

¹¹¹Tc β⁻ decay 1998Pf01

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jean Blachot	NDS 110, 1239 (2009)	1-Feb-2008

Parent: ¹¹¹Tc: E=0.0; J^π=(7/2⁺,9/2⁺); T_{1/2}=290 ms 20; Q(β⁻)=7450 80; %β⁻ decay=100.0

¹¹¹Tc-T_{1/2}: from ENSDF for ¹¹¹Tc.

The experiment was performed using on-line mass separation of products of proton-induced fission of uranium at the IGISOL facility in Jyvaskyla. The mass separated beam was collected on a tape. Long-lived activities were removed at regular intervals. The collection point was viewed by a ΔE-E plastic telescope for the detection of β-particles and two Ge-detectors. The β-γ and γ-γ coincidence events were recorded. Since ¹¹¹Tc has Q(β⁻)= 7.48 MeV 8, the highest value of the separated A=111 isobars, γ rays were assigned to its decay by gating on the high-energy part of the β-spectrum. Preliminary data on ¹¹¹Tc β⁻ decay were given by [1992PeZX](#) and [1988Pe13](#).

¹¹¹Ru Levels

E(level)	J ^π	T _{1/2}	Comments
0.0	(5/2 ⁺)		
150.29 15	(7/2 ⁺)		T _{1/2} : 3.1 ns 8 for complex, levels 150, 213 and 317.
213.2 3	(9/2 ⁺)		T _{1/2} : 3.1 ns 8 for complex, levels 150, 213 and 317.
279.70 20			
317.2 3	(9/2)	4.4 ns 12	
355.89? 25		7.8 ns 21	
368.80 16	(5/2 ⁺ ,7/2 ⁺ ,9/2 ⁺)	7.2 ns 16	
489.8 4		6.1 ns 13	
542.68 18			
571.0 3			
766.8? 8			
824.6? 7			
863.5? 6			
1026.3 4			
1048.5? 6			
1435.2 5			

β⁻ radiations

E(decay)	E(level)	Iβ ^{-†}	Log ft	Comments
(6.01×10 ³ 8)	1435.2	5.1 2	5.3	av Eβ=2709 39
(6.40×10 ^{3‡} 8)	1048.5?	0.50 25	6.3	av Eβ=2880 39
(6.42×10 ³ 8)	1026.3	3.2 7	5.7	av Eβ=2904 39
(6.59×10 ^{3‡} 8)	863.5?	1.0 2	6.2	av Eβ=2982 39
(6.63×10 ^{3‡} 8)	824.6?	0.4 1	6.6	av Eβ=3001 39
(6.68×10 ^{3‡} 8)	766.8?	0.6 2	6.5	av Eβ=3028 39
(6.88×10 ³ 8)	571.0	2.6 9	5.9	av Eβ=3122 39
(6.91×10 ³ 8)	542.68	8.1 11	5.4	av Eβ=3136 39
(6.96×10 ³ 8)	489.8	0.7 1	6.5	av Eβ=3161 39
(7.08×10 ³ 8)	368.80	36 2	4.8	av Eβ=3219 39
				Iβ ⁻ : 38 in figure 1 of 1998Pf01 seems a misprint.
(7.09×10 ^{3‡} 8)	355.89?	2.4 3	6.0	av Eβ=3225 39
(7.13×10 ³ 8)	317.2	4.9 5	5.7	av Eβ=3244 39
(7.17×10 ³ 8)	279.70	13 2	5.3	av Eβ=3262 39
(7.30×10 ³ 8)	150.29	22 2	5.1	av Eβ=3323 39

† Absolute intensity per 100 decays.

‡ Existence of this branch is questionable.

¹¹¹Tc β⁻ decay 1998Pf01 (continued)

γ(¹¹¹Ru)

I_γ normalization: from Σ(I(γ+ce) of γ's to g.s.)=99.15, assuming no β feeding to ¹¹¹Ru g.s.(estimated from Z-dependence of isobaric yields); %β⁻n= 0.85 20.

E _γ	I _γ [†]	E _i (level)	J _i ^π	E _f	J _f ^π	Mult.	α [‡]	Comments
63.0 3	3.0 4	213.2	(9/2 ⁺)	150.29	(7/2 ⁺)	M1+E2	5.8 25	α(exp)=5.8 23 α(K)=2.9 20; α(L)=0.9 8; α(M)=0.17 15; α(N+..)=0.028 24 α(exp) from intensity balance. Possibly from an 11/2 ⁻ level in ¹¹¹ Ru.
^x 76 1	0.07 3							
103.9 3	13.4 17	317.2	(9/2)	213.2	(9/2 ⁺)	D		
150.2 2	93 6	150.29	(7/2 ⁺)	0.0	(5/2 ⁺)	M1	0.101	α(K)=0.088 3; α(L)=0.0106 4; α(M)=0.00193 6; α(N+..)=0.00037 1
166.9 3	3.0 6	317.2	(9/2)	150.29	(7/2 ⁺)	D		
172.6 3	2.0 4	489.8		317.2	(9/2)			
205.6 [#] 2	7.2 8	355.89?		150.29	(7/2 ⁺)			
212.8 7	1.0 5	213.2	(9/2 ⁺)	0.0	(5/2 ⁺)			
218.5 2	5.8 6	368.80	(5/2 ⁺ ,7/2 ⁺ ,9/2 ⁺)	150.29	(7/2 ⁺)			
279.7 2	37 5	279.70		0.0	(5/2 ⁺)			
368.8 2	100 4	368.80	(5/2 ⁺ ,7/2 ⁺ ,9/2 ⁺)	0.0	(5/2 ⁺)	M1,E2		Mult.: from T _{1/2} . I _γ : uncertainty of 42 in table 1 of 1998Pf01 seems a misprint.
392.1 3	2.8 5	542.68		150.29	(7/2 ⁺)			
^x 413.8 5	2.0 7							Possibly in coin with 104γ.
542.8 2	21 3	542.68		0.0	(5/2 ⁺)			
571.0 3	7.7 24	571.0		0.0	(5/2 ⁺)			
616.5 [#] 7	1.7 5	766.8?		150.29	(7/2 ⁺)			
674.3 [#] 6	1.2 4	824.6?		150.29	(7/2 ⁺)			
713.2 [#] 5	2.9 7	863.5?		150.29	(7/2 ⁺)			
898.2 [#] 5	1.5 7	1048.5?		150.29	(7/2 ⁺)			
1026.3 4	9.5 20	1026.3		0.0	(5/2 ⁺)			
1435.2 5	15 4	1435.2		0.0	(5/2 ⁺)			

[†] For absolute intensity per 100 decays, multiply by 0.337 15.

[‡] 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.

^x γ ray not placed in level scheme.

^{111}Tc β^- decay 1998Pf01

Decay Scheme

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

Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- - - - - γ Decay (Uncertain)
- Coincidence
- Coincidence (Uncertain)

