Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	C. W. Reich, Balraj Singh	NDS 111,1211 (2010)	12-Apr-2010

Q(β^-)=−3428 *17*; S(n)=9.32×10^3 *3*; S(p)=3683 *6*; Q(α)=2176 *7* 2012Wa38
Note: Current evaluation has used the following Q record −3431 17 *9323* 27 *3681* 6 *2176* 6 2009AuZZ,2003Au03.
Additional information 1.
An activity with $T_{1/2}$=11 min *3* assigned to ^{163}Tm (1968GrZX) was later retracted (1976Ab09).

^{163}Tm Levels

Cross Reference (XREF) Flags

- A ^{163}Yb ε decay (11.05 min)
- B ^{130}Te(^{37}Cl,4nγ)
- C ^{148}Nd(^{19}F,4nγ),^{130}Te(^{37}Cl,4nγ)
- D ^{165}Ho(^{3}He,5nγ),(α,6nγ)

E(level)[†]	J$^\pi$[#]	$T_{1/2}$[‡]	XREF	Comments
0.0[c]	1/2$^+$	1.810 h *5*	ABCD	%ε+%β^+=100 μ=−0.082 *1* (1988Al04,1989Ra17,2005St24) J$^\pi$: spin from atomic beam (1967Sc33). Parity: log *ft*=5.3 *1* to 947.29 level from 3/2$^-$ parent, the 947.29 level decays by M1,E2−−>E1−−>E2−−>M1+E2 cascade to the g.s.; measured μ consistent with $\mu\approx$−0.2 for π1/2[411] orbital. $T_{1/2}$: from 1982Vy07; measured relative to time decay of γ's from ^{133}Ba, $T_{1/2}$=10.5 y. Others: 1.75 h *5* (1982By03; total absorption γ spect), 1.8 h *2* (1969Ve05), 1.82 h *8* (1963Gr14), 1.8 h *1* (1963Ra15,1961Bj02), 1960Bo29, 1960Bu27, 1959Ha09. μ: from 1988Al04 (also 1987Mi31), atomic-beam LASER method. Other: 0.081 *2* (1967Sc33). From an evaluation of nuclear rms charge radii, 2004An14 report <r^2>$^{1/2}$=5.185 fm 4.
13.52[b] *2*	3/2$^+$	<0.9 ns	ABCD	J$^\pi$: M1+E2 γ to 1/2$^+$.
23.29[d] *5*	(7/2)$^+$		ABCD	J$^\pi$: E2 γ to 3/2$^+$. See also J$^\pi$ comment for 86.92 level.
86.92[f] *5*	(7/2)$^-$	0.38 μs *3*	ABCD	J$^\pi$: E1 γ to positive-parity state. Energy separation and B(E1)(W.u.)(63.6γ) are consistent with systematics of Nilsson states in other odd-A Tm, suggesting J=7/2 for both the 23.3 and 86.9 levels.
136.71[i] *2*	5/2$^+$	60 ps *10*	A D	J$^\pi$: E2 γ to 1/2$^+$,1/2[411] and M1+E2 γ to 3/2$^+$,1/2[411]. Alaga rules.
144.39[c] *2*	(5/2)$^+$	110 ps *25*	A CD	J$^\pi$: E2 γ to 1/2$^+$, band member.
164.69[e] *11*	(9/2$^+$)	≈43 ns	D	J$^\pi$: (M1,E2) γ to (7/2)$^+$. Band member.
174.59[g] *6*	(9/2)$^-$		ABCD	J$^\pi$: M1(+E2) γ to (7/2)$^-$. Band member.
175.00[b] *4*	(7/2)$^+$	@	A CD	J$^\pi$: ΔJ=(2) E2 γ to 3/2$^+$.
217.14[h] *4*	(1/2)$^-$	@	A D	J$^\pi$: E1 γ to 1/2$^+$, E1+M2 γ to 3/2$^+$, band member.
247.97[h] *6*	(5/2$^-$)		ABCD	J$^\pi$: E1 γ to 3/2$^+$, probable band member. In (^{3}He,5nγ), 253 level was assigned the 5/2$^-$ member of 1/2[541] band.
253.5? *3*	(≤7/2)		D	J$^\pi$: γ to 3/2$^+$. In (^{3}He,5nγ), this level was assigned as the 5/2$^-$ member of the π1/2[541] band.
258.35[i] *3*	(7/2)$^+$		A	J$^\pi$: M1(+E2) γ to 5/2$^+$. Band member.
290.30[f] *13*	(11/2$^-$)	≈43 ns	BCD	J$^\pi$: ΔJ=1 γ to (9/2)$^-$. Band member.
326.22[h] *3*	3/2$^-$		A	J$^\pi$: E1 γ's to 1/2$^+$ and 5/2$^+$.
331.08[d] *14*	(11/2$^+$)		D	J$^\pi$: ΔJ=(2) γ to (7/2)$^+$, γ to (9/2$^+$).

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Adopted Levels, Gammas (continued)

^{163}Tm Levels (continued)

E(level)[†]	J$^{\pi}$[#]	T$_{1/2}$[‡]	XREF	Comments
366.36[j] 6	3/2$^+$		A	J$^{\pi}$: M1+E2 γ to 1/2$^+$.
369.08[h] 25	(9/2$^-$)		ABCD	J$^{\pi}$: ΔJ=1 γ to (7/2)$^+$, band member.
383.1[c] 4	(9/2$^+$)		C	
436.89[g] 15	(13/2$^-$)	≈8.5 ns	BCD	J$^{\pi}$: ΔJ=1 γ to (11/2$^-$).
449.20[j] 5	(5/2)$^+$		A	J$^{\pi}$: M1+E2 γ to 5/2$^+$. Syst of π3/2[411] bands.
451.19[b] 24	(11/2$^+$)	@	CD	J$^{\pi}$: ΔJ=(2) γ to (7/2)$^+$.
498.02[h] 13	(7/2)$^-$		A	J$^{\pi}$: E1(+M2) γ to 5/2$^+$. Probable band member.
521.09[e] 14	(13/2$^+$)		D	
559.56[j] 9	(7/2)$^+$		A	J$^{\pi}$: M1+E2 γ to (7/2)$^+$, syst of π3/2[411] bands.
586.48[h] 25	(13/2$^-$)	@	BCD	J$^{\pi}$: ΔJ=1 γ to (11/2$^+$), ΔJ=(2) γ to (9/2$^-$).
603.60[f] 18	(15/2$^-$)		BCD	J$^{\pi}$: γ to (11/2$^-$).
629.10 22	(≤7/2)		A	J$^{\pi}$: γ to 5/2$^+$ and possible ε feeding from 3/2$^-$ suggest 1/2$^+$,3/2,5/2,7/2$^+$.
683.73 14	(≤7/2)		A	J$^{\pi}$: γ to 5/2$^+$ and possible ε feeding from 3/2$^-$ suggest 1/2$^+$,3/2,5/2,7/2$^+$.
728.0[c] 4	(13/2$^+$)		C	J$^{\pi}$: γ's to (9/2$^+$) and (11/2$^+$).
732.59[d] 21	(15/2$^+$)		D	J$^{\pi}$: ΔJ=(2) γ to (11/2$^+$), γ to (13/2$^+$).
774.09 7	(5/2,7/2)$^+$		A	J$^{\pi}$: E2 γ to 3/2$^+$, γ's to (7/2)$^-$ and (7/2)$^+$.
804.80[g] 19	(17/2$^-$)	≈8.5 ns	BCD	J$^{\pi}$: ΔJ=2, (E2) γ to (13/2$^-$), γ to (15/2$^-$).
806.13 7	(3/2,5/2$^+$)		A	J$^{\pi}$: γ's to (5/2)$^+$, possible γ to 1/2$^+$, γ from (5/2)$^-$.
823.94 9	(5/2$^-$)		A	J$^{\pi}$: γ to (9/2)$^-$, possible (E1) γ to 5/2$^+$ and possible ε feeding (log *ft*≈6.6) from 3/2$^-$.
829.7[b] 3	(15/2$^+$)	@	CD	J$^{\pi}$: ΔJ=2 γ to (11/2$^+$), γ to (13/2$^-$).
900.5[h] 3	(17/2$^-$)		BCD	J$^{\pi}$: γ to (13/2$^-$).
947.29[a] 5	(5/2)$^-$		A	J$^{\pi}$: M1,E2 γ to (7/2)$^-$, γ to (7/2)$^+$, evidence of strong ε feeding (log *ft*≈5.3) from 3/2$^-$.
962.85[e] 23	(17/2$^+$)		D	J$^{\pi}$: ΔJ=2 γ to (13/2$^+$), γ to (15/2$^+$).
1011.50[f] 21	(19/2$^-$)		BCD	J$^{\pi}$: γ's to (15/2$^-$) and (17/2$^-$).
1121.0? 6			D	
1130.64 15	(3/2$^+$,5/2$^-$)		A	J$^{\pi}$: γ to (7/2)$^+$, possible ε feeding (log *ft*≈6.5) from 3/2$^-$ and possible γ to (1/2)$^-$.
1159.5[c] 6	(17/2$^+$)		C	
1211.2[d] 4	(19/2$^+$)	@	D	J$^{\pi}$: ΔJ=(2) γ to (15/2$^+$), γ to (17/2$^+$).
1261.10[g] 22	(21/2$^-$)	@	BCD	J$^{\pi}$: ΔJ=2 γ to (17/2$^-$), γ to (19/2$^-$).
1294.5[b] 3	(19/2$^+$)		CD	J$^{\pi}$: ΔJ=(2) γ to (15/2$^+$), γ to (17/2$^-$).
1308.4[h] 3	(21/2$^-$)		BCD	J$^{\pi}$: γ to (17/2$^-$).
1345.32 6	1/2,3/2,5/2$^{(+)}$		A	J$^{\pi}$: γ to 1/2$^+$, possible ε feeding (log *ft*≈6.1) from 3/2$^-$.
1362.92 18	(≤7/2)		A	J$^{\pi}$: γ's to 3/2$^+$ and 5/2$^+$ suggest 1/2$^+$,3/2,5/2,7/2$^+$.
1473.6[e] 4	(21/2$^+$)		D	J$^{\pi}$: γ's to (17/2$^+$) and (19/2$^+$).
1498.40[f] 23	(23/2$^-$)	@	BCD	J$^{\pi}$: ΔJ=1 γ to (21/2$^-$), γ to (19/2$^-$).
1552.2? 6			D	
1661.5[c] 7	(21/2$^+$)		C	
1749.8[d] 4	(23/2$^+$)		D	J$^{\pi}$: ΔJ=(2) γ to (19/2$^+$), γ to (21/2$^+$).
1780.08 9	(1/2$^+$,3/2,5/2)		A	J$^{\pi}$: γ's to 3/2$^+$, 3/2$^-$ and (5/2,7/2)$^+$.
1785.70[g] 24	(25/2$^-$)		BCD	J$^{\pi}$: ΔJ=2 γ to (21/2$^-$), γ to (23/2$^-$).
1803.9[h] 3	(25/2$^-$)		BCD	J$^{\pi}$: ΔJ=2 γ to (21/2$^-$).
1819.55 12	(3/2,5/2)		A	J$^{\pi}$: γ's to (5/2)$^+$ and (5/2)$^-$. Possible γ to (1/2)$^-$.
1820.80 11	(1/2$^+$,3/2,5/2)		A	J$^{\pi}$: γ to 5/2$^+$ and possible γ to (1/2)$^-$.
1826.6[b] 4	(23/2$^+$)		CD	J$^{\pi}$: ΔJ=(2) γ to (19/2$^+$).
1833.48[&] 5	(5/2$^-$)		A	J$^{\pi}$: evidence of strong ε feeding (log *ft*≈5.2) from 3/2$^-$, γ's to (7/2)$^+$ and (7/2)$^-$.
1994.77 11	(5/2$^-$)		A	J$^{\pi}$: γ to (9/2$^-$), possible ε feeding (log *ft*≈5.6) from 3/2$^-$.

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Adopted Levels, Gammas (continued)

^{163}Tm Levels (continued)

E(level)[†]	Jπ[#]	$T_{1/2}$[‡]	XREF	Comments
2034.3[e] *6*	(25/2+)		D	
2046.3[f] *3*	(27/2−)		BCD	Jπ: ΔJ=(2) γ to (23/2−), γ to (25/2−).
2206.1[c] *8*	(25/2+)		C	
2323.0[d] *6*	(27/2+)	@	D	Jπ: γ to (23/2+).
2356.4[g] *3*	(29/2−)		BCD	Jπ: γ′s to (27/2−) and from (31/2−).
2376.8[h] *4*	(29/2−)		BCD	Jπ: γ to (25/2−).
2397.3[b] *4*	(27/2+)		CD	
2607.7[e] *7*	(29/2+)		D	
2626.2[f] *3*	(31/2−)		BCD	Jπ: ΔJ=(2) γ to (27/2−), γ to (29/2−).
2741.6[c] *10*	(29/2+)		C	
2878.6[d] *7*	(31/2+)		D	Jπ: ΔJ=(2) γ to (27/2+).
2920.9[g] *3*	(33/2−)		BCD	
2932.6[b] *5*	(31/2+)		C	
3014.5[h] *4*	(33/2−)		BCD	
3171.3[f] *3*	(35/2−)		BCD	Jπ: ΔJ=(2) γ to (31/2−).
3206.5[c] *11*	(33/2+)		C	
3265.1 *8*	(35/2−)		B	
3420.4[b] *6*	(35/2+)		C	
3427.7[g] *4*	(37/2−)		BC	
3689.6[f] *4*	(39/2−)		BC	
3713.6[h] *5*	(37/2−)		BC	
3722.2[c] *12*	(37/2+)		C	
3964.8[b] *7*	(39/2+)		C	
3967.6[g] *4*	(41/2−)		BC	
4094.5 *8*	(39/2−)		B	
4266.4[f] *4*	(43/2−)		BC	
4319.8[c] *13*	(41/2+)		C	
4443.2[h] *7*	(41/2−)		BC	
4501.6?[l] *11*	(41/2−)		B	
4586.6[g] *4*	(45/2)−		BC	
4588.4[b] *7*	(43/2+)		C	
4774.9 *10*	(43/2−)		B	
4918.5[f] *4*	(47/2−)		BC	
4996.8[c] *14*	(45/2+)		C	
5098.8[l] *10*	(45/2−)		B	
5172.2[h] *8*	(45/2−)		BC	
5285.9[g] *4*	(49/2)−	0.388 ps *14*	BC	
5417.3[k] *12*	(47/2−)		B	
5643.5[f] *8*	(51/2−)		B	
5740.3[c] *15*	(49/2+)		C	
5751.1[l] *12*	(49/2−)		B	
5893.2[h] *13*	(49/2−)		B	
6057.9[g] *9*	(53/2−)	0.353 ps *21*	BC	
6096.8[l] *13*	(51/2−)		B	
6433.5[f] *10*	(55/2−)		B	
6462.2[l] *14*	(53/2−)		B	
6569.3[c] *16*	(53/2+)		C	

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Adopted Levels, Gammas (continued)

^{163}Tm Levels (continued)

E(level)†	Jπ#	$T_{1/2}$‡	XREF
6837.9[k] *15*	(55/2⁻)		B
6845.9? *13*	(57/2⁻)	0.347 ps *21*	C
6893.9[g] *11*	(57/2⁻)		B
7236.8[l] *15*	(57/2⁻)		B
7279.5[f] *12*	(59/2⁻)		B
7642.3[k] *16*	(59/2⁻)		B
7785.9[g] *13*	(61/2⁻)		B
8075.6[l] *17*	(61/2⁻)		B
8175.5[f] *13*	(63/2⁻)		B
8507.5[k] *19*	(63/2⁻)		B
8729.9[g] *14*	(65/2⁻)		B
8978.0[l] *20*	(65/2⁻)		B
9120.5[f] *15*	(67/2⁻)		B
9431.0[k] *22*	(67/2⁻)		B
9729.9[g] *17*	(69/2⁻)		B
9944.8[l] *22*	(69/2⁻)		B
10115.5[f] *18*	(71/2⁻)		B
10412.4[k] *24*	(71/2⁻)		B
10788.9[g] *20*	(73/2⁻)		B
10975.2[l] *24*	(73/2⁻)		B
11159.5[f] *21*	(75/2⁻)		B
11451[k] *3*	(75/2⁻)		B
11908.9[g] *23*	(77/2⁻)		B
12070[l] *3*	(77/2⁻)		B
12253.5[f] *23*	(79/2⁻)		B
12547[k] *3*	(79/2⁻)		B
13089.9[g] *25*	(81/2⁻)		B
13219[l] *3*	(81/2⁻)		B
13400.5[f] *25*	(83/2⁻)		B
13695[k] *3*	(83/2⁻)		B
14321[g] *3*	(85/2⁻)		B
14598[f] *3*	(87/2⁻)		B
14882[k] *3*	(87/2⁻)		B

† Levels above 6890 keV are from (^{37}Cl,4nγ) (2007Pa22) only.

‡ From ceγ(t) and $\gamma\gamma$(t) in ε decay for levels between 13 and 150 and from γ(t) in (α,6nγ) for levels above 150.

For high-spin levels populated in (^{19}F,4nγ),(^{37}Cl,4nγ), the assignments are from band structures and deexcitation pattern. Some of these assignments are based on $\gamma\gamma(\theta)$ (DCO) and/or $\gamma(\theta)$ data but the details of such measurements are generally not available. Thus, all assignments are given under parentheses.

@ <14 ns from resolving time of $\gamma\gamma$ coin system in (α,6nγ).

& Configuration=π7/2[523]⊗ν3/2[521]⊗ν5/2[532] (?).

a Configuration=π5/2[532] (?).

b Band(A): π1/2[411] band, α=−1/2. Band assignment from 1992JeZW, 1977Fo08 and 1975Ad09. A=15.39, B=−6.65 eV, a=−0.706. First four members of band proposed by 1975Ad09; extended to 27/2 by 1977Fo08 and to 43/2 by 1992JeZW.

c Band(a): π1/2[411] band, α=+1/2. Band assignment from 1992JeZW.

d Band(B): π7/2[404] band, α=−1/2. A=16.07, B=−25.4 eV, A_7=1.25×10^{-6}. Bandhead identification (1977Fo08) from systematics of odd-A Tm nuclides. Identification of other members based on strong crossover transitions.

e Band(C): π7/2[404] band, α=+1/2. See comments on other signature partner for band assignment and band parameters.

f Band(D): π7/2[523] band, α=−1/2. Band assignment from 1977Fo08 and 1991Je04. A=9.16, B=36.6 eV, A_7=−8.63×10^{-7}. 1985Ad12 do not observe the strong Coriolis effects mentioned by 1977Fo08.

g Band(d): π7/2[523] band, α=+1/2. See comments on other signature partner for band assignment and band parameters.

h Band(E): π1/2[541] band α=+1/2. Band assignment from 1991Je04 and 1977Fo08. The signature partner (α=−1/2) of this band was reported by 1992JeZW but later retracted (1994JeZZ). A=11.46, B=−7.07 eV, a=2.20.

i Band(F): π5/2[402] band. A=17.4, if B=0.

j Band(G): π3/2[411] band. A=17.10, B=−66.9 eV.

k Band(H): Triaxial SD-1 band, α=−1/2. Percent population intensity=2.9 *11* (2007Pa22). Q_t=7.42 *+44−37* (DSAM,2007Wa21). The side-feeding Q_{sf}=10.2 *+18−13*. From comparison with structure calculations and interband transitions, this band is proposed as a particle-hole excitation rather than a wobbling-mode excitation (2007Pa22).

l Band(h): Triaxial SD-2 band, α=+1/2. Percent population intensity=2.1 *9* (2007Pa22). Q_t=7.7 *+10−6* (DSAM,2007Wa21). The side-feeding Q_{sf}=9.7 *+29−23*. See comment for the α=−1/2 signature partner for the nature of this band.

Adopted Levels, Gammas (continued)

$\gamma(^{163}Tm)$

See ε decay and (^{3}He,5nγ),(α,6nγ) for a large number of gamma rays assigned to ^{163}Tm but not yet placed in the level scheme.

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	α[b]	Comments
13.52	3/2$^+$	13.53 *3*	100	0.0	1/2$^+$	M1+E2	≈0.04	240 *60*	B(M1)(W.u.)>0.030; B(E2)(W.u.)>130 α(L)=186 *45*; α(M)=43 *11*; α(N+..)=11 *3* α(N)≈10; α(O)≈1.337; α(P)≈0.0575 α: for δ=0.04 *2*.
23.29	(7/2)$^+$	9.74 *5*	100	13.52	3/2$^+$	E2		1.32×10^5	α(L)=8.55×10^4; α(M)=3.47×10^4; α(N+..)=1.16×10^4
86.92	(7/2)$^-$	63.62 *3*	100	23.29	(7/2)$^+$	E1		1.077	B(E1)(W.u.)=9.5×10^{-7} *8* α(K)=0.875 *13*; α(L)=0.1576 *23*; α(M)=0.0352 *5*; α(N+..)=0.00908 *13* α(N)=0.00802 *12*; α(O)=0.001025 *15*; α(P)=3.70×10^{-5} *6* δ: <0.03 from RUL(M2)=1, <0.035 from α(K)exp in ε decay.
136.71	5/2$^+$	123.21 *2*	100 *4*	13.52	3/2$^+$	M1+E2	0.28 *4*	1.686 *25*	B(M1)(W.u.)=0.062 *11*; B(E2)(W.u.)=160 *50* α(K)=1.37 *3*; α(L)=0.244 *9*; α(M)=0.0552 *22*; α(N+..)=0.0147 *6* α(N)=0.0129 *5*; α(O)=0.00178 *6*; α(P)=8.33×10^{-5} *17*
		136.70 *3*	11.4 *5*	0.0	1/2$^+$	E2		0.968	B(E2)(W.u.)=140 *30* α(K)=0.478 *7*; α(L)=0.376 *6*; α(M)=0.0914 *13*; α(N+..)=0.0233 *4* α(N)=0.0208 *3*; α(O)=0.00246 *4*; α(P)=2.06×10^{-5} *3*
144.39	(5/2)$^+$	(7.68 *3*)	0.48 *16*	136.71	5/2$^+$	(M1)		219 *4*	B(M1)(W.u.)=0.50 *21* α(M)=173 *4*; α(N+..)=46.5 *9* α(N)=40.4 *8*; α(O)=5.78 *11*; α(P)=0.311 *6* Mult.: not E2, M2 or higher from RUL. M1 from $\Delta\pi$.
		130.86 *2*	100 *3*	13.52	3/2$^+$	M1(+E2)	0.5 *5*	1.38 *10*	B(M1)(W.u.)=0.017 *8*; B(E2)(W.u.)<182 α(K)=1.07 *21*; α(L)=0.24 *9*; α(M)=0.055 *22*; α(N+..)=0.014 *6* α(N)=0.013 *5*; α(O)=0.0017 *5*; α(P)=6.4×10^{-5} *16*
		144.39 *3*	37.4 *16*	0.0	1/2$^+$	E2		0.797	B(E2)(W.u.)=140 *40* α(K)=0.411 *6*; α(L)=0.295 *5*; α(M)=0.0717 *10*; α(N+..)=0.0183 *3* α(N)=0.01635 *23*; α(O)=0.00194 *3*; α(P)=1.79×10^{-5} *3*
164.69	(9/2$^+$)	141.4 *1*	100	23.29	(7/2)$^+$	(M1,E2)		1.01 *15*	α(K)=0.7 *3*; α(L)=0.23 *9*; α(M)=0.056 *23*; α(N+..)=0.014 *6* α(N)=0.013 *6*; α(O)=0.0016 *6*; α(P)=3.9×10^{-5} *21* E_γ: from (^{3}He,5nγ). Mult.: D,E2 from RUL. α(exp) in (^{3}He,5nγ) suggests not E1.

$^{163}_{69}Tm_{94}$-5

Adopted Levels, Gammas (continued)

γ(^{163}Tm) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	α[b]	Comments
174.59	$(9/2)^-$	87.67 *3*	100	86.92	$(7/2)^-$	M1(+E2)	0.4 *+5−4*	4.61 *19*	α(K)=3.5 *8*; α(L)=0.9 *7*; α(M)=0.21 *18*; α(N+..)=0.05 *5* α(N)=0.05 *4*; α(O)=0.006 *5*; α(P)=0.00021 *6*
		151.3[a] *10*		23.29	$(7/2)^+$				
175.00	$(7/2)^+$	161.49 *3*	100	13.52	$3/2^+$	E2		0.538	α(K)=0.301 *5*; α(L)=0.182 *3*; α(M)=0.0440 *7*; α(N+..)=0.01125 *16* α(N)=0.01003 *14*; α(O)=0.001201 *17*; α(P)=1.342×10^{-5} *19*
217.14	$(1/2)^-$	203.60 *4*	100 *6*	13.52	$3/2^+$	E1+M2	0.14 *4*	0.09 *3*	α(K)=0.075 *21*; α(L)=0.014 *5*; α(M)=0.0031 *11*; α(N+..)=0.0008 *3* α(N)=0.00072 *25*; α(O)=0.00010 *4*; α(P)=4.8×10^{-6} *17*
		217.17 *5*	80 *8*	0.0	$1/2^+$	E1		0.0434	α(K)=0.0364 *6*; α(L)=0.00543 *8*; α(M)=0.001206 *17*; α(N+..)=0.000319 *5* α(N)=0.000279 *4*; α(O)=3.85×10^{-5} *6*; α(P)=1.80×10^{-6} *3* δ: 0.05 *+7−5* from ε decay, ΔJ^π forbids M2.
247.97	$(5/2^-)$	234.45 *5*	100	13.52	$3/2^+$	E1		0.0357	α(K)=0.0300 *5*; α(L)=0.00444 *7*; α(M)=0.000986 *14*; α(N+..)=0.000261 *4* α(N)=0.000228 *4*; α(O)=3.16×10^{-5} *5*; α(P)=1.496×10^{-6} *21*
253.5?	(≤7/2)	108.9[f] *5*	6 *3*	144.39	$(5/2)^+$				
		240.0[f] *3*	100 *32*	13.52	$3/2^+$				
258.35	$(7/2)^+$	113.91 *3*	100 *8*	144.39	$(5/2)^+$	M1(+E2)	0.2 *+28−2*	2.13 *23*	α(K)=1.7 *9*; α(L)=0.3 *5*; α(M)=0.07 *13*; α(N+..)=0.02 *4* α(N)=0.02 *3*; α(O)=0.002 *3*; α(P)=0.00011 *7*
		121.73 *5*	74 *8*	136.71	$5/2^+$	M1(+E2)	0.1 *+15−1*	1.76 *21*	α(K)=1.5 *6*; α(L)=0.2 *3*; α(M)=0.05 *8*; α(N+..)=0.014 *19* α(N)=0.012 *17*; α(O)=0.0017 *18*; α(P)=9.E−5 *5*
290.30	$(11/2^-)$	115.7 *2*	100 *10*	174.59	$(9/2)^-$	D[&]			
		203.4 *2*	20 *10*	86.92	$(7/2)^-$				I_γ: 68 *7* in ^{130}Te(^{37}Cl,4nγ) (2007Pa22).
326.22	$3/2^-$	181.84 *5*	15.5 *10*	144.39	$(5/2)^+$	E1		0.0688	α(K)=0.0576 *8*; α(L)=0.00871 *13*; α(M)=0.00194 *3*; α(N+..)=0.000511 *8* α(N)=0.000447 *7*; α(O)=6.12×10^{-5} *9*; α(P)=2.79×10^{-6} *4* δ: <0.13 from α(K)exp.
		189.40 *10*	17 *3*	136.71	$5/2^+$	E1		0.0619	α(K)=0.0518 *8*; α(L)=0.00781 *11*; α(M)=0.001735 *25*; α(N+..)=0.000459 *7* α(N)=0.000401 *6*; α(O)=5.50×10^{-5} *8*; α(P)=2.52×10^{-6} *4* δ: <0.15 from α(K)exp.
		312.71 *4*	12 *3*	13.52	$3/2^+$	[E1]		0.01736	α(K)=0.01463 *21*; α(L)=0.00213 *3*; α(M)=0.000471 *7*; α(N+..)=0.0001254 *18* α(N)=0.0001094 *16*; α(O)=1.528×10^{-5} *22*; α(P)=7.51×10^{-7} *11*
		326.20 *7*	100 *4*	0.0	$1/2^+$	E1		0.01566	α(K)=0.01321 *19*; α(L)=0.00192 *3*; α(M)=0.000424 *6*; α(N+..)=0.0001130 *16* α(N)=9.85×10^{-5} *14*; α(O)=1.378×10^{-5} *20*; α(P)=6.81×10^{-7} *10*

$^{163}_{69}Tm_{94}$-6

Adopted Levels, Gammas (continued)

γ(^{163}Tm) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	α[b]	Comments
331.08	(11/2$^+$)	166.4 *1*	≤282	164.69	(9/2$^+$)				
		307.8 *3*	100 *30*	23.29	(7/2)$^+$	@			
366.36	3/2$^+$	221.74 *20*	12.9 *21*	144.39	(5/2)$^+$	(E2)		0.185	α(K)=0.1216 *18*; α(L)=0.0487 *7*; α(M)=0.01164 *17*; α(N+..)=0.00300 *5* α(N)=0.00266 *4*; α(O)=0.000328 *5*; α(P)=5.84×10^{-6} *9*
		352.95 *10*	100 *6*	13.52	3/2$^+$	E2(+M1)	>0.93	0.058 *14*	α(K)=0.045 *13*; α(L)=0.0094 *9*; α(M)=0.00216 *17*; α(N+..)=0.00057 *5* α(N)=0.00050 *4*; α(O)=6.7×10^{-5} *8*; α(P)=2.6×10^{-6} *9*
		366.30 *10*	99 *4*	0.0	1/2$^+$	M1+E2	0.86 *45*	0.066 *13*	α(K)=0.054 *12*; α(L)=0.0093 *9*; α(M)=0.00210 *17*; α(N+..)=0.00056 *5* α(N)=0.00049 *5*; α(O)=6.8×10^{-5} *8*; α(P)=3.2×10^{-6} *8*
369.08	(9/2$^-$)	121.1 *5*	12 *7*	247.97	(5/2$^-$)				
		194.1 *5*	100 *10*	175.00	(7/2)$^+$	&			
383.1	(9/2$^+$)	208.1 *5*		175.00	(7/2)$^+$				
		238.7 *5*		144.39	(5/2)$^+$				
436.89	(13/2$^-$)	146.6 *2*	100 *10*	290.30	(11/2$^-$)	D&			Iγ: the γ-ray branching ratios are from ^{165}Ho(^{3}He,5nγ),(α,6nγ); Iγ(146.6)/Iγ(262.3)=0.3/78 in ^{130}Te(^{37}Cl,4nγ).
		262.3 *2*	≤41	174.59	(9/2)$^-$	[E2]		0.1081	B(E2)(W.u.)≈0.14 α(K)=0.0753 *11*; α(L)=0.0252 *4*; α(M)=0.00598 *9*; α(N+..)=0.001548 *23* α(N)=0.001373 *20*; α(O)=0.0001719 *25*; α(P)=3.76×10^{-6} *6*
449.20	(5/2)$^+$	274.30 *15*	37 *5*	175.00	(7/2)$^+$	[M1,E2]		0.14 *5*	α(K)=0.11 *5*; α(L)=0.0222 *10*; α(M)=0.00508 *9*; α(N+..)=0.00134 *5* α(N)=0.00118 *3*; α(O)=0.000159 *14*; α(P)=6.E−6 *3*
		304.67 *20*	22 *4*	144.39	(5/2)$^+$	M1+E2	0.62 *45*	0.119 *19*	α(K)=0.098 *18*; α(L)=0.0165 *8*; α(M)=0.00373 *13*; α(N+..)=0.00100 *5* α(N)=0.00087 *4*; α(O)=0.000121 *8*; α(P)=5.8×10^{-6} *12*
		312.52 *6*	53 *9*	136.71	5/2$^+$	M1+E2	≈2	0.077 *11*	α(K)=0.059 *11*; α(L)=0.0138 *5*; α(M)=0.00319 *9*; α(N+..)=0.00084 *3* α(N)=0.000734 *3*; α(O)≈9.68×10^{-5}; α(P)≈3.23×10^{-6} α: for δ=2 *1*.
		435.62 *7*	100 *7*	13.52	3/2$^+$	E2(+M1)	>2.2	0.027 *3*	α(K)=0.0214 *23*; α(L)=0.00445 *22*; α(M)=0.00102 *5*; α(N+..)=0.000270 *13* α(N)=0.000237 *11*; α(O)=3.17×10^{-5} *18*; α(P)=1.18×10^{-6} *15*
451.19	(11/2$^+$)	276.2 *3*	100	175.00	(7/2)$^+$	@			
498.02	(7/2)$^-$	353.8 *3*	83 *21*	144.39	(5/2)$^+$	[E1]		0.01288	α(K)=0.01088 *16*; α(L)=0.001569 *23*; α(M)=0.000347 *5*; α(N+..)=9.26×10^{-5} *13* α(N)=8.07×10^{-5} *12*; α(O)=1.131×10^{-5} *16*; α(P)=5.64×10^{-7} *8*
		361.55 *20*	100 *9*	136.71	5/2$^+$	E1(+M2)	≈0.13	≈0.01744	α(K)≈0.01453; α(L)≈0.00227; α(M)≈0.000509; α(N+..)≈0.0001362 α(N)≈0.0001186; α(O)≈1.672×10^{-5}; α(P)≈8.44×10^{-7} α: for δ=0.13 *7*.

$^{163}_{69}Tm_{94}$-7

Adopted Levels, Gammas (continued)

γ(^{163}Tm) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	α[b]	Comments
521.09	(13/2$^+$)	190.1 *3*	<48	331.08	(11/2$^+$)				
		356.4 *1*	100 *10*	164.69	(9/2$^+$)				
559.56	(7/2)$^+$	384.62 *10*	100 *7*	175.00	(7/2)$^+$	M1+E2	1.4 *8*	0.048 *16*	α(K)=0.039 *15*; α(L)=0.0074 *12*; α(M)=0.00168 *23*; α(N+..)=0.00044 *7* α(N)=0.00039 *6*; α(O)=5.3×10^{-5} *10*; α(P)=2.2×10^{-6} *10*
		415.0 *3*	22 *3*	144.39	(5/2)$^+$	[M1,E2]		0.045 *17*	α(K)=0.037 *15*; α(L)=0.0063 *14*; α(M)=0.0014 *3*; α(N+..)=0.00038 *8* α(N)=0.00033 *7*; α(O)=4.6×10^{-5} *11*; α(P)=2.1×10^{-6} *10*
		422.80 *20*	13 *5*	136.71	5/2$^+$	[M1,E2]		0.043 *16*	α(K)=0.035 *15*; α(L)=0.0059 *13*; α(M)=0.0013 *3*; α(N+..)=0.00036 *8* α(N)=0.00031 *7*; α(O)=4.4×10^{-5} *11*; α(P)=2.0×10^{-6} *10*
586.48	(13/2$^-$)	135.3 *5*	43 *14*	451.19	(11/2$^+$)	D+Q[&]			
		217.4 *2*	100 *21*	369.08	(9/2$^-$)	[@]			
603.60	(15/2$^-$)	166.7 *2*	82 *11*	436.89	(13/2$^-$)				
		313.3 *2*	100 *19*	290.30	(11/2$^-$)				
629.10	(≤7/2)	484.6 *3*	100 *22*	144.39	(5/2)$^+$				
		492.5 *3*	67 *22*	136.71	5/2$^+$				
683.73	(≤7/2)	539.33 *14*	100 *9*	144.39	(5/2)$^+$				
		547.32 *70*	36 *9*	136.71	5/2$^+$				
728.0	(13/2$^+$)	276.8 *5*		451.19	(11/2$^+$)				
		344.9 *5*		383.1	(9/2$^+$)				
732.59	(15/2$^+$)	211.3 *5*	17 *9*	521.09	(13/2$^+$)				
		401.5 *2*	100 *20*	331.08	(11/2$^+$)	[@]			
774.09	(5/2,7/2)$^+$	407.72 *10*	20.3 *14*	366.36	3/2$^+$	E2		0.0294	α(K)=0.0226 *4*; α(L)=0.00526 *8*; α(M)=0.001220 *18*; α(N+..)=0.000320 *5* α(N)=0.000281 *4*; α(O)=3.70×10^{-5} *6*; α(P)=1.219×10^{-6} *17*
		599.2 *3*	37 *4*	175.00	(7/2)$^+$				
		687.22[e] *10*	100[e] *86*	86.92	(7/2)$^-$	(E1)		0.00297	α(K)=0.00252 *4*; α(L)=0.000349 *5*; α(M)=7.70×10^{-5} *11*; α(N+..)=2.06×10^{-5} *3* α(N)=1.79×10^{-5} *3*; α(O)=2.56×10^{-6} *4*; α(P)=1.355×10^{-7} *19*
804.80	(17/2$^-$)	201.2 *2*	100 *11*	603.60	(15/2$^-$)				
		367.9 *2*	97 *13*	436.89	(13/2$^-$)	(E2)[@]		0.0392	B(E2)(W.u.)≈0.09 α(K)=0.0296 *5*; α(L)=0.00741 *11*; α(M)=0.001728 *25*; α(N+..)=0.000452 *7* α(N)=0.000398 *6*; α(O)=5.17×10^{-5} *8*; α(P)=1.574×10^{-6} *23*
806.13	(3/2,5/2$^+$)	661.98 *15*	100 *10*	144.39	(5/2)$^+$				

$^{163}_{69}Tm_{94}$-8

Adopted Levels, Gammas (continued)

γ(^{163}Tm) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	α[b]	Comments
806.13	(3/2,5/2$^+$)	805.6[d f] *16*	≤19[d]	0.0	1/2$^+$			
823.94	(5/2$^-$)	649.33 *15*	24.4 *22*	174.59	(9/2)$^-$	[E2]	0.0091	α(K)=0.0074; α(L)=0.0013; α(M)=0.00029; α(N+..)=0.00007 α(N)=0.00007; α(O)=1.0×10^{-5}; α(P)=4.E−7
		687.22[e f] *10*	100[e] *67*	136.71	5/2$^+$	(E1)	0.00297	α(K)=0.00252 *4*; α(L)=0.000349 *5*; α(M)=7.70×10^{-5} *11*; α(N+..)=2.06×10^{-5} *3* α(N)=1.79×10^{-5} *3*; α(O)=2.56×10^{-6} *4*; α(P)=1.355×10^{-7} *19*
		737.05 *10*	82 *4*	86.92	(7/2)$^-$	[M1,E2]	0.010 *4*	α(K)=0.009 *4*; α(L)=0.0013 *4*; α(M)=0.00030 *9*; α(N+..)=8.0×10^{-5} *23* α(N)=6.9×10^{-5} *20*; α(O)=1.0×10^{-5} *3*; α(P)=5.1×10^{-7} *20*
829.7	(15/2$^+$)	243.2 *3*	21 *11*	586.48	(13/2$^-$)			
		378.5 *3*	100 *30*	451.19	(11/2$^+$)	Q[@]		
900.5	(17/2$^-$)	296.9[a] *10*	2.6 *3*	603.60	(15/2$^-$)			
		314.0 *2*	100 *10*	586.48	(13/2$^-$)			
947.29	(5/2)$^-$	141.21 *6*	1.10 *10*	806.13	(3/2,5/2$^+$)			
		688.94 *8*	2.0 *5*	258.35	(7/2)$^+$			
		772.67[f] *10*	2.54 *14*	174.59	(9/2)$^-$			
		802.96 *15*	3.5 *3*	144.39	(5/2)$^+$			
		810.60 *10*	6.1 *3*	136.71	5/2$^+$			
		860.28 *6*	100 *4*	86.92	(7/2)$^-$	M1,E2	0.0072 *24*	α(K)=0.0061 *21*; α(L)=0.0009 *3*; α(M)=0.00020 *6*; α(N+..)=5.4×10^{-5} *16* α(N)=4.7×10^{-5} *14*; α(O)=6.7×10^{-6} *20*; α(P)=3.5×10^{-7} *13*
962.85	(17/2$^+$)	230.2 *5*	22 *12*	732.59	(15/2$^+$)			
		441.8 *2*	100 *20*	521.09	(13/2$^+$)	Q[@]		
1011.50	(19/2$^-$)	206.7 *2*	71 *8*	804.80	(17/2$^-$)			
		407.9[c] *2*	100 *10*	603.60	(15/2$^-$)			
1121.0?		534.5[f] *5*	100	586.48	(13/2$^-$)			
1130.64	(3/2$^+$,5/2$^-$)	571.9 *5*	28 *5*	559.56	(7/2)$^+$			
		805.6[d f] *16*	≤14[d]	326.22	3/2$^-$			
		913.7[d] *6*	≤48[d]	217.14	(1/2)$^-$			
		985.94 *20*	100 *12*	144.39	(5/2)$^+$			
		994.17 *25*	76 *12*	136.71	5/2$^+$			
1159.5	(17/2$^+$)	330 *1*		829.7	(15/2$^+$)			
		431.4 *5*		728.0	(13/2$^+$)			
1211.2	(19/2$^+$)	248		962.85	(17/2$^+$)			
		478.5 *3*		732.59	(15/2$^+$)	@		
1261.10	(21/2$^-$)	249.6 *2*	72 *14*	1011.50	(19/2$^-$)			
		456.3 *2*	100 *22*	804.80	(17/2$^-$)	Q[@]		
1294.5	(19/2$^+$)	394.0 *3*	56 *29*	900.5	(17/2$^-$)			

Adopted Levels, Gammas (continued)

γ(^{163}Tm) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]
1294.5	(19/2$^+$)	464.8 *3*	100 *31*	829.7	(15/2$^+$)	@
1308.4	(21/2$^-$)	407.9[c] *2*	100	900.5	(17/2$^-$)	
1345.32	1/2,3/2,5/2$^{(+)}$	1331.84 *8*	100 *5*	13.52	3/2$^+$	
		1345.27 *8*	88 *3*	0.0	1/2$^+$	
1362.92	(≤7/2)	588.8[f] *10*	28 *8*	774.09	(5/2,7/2)$^+$	
		913.7[d] *6*	≤52[d]	449.20	(5/2)$^+$	
		996.50 *20*	100 *13*	366.36	3/2$^+$	
		1218.6 *5*	26 *5*	144.39	(5/2)$^+$	
		1226.5 *5*	65 *9*	136.71	5/2$^+$	
1473.6	(21/2$^+$)	262.3 *3*		1211.2	(19/2$^+$)	
		511.1 *5*		962.85	(17/2$^+$)	
1498.40	(23/2$^-$)	190.0[a] *10*	0.5 *5*	1308.4	(21/2$^-$)	
		237.3 *2*	46 *3*	1261.10	(21/2$^-$)	&
		486.9 *2*	100 *10*	1011.50	(19/2$^-$)	
1552.2?		651.7[f] *5*	100	900.5	(17/2$^-$)	
1661.5	(21/2$^+$)	367 *1*		1294.5	(19/2$^+$)	
		502.0 *5*		1159.5	(17/2$^+$)	
1749.8	(23/2$^+$)	276.2 *1*	≤786	1473.6	(21/2$^+$)	
		538.8 *5*	100 *50*	1211.2	(19/2$^+$)	@
1780.08	(1/2$^+$,3/2,5/2)	973.6 *3*	33 *5*	806.13	(3/2,5/2$^+$)	
		1006.11 *10*	67 *3*	774.09	(5/2,7/2)$^+$	
		1453.62 *20*	100 *8*	326.22	3/2$^-$	
		1766.52 *15*	66 *5*	13.52	3/2$^+$	
1785.70	(25/2$^-$)	287.3 *2*	48 *11*	1498.40	(23/2$^-$)	
		477.3 *5*		1308.4	(21/2$^-$)	
		524.6 *2*	100 *22*	1261.10	(21/2$^-$)	Q@
1803.9	(25/2$^-$)	305.5[a] *10*	13.0 *13*	1498.40	(23/2$^-$)	
		495.5 *2*	100 *10*	1308.4	(21/2$^-$)	Q@
		542.8[f] *5*		1261.10	(21/2$^-$)	
1819.55	(3/2,5/2)	871.9 *10*	51 *20*	947.29	(5/2)$^-$	
		1370.0 *5*	46 *6*	449.20	(5/2)$^+$	
		1493.35 *12*	100 *6*	326.22	3/2$^-$	
		1603.05[df] *20*	≤39[d]	217.14	(1/2)$^-$	
1820.80	(1/2$^+$,3/2,5/2)	1603.05[df] *20*	≤39[d]	217.14	(1/2)$^-$	
		1676.54 *13*	100 *6*	144.39	(5/2)$^+$	
		1683.87 *16*	65 *4*	136.71	5/2$^+$	
1826.6	(23/2$^+$)	518.2[f] *3*	100 *50*	1308.4	(21/2$^-$)	
		532.1 *3*	97 *48*	1294.5	(19/2$^+$)	@

$^{163}_{69}Tm_{94}$-10

Adopted Levels, Gammas (continued)

γ(^{163}Tm) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]
1833.48	(5/2$^-$)	886.08 *20*	8.8 *12*	947.29	(5/2)$^-$	
		1009.59 *15*	16.4 *10*	823.94	(5/2$^-$)	
		1058.9 *3*	11.2 *12*	774.09	(5/2,7/2)$^+$	
		1335.77 *20*	10.9 *8*	498.02	(7/2)$^-$	
		1384.0 *6*	7.1 *12*	449.20	(5/2)$^+$	
		1574.92 *10*	20.8 *9*	258.35	(7/2)$^+$	
		1658.40 *16*	22.9 *18*	175.00	(7/2)$^+$	
		1689.11 *8*	44.1 *24*	144.39	(5/2)$^+$	
		1696.80 *20*	29.4 *24*	136.71	5/2$^+$	
		1746.68 *15*	100 *6*	86.92	(7/2)$^-$	
		1820.17 *15*	11.9 *9*	13.52	3/2$^+$	
1994.77	(5/2$^-$)	1625.7 *8*	4.6 *13*	369.08	(9/2$^-$)	
		1907.84 *10*	100 *4*	86.92	(7/2)$^-$	
2034.3	(25/2$^+$)	284		1749.8	(23/2$^+$)	
		560.6 *5*		1473.6	(21/2$^+$)	@
2046.3	(27/2$^-$)	242.4[a] *10*	13.3 *17*	1803.9	(25/2$^-$)	
		260.6 *2*	42 *8*	1785.70	(25/2$^-$)	
		547.9 *2*	100 *10*	1498.40	(23/2$^-$)	@
2206.1	(25/2$^+$)	544.6 *5*		1661.5	(21/2$^+$)	
2323.0	(27/2$^+$)	573.3[d] *5*	100[d]	1749.8	(23/2$^+$)	
2356.4	(29/2$^-$)	310.1 *2*	42 *10*	2046.3	(27/2$^-$)	
		552.5[f] *5*		1803.9	(25/2$^-$)	
		570.7 *2*	100 *22*	1785.70	(25/2$^-$)	
2376.8	(29/2$^-$)	330.4[a] *10*	7.8 *12*	2046.3	(27/2$^-$)	
		572.9 *2*	100 *9*	1803.9	(25/2$^-$)	
		591.1[f] *5*		1785.70	(25/2$^-$)	
2397.3	(27/2$^+$)	570.7 *3*		1826.6	(23/2$^+$)	
		593.4 *3*		1803.9	(25/2$^-$)	
2607.7	(29/2$^+$)	573.3[d] *5*	100[d]	2034.3	(25/2$^+$)	
2626.2	(31/2$^-$)	249.5[a] *10*	68 *7*	2376.8	(29/2$^-$)	
		269.8 *2*	34 *3*	2356.4	(29/2$^-$)	
		579.9 *2*	100 *10*	2046.3	(27/2$^-$)	@
2741.6	(29/2$^+$)	535.5 *5*		2206.1	(25/2$^+$)	
2878.6	(31/2$^+$)	270.7 *5*	≤144	2607.7	(29/2$^+$)	
		555.7 *5*	100 *50*	2323.0	(27/2$^+$)	@
2920.9	(33/2$^-$)	294.7 *2*	77 *12*	2626.2	(31/2$^-$)	
		544.5[f] *5*		2376.8	(29/2$^-$)	
		564.5 *2*	100 *21*	2356.4	(29/2$^-$)	
2932.6	(31/2$^+$)	535.3 *3*		2397.3	(27/2$^+$)	

$^{163}_{69}Tm_{94}$-11

Adopted Levels, Gammas (continued)

γ(^{163}Tm) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]
3014.5	(33/2$^-$)	637.7 *2*	100	2376.8	(29/2$^-$)	
		658.1[f] *5*		2356.4	(29/2$^-$)	
3171.3	(35/2$^-$)	250.4 *2*	38 *4*	2920.9	(33/2$^-$)	
		545.1 *2*	100 *10*	2626.2	(31/2$^-$)	@
3206.5	(33/2$^+$)	464.9 *5*		2741.6	(29/2$^+$)	
3265.1	(35/2$^-$)	639.0[a] *10*	100	2626.2	(31/2$^-$)	
3420.4	(35/2$^+$)	487.8 *3*		2932.6	(31/2$^+$)	
3427.7	(37/2$^-$)	256.4 *2*	71 *16*	3171.3	(35/2$^-$)	
		506.8 *2*	100 *16*	2920.9	(33/2$^-$)	
3689.6	(39/2$^-$)	261.9 *2*	38 *4*	3427.7	(37/2$^-$)	
		518.3 *2*	100 *11*	3171.3	(35/2$^-$)	
3713.6	(37/2$^-$)	699.1 *2*	100	3014.5	(33/2$^-$)	
3722.2	(37/2$^+$)	515.7 *5*		3206.5	(33/2$^+$)	
3964.8	(39/2$^+$)	544.4 *3*		3420.4	(35/2$^+$)	
3967.6	(41/2$^-$)	278.0 *2*	71 *11*	3689.6	(39/2$^-$)	
		539.9 *2*	100 *16*	3427.7	(37/2$^-$)	
4094.5	(39/2$^-$)	829.4[a] *5*	100 *33*	3265.1	(35/2$^-$)	
		923.1[a] *10*	89 *33*	3171.3	(35/2$^-$)	
4266.4	(43/2$^-$)	298.8 *2*	57 *7*	3967.6	(41/2$^-$)	
		576.8 *2*	100 *11*	3689.6	(39/2$^-$)	
4319.8	(41/2$^+$)	597.6 *5*		3722.2	(37/2$^+$)	
4443.2	(41/2$^-$)	729.6 *5*	100	3713.6	(37/2$^-$)	
4501.6?	(41/2$^-$)	788.0[af] *10*	100	3713.6	(37/2$^-$)	
4586.6	(45/2)$^-$	320.2 *2*	47 *7*	4266.4	(43/2$^-$)	
		619.0 *2*	100 *14*	3967.6	(41/2$^-$)	
4588.4	(43/2$^+$)	623.6 *3*		3964.8	(39/2$^+$)	
4774.9	(43/2$^-$)	680.4[a] *10*	100	4094.5	(39/2$^-$)	
4918.5	(47/2$^-$)	331.9 *2*	40 *4*	4586.6	(45/2)$^-$	
		652.1 *2*	100 *10*	4266.4	(43/2$^-$)	
4996.8	(45/2$^+$)	677.0 *5*		4319.8	(41/2$^+$)	
5098.8	(45/2$^-$)	323.9[a] *10*	58.0 *22*	4774.9	(43/2$^-$)	
		598[af]		4501.6?	(41/2$^-$)	
		655.7[a] *10*	100.0 *22*	4443.2	(41/2$^-$)	
5172.2	(45/2$^-$)	729.0 *5*	100	4443.2	(41/2$^-$)	
5285.9	(49/2)$^-$	367.4 *2*	37 *4*	4918.5	(47/2$^-$)	
		699.3 *2*	100 *12*	4586.6	(45/2)$^-$	
5417.3	(47/2$^-$)	318.5[af] *10*	1.6 *16*	5098.8	(45/2$^-$)	
		642.4[a] *10*	100.0 *16*	4774.9	(43/2$^-$)	
5643.5	(51/2$^-$)	357.6[a] *10*	34 *4*	5285.9	(49/2)$^-$	
5643.5	(51/2$^-$)	725.0[a] *10*	100 *10*	4918.5	(47/2$^-$)	
5740.3	(49/2$^+$)	743.5 *5*		4996.8	(45/2$^+$)	
5751.1	(49/2$^-$)	333.8 *10*	46.9 *13*	5417.3	(47/2$^-$)	D
		652.3[a] *10*	100 *6*	5098.8	(45/2$^-$)	
5893.2	(49/2$^-$)	721.0[a] *10*	100	5172.2	(45/2$^-$)	
6057.9	(53/2$^-$)	414.4[a] *10*	33 *4*	5643.5	(51/2$^-$)	
		772.0 *10*	100 *13*	5285.9	(49/2)$^-$	
6096.8	(51/2$^-$)	345.7[a] *10*	31.1 *15*	5751.1	(49/2$^-$)	D
		679.5[a] *10*	100.0 *15*	5417.3	(47/2$^-$)	
6433.5	(55/2$^-$)	375.6[a] *10*	26 *3*	6057.9	(53/2$^-$)	
		790.0[a] *10*	100 *10*	5643.5	(51/2$^-$)	
6462.2	(53/2$^-$)	365.4[a] *10*	20.5 *14*	6096.8	(51/2$^-$)	D
		711.1[a] *10*	100 *14*	5751.1	(49/2$^-$)	
6569.3	(53/2$^+$)	829.0 *5*		5740.3	(49/2$^+$)	
6837.9	(55/2$^-$)	375.7[a] *10*	27.0 *17*	6462.2	(53/2$^-$)	
		741.1[a] *10*	100.0 *17*	6096.8	(51/2$^-$)	
6845.9?	(57/2$^-$)	788[f]		6057.9	(53/2$^-$)	
6893.9	(57/2$^-$)	460.4 *10*	38 *5*	6433.5	(55/2$^-$)	
		836.0 *10*	100 *13*	6057.9	(53/2$^-$)	
7236.8	(57/2$^-$)	398.9 *10*	15.7 *15*	6837.9	(55/2$^-$)	D
		774.6 *10*	100 *11*	6462.2	(53/2$^-$)	
7279.5	(59/2$^-$)	385.6 *10*	19.6 *18*	6893.9	(57/2$^-$)	
		846.0 *10*	100 *11*	6433.5	(55/2$^-$)	
7642.3	(59/2$^-$)	405.5 *10*	1.6 *16*	7236.8	(57/2$^-$)	
		804.4 *10*	100 *16*	6837.9	(55/2$^-$)	
7785.9	(61/2$^-$)	506.4 *10*	40 *5*	7279.5	(59/2$^-$)	
		892.0 *10*	100 *11*	6893.9	(57/2$^-$)	
8075.6	(61/2$^-$)	433.3 *10*	6.3 *16*	7642.3	(59/2$^-$)	
		838.8 *10*	100 *16*	7236.8	(57/2$^-$)	
8175.5	(63/2$^-$)	389.6 *10*	19 *5*	7785.9	(61/2$^-$)	
		896.0 *10*	100 *12*	7279.5	(59/2$^-$)	
8507.5	(63/2$^-$)	431.9[f] *10*	1.4 *14*	8075.6	(61/2$^-$)	
		865.2 *10*	100 *14*	7642.3	(59/2$^-$)	
8729.9	(65/2$^-$)	554.4 *10*	1.2 *12*	8175.5	(63/2$^-$)	
		944.0 *10*	100 *12*	7785.9	(61/2$^-$)	
8978.0	(65/2$^-$)	902.4 *10*	100	8075.6	(61/2$^-$)	
9120.5	(67/2$^-$)	390.6 *10*	10 *5*	8729.9	(65/2$^-$)	
		945.0 *10*	100 *13*	8175.5	(63/2$^-$)	
9431.0	(67/2$^-$)	452.9[f] *10*	1.3 *13*	8978.0	(65/2$^-$)	

Adopted Levels, Gammas (continued)

γ(^{163}Tm) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π
9431.0	(67/2$^-$)	923.4 *10*	100 *17*	8507.5	(63/2$^-$)	12070	(77/2$^-$)	1095.0 *10*	100	10975.2	(73/2$^-$)
9729.9	(69/2$^-$)	1000.0 *10*	100	8729.9	(65/2$^-$)	12253.5	(79/2$^-$)	1094.0 *10*	100	11159.5	(75/2$^-$)
9944.8	(69/2$^-$)	966.7 *10*	100	8978.0	(65/2$^-$)	12547	(79/2$^-$)	1096.0 *10*	100	11451	(75/2$^-$)
10115.5	(71/2$^-$)	995.0 *10*	100	9120.5	(67/2$^-$)	13089.9	(81/2$^-$)	1181.0 *10*	100	11908.9	(77/2$^-$)
10412.4	(71/2$^-$)	981.4 *10*	100	9431.0	(67/2$^-$)	13219	(81/2$^-$)	1148.8 *10*	100	12070	(77/2$^-$)
10788.9	(73/2$^-$)	1059.0 *10*	100	9729.9	(69/2$^-$)	13400.5	(83/2$^-$)	1147.0 *10*	100	12253.5	(79/2$^-$)
10975.2	(73/2$^-$)	1030.4 *10*	100	9944.8	(69/2$^-$)	13695	(83/2$^-$)	1148.0 *10*	100	12547	(79/2$^-$)
11159.5	(75/2$^-$)	1044.0 *10*	100	10115.5	(71/2$^-$)	14321	(85/2$^-$)	1231.0 *10*	100	13089.9	(81/2$^-$)
11451	(75/2$^-$)	1039.0 *10*	100	10412.4	(71/2$^-$)	14598	(87/2$^-$)	1197.0 *10*	100	13400.5	(83/2$^-$)
11908.9	(77/2$^-$)	1120.0 *10*	100	10788.9	(73/2$^-$)	14882	(87/2$^-$)	1187.0 *10*	100	13695	(83/2$^-$)

[†] From ε decay for low-spin (J≤9/2) levels and from (^{19}F,4nγ),(^{37}Cl,4nγ) and/or ^{165}Ho(^{3}He,5nγ) for high-spin levels. Gammas from levels above 6890 keV excitation are from (^{37}Cl,4nγ) (2007Pa22) only.

[‡] From ε decay for low-spin (J≤9/2) levels and from (^{37}Cl,4nγ) and/or ^{165}Ho(^{3}He,5nγ) for high-spin levels. Gammas from levels above 6890 keV excitation are from (^{37}Cl,4nγ) (2007Pa22) only.

[#] From α(exp)′s and subshell ratios in ε decay for gammas from low-spin levels and from $\gamma(\theta)$ or $\gamma\gamma(\theta)$ for gammas from high-spin levels.

[@] Positive A_2 from $\gamma(\theta)$ in (^{3}He,5nγ) is consistent with ΔJ=2, quadrupole.

[&] Negative A_2 from $\gamma(\theta)$ in (^{3}He,5nγ) suggests ΔJ=1, dipole or D+Q.

[a] From ^{130}Te(^{37}Cl,4nγ) (2007Pa22) only.

[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] Multiply placed.

[d] Multiply placed with undivided intensity.

[e] Multiply placed with intensity suitably divided.

[f] Placement of transition in the level scheme is uncertain.

$^{163}_{69}Tm_{94}$-13

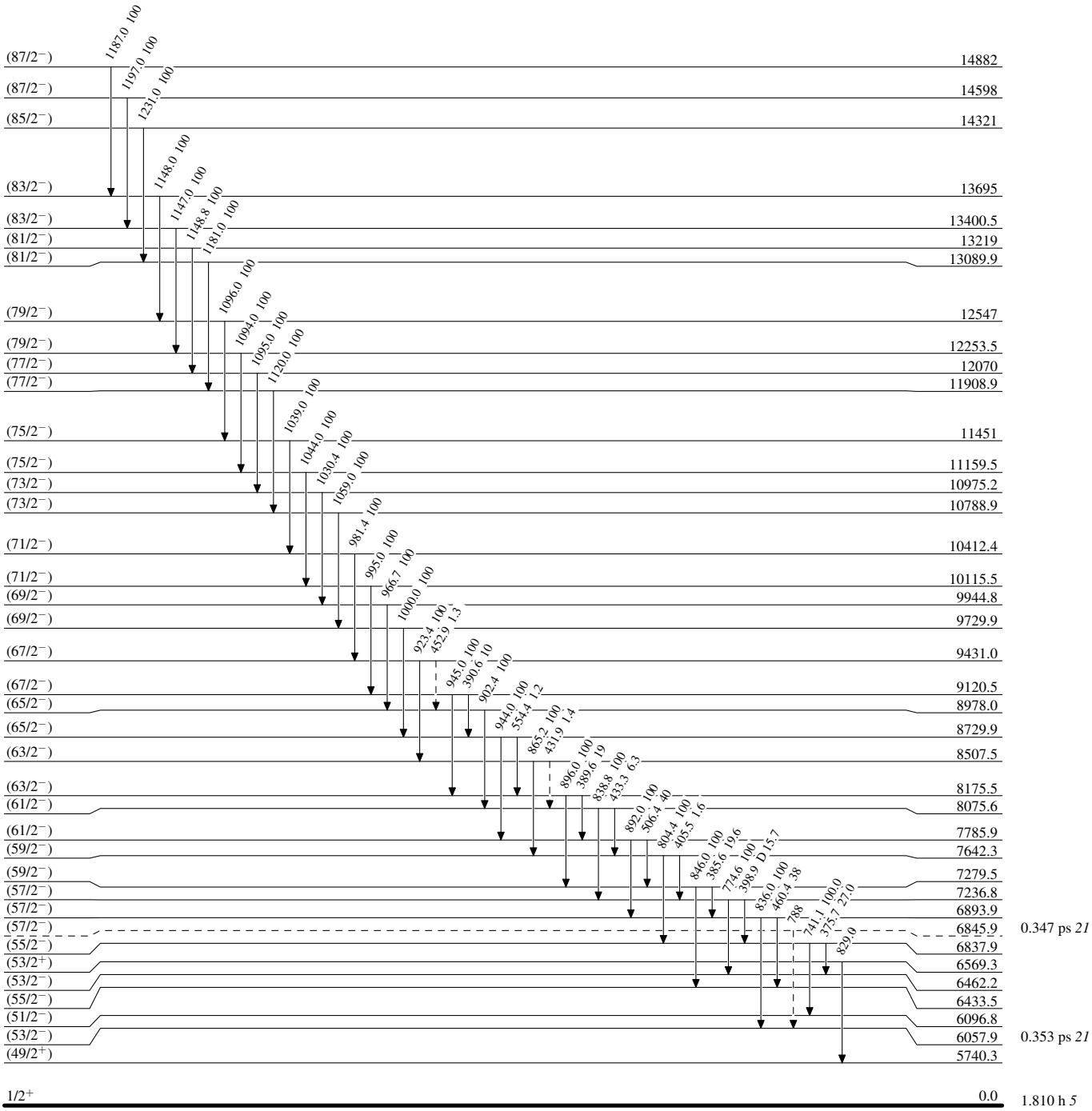
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{163}_{69}Tm_{94}$

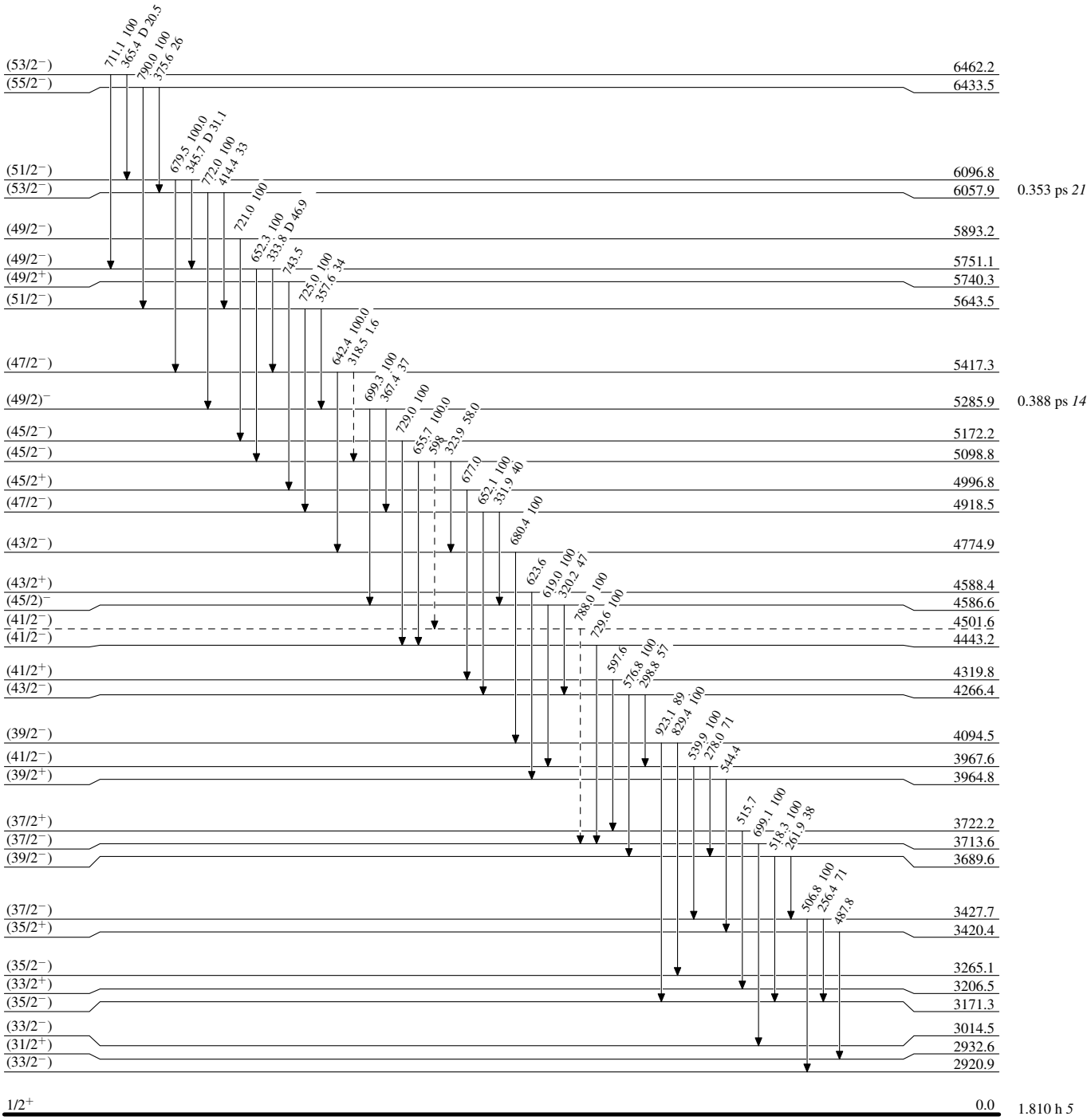
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{163}_{69}Tm_{94}$

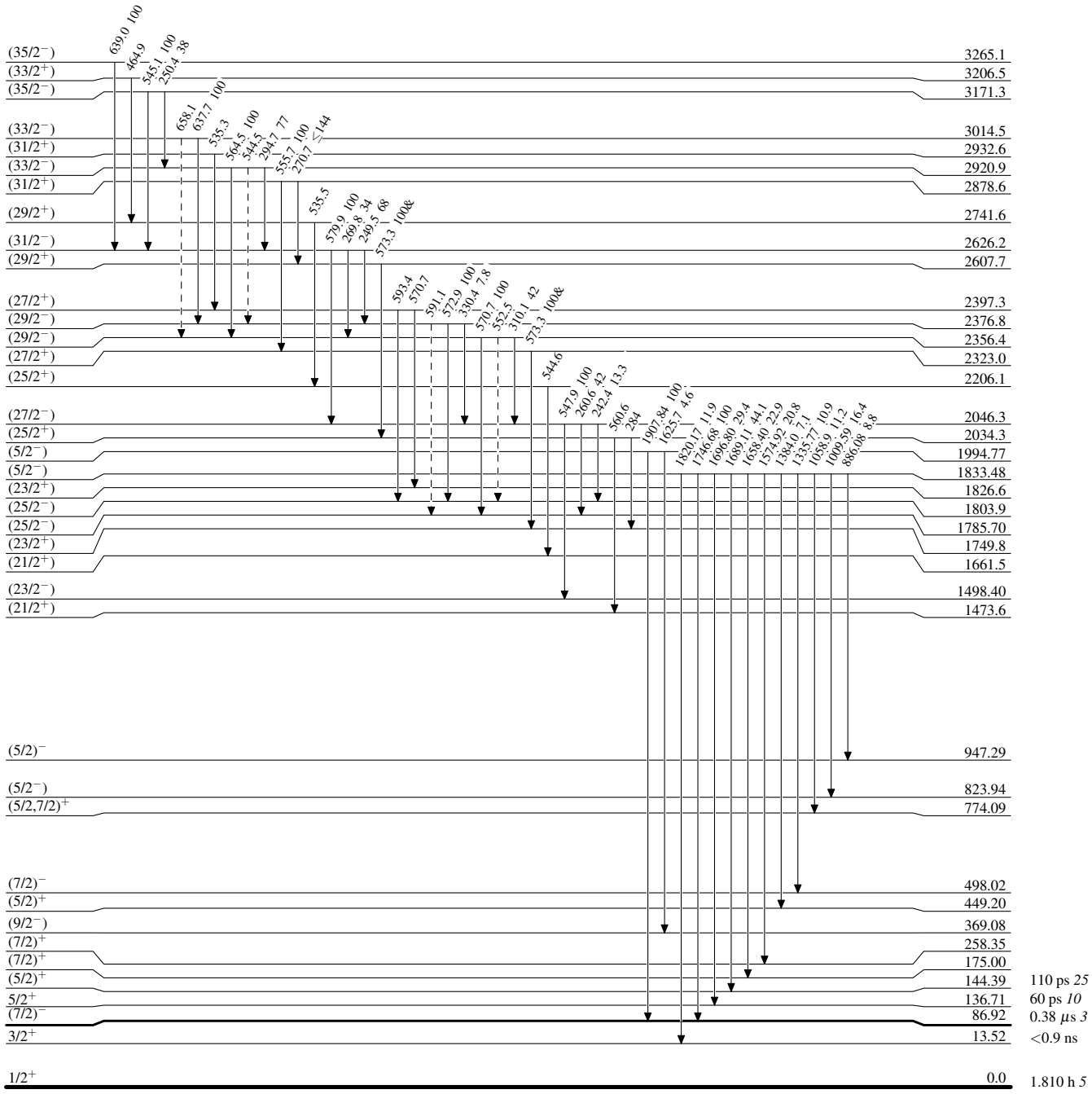
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

– – – – – – ► γ Decay (Uncertain)



$^{163}_{69}Tm_{94}$

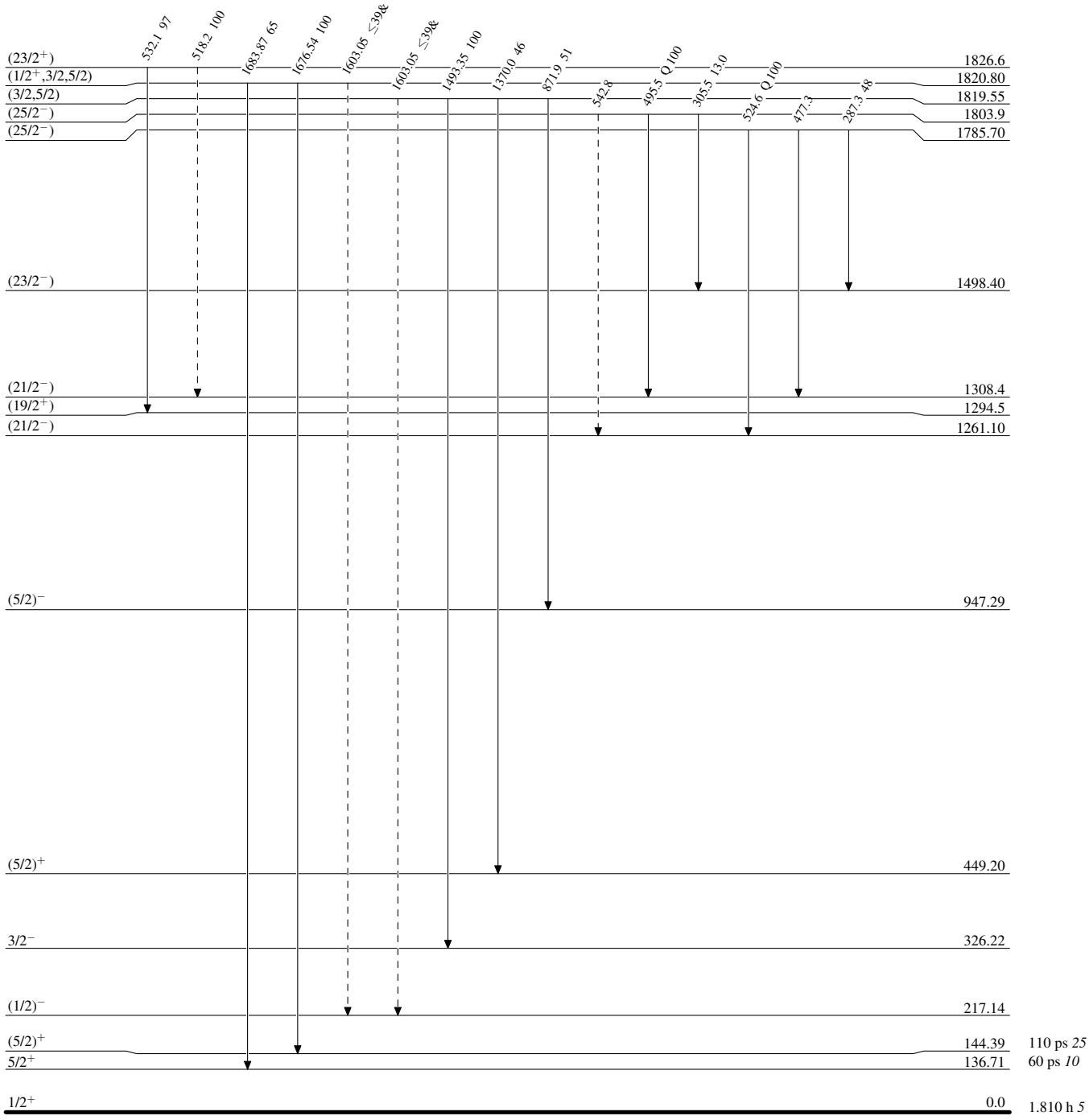
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

- - - - - - ► γ Decay (Uncertain)



$^{163}_{69}Tm_{94}$

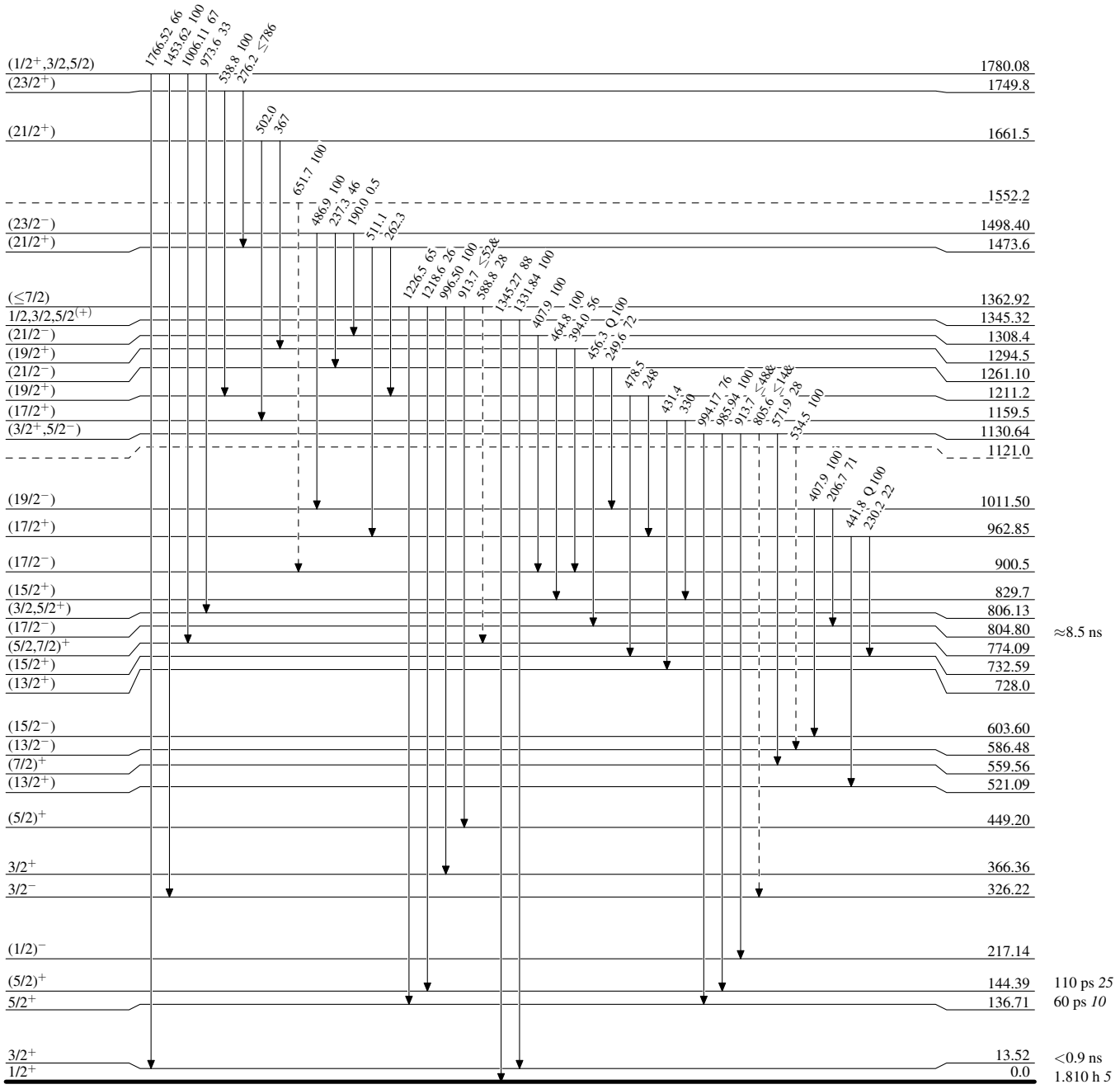
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

- - - - - - ► γ Decay (Uncertain)



$^{163}_{69}Tm_{94}$

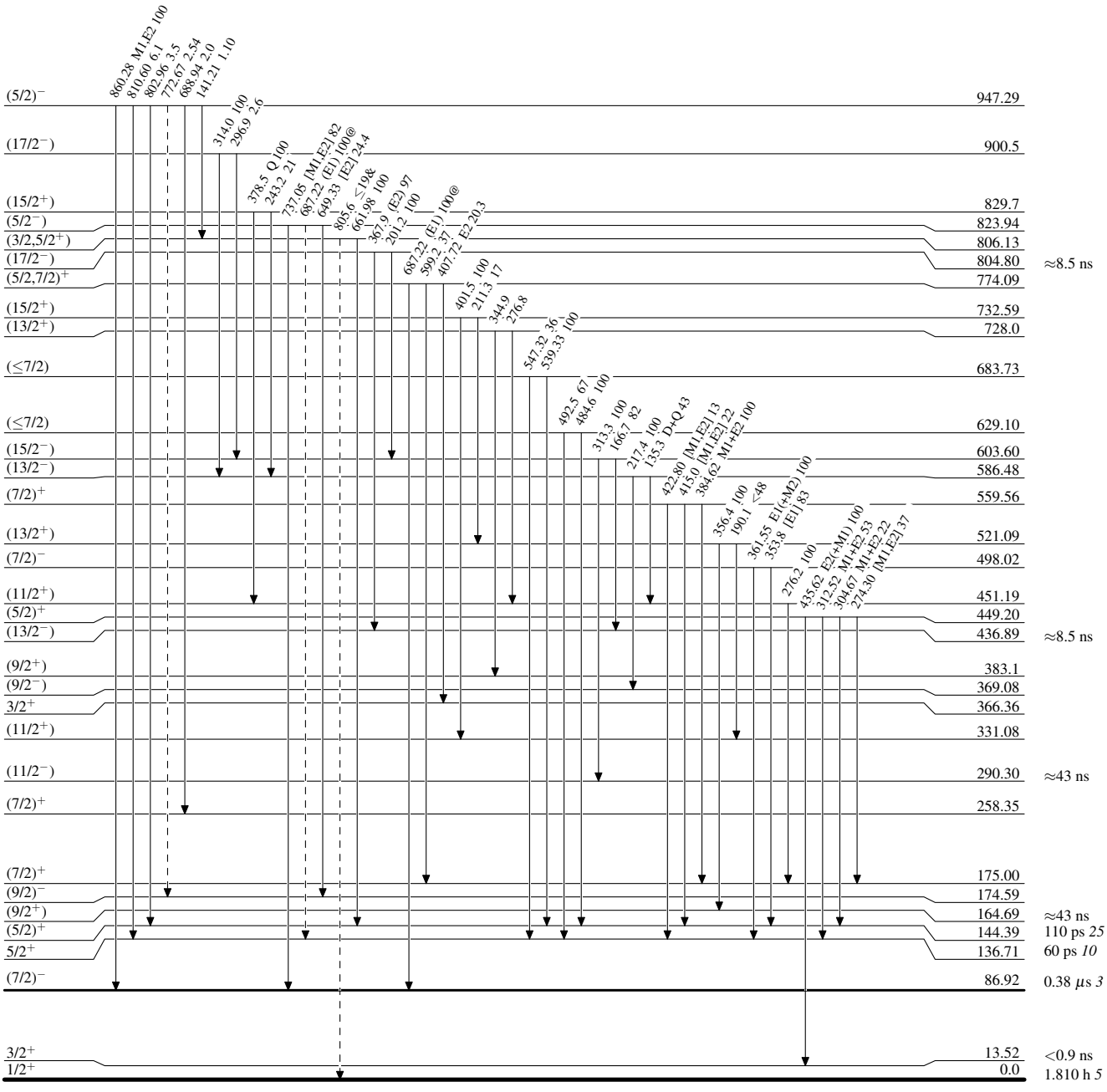
Adopted Levels, Gammas

Level Scheme (continued)

Legend

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

– – – – – – ► γ Decay (Uncertain)



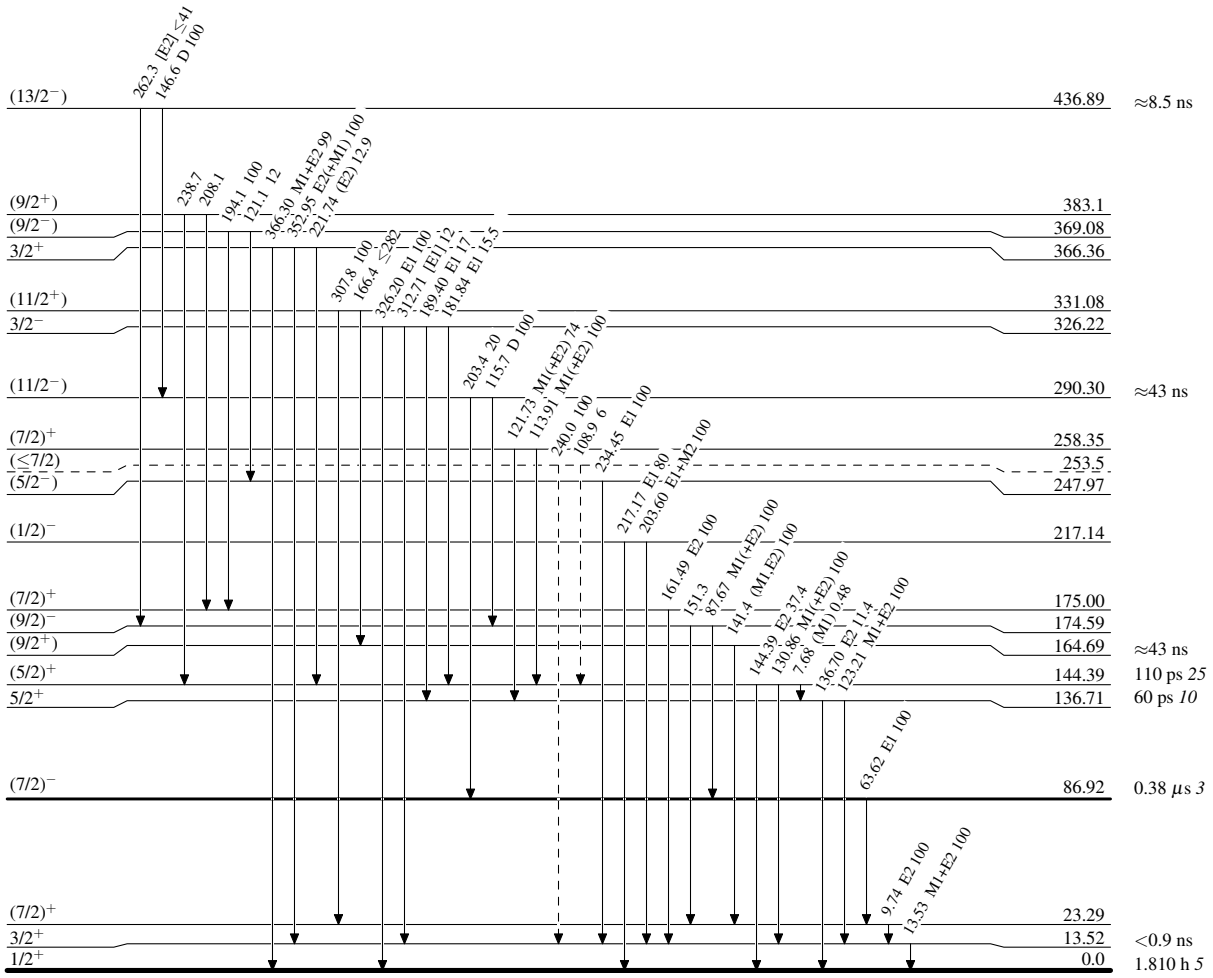
$^{163}_{69}Tm_{94}$

Adopted Levels, Gammas

Level Scheme (continued)

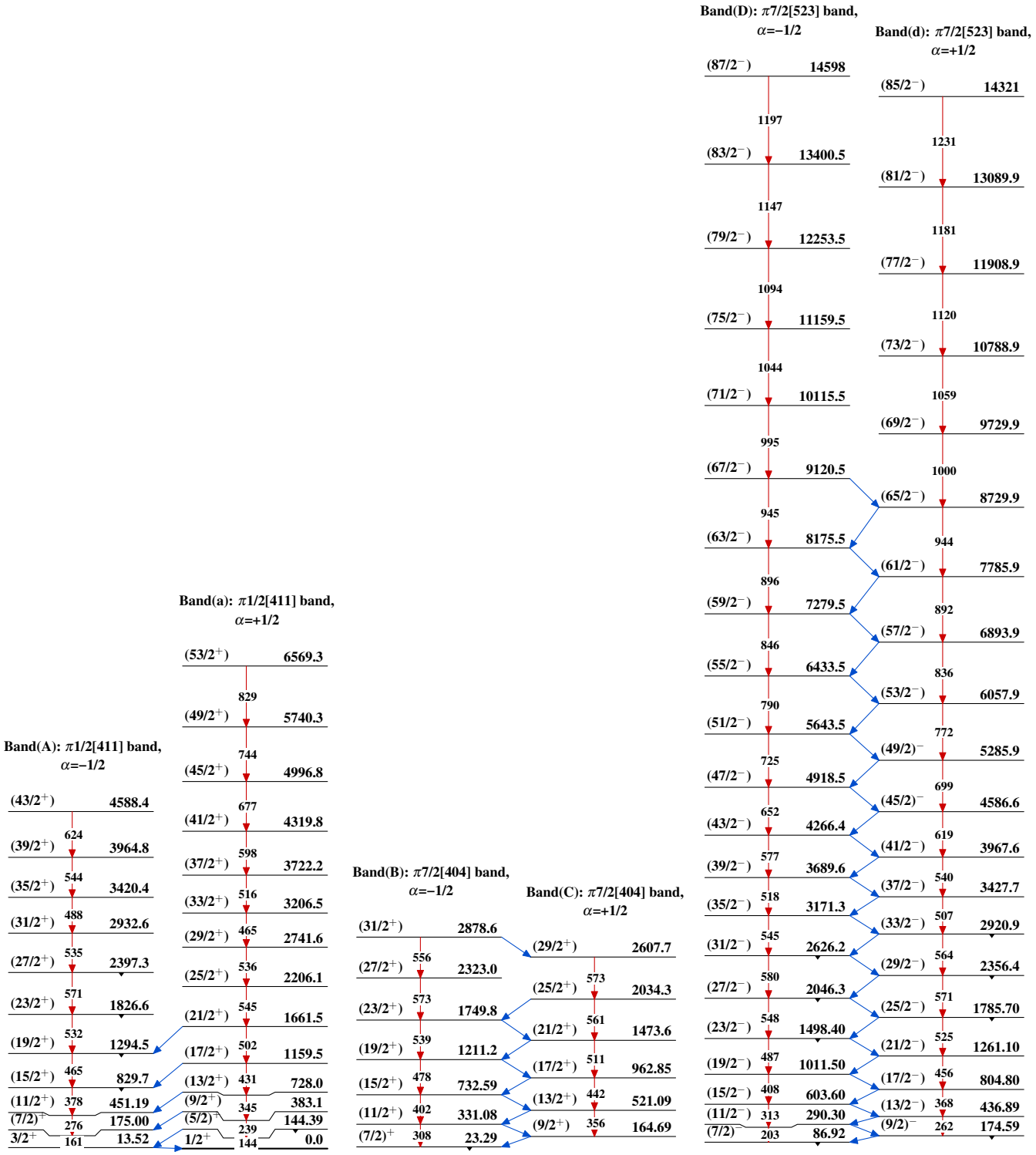
Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend
- - - - - - ► γ Decay (Uncertain)



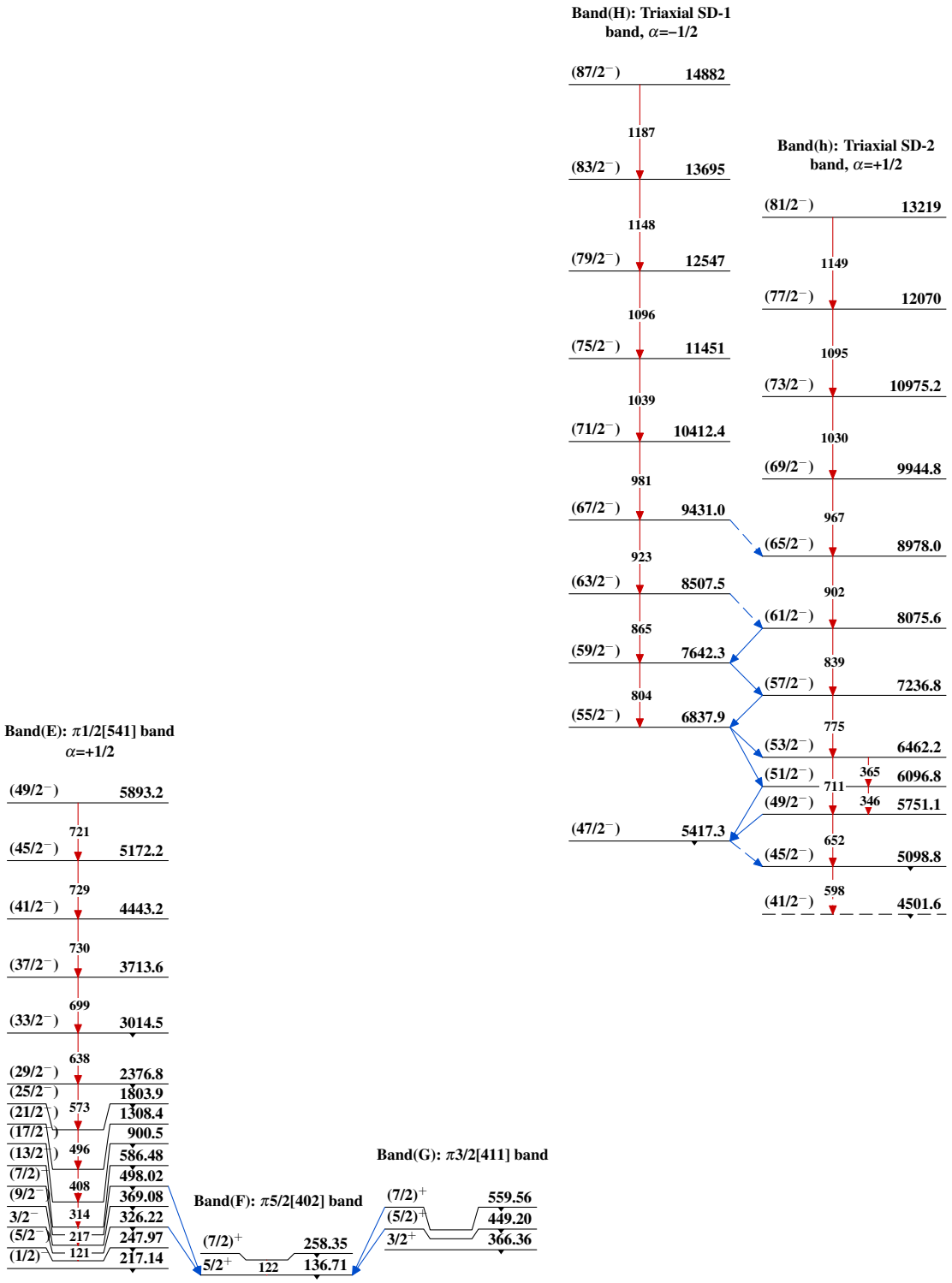
$^{163}_{69}Tm_{94}$

Adopted Levels, Gammas



$^{163}_{69}Tm_{94}$

Adopted Levels, Gammas (continued)



$^{163}_{69}Tm_{94}$