

¹⁷⁶Tm β⁻ decay [1973DrZK](#),[1975DrZT](#),[1970Tu07](#)

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	M. S. Basunia	NDS 107, 791 (2006)	15-Sep-2005

Parent: ¹⁷⁶Tm: E=0.0; J^π=(4⁺); T_{1/2}=1.9 min I; Q(β⁻)=4.12×10³ I0; %β⁻ decay=100.0

Other: [1967Gu11](#).

¹⁷⁶Yb Levels

E(level) [‡]	J ^π [†]	E(level) [‡]	J ^π [†]	E(level) [‡]	J ^π [†]	E(level) [‡]	J ^π [†]
0.0	0 ⁺	1260.97 22	2 ⁺	1630.26 19		2537.9 6	
82.20 10	2 ⁺	1283.6 3	(4 ⁻)	1671.56 16	(3)	2949.9 6	(3 ⁺ ,4 ⁺)
271.98 13	4 ⁺	1341.22 17	(4 ⁺)	1798.30 21		2954.0 4	(3 ⁺ ,4 ⁺)
564.88 24	6 ⁺	1431.82 18	(2 ⁻)	2053.49 19	(3 ⁺ ,4 ⁺)	3052.4 4	(3 ⁺ ,4 ⁺ ,5 ⁺)
1088.27 18	(1 ⁻)	1435.5 5	(4 ⁺)	2153.6 3		3186.5 4	(4 ⁺ ,5 ⁺)
1132.14 18	(2 ⁻)	1498.78 17	(3 ⁻)	2295.4 4			
1193.47 19	(3 ⁻)	1575.61 18	(3)	2480.9 4			

[†] From Adopted Levels.

[‡] Deduced by evaluator from a least-squares fit to γ-ray energies from [1973DrZK](#), [1975DrZT](#), and [1970Tu07](#). The decay scheme and the γ-ray coincidence data are from [1973DrZK](#), [1975DrZT](#).

β⁻ radiations

Eβ=4.2 MeV I ([1961Ta08](#)); Eβ≈4 MeV, weak Iβ ([1970Tu07](#)). βγ coin data of [1967Gu11](#) is partly due to ¹⁷³Er and ²⁸Al ([1970Tu07](#)).

Only sufficiently strong β⁻ intensities, deduced from decay-scheme transition intensity balances, are shown.

E(decay)	E(level)	Iβ ^{-†}	Log ft	Comments
(9.3×10 ² I0)	3186.5	7.4 4	4.92 18	av Eβ=310 40
(1.07×10 ³ I0)	3052.4	3.2 2	5.50 16	av Eβ=362 41
(1.17×10 ³ I0)	2954.0	8.5 4	5.21 15	av Eβ=402 41
(1.17×10 ³ I0)	2949.9	3.1 3	5.66 15	av Eβ=404 41
(1.58×10 ³ I0)	2537.9	1.4 1	6.49 12	av Eβ=574 43
(1.64×10 ³ I0)	2480.9	1.2 2	6.62 13	av Eβ=599 43
(1.82×10 ³ I0)	2295.4	1.0 1	6.87 11	av Eβ=678 44
(1.97×10 ³ I0)	2153.6	3.6 3	6.44 10	av Eβ=739 44
(2.07×10 ³ I0)	2053.49	27 1	5.65 9	av Eβ=783 44
(2.78×10 ³ I0)	1341.22	22 5	6.25 12	av Eβ=1098 45
(3.85×10 ³ I0)	271.98	<16	>7.0	av Eβ=1580 46

[†] Absolute intensity per 100 decays.

¹⁷⁶Tm β⁻ decay **1973DrZK,1975DrZT,1970Tu07** (continued)

γ(¹⁷⁶Yb)

I_γ normalization: I_γ(γ+ce)(82γ+1088γ+1261γ)=100% from decay scheme assuming no β⁻ population of ¹⁷⁶Yb g.s. from ¹⁷⁶Tm (J^π=(4⁺)).

E _γ [†]	I _γ ^{#a}	E _i (level)	J _i ^π	E _f	J _f ^π	Mult. [‡]	δ [‡]	α ^b	Comments
82.2 1	34 4	82.20	2 ⁺	0.0	0 ⁺	E2		7.03	α(K)=1.49 5; α(L)=4.22 13; α(M)=1.04 4; α(N+..)=0.286 9
95.9 1	2.4 3	1671.56	(3)	1575.61	(3)				I _γ : 1970Tu07 report I _γ <2.5.
^x 101.1 2	2.8 3								
^x 111.2 2	0.3 1								
172.8 1	2.7 3	1671.56	(3)	1498.78	(3 ⁻)				
189.8 1	131 6	271.98	4 ⁺	82.20	2 ⁺	E2		0.324	α(K)=0.193 6; α(L)=0.100 3; α(M)=0.0240 8; α(N+..)=0.00659 20
215.4 3	1.10 18	1498.78	(3 ⁻)	1283.6	(4 ⁻)				
234.2 2	9.2 8	1575.61	(3)	1341.22	(4 ⁺)				
238.4 3	7.1 9	1431.82	(2 ⁻)	1193.47	(3 ⁻)	M1+E2	-0.40 +10-20	0.281 10	α(K)=0.231 20; α(L)=0.0382 1; α(M)=0.0086 1; α(N+..)=0.00254 2
239.7 2	24.6 21	1671.56	(3)	1431.82	(2 ⁻)				
241.9 3	3.0 4	2295.4		2053.49	(3 ⁺ ,4 ⁺)				
255.2 2	3.0 4	2053.49	(3 ⁺ ,4 ⁺)	1798.30					
289.1 2	4.0 4	1630.26		1341.22	(4 ⁺)				
292.9 2	9.9 9	564.88	6 ⁺	271.98	4 ⁺	E2		0.0801	α(K)=0.0567 17; α(L)=0.0180 6; α(M)=0.00425 13; α(N+..)=0.00123 4
299.7 2	8.7 8	1431.82	(2 ⁻)	1132.14	(2 ⁻)	M1+E2	+0.09 +3 -6	0.161 1	α(K)=0.135 1; α(L)=0.0203; α(M)=0.00453 1; α(N+..)=0.00137
305.4 3	0.55 18	1498.78	(3 ⁻)	1193.47	(3 ⁻)				
330.5 2	24.5 17	1671.56	(3)	1341.22	(4 ⁺)				
343.5 2	18.3 14	1431.82	(2 ⁻)	1088.27	(1 ⁻)	M1+E2	-0.11 2	0.112	α(K)=0.093; α(L)=0.0140; α(M)=0.00312; α(N+..)=0.00095
^x 347.8 3	2.8 10								
366.5 2	<4.2	1498.78	(3 ⁻)	1132.14	(2 ⁻)	M1+E2	0.00 5	0.07 3	α(K)=0.055 25; α(L)=0.0099 19; α(M)=0.0023 4; α(N+..)=0.00067 13
381.8 2	64 3	2053.49	(3 ⁺ ,4 ⁺)	1671.56	(3)				
^x 389.7 [@] 4	<2.5								
^x 392.1 4	2.1 4								
410.6 ^c 2	<0.3 ^c	1498.78	(3 ⁻)	1088.27	(1 ⁻)	E2		0.0301	α(K)=0.0230 7; α(L)=0.00551 17; α(M)=0.00128 4; α(N+..)=0.00037 1
410.6 ^c 2	12.5 ^c 9	1671.56	(3)	1260.97	2 ⁺				
423.6 3	2.5 5	2053.49	(3 ⁺ ,4 ⁺)	1630.26					
436.6 3	<1.6	1630.26		1193.47	(3 ⁻)				
^x 440.9 5	0.9 2								
^x 449.0 5	2.1 4								
^x 451.5 3	3.7 7								

γ(¹⁷⁶Yb) (continued)

E_γ †	I_γ #a	E_i (level)	J_i^π	E_f	J_f^π	Mult. ‡	δ^\ddagger	α^b	Comments
457.1 2	7.7 9	1798.30		1341.22	(4 ⁺)				
478.0 3	<3.2	1671.56	(3)	1193.47	(3 ⁻)				
482.2 3	6.2 6	2153.6		1671.56	(3)				
498.3 2	2.6 3	1630.26		1132.14	(2 ⁻)				
^x 520.2 4	2.5 3								
539.4 5	1.9 3	1671.56	(3)	1132.14	(2 ⁻)				
554.6 5	1.38 18	2053.49	(3 ⁺ ,4 ⁺)	1498.78	(3 ⁻)				
571.5 3	1.9 3	3052.4	(3 ⁺ ,4 ⁺ ,5 ⁺)	2480.9					
621.7 3	9.2 8	2053.49	(3 ⁺ ,4 ⁺)	1431.82	(2 ⁻)				
654.8 6	1.7 4	2153.6		1498.78	(3 ⁻)				
712.1 6	1.9 4	2053.49	(3 ⁺ ,4 ⁺)	1341.22	(4 ⁺)				
^x 754.3 7	1.8 4								
^x 774.8 6	3.4 4								
809.2 5	5.3 6	2480.9		1671.56	(3)				
^x 852.8 6	3.1 3								
900.4 5	7.4 7	2954.0	(3 ⁺ ,4 ⁺)	2053.49	(3 ⁺ ,4 ⁺)				
921.5 7	1.4 3	1193.47	(3 ⁻)	271.98	4 ⁺	E1(+M2)	0.00 5	0.012 11	$\alpha(K)=0.010$ 9; $\alpha(L)=0.0016$ 14
1006.2 6	2.9 3	1088.27	(1 ⁻)	82.20	2 ⁺	(E1+M2)	0.0 +2 -8	0.010 9	$\alpha(K)=0.008$ 7; $\alpha(L)=0.0013$ 11
1011.9 4	4.3 5	1283.6	(4 ⁻)	271.98	4 ⁺	(E1+M2)	-0.05 5	0.00151 12	$\alpha=0.00151$ 12; $\alpha(K)=0.00127$ 10; $\alpha(L)=0.00018$ 2
^x 1023.2 7	1.8 4								
1050.1 4	20.4 17	1132.14	(2 ⁻)	82.20	2 ⁺	(E1+M2)	-0.02 5	0.00138 7	$\alpha=0.00138$ 7; $\alpha(K)=0.00116$ 6; $\alpha(L)=0.00016$ 1
1069.3 3	100 14	1341.22	(4 ⁺)	271.98	4 ⁺	M1+E2	-0.26 2	0.00609 3	$\alpha=0.00609$ 3; $\alpha(K)=0.00511$ 3; $\alpha(L)=0.00074$
1088.3 3	16.2 16	1088.27	(1 ⁻)	0.0	0 ⁺	E1		0.00129	$\alpha=0.00129$; $\alpha(K)=0.00109$ 4; $\alpha(L)=0.00015$ 1
1111.1 3	14.7 16	1193.47	(3 ⁻)	82.20	2 ⁺	E1(+M2)	0.00 5	0.008 7	$\alpha(K)=0.006$ 6; $\alpha(L)=0.0010$ 9
^x 1121.4 6	<3								
1163.6 6	2.9 3	1435.5	(4 ⁺)	271.98	4 ⁺	M1+E2	-1.2 3	0.0037 4	$\alpha=0.0037$ 4; $\alpha(K)=0.0031$ 3; $\alpha(L)=0.00046$ 4
1178.8 4	8.6 8	1260.97	2 ⁺	82.20	2 ⁺	[E2]		0.00268	$\alpha=0.00268$; $\alpha(K)=0.00223$ 7; $\alpha(L)=0.00034$ 1
1254.1 4	5.7 6	3052.4	(3 ⁺ ,4 ⁺ ,5 ⁺)	1798.30					
1258.8 5	<18	1341.22	(4 ⁺)	82.20	2 ⁺	E2		0.00236	$\alpha=0.00236$; $\alpha(K)=0.00197$ 6; $\alpha(L)=0.00030$ 1
1260.9 7	6.4 6	1260.97	2 ⁺	0.0	0 ⁺	E2		0.00235	$\alpha=0.00235$; $\alpha(K)=0.00196$ 6; $\alpha(L)=0.00029$ 1
^x 1273.2 6	1.8 2								
1282.4 6	5.1 6	2954.0	(3 ⁺ ,4 ⁺)	1671.56	(3)				
1349.5 7	4.2 5	1431.82	(2 ⁻)	82.20	2 ⁺	E1+M2+(E3)		0.005 4	$\alpha=0.005$ 4; $\alpha(K)=0.004$ 4; $\alpha(L)=0.0006$ 5
1353.3 6	2.1 & 4	1435.5	(4 ⁺)	82.20	2 ⁺	E2		0.00205	$\alpha=0.00205$; $\alpha(K)=0.00171$ 6; $\alpha(L)=0.00025$ 1
1358.3 8	0.83 18	1630.26		271.98	4 ⁺				
1493.1 7	2.5 6	1575.61	(3)	82.20	2 ⁺				
^x 1521.3 7	2.9 3								
1589.3 6	8.0 8	1671.56	(3)	82.20	2 ⁺				
1612.7 7	2.9 3	2954.0	(3 ⁺ ,4 ⁺)	1341.22	(4 ⁺)				
^x 1748.0 8	2.1 2								
1756.1 8	1.4 3	2949.9	(3 ⁺ ,4 ⁺)	1193.47	(3 ⁻)				
1845.1 6	2.02 19	3186.5	(4 ⁺ ,5 ⁺)	1341.22	(4 ⁺)				
1881.2 7	1.4 3	2153.6		271.98	4 ⁺				

^{176}Tm β^- decay **1973DrZK,1975DrZT,1970Tu07** (continued)

$\gamma(^{176}\text{Yb})$ (continued)

E_γ †	I_γ # ^a	E_i (level)	J_i^π	E_f	J_f^π	E_γ †	I_γ # ^a	E_i (level)	J_i^π	E_f	J_f^π
^x 1891.8 7	<2.4					2621.6 6	8.0 7	3186.5	(4 ⁺ ,5 ⁺)	564.88	6 ⁺
1970.9 6	6.8 6	2053.49	(3 ⁺ ,4 ⁺)	82.20	2 ⁺	2678 1	2.6 3	2949.9	(3 ⁺ ,4 ⁺)	271.98	4 ⁺
2070.8 8	1.4 3	2153.6		82.20	2 ⁺	2682.0 8	3.8 4	2954.0	(3 ⁺ ,4 ⁺)	271.98	4 ⁺
2265.5 8	1.4 3	2537.9		271.98	4 ⁺	2780.7 8	1.66 18	3052.4	(3 ⁺ ,4 ⁺ ,5 ⁺)	271.98	4 ⁺
^x 2403.2 10	<1.5					2868 1	5.1 6	2949.9	(3 ⁺ ,4 ⁺)	82.20	2 ⁺
2456.0 8	2.6 3	2537.9		82.20	2 ⁺	2871.9 9	5.9 6	2954.0	(3 ⁺ ,4 ⁺)	82.20	2 ⁺
^x 2614.1 10	2.8 3					2914.7 6	11.6 9	3186.5	(4 ⁺ ,5 ⁺)	271.98	4 ⁺

† Weighted average of [1973DrZK](#), [1975DrZT](#), and [1970Tu07](#).

‡ From adopted gammas.

Weighted average of [1975DrZT](#) and [1970Tu07](#).

@ γ ray not observed ([1970Tu07](#)).

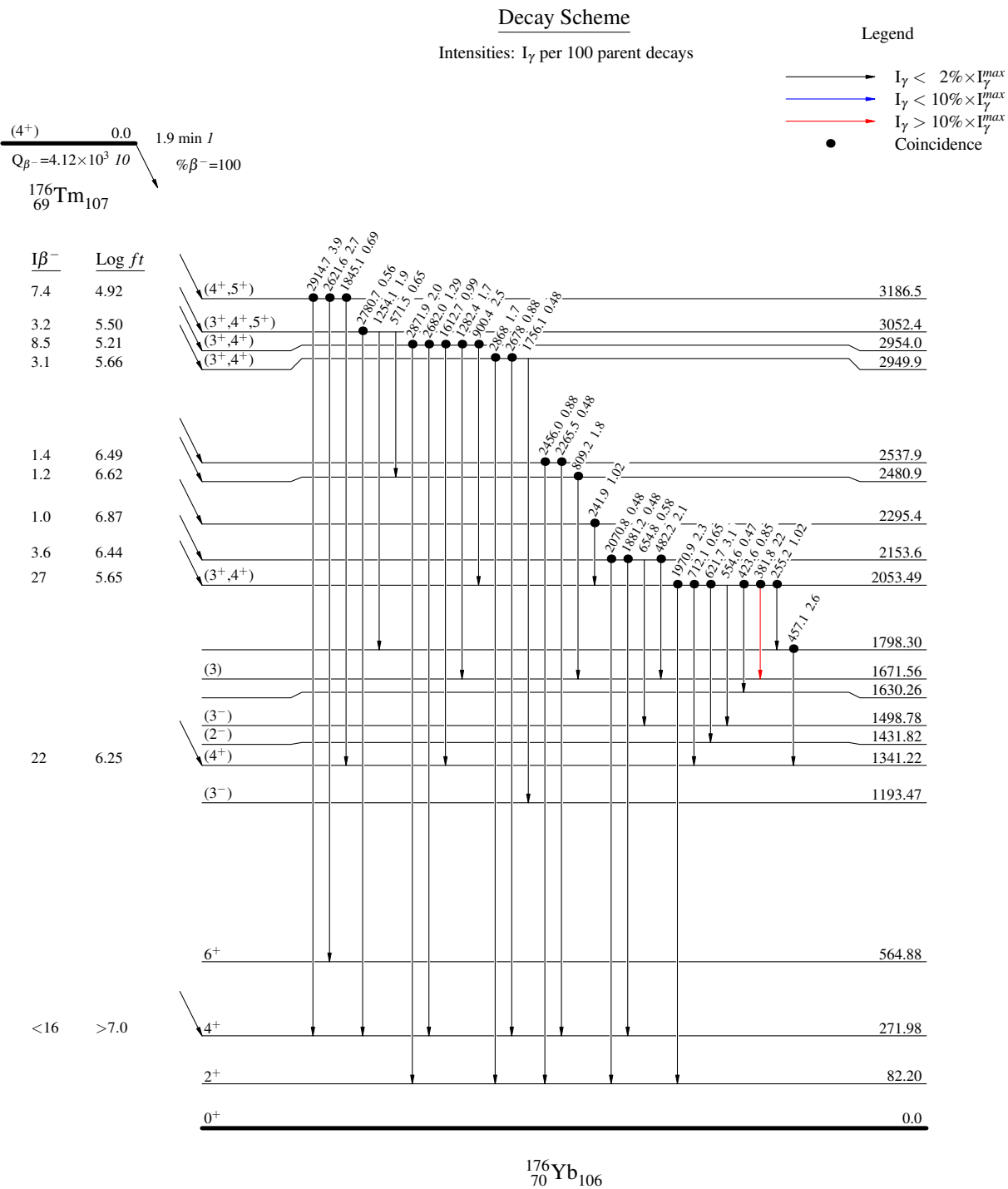
& From [1973DrZK](#), [1975DrZT](#). $I_\gamma=7.6$ 40 ([1970Tu07](#)).

^a For absolute intensity per 100 decays, multiply by 0.34 4.

^b Total theoretical internal conversion coefficients, calculated using the BrIcc code ([2008Ki07](#)) with Frozen orbital approximation based on γ -ray energies, assigned multiplicities, and mixing ratios, unless otherwise specified.

^c Multiply placed with intensity suitably divided.

^x γ ray not placed in level scheme.

^{176}Tm β^- decay 1973DrZK,1975DrZT,1970Tu07

^{176}Tm β^- decay 1973DrZK,1975DrZT,1970Tu07

Decay Scheme (continued)

Intensities: I_γ per 100 parent decays
@ Multiply placed: intensity suitably divided

Legend

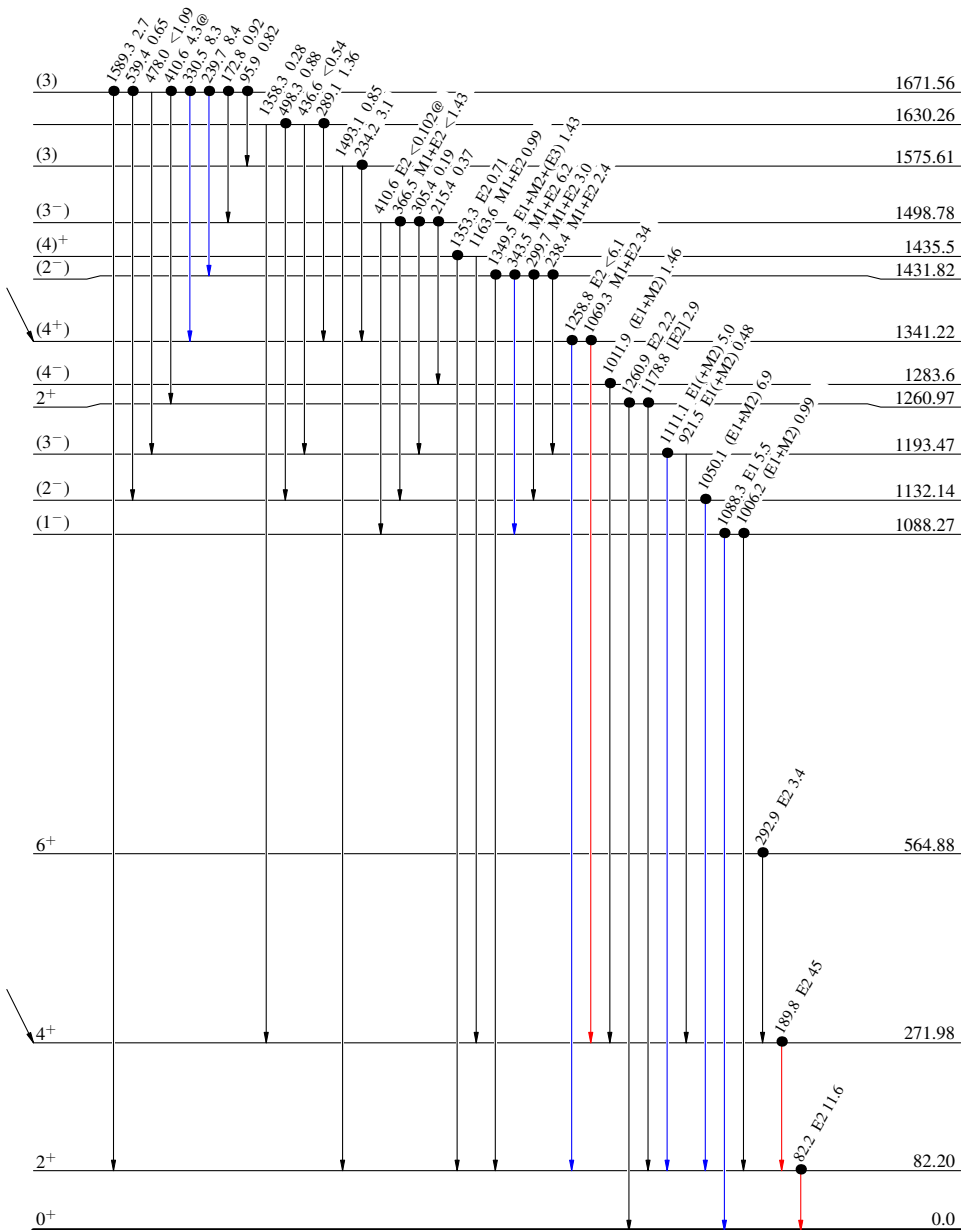
- $I_\gamma < 2\% \times I_\gamma^{\max}$
- $I_\gamma < 10\% \times I_\gamma^{\max}$
- $I_\gamma > 10\% \times I_\gamma^{\max}$
- Coincidence

(4^+) 0.0 1.9 min $T_{1/2}$
 $Q_{\beta^-} = 4.12 \times 10^3$ keV
 $\% \beta^- = 100$
 $^{176}\text{Tm}_{107}$

$I\beta^-$ Log ft

22 6.25

<16 >7.0



$^{176}_{70}\text{Yb}_{106}$