^{174}Tm β^- decay 1975Ka32

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, Huo Junde	NDS 87, 15 (1999)	1-Nov-1998

Parent: ^{174}Tm: E=0.0; J$^{\pi}$=(4)$^-$; $T_{1/2}$=5.4 min *1*; Q(β^-)=3.08×10^3 *5*; %β^- decay=100.0

^{174}Yb Levels

^{174}Tm g.s. probable Configuration=(π 1/2[411])+(ν 7/2[514]).

E(level)	J$^{\pi}$ †	$T_{1/2}$	Comments
0.0‡	0$^+$	stable	
76.45‡ *5*	2$^+$		
253.0‡ *1*	4$^+$		
526.0‡ *1*	6$^+$		
889.7‡ *2*	8$^+$		
1318.3# *2*	2$^-$		
1381.5# *2*	3$^-$		
1467.9# *2*	(4)$^-$		
1518.0@ *1*	6$^+$	850 μs *80*	$T_{1/2}$: from 1964Ka15, $\gamma\gamma$(t). J$^{\pi}$: J$^{\pi}$=7$^-$ is also possible. The J$^{\pi}$=6$^+$ assignment is preferred from considerations of the hindrance factors per degree of K-forbiddenness of the γ rays which deexcite this level.
1569.5# *10*	(5$^-$)		
1606.1[b] *2*	(3)$^+$		
1671.1@ *2*	(7$^+$)		
1701.2[b] *2*	4$^+$		
1884.5[a] *2*	(5)$^-$		
2020.5[a] *2*	(6$^-$)		
2049.8 *2*	(3$^-$)		J$^{\pi}$: odd parity from (n,γ).
2088.4 *2*	(4$^-$)		
2160.4 *2*	(4$^-$)		J$^{\pi}$: odd parity from (n,γ).
2336.7 *3*	(4$^-$,5)		
2378.7& *1*	(5)$^-$		

† From Adopted Levels.
‡ K$^{\pi}$=0$^+$ g.s. rotational band member.
# K$^{\pi}$=2$^-$ octupole-vibrational band member. Probable Configuration=(ν 5/2[512])-(ν 9/2[624]).
@ K$^{\pi}$=6$^+$ band member. Probable Configuration=(ν 7/2[514])+(ν 5/2[512]) assignment is not definite.
& K$^{\pi}$=(5$^-$) band member. Probable Configuration=((π 1/2(411))+(π 9/2(624))) is consistent with log *ft*=4.6 from ^{174}Tm β^- decay.
[a] K$^{\pi}$=5$^-$ band member. Probable Configuration=(ν 1/2[521])+(ν 9/2[624]). log *ft*=4.7 from ^{174}Tm β^- decay and intense 494.4 M1 γ from 2378.7 keV level requires mixing between these states.
[b] K$^{\pi}$=(3$^+$) band member. Probable Configuration=(ν 7/2[514])-(ν 1/2[521]).

^{174}Tm β^- decay 1975Ka32 (continued)

β^- radiations

E(decay)	E(level)	Iβ^- [†‡]	Log *ft*	Comments
700 *50*	2378.7	14.3 *8*	4.67 *12*	av Eβ= 226 *19* E(decay): from 1967Gu12. Iβ=18%, $\gamma\beta$ coin, Kurie-plot, scin. Other values: 600, I$\beta\approx$20% (1966Wi04). Other: 1964Ka16.
(7.4×10^2 *5*)	2336.7	0.4 *1*	6.31 *15*	av Eβ= 241 *19*
(9.2×10^2 *5*)	2160.4	0.9 *1*	6.28 *10*	av Eβ= 308 *20*
(9.9×10^2 *5*)	2088.4	0.5 *1*	6.66 *12*	av Eβ= 336 *20*
(1.03×10^3 *5*)	2049.8	1.4 *2*	6.24 *10*	av Eβ= 352 *20*
1200 *50*	1884.5	83 *5*	4.73 *8*	av Eβ= 418 *21* E(decay): from 1967Gu12, Iβ=82%, $\gamma\beta$ coin, Kurie-plot, scin. Other values: 1200 *100* (1964Ka16), 1150 *100* (1964Or01), 1100, I$\beta\approx$80% (1966Wi04).

† From γ-ray intensity balance.

‡ Absolute intensity per 100 decays.

$\gamma(^{174}$Yb)

Iγ normalization: From Σ (γ rays to g.s., 76, and 253 levels, except 76γ and 176γ)=100%. Two β^- groups of 1200 and 700 keV have been measured (1964Ka16). The first one was observed in coincidence with 366.4γ, consistent with no β^- population to levels below 1884 keV. Positive transition intensity imbalances to levels below this energy (which suggest β^- feeding) can not be confirmed because of possible uncertainties in the decay scheme and/or low-energy transitions between those levels, which may be significantly converted and therefore escaped detection.

Measured Eγ, Iγ, $\gamma\gamma$ coin, detectors:Ge(Li). Others: 1971Tu02, 1967Ka13, 1967Gu12, 1966Wi04, 1964Ka15, 1964Ka16.

K x ray relative intensity=60 *30* (1964Ka16), scin; 40 *13* (1967Gu12), scin.

E_γ	I_γ[#]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	δ[‡]	α[@]	Comments
76.45[†] *5*	10.5 *10*	76.45	2$^+$	0.0	0$^+$	E2		9.44	α(K)= 1.62; α(L)= 5.95; α(M)= 1.46; α(N+..)= 0.402
94.9 *2*	0.11 *3*	1701.2	4$^+$	1606.1	(3)$^+$	M1+E2	0.56 *18*	4.02	α(K)= 2.84; α(L)= 0.91; α(M)= 0.21; α(N+..)= 0.061
136.0 *5*	0.07 *3*	2020.5	(6$^-$)	1884.5	(5)$^-$			0.7 *6*	α(K)= 0.7 *5*; α(L)= 0.28 *15*; α(M)= 0.07 *4*; α(N+..)= 0.014 *13*
138.2 *5*	≈0.08	1606.1	(3)$^+$	1467.9	(4)$^-$	[E1]		0.147	α(K)= 0.122; α(L)= 0.0192; α(M)= 0.00426; α(N+..)= 0.00113
149.5 *5*	≈0.03	1467.9	(4)$^-$	1318.3	2$^-$	[E2]		0.738	α(K)= 0.377; α(L)= 0.276; α(M)= 0.0671; α(N+..)= 0.0180
153.1 *2*	0.36 *7*	1671.1	(7$^+$)	1518.0	6$^+$	[M1,E2]		0.85 *17*	α(K)= 0.61 *25*; α(L)= 0.19 *8*; α(M)= 0.045 *20*; α(N+..)= 0.012 *4*
176.52[†] *7*	76.1 *24*	253.0	4$^+$	76.45	2$^+$	E2		0.414	α(K)= 0.237; α(L)= 0.135; α(M)= 0.0327; α(N+..)= 0.00885
223.4[†] *10*	0.34 *5*	1606.1	(3)$^+$	1381.5	3$^-$	E1		0.0419	α(K)= 0.0351; α(L)= 0.00528; α(M)= 0.00117; α(N+..)= 0.000342
233.0 *5*	≈0.1	1701.2	4$^+$	1467.9	(4)$^-$	[E1]		0.0376	α(K)= 0.0315; α(L)= 0.00473; α(M)= 0.00105; α(N+..)= 0.000311
272.73[†] *10*	98.6 *30*	526.0	6$^+$	253.0	4$^+$	E2		0.0998	α(K)= 0.0691; α(L)= 0.0235; α(M)= 0.00557; α(N+..)= 0.00165 %Iγ=85.7 *3*
288.0[†] *5*	1.77 *8*	1606.1	(3)$^+$	1318.3	2$^-$	E1		0.0221	α(K)= 0.0185; α(L)= 0.00274; α(M)= 0.000608; α(N+..)= 0.000194
315.8 *8*	≈0.1	2336.7	(4$^-$,5)	2020.5	(6$^-$)			0.07 *6*	α(K)= 0.07 *5*; α(L)= 0.013 *8*; α(M)= 0.0030 *17*; α(N+..)= 0.0007 *6*
319.8[†] *10*	0.31 *6*	1701.2	4$^+$	1381.5	3$^-$	E1		0.0171	α(K)= 0.0143; α(L)= 0.00211; α(M)= 0.000467; α(N+..)= 0.000152
348.5 *5*	0.30 *15*	2049.8	(3$^-$)	1701.2	4$^+$	[E1]		0.0139	α(K)= 0.0117; α(L)= 0.00171; α(M)= 0.000378; α(N+..)= 0.000124
349.3 *5*	0.40 *15*	2020.5	(6$^-$)	1671.1	(7$^+$)	[E1]		0.0138	α(K)= 0.0116; α(L)= 0.00170; α(M)= 0.000376; α(N+..)= 0.000123
358.1 *2*	0.60 *6*	2378.7	(5)$^-$	2020.5	(6$^-$)	[M1,E2]		0.07 *3*	α(K)= 0.06 *3*; α(L)= 0.011 *4*; α(M)= 0.0024 *9*; α(N+..)= 0.00077 *15*

γ(^{174}Yb) (continued)

E_γ	I_γ[#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	α[@]	Comments
363.7 *2*	3.1 *3*	889.7	8^+	526.0	6^+	[E2]		0.0423	α(K)= 0.0315; α(L)= 0.00828; α(M)= 0.00194; α(N+..)= 0.000589
366.4[†] *2*	106 *4*	1884.5	$(5)^-$	1518.0	6^+	E1		0.0123	α(K)= 0.0104; α(L)= 0.00151; α(M)= 0.000335; α(N+..)= 0.000110 Mult.: from α(K)exp=0.009 *4*, γ-K x ray coin.
387.2 *2*	0.38 *7*	2088.4	(4^-)	1701.2	4^+	[E1]		0.0108	α(K)= 0.00912; α(L)= 0.00132; α(M)= 0.000293; α(N+..)= 0.0000952
443.63 *10*	1.25 *12*	2049.8	(3^-)	1606.1	$(3)^+$	[E1]		0.00794	α(K)= 0.00670; α(L)= 0.000959; α(M)= 0.000212; α(N+..)= 0.0000656
452.2 *2*	0.34 *8*	2336.7	$(4^-,5)$	1884.5	$(5)^-$			0.027 *23*	α(K)= 0.026 *20*; α(L)= 0.004 *3*; α(M)= 0.0010 *6*; α(N+..)= 0.00026 *20*
458.9 *2*	0.64 *10*	2160.4	(4^-)	1701.2	4^+	[E1]		0.00736	α(K)= 0.00621; α(L)= 0.000887; α(M)= 0.000196; α(N+..)= 0.0000594
482.4 *3*	0.16 *6*	2088.4	(4^-)	1606.1	$(3)^+$	[E1]		0.00658	α(K)= 0.00556; α(L)= 0.000791; α(M)= 0.000175; α(N+..)= 0.0000511
494.12 *10*	13.1 *7*	2378.7	$(5)^-$	1884.5	$(5)^-$	M1		0.0433	α(K)= 0.0364; α(L)= 0.00537; α(M)= 0.00119; α(N+..)= 0.000347 Mult.: from α(K)exp=0.06 *4*, γ-K x ray coin.
502.4 *3*	0.27 *10*	2020.5	(6^-)	1518.0	6^+			0.021 *18*	α(K)= 0.020 *15*; α(L)= 0.0033 *21*
554.5 *2*	0.32 *8*	2160.4	(4^-)	1606.1	$(3)^+$	[E1]		0.00488	α(K)= 0.00411; α(L)= 0.000580
628.3 *1*	3.10 *15*	1518.0	6^+	889.7	8^+			0.012 *10*	α(K)= 0.011 *8*; α(L)= 0.0018 *12*
860.75 *10*	1.86 *10*	2378.7	$(5)^-$	1518.0	6^+			0.005 *4*	α(K)= 0.005 *4*; α(L)= 0.0008 *5*
991.84[†] *10*	100 *4*	1518.0	6^+	526.0	6^+	(M1+E2)	+1.63 *20*	0.00482 *16*	α(K)= 0.00401 *14*; α(L)= 0.000611 *20*
1064.7 *10*	≈0.1	1318.3	2^-	253.0	4^+	E3(+M2)	>1.64	0.0082 *11*	α(K)= 0.0066 *10*; α(L)= 0.00120 *14*
1128.5 *2*	0.21 *4*	1381.5	3^-	253.0	4^+	E1		0.00120	α(K)=0.001019; α(L)= 0.000140
1174.8 *3*	0.16 *4*	1701.2	4^+	526.0	6^+			0.0025 *19*	α(K)= 0.0026 *16*; α(L)= 0.00037 *22*
1214.9 *2*	0.21 *3*	1467.9	$(4)^-$	253.0	4^+	E1		0.00106	α(K)=0.000894; α(L)= 0.000122
1242.1[†] *5*	1.98 *10*	1318.3	2^-	76.45	2^+	E1+E3+M2			
1265.18 *10*	2.52 *12*	1518.0	6^+	253.0	4^+			0.0021 *16*	α(K)= 0.0022 *13*; α(L)= 0.00031 *18*
1304.7[†] *7*	0.75 *5*	1381.5	3^-	76.45	2^+	E1			
1316.5 *10*	≈0.1	1569.5	(5^-)	253.0	4^+			0.0019 *14*	α(K)= 0.0020 *12*; α(L)= 0.00028 *17*
1318.2 *3*	≈0.1	1318.3	2^-	0.0	0^+	M2		0.00891	α(K)= 0.00741; α(L)= 0.00112
1353.3 *3*	0.14 *3*	1606.1	$(3)^+$	253.0	4^+			0.0018 *13*	α(K)= 0.0019 *11*; α(L)= 0.00027 *15*
1358.7 *3*	0.07 *3*	1884.5	$(5)^-$	526.0	6^+			0.0018 *13*	α(K)= 0.0018 *11*; α(L)= 0.00026 *15*
1448.3 *3*	0.18 *5*	1701.2	4^+	253.0	4^+			0.0015 *11*	α(K)= 0.0016 *9*; α(L)= 0.00023 *13*
1530.0 *3*	0.18 *5*	1606.1	$(3)^+$	76.45	2^+			0.0011 *8*	α(K)= 0.0014 *8*
1631.5 *3*	0.21 *4*	1884.5	$(5)^-$	253.0	4^+				

[†] Ge(Li), $\gamma\gamma$ coin (1971Tu02).
[‡] From adopted gammas, unless otherwise specified.

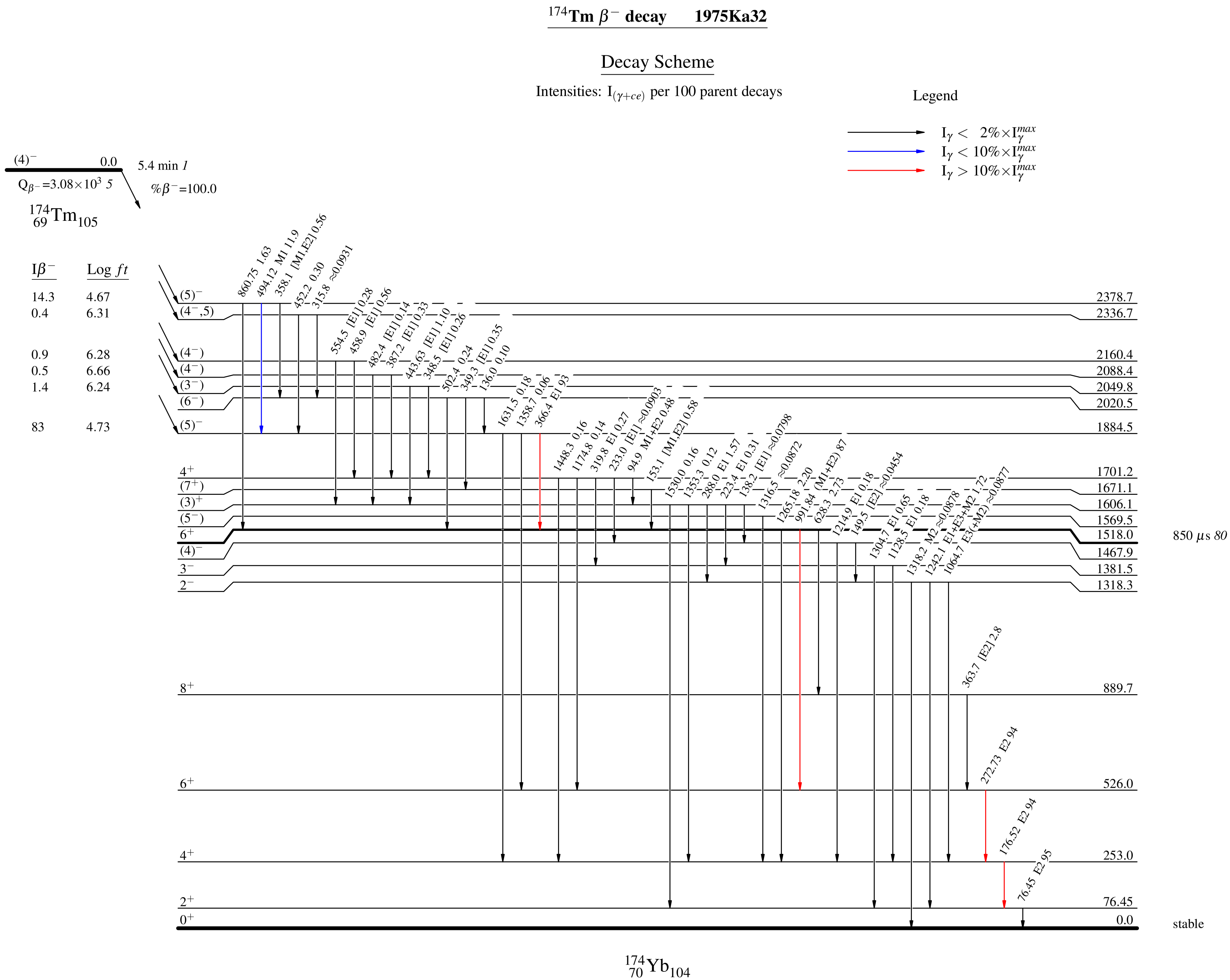
$^{174}_{70}$Yb$_{104}$-4

$\gamma(^{174}$Yb) (continued)

For absolute intensity per 100 decays, multiply by 0.87 *2*.

@ 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.

$^{174}_{70}$Yb$_{104}$-5


174Tm β− decay 1975Ka32
Decay Scheme
Intensities: I(γ+ce) per 100 parent decays
Legend
Iγ < 2%×Iγmax
Iγ < 10%×Iγmax
Iγ > 10%×Iγmax
(4)− 0.0
5.4 min 1
Qβ−=3.08×10³ 5
%β−=100.0
174 69 Tm105
Iβ− Log ft
14.3 4.67
0.4 6.31
0.9 6.28
0.5 6.66
1.4 6.24
83 4.73
(5)− 2378.7
(4−,5) 2336.7
(4−) 2160.4
(4−) 2088.4
(3−) 2049.8
(6−) 2020.5
(5)− 1884.5
4+ 1701.2
(7+) 1671.1
(3)+ 1606.1
(5−) 1569.5
6+ 1518.0
(4)− 1467.9
3− 1381.5
2− 1318.3
8+ 889.7
6+ 526.0
4+ 253.0
2+ 76.45
0+ 0.0
860.75 1.63
494.12 M1 11.9
358.1 [M1,E2] 0.56
452.2 0.30
315.8 ≈0.0931
554.5 [E1] 0.28
458.9 [E1] 0.56
482.4 [E1] 0.14
387.2 [E1] 0.33
443.63 [E1] 1.10
348.5 [E1] 0.26
502.4 0.24
349.3 [E1] 0.35
136.0 0.10
1631.5 0.18
1358.7 0.06
366.4 E1 93
1448.3 0.16
1174.8 0.14
319.8 E1 0.27
233.0 [E1] ≈0.0903
94.9 M1+E2 0.48
153.1 [M1,E2] 0.58
1530.0 0.16
1353.3 0.12
288.0 E1 1.57
223.4 E1 0.31
138.2 [E1] ≈0.0798
1316.5 ≈0.0872
1265.18 2.20
991.84 (M1+E2) 87
628.3 2.73
1214.9 E1 0.18
149.5 [E2] ≈0.0454
1304.7 E1 0.65
1128.5 E1 0.18
1318.2 M2 ≈0.0878
1242.1 E1+E3+M2 1.72
1064.7 E3(+M2) ≈0.0877
363.7 [E2] 2.8
272.73 E2 94
176.52 E2 94
76.45 E2 95
850 μs 80
stable
174 70 Yb104