^{216}Th α decay (133 μs) 2005Ku31

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	K. Auranen and E. A. Mccutchan	NDS 168, 117 (2020)	1-Aug-2020

Parent: ^{216}Th: E=2045 *9*; $J^{\pi}=(8^+)$; $T_{1/2}$=133 μs *4*; Q(α)=8072 *4*; %α decay=2.8 *9*

^{216}Th-$T_{1/2}$: weighted average of 126 μs *14* (2019Zh54), 135 μs *4* (2005Ku31), and 128 μs *8* (2001Ha46). Others: 120 μs *+60−30* and 250 μs *+340−90* from α(t) to excited state levels (2019Zh54), 180 μs *40* (1983Hi08), and 140 μs *5* (2000He17) which is assumed to be superseded by 2005Ku31.

^{216}Th-%α decay: from 2005Ku31. Others: %α= 5 *+5−3* (2001Ha46), %α≈3 (1983Hi08) deduced from %IT=97 *1* from the observed isomer ratio and comparison with that for the ^{217}Pa(29/2) level.

2005Ku31: the nuclei of interest were observed as the α-decay daughter of ^{216}Th nuclei produced in the ^{170}Er(^{50}Ti,4n)^{216}Th fusion evaporation reaction at GSI, Germany. The 400−μg/cm^2 thick ^{170}Eu targets were evaporated on 30−μg/cm^2 thick carbon foils. UNILAC provided the 217.5 MeV ^{50}Ti beam with an intensity of ≈200 pnA. Residues were selected with the velocity filter SHIP, and implanted into a position-sensitive 16-strip PIPS silicon detector. Eα, Eγ, Iγ, $\alpha\gamma$ coin, recoil-γ-α-γ correlations were measured. γ rays were detected, without a coincidence condition, with a Clover Ge detector placed behind the PIPS.

2019Zh54: ^{216}Th produced in the ^{183}W(^{40}Ar,X) reaction with E(^{40}Ar)=180 MeV followed by separation with the SHANS separator and implantation into a position-sensitive strip detector. Measured Eα, Iα, α(t).

α: Additional information 1.

^{212}Ra Levels

E(level)[†]	J^{π}[‡]	$T_{1/2}$[‡]
0.0	0^+	13.0 s *2*
629.30 *10*	2^+	
1454.30 *22*	4^+	
1895.10 *24*	6^+	
1967 *13*	8^+	9.3 μs *9*

[†] From Eγ data, except the E(level)=1967 which is derived from the measured Eα and Q(α) from 2017Wa10.
[‡] From the Adopted Levels.

α radiations

Eα[‡]	E(level)	Iα[‡#]	HF[†]	Comments
7999 *10*	1967	13 *2*	2.4 *9*	Eα: other: 7998 *18* (2019Zh54). Iα: other: 4.9 *+48−27* (2019Zh54).
9308 *12*	629.30	13 *3*	8.2×10^3 *33*	Eα: weighted average of 9301 keV *16* (2019Zh54) and 9312 keV *12* 2005Ku31). Iα: other: 11.5 *+60−43* (2019Zh54).
9922 *10*	0.0	74 *4*	3.5×10^4 *12*	Eα: weighted average of 9918 keV *15* (2019Zh54), 9930 keV *10* (2005Ku31), 9915 keV *15* (2001Ha46), 9912 keV *20* (1983Hi08). Other: 9933 keV *15* (2000He17) which is assumed to be superseded by 2005Ku31. Iα: other: 84 *12* (2019Zh54).

[†] r_0(^{212}Ra)=1.4695 *14*; see ^{216}Th α decay (26.0 ms) dataset.
[‡] From 2005Ku31, except where noted.
[#] For absolute intensity per 100 decays, multiply by 0.028 *9*.

^{216}Th α decay (133 μs) 2005Ku31 (continued)

γ(^{212}Ra)

E_γ †	I_γ ‡@	E_i(level)	J_i^π	E_f	J_f^π	Mult.#	α	Comments
(63.3 *20*)	0.15 *4*	1967	8^+	1895.10	6^+	[E2]	84 *14*	α(L)=61 *11*; α(M)=17 *3*; α(N)=4.4 *8*; α(O)=0.93 *16*; α(P)=0.134 *23*; α(Q)=0.00032 *5* E_γ: from 1986Ko01 using observed ce(L) and ce(M) in ^{204}Pb(^{12}C,4nγ). In 2005Ku31 the transition was not observed, but the level energy differences suggest a value of ≈72 keV. I_γ: the uncertainty includes the uncertainty on α feeding intensity as well as the uncertainty on the conversion coefficient.
440.8 *1*	12 *2*	1895.10	6^+	1454.30	4^+	E2	0.0526	α(K)=0.0323 *5*; α(L)=0.01508 *22*; α(M)=0.00391 *6*; α(N)=0.001032 *15*; α(O)=0.000226 *4* α(P)=3.55×10^{-5} *5*; α(Q)=1.205×10^{-6} *17*
629.3 *1*	25 *4*	629.30	2^+	0.0	0^+	E2	0.0230	α(K)=0.01624 *23*; α(L)=0.00504 *7*; α(M)=0.001273 *18*; α(N)=0.000336 *5*; α(O)=7.43×10^{-5} *11* α(P)=1.208×10^{-5} *17*; α(Q)=5.78×10^{-7} *8*
825.0 *2*	13 *2*	1454.30	4^+	629.30	2^+	E2	0.01311	α(K)=0.00985 *14*; α(L)=0.00245 *4*; α(M)=0.000607 *9*; α(N)=0.0001599 *23*; α(O)=3.57×10^{-5} *5* α(P)=5.93×10^{-6} *9*; α(Q)=3.40×10^{-7} *5*

† From 2005Ku31, except where noted.
‡ Deduced by the evaluator based on reported α feeding and internal-conversion coefficients.
# From the Adopted Gammas.
@ For absolute intensity per 100 decays, multiply by 0.028 *9*.

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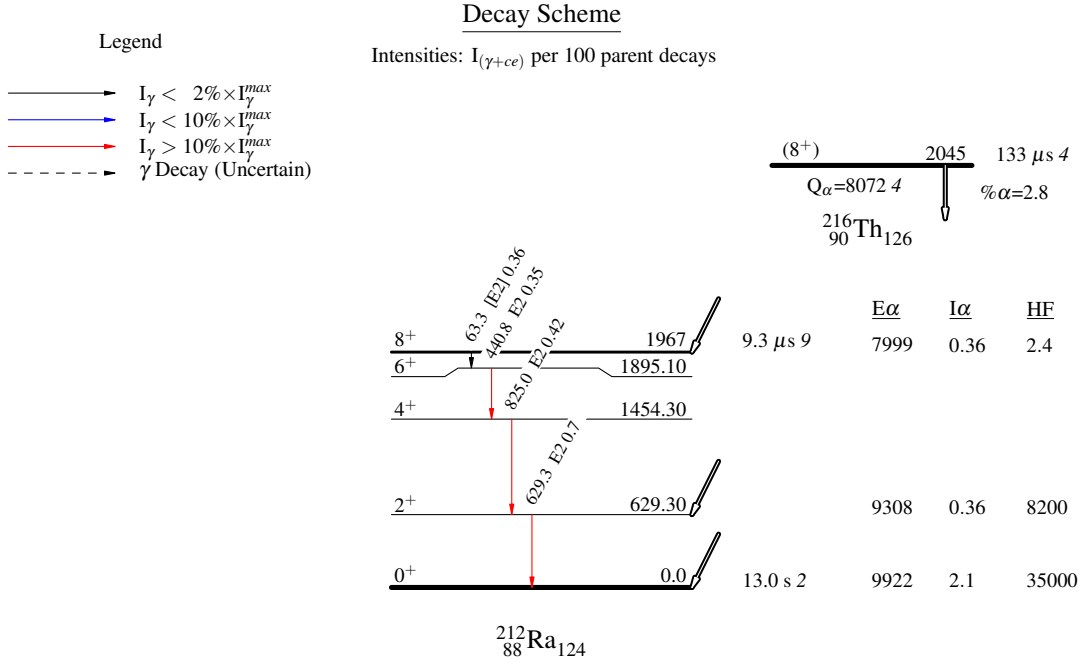
Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays



$^{212}_{88}Ra_{124}$