^{217}Th IT decay (67 μs) 2005Ku31

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	B. Singh, R. Shearman	NDS 147, 382 (2018)	1-Dec-2017

Parent: ^{217}Th: E=2251.91+x; J^π=(25/2$^+$); $T_{1/2}$=67 μs *+17−11*; %IT decay=100.0

2005Ku31: ^{217}Th recoils produced in ^{170}Er(^{50}Ti,3n), E=4.35 MeV/nucleon were separated from the beam using a velocity filter SHIP at GSI facility and implanted into a position-sensitive 16-strip PIPS semiconductor detector. Measured Eγ, Iγ, (recoil)$\gamma\alpha$ correlations, using 'Clover' Ge detector for γ rays. The 67−μs isomer in ^{217}Th decays through a possible E2 transition to a (21/2$^+$) excited state. All of the transitions built on top of the first isomeric state (1989Dr02) were proposed according to the N=127 isotones systematics. There were not enough statistics for coincidence measurements.

2003MuZV: ^{172}Yb(^{48}Ca,3n),E=219 MeV; measured Eγ, Iγ, (A=217 recoils)γ-coin, isomer half-life at ATLAS-ANL facility. Recoils were identified in the FMA, using (M/Q), and were detected after the ≈1.4 μs flight time by two clover Ge detectors and two LEPs surrounding the catcher foil. The authors proposed levels at 673,(15/2$^-$) decaying by 673γ; 1649, (17/2$^+$) decaying by a 976γ; 1943, (19/2$^-$) decaying by 294γ and 1270γ; and a 20 μs isomer at ≈2113 keV, decaying by unknown transitions to a (21/2$^+$) level. The 294γ and 976γ were not reported by 2005Ku31, thus the decay scheme proposed by 2003MuZV is considered as tentative at this stage, and the level at 1649 as well as the gamma rays of 976 and 294 keV are not included in the present dataset, or the Adopted dataset.

The decay scheme is incomplete above the 673-keV level.

^{217}Th Levels

E(level)[†]	J^π[‡]	$T_{1/2}$[#]	Comments
0.0	(9/2$^+$)	0.252 ms *4*	
673.3 *1*	(15/2$^-$)	141 ns *50*	
1942.61 *15*	(17/2$^+$)		J^π: with a different level scheme, 2003MuZV proposed (19/2$^-$) for this level.
2251.91 *18*	(21/2$^+$)		
2251.91+x	(25/2$^+$)	67 μs *+17−11*	%IT=100 E(level): x<110 keV, see comment in the γ-table. $T_{1/2}$: from (evaporation residues)$\gamma\alpha$ correlations for three γ rays (2005Ku31, average of 64 μs *+64−22*, 69 μs *+32−17* and 66 μs *+27−15* for 309γ, 673γ and 1269γ, respectively). Other: 20 μs *5* (2003MuZV, from decay curve for summed 673γ+1270γ).

[†] Deduced by evaluators from Eγ data.
[‡] From systematics of N=127 isotones (1989Dr02), same values are given in the Adopted Levels.
[#] From the Adopted Levels for g.s. and 673.3 level.

γ(^{217}Th)

Eγ	Iγ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[‡]	Comments
x		2251.91+x	(25/2$^+$)	2251.91	(21/2$^+$)			Eγ: x<110 keV, from small number of thorium K x-rays observed in $\gamma\gamma$-coincidences gated by the 309, 673 or 1269 keV γ-rays 2005Ku31 concluded that the transition energy is probably below the K-electron binding energy of ≈110 keV. Mult.: E2 expected from systematics of N=127 isotones.
309.3 *1*	18 *3*	2251.91	(21/2$^+$)	1942.61	(17/2$^+$)	[E2]	0.1538	α(K)=0.0686 *10*; α(L)=0.0627 *9*; α(M)=0.01679 *24* α(N)=0.00450 *7*; α(O)=0.001016 *15*; α(P)=0.0001754 *25*; α(Q)=4.24×10^{-6} *6*
673.3 *1*	100 *7*	673.3	(15/2$^-$)	0.0	(9/2$^+$)	(E3)	0.0654	α(K)=0.0367 *6*; α(L)=0.0211 *3*; α(M)=0.00561

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^{217}Th IT decay (67 μs) 2005Ku31 (continued)

$\gamma(^{217}Th)$ (continued)

E_γ	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[‡]	Comments
1269.3 *1*	84 *10*	1942.61	(17/2$^+$)	673.3	(15/2$^-$)	[E1]	0.00232	α(N)=0.001507 *22*; α(O)=0.000346 *5*; α(P)=6.18×10^{-5} *9*; α(Q)=2.67×10^{-6} *4* E_γ: other: 673 (2003MuZV). Mult.: from Adopted Gammas. α(K)=0.00188 *3*; α(L)=0.000307 *5*; α(M)=7.22×10^{-5} *11* α(N)=1.92×10^{-5} *3*; α(O)=4.52×10^{-6} *7*; α(P)=8.74×10^{-7} *13*; α(Q)=8.20×10^{-8} *12*; α(IPF)=3.39×10^{-5} *5* E_γ: other: 1270 (2003MuZV).

[†] For absolute intensity per 100 decays, multiply by 0.9386 *8*.

[‡] 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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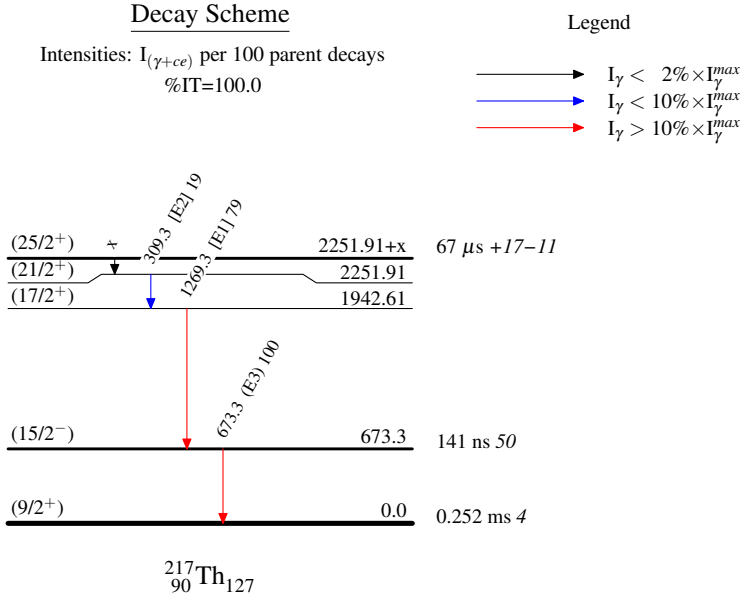
Decay Scheme

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

%IT=100.0



$^{217}_{90}Th_{127}$