

¹⁰⁸Tc β⁻ decay 1984St04,1980Su01

Type	History		Literature Cutoff Date
	Author	Citation	
Full Evaluation	Jean Blachot	ENSDF	1-Jul-2008

Parent: ¹⁰⁸Tc: E=0.0; J^π=(2)⁺; T_{1/2}=5.17 s 7; Q(β⁻)=7720 50; %β⁻ decay=100.0

Others: 1969WiZX, 1972Tr08, 1973Ka22, 1976KaYO.

Sources: from ²³⁵U, ²³⁸U, ²³⁹Pu(n,f) rapid technetium chem; see 1972Tr08.

¹⁰⁸Ru Levels

Level scheme is based on γγ-coin, Eγ fits, and band-structure systematics. 1969ZiZZ proposed an E2 γ-cascade of 98-233 keV built on g.s. up to 4⁺, in conflict with more recent ¹⁰⁸Tc β⁻ and ²⁵²Cf SF decay studies.

E(level) [†]	J ^π	E(level) [†]	J ^π	E(level) [†]	J ^π	E(level) [†]
0.0 [‡]	0 ⁺	1183.03 14	(4 ⁺)	1825.76 8	2	2862.55 18
242.23 [‡] 5	2 ⁺	1218.84 22	@	1973.31 17		2925.10 22
665.14 [‡] 8	4 ⁺	1249.19 8	(2 ⁺)	2002.56 10		3097.63 14
707.83 [#] 5	2 ⁽⁺⁾	1486.15 14		2124.95 9	1,2,3	
974.83 [#] 7	(3 ⁺)	1643.87 9		2352.29 18		
975.96 15	(0 ⁺)	1741.29 22		2730.98 14		

[†] From least-squares fit to Eγ's.

[‡] Band(A): g.s. band.

[#] Band(B): γ-vibrational band?

@ A 6⁺ is proposed by 1984St04, not adopted.

β⁻ radiations

Iβ⁻ (975.96 level): the observed intensity imbalance must be from unplaced or as yet unobserved gammas.

E(decay) ^{†#}	E(level)	Iβ ⁻ ^{‡@}	Log ft	Comments
(4.62×10 ³ 5)	3097.63	3.7 2	6.115 25	av Eβ= 1923.15 7 E(decay): Eβ= 4640 115.
(4.79×10 ³ 5)	2925.10	2.0 2	6.46 5	av Eβ= 2005.53 11 E(decay): Eβ= 4775 60.
(4.86×10 ³ 5)	2862.55	1.0 1	6.78 5	av Eβ= 2035.41 9 E(decay): Eβ= 4700 210.
(4.99×10 ³ 5)	2730.98	1.8 2	6.58 5	av Eβ= 2098.29 7 E(decay): Eβ= 4940 225.
(5.37×10 ³ 5)	2352.29	1.1 1	6.94 4	av Eβ= 2279.40 9
(5.60×10 ³ 5)	2124.95	4.5 4	6.41 4	av Eβ= 2388.18 5 E(decay): Eβ= 5505 100.
(5.72×10 ³ 5)	2002.56	3.1 3	6.62 5	av Eβ= 2446.77 5 E(decay): Eβ= 5765 115.
(5.75×10 ³ 5)	1973.31	2.9 2	6.66 3	av Eβ= 2460.77 9 E(decay): Eβ= 5580 375.
(5.89×10 ³ 5)	1825.76	18.1 10	5.915 25	av Eβ= 2531.40 4 E(decay): Eβ= 5925 55.
(5.98×10 ³ 5)	1741.29	0.2 1	7.90 22	av Eβ= 2571.84 11
(6.08×10 ³ 5)	1643.87	1.9 3	6.96 7	av Eβ= 2618.48 5

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¹⁰⁸Tc β⁻ decay **1984St04,1980Su01** (continued)

β⁻ radiations (continued)

E(decay) ^{†‡}	E(level)	Iβ ^{-‡@}	Log ft	Comments
(6.47×10 ³ 5)	1249.19	2.2 7	7.02 14	E(decay): Eβ= 6335 235. av Eβ= 2807.45 4 E(decay): Eβ= 6630 210.
(6.54×10 ³ 5)	1183.03	0.3 1	7.90 15	av Eβ= 2839.12 7
(6.75×10 ³ 5)	974.83	2.5 10	7.05 18	av Eβ= 2938.80 4 E(decay): Eβ= 6815 375.
(7.01×10 ³ 5)	707.83	7.9 10	6.63 6	av Eβ= 3066.60 3 E(decay): Eβ= 7065 235.
(7.48×10 ³ 5)	242.23	27.6 25	6.21 4	av Eβ= 3289.39 3 E(decay): Eβ= 7445 55.

† From 1989Gr23, mass separation LOHENGRIN. βγ coin.

‡ From (γ+ce)-intensity balance at each level.

1989Gr23 report a β branch to the 665 level, with Eβ=7190 375, but no intensity is given. Since J^π(665)=4⁺, an observed branch from the (2⁺) β⁻ parent would invalidate one of the two J^π assignments.

@ Absolute intensity per 100 decays.

γ(¹⁰⁸Ru)

I_γ normalization: for I(γ+ce)=100 to g.s. Iβ (g.s.) assumed negligible since ΔJ=2. Other: absolute I_γ(242γ)/decay=0.88 19 (1980Su01) calibrated via absolute I_γ(165γ, ¹⁰⁸Rh)/decay= 0.28 6 (1962Pi02). On the basis of this measurement, I(β⁻ to g.s.)<16%.

E _γ [†]	I _γ ^{†a}	E _i (level)	J _i ^π	E _f	J _f ^π	Mult.&	δ	α ^b	Comments
181.9 ^{‡#} 2	1.1 [#] 2	1825.76	2	1643.87					
^x 192.9 5	0.24 [@] 3								
^x 212.3 5	0.9 3								
242.25 [#] 5	100 [#]	242.23	2 ⁺	0.0	0 ⁺	[E2]		0.056	E _γ : others: 242.27 16 (1969WiZX), 242.4 2 (1973Ka22).
267.1 ^{‡#} 2	1.3 [#] 2	974.83	(3 ⁺)	707.83	2 ⁽⁺⁾				
273.4 2	0.31 8	1249.19	(2 ⁺)	975.96	(0 ⁺)				
309.7 ^{‡#} 2	0.75 [#] 10	974.83	(3 ⁺)	665.14	4 ⁺				
358.7 2	0.30 8	2002.56		1643.87					
^x 389.2 3	0.34 13								
394.6 2	0.54 15	1643.87		1249.19	(2 ⁺)				
422.9 [#] 1	4.0 [#] 10	665.14	4 ⁺	242.23	2 ⁺				
465.6 [#] 1	17.5 [#] 15	707.83	2 ⁽⁺⁾	242.23	2 ⁺	D+Q	+4 +9-6		
475.4 ^c 2	0.63 15	1183.03	(4 ⁺)	707.83	2 ⁽⁺⁾				
492.1 2	0.22 6	1741.29		1249.19	(2 ⁺)				
511.0 2	0.39 8	1486.15		974.83	(3 ⁺)				
518.0 2	0.40 10	1183.03	(4 ⁺)	665.14	4 ⁺				
541.3 2	0.40 5	1249.19	(2 ⁺)	707.83	2 ⁽⁺⁾				
553.7 ^c 2	0.28 7	1218.84		665.14	4 ⁺				
576.6 [#] 1	2.2 [#] 5	1825.76	2	1249.19	(2 ⁺)				
584.0 ^{‡#} 1	0.75 [#] 25	1249.19	(2 ⁺)	665.14	4 ⁺				
669.1 [#] 1	1.5 [#] 2	1643.87		974.83	(3 ⁺)				
707.81 [#] 5	14.0 [#] 10	707.83	2 ⁽⁺⁾	0.0	0 ⁺				

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$^{108}\text{Tc} \beta^-$ decay **1984St04,1980Su01** (continued) $\gamma(^{108}\text{Ru})$ (continued)

E_γ †	I_γ † ^a	E_i (level)	J_i^π	E_f	J_f^π	Mult.&	δ	Comments
732.6# 1	12.0# 10	974.83	(3 ⁺)	242.23	2 ⁺	D+Q	-3.0 +7-14	
733.9 2	2.3 6	975.96	(0 ⁺)	242.23	2 ⁺			
790.6 2	0.70 20	1973.31		1183.03	(4 ⁺)			
821.0 2	0.30 7	1486.15		665.14	4 ⁺			
851.0# 2	4.0# 4	1825.76	2	974.83	(3 ⁺)			
^x 877.2 2	0.20 16							
935.9 2	0.62 15	1643.87		707.83	2 ⁽⁺⁾			
972.6 2	0.76 20	3097.63		2124.95	1,2,3			
^x 974.6 3	0.29 7							
1007.1# 2	2.7# 4	1249.19	(2 ⁺)	242.23	2 ⁺	D+Q	0.9 +7-5	
1027.4 2	0.66 15	2002.56		974.83	(3 ⁺)			
1118.0 2	5.8 7	1825.76	2	707.83	2 ⁽⁺⁾			
1150.4 2	0.66 15	2124.95	1,2,3	974.83	(3 ⁺)			
1244.5 2	0.86 20	2730.98		1486.15				
1249.0# 5	1.8# 3	1249.19	(2 ⁺)	0.0	0 ⁺			
1272.1# 2	2.0# 5	3097.63		1825.76	2			
1308.0 3	1.1 3	1973.31		665.14	4 ⁺			
^x 1356.2 2	1.7 1							
1401.6# 2	1.1# 2	1643.87		242.23	2 ⁺			
1417.0# 1	4.8# 4	2124.95	1,2,3	707.83	2 ⁽⁺⁾	D+Q		δ : δ ranges from -1.6 to +3.6.
^x 1490.4 2	0.99@ 7							
^x 1570.9 3	0.27@ 6							
1583.5# 1	12.0# 10	1825.76	2	242.23	2 ⁺	D+Q	-0.29 +11-14	
^x 1623.6 2	0.90 11							
^x 1633.6 2	1.2 2							
^x 1670.1 3	0.32@ 8							
1687.2 2	0.24 6	2352.29		665.14	4 ⁺			
1730.5 ^c 3	1.8 5	1973.31		242.23	2 ⁺			
1756.2 2	0.44 11	2730.98		974.83	(3 ⁺)			
1760.4# 1	2.8# 2	2002.56		242.23	2 ⁺			
1882.8# 2	0.85# 15	2124.95	1,2,3	242.23	2 ⁺	D+Q	-0.7 +6-11	
1887.7 2	0.45 12	2862.55		974.83	(3 ⁺)			
^x 1934.0 5	1.1 3							
1950.4 3	0.62 17	2925.10		974.83	(3 ⁺)			
^x 2001.0 5	0.32 9							
2023.4 2	0.96 24	2730.98		707.83	2 ⁽⁺⁾			
^x 2032.0 2	1.4 1							
^x 2044.6 3	1.3 2							
^x 2130.4 3	0.97@ 8							
2217.1 3	1.8 5	2925.10		707.83	2 ⁽⁺⁾			
^x 2279.1 5	0.64@ 11							
2352.1 3	1.1 4	2352.29		0.0	0 ⁺			
2389.4 3	1.8 5	3097.63		707.83	2 ⁽⁺⁾			
^x 2460.2 2	0.20 14							
^x 2539.9 5	0.85 18							
^x 2548.5 5	0.76 15							
2620.3 3	0.75 20	2862.55		242.23	2 ⁺			
^x 2671.1 5	0.68 6							
^x 2702.5 5	0.63@ 9							
^x 2944.0 3	1.1 3							
^x 3013.3 5	1.3 4							

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$^{108}\text{Tc} \beta^-$ decay 1984St04,1980Su01 (continued) $\gamma(^{108}\text{Ru})$ (continued)

E_γ^\dagger	$I_\gamma^\dagger{}^a$	$E_i(\text{level})$
^x 3050.3 5	0.84 [@] 11	
^x 3073.3 3	0.7 4	
^x 3454.5 4	0.29 [@] 18	
^x 3499.2 3	0.80 6	

[†] E_γ , I_γ are from 1984St04, except where noted otherwise. 1984St04 adopt data from 1980Su01 where available. The unplaced transitions are given as tabulated by 1984St04 with uncertainties on E_γ and I_γ . However, the placed transitions are given only in the decay scheme and are given without uncertainties. For these transitions the evaluator has assigned $\Delta E_\gamma=0.2$ keV and $\Delta I_\gamma=10\%$.

[‡] Seen in coin only.

[#] E_γ and I_γ from 1980Su01.

[@] From $\gamma\gamma$ (1984St04). Authors state the value should be considered a lower limit.

[&] From $\gamma\gamma(\theta)$.

^a For absolute intensity per 100 decays, multiply by 0.816 7.

^b 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.

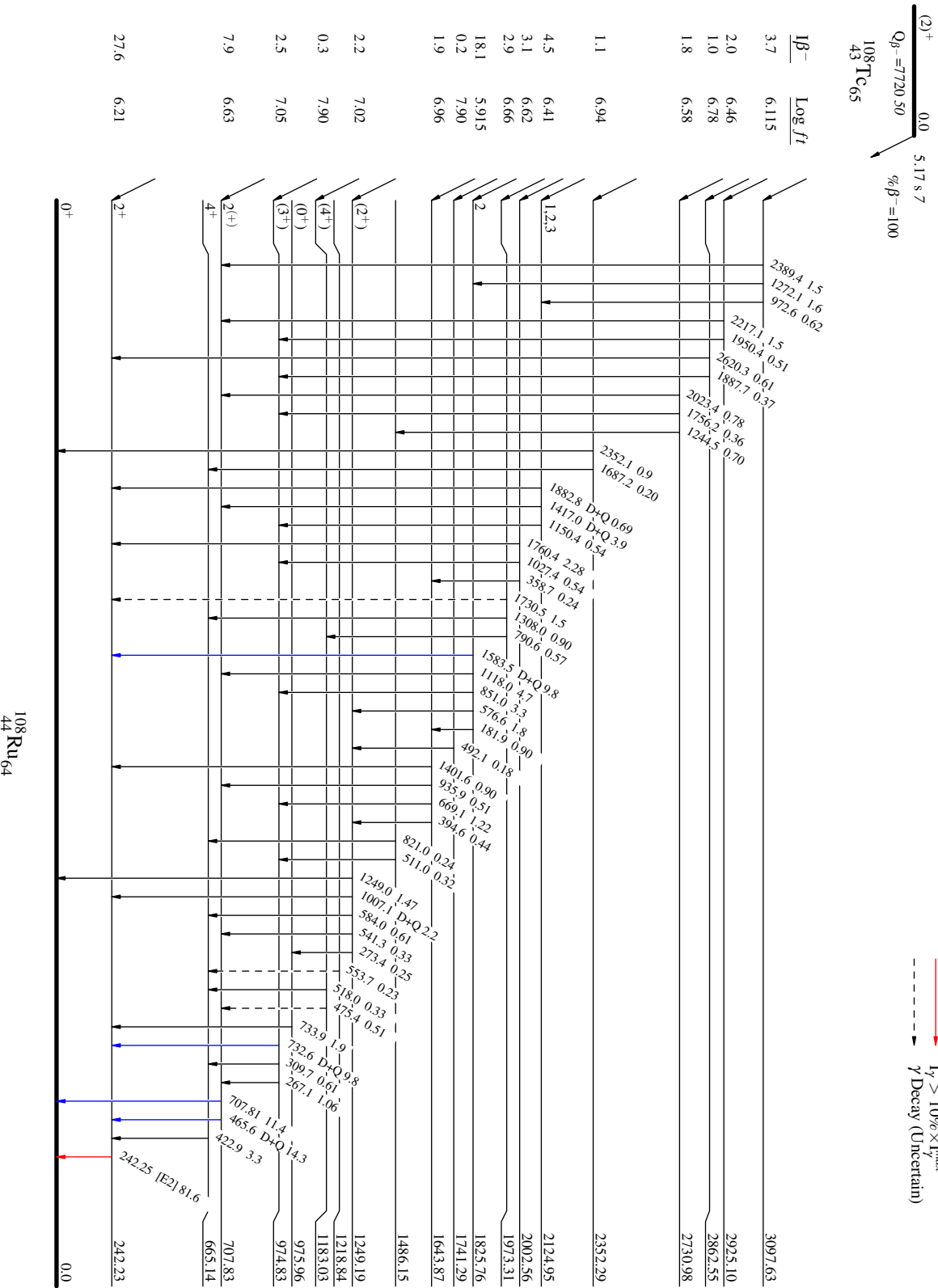
^c Placement of transition in the level scheme is uncertain.

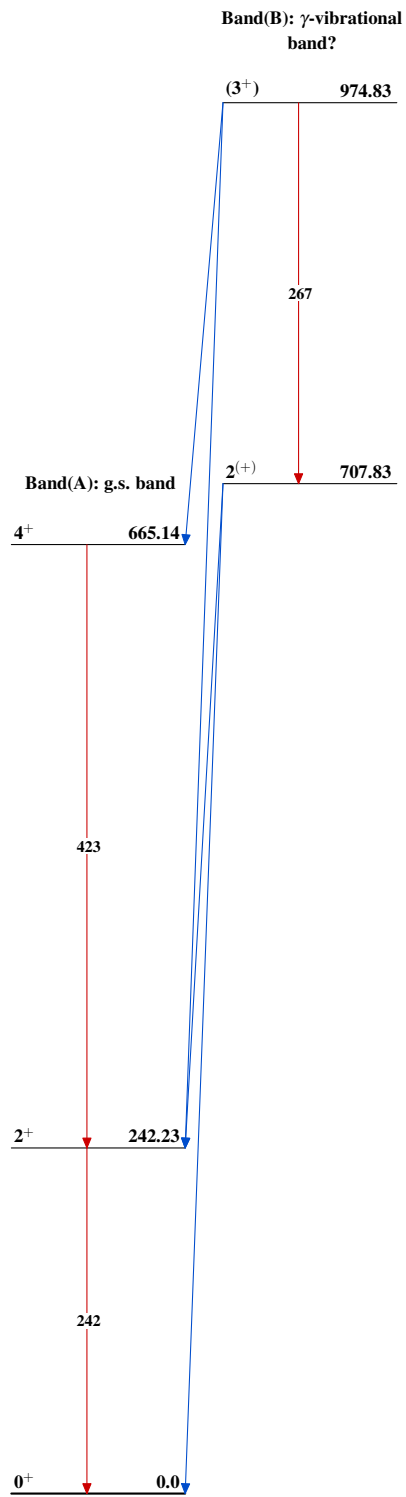
^x γ ray not placed in level scheme.

¹⁰⁸Tc β⁻ decay 1984SI04,1980Su01

Decay Scheme
Intensities: I_γ per 100 parent decays

Legend
 ↓ I_γ < 2% × I_{max}
 ↓ I_γ < 10% × I_{max}
 ↓ I_γ > 10% × I_{max}
 - - - γ Decay (Uncertain)



^{108}Tc β^- decay 1984St04,1980Su01 $^{108}_{44}\text{Ru}_{64}$