1960Be25).
186.85 *7*	4^+	0.164 ns *4*	$T_{1/2}$: weighted average of 0.169 ns *7* (1970To08), 0.161 ns *5* (1965Ne03).
327.91 *14*	1^-		
377.89 *21*	6^+		
395.96 *19*	3^-		
519.1 *3*	5^-		
831.4 *3*	0^+		
874.6 *6*	2^+		

† From Adopted Levels.

α radiations

Eα†	E(level)	Iα‡[a]	HF#	Comments
4460.94 *CA*	874.6	3.9×10^{-6} *9*	27 *8*	Iα: includes additional weak γ's at 688.1, 816.7 and 874.4 keV, from Adopted Levels. Iα=3.2×10^{-6} *9* without inclusion of these additional γ's.
4502.80 *CA*	831.4	2.1×10^{-5} *2*	10.6 *11*	Iα: 0.000024 *7* (1963Le17).
4810.04 *CA*	519.1	5.6×10^{-5} *3*	680 *40*	
4931.04 *CA*	395.96	4.8×10^{-5} *4*	5.2×10^{3} *5*	Iα: 0.00021 *3* (1966Ba49).
4948.63 *CA*	377.89	5.1×10^{-5} *5*	6.4×10^{3} *6*	Iα: 0.00017 *3* (1966Ba49).
4997.94 *CA*	327.91	0.00616 *8*	111 *2*	Iα: 0.0029 *2* (1966Ba49).
5139.0 *20*	186.85	0.30 *2*	17.5 *12*	Iα: weighted average from 1955As28, 1965Be15, 1966Ba49, 1971So15.
5263.36@ *9*	57.78	31.55& *23*	0.992 *12*	
5320.12@ *14*	0.0	68.15& *23*	1.00	

† 1972Go33, 1971So15, 1966Ba49, 1963Le17. Calculated values are from Q(α) and E(level) in ^{228}Th.
‡ Calculated from I(γ+ce) balance in level scheme, unless otherwise noted. The values differ substantially from the direct Iα measurements of 1966Ba49.
# HF(5320.12α)=1.00 yields $r_0(^{228}Th)$=1.5289 *3*.
@ From 1991Ry01. Recommended Eα=5262.36 *9* in 1991Ry01 is a misprint, see originally published Eα and adjustment.
& From I(A_0)/Iα(58)=0.463 *5* (weighted average from 1955As28, 1965Be15, 1966Ba49, 1971So15) and I(A_0)+Iα(58)=99.70 *2*.
[a] Absolute intensity per 100 decays.

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γ(^{228}Th)

Iγ normalization: From absolute Iγ measurements of 1984Ge07, 1986LoZT.

E_γ[†]	I_γ[†&]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α[a]	$I_{(\gamma+ce)}$[&]	Comments
57.78 *5*	77.2[#] *7*	57.78	2^+	0.0	0^+	E2	156		α(L)= 114; α(M)= 31.1; α(N+..)= 11.4 α: 158 *7* (1968Du06). Mult.: L1:L2:L3=3.55 *25*:115 *4*:100 (1966Ha01); M1:M2:M3=5.3 *13*:107 *8*:100, M3/L3=0.32 *3* (1966Ra15); theory: L1:L2:L3=3.90:119:100, M1:M2:M3=4.35:114:100, M3/L3=0.276.
129.08 *5*	26.33[#] *15*	186.85	4^+	57.78	2^+	E2	3.81		α(K)= 0.269; α(L)= 2.57; α(M)= 0.706; α(N+..)= 0.263
141.0 *5*	0.0012 *5*	519.1	5^-	377.89	6^+	(E1)	0.220		α(K)= 0.1711; α(L)= 0.0367; α(M)=0.00883; α(N+..)=0.00313
191.0 *2*	0.012 *1*	377.89	6^+	186.85	4^+	E2	0.791		α(K)= 0.1741; α(L)= 0.453; α(M)= 0.1237; α(N+..)= 0.0457
209.5 *5*	0.0041 *10*	395.96	3^-	186.85	4^+	E1	0.0856		α(K)= 0.0676; α(L)=0.01341; α(M)=0.00323; α(N+..)=0.00114
270.2 *2*	1.220[#] *19*	327.91	1^-	57.78	2^+	E1	0.0474		α(K)= 0.0379; α(L)=0.00722; α(M)=0.00173; α(N+..)=0.00061
327.9 *2*	1.093[#] *23*	327.91	1^-	0.0	0^+	E1	0.0308		α(K)=0.02472; α(L)=0.00458; α(M)=0.00110; α(N+..)=0.00039
332.3 *3*	0.019 *1*	519.1	5^-	186.85	4^+	(E1)	0.0299		α(K)=0.02402; α(L)=0.00444; α(M)=0.00106; α(N+..)=0.00038
338.1 *2*	0.0143 *5*	395.96	3^-	57.78	2^+	E1	0.0288		α(K)=0.02314; α(L)=0.00427; α(M)=0.00102; α(N+..)=0.00036
478 *1*	0.00055 *21*	874.6	2^+	395.96	3^-	[E1]	0.0139		α(K)=0.01127; α(L)=0.00199; α(M)=0.00047; α(N+..)=0.00017
503.6 *3*	0.0056 *3*	831.4	0^+	327.91	1^-	(E1)	0.0125		α(K)=0.01015; α(L)=0.00179
547 *1*	0.00039 *24*	874.6	2^+	327.91	1^-	[E1]	0.0106		α(K)=0.00863; α(L)=0.00150
773.4 *5*	0.0018 *3*	831.4	0^+	57.78	2^+	[E2]	0.0167		α(K)=0.01218; α(L)=0.00340
817 *1*	≈0.0003	874.6	2^+	57.78	2^+	[M1+E2][@]	0.038 *23*		
831	<0.0003	831.4	0^+	0.0	0^+	E0		8×10^{-4} *4*	Mult.,$I_{(\gamma+ce)}$: from 1963Le17.

[†] From 1977Ku15, except as noted. (Iγ of 1977Ku15 are normalized to 26.33 for the 129γ). Others: 1963Le17, 1965Be15, 1966Ah02, 1984Ge07.
[‡] From adopted gammas, unless otherwise noted.
[#] From 1986LoZT, 1984Ge07.
[@] 1977Ku15 quote A. Plochocki, thesis (1974) as establishing the multipolarity E0+E2; however, no published information is available on this. 1977Ku15 give Iγ=I(γ+ce) in their level scheme, suggesting that the E0 admixture may not be significant for

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$\gamma(^{228}Th)$ (continued)

intensity calculations.

[&] For absolute intensity per 100 decays, multiply by 0.00259.

[a] 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.

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Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 decays through this branch