Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	C. W. Reich	NDS 112,2497 (2011)	1-Jun-2011

Q(β^-)=−4.06×10^3 *4*; S(n)=9.67×10^3 *5*; S(p)=3.12×10^3 *4*; Q(α)=2.51×10^3 *4* 2012Wa38
Note: Current evaluation has used the following Q record $ −4056 *32* 9668 *44* 3129 *37* 2506 *36* 2009AuZZ.
2003Au03 report the following: Q(β^-)=−4050 *30*; S(n)=9670 *40*; 3130 *40*; and Q(α)=2510 *40*.
Additional information 1.

^{161}Tm Levels

From measurements following chemical separations by Szilard-Chalmers reactions, 1968GrZX report an 'isomer' of 7 min *2*. This has not been confirmed. See, however, the comment below on the half-life of the 7.51 level.

Cross Reference (XREF) Flags

A	^{128}Te(^{37}Cl,4nγ):SD
B	^{152}Sm(^{14}N,5nγ),^{165}Ho(^{4}He,^{8}Nγ)
C	^{128}Te(^{37}Cl,4nγ)
D	^{161}Yb ε decay

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$	XREF	Comments
0[a]	7/2$^+$	30.2 min *8*	BCD	%ε+%β^+=100 μ=+2.40 *2*; Q=+2.90 *7* From an evaluation of data on nuclear rms charge radii, 2004An14 report <r^2>$^{1/2}$=5.162 fm 5. J$^\pi$: J from atomic-beam magnetic resonance (1971Ek01) and resonance ionization spectroscopy (1988Al04). Agreement of μ with that expected for 7/2[404] but not for 7/2[523] (1989Be04) indicates that the former is the correct orbital assignment. Hence, π=+. T$_{1/2}$: from 1993Al03, γ(t) in total-absorption γ spectroscopy. Others: 30.2 min 14 (1982By03, which includes many of the same authors as 1993Al03); 30 min 10 (1959Ha09); 37 min 5 (1960Da23); 44 min 7 (1963Gr14); all from γ(t). Also, 32 min (1960Bu27) and 20-30 min (1963Ra15). μ: from the evaluation by 1989Ra17. See also 2005St24. Q: from the evaluation by 1989Ra17. See also 2005St24.
7.51[c] *24*	1/2$^+$[#]		B D	%ε+%β^+=?; %IT=? Because of its low energy and its sole possible γ-decay mode, namely M3 to the g.s., this level is expected to have a half-life of the order of minutes. In such a case, an ε+β^+ decay branch would be expected. Neither of these possibilities, however, has yet been reported. E(level): from the ^{161}Yb ε decay data, 1981Ad02 deduce that the energy of this level is less than a few tens of keV. From in-beam study, 1984Fo04 deduce an energy of 7.3 keV. J$^\pi$: proposed bandhead of 1/2[411]. T$_{1/2}$: Measured value not yet reported. From an assumed %IT=100 and RUL=10 for M3 transitions, T$_{1/2}$≈14 s is computed. 2003Au02, from systematics, list T$_{1/2}$=5 min. (Note the comment above regarding the study by 1968GrZX about a 7-min isomer in 161Tm.).
18.90[d] *9*	5/2$^+$	<50 ns	BCD	J$^\pi$: from (M1) γ to 7/2$^+$ level and expected Nilsson level ordering. T$_{1/2}$: see the comment in the ^{161}Yb ε decay data set.
22.84[c] *17*	3/2$^+$[#]		BCD	J$^\pi$: assigned as the 3/2$^+$ member of 1/2[411].
78.20[e] *3*	7/2$^-$	110 ns *3*	BCD	J$^\pi$: from E1 γ to 7/2$^+$ level and expected Nilsson level ordering. T$_{1/2}$: weighted average of: 112 ns 5, from ^{161}Yb ε decay (1981Ad02); and 111 ns

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{161}Tm Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$	XREF	Comments
				6 and 106 ns 5, from ^{152}Sm(^{14}N,5nγ) (1984Fo04).
149.20[f] 9	9/2⁻		BC	Jπ: from dipole γ to 7/2⁻ level and expected band structure.
159.11[d] 11	7/2⁺		BCD	Jπ: from dipole γ to 5/2⁺ level and expected band structure.
161.81[b] 8	9/2⁺		BC	Jπ: from γ to 7/2⁺ level and expected band structure.
167.28[c] 18	5/2⁺[#]		B D	Jπ: γ to 3/2⁺ level and expected band structure.
211.10[c] 17	7/2⁺[#]		BCD	Jπ: γ to 3/2⁺ level and expected band structure.
254.80[e] 9	11/2⁻		BC	Jπ: dipole component in γ to 9/2⁻, γ to 7/2⁻, and expected band structure.
326.70[d] 13	9/2⁺		BC	Jπ: from dipole γ to 7/2⁺ level, γ to 5/2⁺, and expected band structure.
337.55[h] 17	1/2⁺,3/2⁺		D	Jπ: M1 components in γ's to 1/2⁺ and 3/2⁺ levels. If this is the bandhead of 3/2[411], then Jπ=3/2⁺.
347.89[a] 8	11/2⁺		BC	Jπ: M1 component in γ to 9/2⁺, γ to 7/2⁺, and expected band structure.
367.46[g] 25	1/2⁻		B D	Jπ: γ's to 1/2⁺ and 3/2⁺ indicate Jπ=1/2,3/2 or 5/2⁺. Assignment as bandhead of 1/2[541] indicates Jπ=1/2⁻.
376.64[g] 18	5/2⁻		BC	Jπ: from γ's to 3/2⁺ and 5/2⁺ levels and expected band structure.
417.50[f] 10	13/2⁻		BC	Jπ: M1 component in γ to 11/2⁻, γ to 9/2⁻, and expected band structure.
433.31[h] 20	3/2⁺,5/2,7/2⁺		D	Jπ: γ's to 3/2⁺,5/2⁺ and 7/2⁺ levels. If this is the first excited member of 3/2[411], then Jπ=5/2⁺.
465.80 21			D	
515.75[d] 15	11/2⁺		BC	Jπ: from dipole γ to 9/2⁺ level, γ to 7/2⁺, and expected band structure.
516.57[g] 17	9/2⁻		BC	Jπ: from γ's to 5/2⁻ and 7/2⁺ levels and expected band structure.
531.45[c] 15	11/2⁺		BC	Jπ: from γ's to 7/2⁺ and 9/2⁺ levels and expected band structure.
557.34[b] 10	13/2⁺		BC	Jπ: M1 component in γ 11/2⁺ level, E2 γ to 9/2⁺, and expected band structure.
577.40[e] 11	15/2⁻	7.5[@] ps 17	BC	Jπ: M1 component in γ to 13/2⁻, E2 γ to 11/2⁻, and expected structure.
625.53 20			D	
638.74 12			D	
647.89 13			D	
678.08 9	5/2⁻		D	Jπ: M1 component in γ to 7/2⁻ indicates Jπ=5/2⁻,7/2⁻,9/2⁻. log ft≈5.3 from 3/2⁻ rules out 7/2⁻ and 9/2⁻.
709.66 9	5/2⁻		D	Jπ: M1 component in γ to 7/2⁻ indicates Jπ=5/2⁻,7/2⁻,9/2⁻. log ft≈5.6 from 3/2⁻ rules out 7/2⁻ and 9/2⁻.
756.39[g] 15	13/2⁻		BC	Jπ: from γ's to 11/2⁺ levels, γ to 9/2⁻, and expected band structure.
788.50[a] 12	15/2⁺		BC	Jπ: M1 component in γ to 13/2⁺, γ to 11/2⁺, and expected band structure.
815.60[f] 12	17/2⁻	3.6[@] ps 11	BC	Jπ: M1 component in γ to 15/2⁻, E2 γ to 13/2⁻, and expected band structure.
989.25[c] 18	15/2⁺		B	Jπ: from γ to 11/2⁺ level and expected band structure.
1008.40[e] 13	19/2⁻	2.6[@] ps 10	BC	Jπ: M1 component in γ to 17/2⁻, E2 γ to 15/2⁻, and expected band structure.
1036.73[b] 12	17/2⁺		BC	Jπ: M1 component in γ to 15/2⁺, E2 γ to 13/2⁺, and expected band structure.
1080.1[g] 3	17/2⁻		BC	Jπ: from E2 γ to 13/2⁻ level and expected band structure.
1180.70 12			D	
1305.03[a] 14	19/2⁺		BC	Jπ: M1 component in γ to 17/2⁺, E2 γ to 15/2⁺, and expected band structure.
1310.10[f] 14	21/2⁻	1.7[@] ps 4	BC	Jπ: M1 component in γ to 19/2⁻, E2 γ to 17/2⁻, and expected band structure.
1496.1[g] 3	21/2⁻	2.7[@] ps 3	BC	Jπ: from E2 γ to 17/2⁻ level and expected band structure.
1525.53[e] 16	23/2⁻	1.1[@] ps 3	BC	Jπ: M1 component in γ to 21/2⁻, E2 γ to 19/2⁻, and expected band structure.
1581.65[b] 15	21/2⁺		BC	Jπ: M1 component in γ to 19/2⁺, E2 γ to 17/2⁺, and expected band

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{161}Tm Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$	XREF	Comments
				structure.
1873.97[f] *16*	25/2−	0.55 ps *7*	BC	Jπ: M1 component in γ to 23/2−, E2 γ to 21/2−, and expected band structure.
1876.72[a] *24*	23/2+		BC	Jπ: M1 component in γ to 21/2+, E2 γ to 19/2+, and expected band structure.
1996.2[g] *4*	25/2−	0.96[@] ps *5*	BC	Jπ: From E2 γ to 21/2− level and expected band structure.
2108.95[e] *17*	27/2−	1.0[@] ps *3*	BC	Jπ: M1 component in γ to 25/2−, E2 γ to 23/2−, and expected band structure.
2172.26[b] *24*	25/2+		BC	Jπ: γ to 23/2+, E2 γ to 21/2+, and expected band structure.
2478.0[a] *3*	27/2+		BC	Jπ: γ's to 25/2+ and 23/2+ and expected band structure.
2480.95[f] *22*	29/2−	0.49[@] ps *14*	BC	Jπ: M1 component in γ to 27/2−, E2 γ to 25/2−, and expected band structure.
2570.3[g] *4*	29/2−		BC	Jπ: from γ to 25/2− level and expected band structure.
2736.57[e] *22*	31/2−		BC	Jπ: M1 component in γ to 29/2−, E2 γ to 27/2−, and expected band structure.
2786[b]	29/2+		C	Jπ: γ's to 25/2+ and 27/2+ and expected band structure.
3050.89[f] *23*	33/2−		BC	Jπ: from dipole γ to 31/2− level, E2 γ to 29/2−, and expected band structure.
3110[a]	31/2+		C	Jπ: γ's to 27/2+ and 29/2+ and expected band structure.
3117	(33/2−)		C	Jπ: γ's to 31/2− and 29/2− levels.
3206.4[g] *5*	33/2−		BC	Jπ: from γ to 29/2− level and expected band structure.
3255.34[e] *24*	35/2−		BC	Jπ: from dipole γ to 33/2− level, γ to 31/2−, and expected band structure.
3381	35/2−		BC	Jπ: γ's to 31/2− and 33/2− levels. Fed by γ from 39/2−. E(level): probably the same as the 3380.7 level reported by 1984Fo04. These latter authors report only a 644.2 γ deexciting this level.
3441[b]	33/2+		C	Jπ: from γ's to 29/2+ and 31/2+ and expected band structure.
3476.75[f] *31*	37/2−		BC	Jπ: from dipole γ to 35/2− level, γ to 33/2−, and expected band structure.
3723?	(37/2−)		C	Jπ: γ's to (33/2−) and 35/2−.
3739.7[e] *3*	39/2−		BC	Jπ: from γ to 37/2− level, E2 γ to 35/2−, and expected band structure.
3779[a]	35/2+		C	Jπ: from γ's to 31/2+ and 33/2+ and expected band structure.
3886[g]	(37/2−)		C	Jπ: γ to 33/2− and expected band structure.
4012.7[f] *3*	41/2−	0.42[&] ps *10*	BC	Jπ: from γ's to 39/2− and 37/2− levels and expected band structure.
4084?	(39/2−)		C	Jπ: γ's to 35/2− and (37/2−).
4130[b]	37/2+		C	Jπ: γ to 33/2+ and expected band structure.
4330.4[e] *3*	43/2−	0.42[&] ps *10*	BC	Jπ: from dipole γ to 41/2− level, E2 γ to 39/2−, and expected band structure.
4492[a]	(39/2+)		C	Jπ: γ to 35/2+ and expected band structure.
4578[g]	(41/2−)		C	Jπ: γ to (37/2)− and expected band structure.
4656.0[f] *7*	45/2−	0.28[&] ps *+15−8*	BC	E(level): 1984Fo04 place this level at 4660.0 and place two different γ's deexciting it. Jπ: from γ's to 43/2− and 41/2− levels and expected band structure.
4867[b]	(41/2+)		C	Jπ: γ to 37/2+ and expected band structure.
5017.3[e]	47/2−	0.21[&] ps *+21−12*	C	Jπ: γ's to 43/2− and 45/2− and expected band structure.
5267[a]	(43/2+)		C	Jπ: γ to (39/2+) and expected band structure.
5270[g]	(45/2−)		C	Jπ: γ to (41/2−) and expected band structure.
5394.1[f]	49/2−	0.14[&] ps *3*	C	Jπ: γ's to 45/2− and 47/2− and expected band structure.
5675[b]	(45/2+)		C	Jπ: γ to (41/2+) and expected band structure.
5789.1[e]	51/2−	0.10[&] ps *3*	C	Jπ: γ's to 47/2− and 49/2− and expected band structure.
5988[g]	(49/2−)		C	Jπ: γ to (45/2−) and expected band structure.
6113[a]	(47/2+)		C	Jπ: γ to (43/2+) and expected band structure.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{161}Tm Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$	XREF	Comments
6216.6[f]	53/2−	≤0.18[&] ps	C	Jπ: γ to 49/2− and expected band structure.
6560[b]	(49/2+)		C	
6633.4[e]	(55/2−)	0.11[&] ps 4	C	Jπ: γ to 51/2− and expected band structure.
6726?[g]	(53/2−)		C	Jπ: γ to (49/2−) and expected band structure.
7037?[a]	(51/2+)		C	Jπ: γ to (47/2+) and expected band structure.
7110.3[f]	(57/2−)	0.08[&] ps 4	C	Jπ: γ to 53/2− and expected band structure.
7519?[b]	(53/2+)		C	Jπ: γ to (49/2+) and expected band structure.
7533.8[e]	(59/2−)	0.07[&] ps 3	C	Jπ: γ to (55/2−) and expected band structure.
8052.8[f]	(61/2−)	0.07[&] ps 2	C	Jπ: γ to (57/2−) and expected band structure.
8476.3[e]	(63/2−)	0.07[&] ps 2	C	Jπ: γ to (59/2−) and expected band structure.
9034.1[f]	(65/2−)	0.11[&] ps 4	C	Jπ: γ to (61/2−) and expected band structure.
9457.6[e]	(67/2−)	0.11[&] ps 4	C	Jπ: γ to (63/2−) and expected band structure.
10059.6[f]	(69/2−)		C	Jπ: γ to (65/2−) and expected band structure.
10483.1[e]	(71/2−)		C	Jπ: γ to (67/2−) and expected band structure.
11141?[f]	(73/2−)		C	Jπ: possible γ to (69/2−) and expected band structure.
11582?[e]	(75/2−)		C	Jπ: possible γ to (71/2−) and expected band structure.
x[i]	J		A	
881+x[i]	J+2		A	
1814+x[i]	J+4		A	
2795+x[i]	J+6		A	
3825+x[i]	J+8		A	
4904+x[i]	J+10		A	
6034+x[i]	J+12		A	
7215+x[i]	J+14		A	
8446+x[i]	J+16		A	
9738+x?[i]	J+18		A	

[†] From a least-squares fit to the listed γ-ray energies.

[‡] For the data from the in-beam studies, the J^π assignments are based on the expected properties of rotational bands, including level energies, the decrease of γ intensity and the increase of J values with increasing excitation energy. This has been supplemented with the measured γ−ray multipolarities and mixing ratios. These are interpreted as M1+E2 and E2, instead of E1+M2 M2, in keeping with the interpretation of the associated gammas as being intraband transitions.

[#] The pattern of transitions populating of these levels from higher-lying levels suggests that they are members of the same rotational band. The spin sequence adopted here is consistent with the pattern of populating γ rays; and the energy spacings within the proposed band are what is expected for the proposed configuration, namely 1/2[411], an orbital that is expected to occur at a low energy in ^{161}Tm.

[@] From recoil-distance measurements in ^{128}Te(^{37}Cl,4nγ).

[&] From DSAM studies in ^{128}Te(^{37}Cl,4nγ). See the comments there regarding the evaluator′s treatment of those data.

[a] Band(A): 7/2[404] band. α=−1/2 branch. A=18.83 keV, B=−53 eV. (Computed from the $7/2^+$,$9/2^+$ and $11/2^+$ level energies.).

[b] Band(a): 7/2[404] band. α=+1/2 branch.

[c] Band(B): 1/2[411] band. A=16.54 keV, B=+57 eV, a=−0.71.

[d] Band(C): 5/2[402] band. A=22.18 keV, B=−8.8 eV.

[e] Band(D): 7/2[523] band, α=−1/2 branch.

[f] Band(E): 7/2[523] band; α=+1/2 branch.

[g] Band(F): 1/2[541] band. α=+1/2 branch. Only the signature=+1/2 portion is observed.

[h] Band(G): possible 3/2[411] band.

[i] Band(H): triaxial SD band.

$\gamma(^{161}$Tm)

E_i(level)	J^π_i	E_γ[†‡]	I_γ[#]	E_f	J^π_f	Mult.[@&a]	δ[b]	α[c]	Comments
7.51	1/2+	(7.4)		0	7/2+	[M3]			
18.90	5/2+	18.90 *12*	100	0	7/2+	(M1)		67.7 *16*	B(M1)(W.u.)>0.00092 Mult.: $\delta\leq$0.10 (1981Ad02).
22.84	3/2+	(15.4)	100	7.51	1/2+				
78.20	7/2−	78.20 *3*	100	0	7/2+	E1		0.635	B(E1)(W.u.)=2.66×10^{-6} *8* Mult.: $\delta\leq$0.045 (1981Ad02).
149.20	9/2−	71.0 *1*	100	78.20	7/2−	D			
159.11	7/2+	140.25 *8*	100	18.90	5/2+	D			
161.81	9/2+	161.8 *1*	100	0	7/2+				
167.28	5/2+	144.43 *6*	100	22.84	3/2+				
211.10	7/2+	188.28 *5*	100	22.84	3/2+				Mult.: $\gamma(\theta)$ suggests γ is dipole, but placement has ΔJ=2. ce data suggest E1 or E2.
254.80	11/2−	105.6 *1*	100	149.20	9/2−	M1+E2	0.23 *6*		
		176.6 *1*	29 *1*	78.20	7/2−	E2			
326.70	9/2+	167.6 *1*	100 *21*	159.11	7/2+	D			
		307.8 *2*	21.1 *14*	18.90	5/2+				
337.55	1/2+,3/2+	314.70 *15*	97 *4*	22.84	3/2+	M1(+E2)			
		318.63 *18*	23.3 *19*	18.90	5/2+				
		330.10 *24*	100 *6*	7.51	1/2+	M1(+E2)			
347.89	11/2+	186.1 *1*	53.9 *21*	161.81	9/2+	M1+E2	0.64 *13*		
		347.9 *1*	100 *5*	0	7/2+				
367.46	1/2−	344.72 *28*	100 *9*	22.84	3/2+				
		359.92 *17*	77 *5*	7.51	1/2+				
376.64	5/2−	353.7 *2*	100	22.84	3/2+				
		357.7	≤120	18.90	5/2+				
417.50	13/2−	162.7 *1*	100	254.80	11/2−	M1+E2	0.26 *3*		
		268.3[e] *1*	34.7[e] *5*	149.20	9/2−	E2			
433.31	3/2+,5/2,7/2+	222.37 *20*	19 *3*	211.10	7/2+				
		266.0 *5*	64 *21*	167.28	5/2+				
		410.44 *17*	100 *7*	22.84	3/2+				
465.80		298.46 *15*	100 *6*	167.28	5/2+				
		443.02 *24*	30 *5*	22.84	3/2+				
515.75	11/2+	189.0 *1*	100	326.70	9/2+	D			Mult.: From $\gamma(\theta)$, 1984Fo04.
		356.6	≤127	159.11	7/2+				I_γ: From 1995Sm02, where γ is part of a peak containing two γ's.
516.57	9/2−	139.9 *1*	≤172	376.64	5/2−				I_γ: From 1995Sm02, where γ is part of a peak containing two γ's.
		305.5 *2*	100 *2*	211.10	7/2+				
531.45	11/2+	204.8 *1*	32 *1*	326.70	9/2+				
		320.4 *2*	100 *2*	211.10	7/2+				
		372.3	9.3 *5*	159.11	7/2+				

$\gamma(^{161}Tm)$ (continued)

E_i(level)	J^π_i	E_γ[†‡]	I_γ[#]	E_f	J^π_f	Mult.[@&a]	δ[b]	α[c]	Comments
557.34	13/2+	209.5 *1*	70 *15*	347.89	11/2+	M1+E2	0.67 *18*		
		395.5 *1*	100	161.81	9/2+	E2			
577.40	15/2−	159.9 *1*	100	417.50	13/2−	M1+E2	0.162 *22*	0.810	B(M1)(W.u.)=0.26 *6*; B(E2)(W.u.)=1.3×10^2 *5*
		322.6 *1*	84 *3*	254.80	11/2−	E2		0.0575	B(E2)(W.u.)=1.3×10^2 *3*
625.53		159.67 *19*	21 *5*	465.80					
		192.26 *14*	20 *2*	433.31	3/2+,5/2,7/2+				
		458.22 *16*	100 *4*	167.28	5/2+				
638.74		560.48 *20*	100	78.20	7/2−				
647.89		569.73 *14*	100	78.20	7/2−				
678.08	5/2−	519.12 *20*	2.4 *3*	159.11	7/2+				
		599.88 *10*	100 *5*	78.20	7/2−	M1(+E2)			
		659.10 *14*	12.5 *5*	18.90	5/2+				
709.66	5/2−	70.90 *10*	3.5 *8*	638.74					
		550.0 *5*	1.9 *6*	159.11	7/2+				
		631.45 *10*	100 *5*	78.20	7/2−	M1(+E2)			
		690.75 *20*	7.8 *7*	18.90	5/2+				
756.39	13/2−	225.0 *1*	100 *2*	531.45	11/2+				
		239.8 *1*	≤51	516.57	9/2−				I_γ: From 1995Sm02, where γ is part of a peak containing two γ's.
		240.6 *1*	≤51	515.75	11/2+				I_γ: From 1995Sm02, where γ is part of a peak containing two γ's.
788.50	15/2+	231.2	36.5 *24*	557.34	13/2+	M1+E2	0.55 *7*		
		440.6 *1*	100	347.89	11/2+				
815.60	17/2−	238.2 *1*	100	577.40	15/2−	M1+E2	0.17 *3*	0.267	B(M1)(W.u.)=0.21 *7*; B(E2)(W.u.)=54 *25*
		398.1 *1*	77 *4*	417.50	13/2−	E2		0.0314	B(E2)(W.u.)=1.1×10^2 *4*
989.25	15/2+	457.8 *1*	100	531.45	11/2+				
1008.40	19/2−	192.8 *1*	57 *11*	815.60	17/2−	M1+E2	0.15 *3*	0.480	B(M1)(W.u.)=0.35 *16*; B(E2)(W.u.)=1.1×10^2 *7*
		431.0 *1*	100	577.40	15/2−	E2		0.0253	B(E2)(W.u.)=1.5×10^2 *6*
1036.73	17/2+	248.2 *1*	20 *1*	788.50	15/2+	M1+E2	0.45 *13*		
		479.4 *1*	100	557.34	13/2+	E2			
1080.1	17/2−	323.7 *2*	100	756.39	13/2−	E2			
1180.70		471.00 *10*	100 *6*	709.66	5/2−				
		532.91 *23*	38 *6*	647.89					
		1022.0 *4*	31 *4*	159.11	7/2+				
1305.03	19/2+	268.3[e] *1*	18.9[e] *6*	1036.73	17/2+	M1+E2	0.48 *20*		
		516.6 *2*	100	788.50	15/2+	E2			
1310.10	21/2−	301.7 *1*	71.4 *20*	1008.40	19/2−	M1+E2	0.26 *3*	0.1381 *22*	B(M1)(W.u.)=0.17 *4*; B(E2)(W.u.)=63 *21*
		494.5 *1*	100	815.60	17/2−	E2		0.01762	B(E2)(W.u.)=1.2×10^2 *3*
1496.1	21/2−	416.0 *1*	100	1080.1	17/2−	E2		0.0279	B(E2)(W.u.)=3.1×10^2 *4*
1525.53	23/2−	215.4 *1*	47 *3*	1310.10	21/2−	M1+E2	0.18 *4*	0.352 *6*	B(M1)(W.u.)=0.55 *16*; B(E2)(W.u.)=1.9×10^2 *10*
		517.1 *2*	100	1008.40	19/2−	E2		0.01572	B(E2)(W.u.)=1.6×10^2 *5*

$^{161}_{69}Tm_{92}$-6

γ(^{161}Tm) (continued)

E_i(level)	J^π_i	E_γ[†‡]	I_γ[#]	E_f	J^π_f	Mult.[@&a]	δ[b]	α[c]	Comments
1581.65	21/2$^+$	276.7 *2*	32.8 *14*	1305.03	19/2$^+$	M1+E2	0.46 *16*		
		544.9 *1*	100	1036.73	17/2$^+$	E2			
1873.97	25/2$^-$	348.4 *2*	71 *4*	1525.53	23/2$^-$	M1+E2	0.227 *19*	0.0947	B(M1)(W.u.)=0.36 *5*; B(E2)(W.u.)=75 *16*
		563.9 *1*	100	1310.10	21/2$^-$	E2		0.01267	B(E2)(W.u.)=1.9×10^2 *3*
1876.72	23/2$^+$	295	14.1 *8*	1581.65	21/2$^+$	M1+E2	0.42 *9*		
		571.7 *2*	100	1305.03	19/2$^+$	E2			
1996.2	25/2$^-$	500.1 *2*	100	1496.1	21/2$^-$	E2		0.01712	B(E2)(W.u.)=356 *19*
2108.95	27/2$^-$	235.0 *1*	31 *4*	1873.97	25/2$^-$	M1+E2	0.128 *23*	0.279	B(M1)(W.u.)=0.37 *12*; B(E2)(W.u.)=5.E+1 *3*
		583.4 *1*	100	1525.53	23/2$^-$	E2		0.01167	B(E2)(W.u.)=1.1×10^2 *4*
2172.26	25/2$^+$	296	9.3 *10*	1876.72	23/2$^+$				
		590.6[e] *2*	100[e]	1581.65	21/2$^+$	E2			
2478.0	27/2$^+$	306	44.4 *25*	2172.26	25/2$^+$				
		601.3 *2*	100	1876.72	23/2$^+$				
2480.95	29/2$^-$	372.0	49 *3*	2108.95	27/2$^-$	M1+E2	0.15 *3*	0.0808	B(M1)(W.u.)=0.27 *8*; B(E2)(W.u.)=22 *11*
		607.0 *2*	100	1873.97	25/2$^-$	E2		0.01061	B(E2)(W.u.)=1.7×10^2 *5*
2570.3	29/2$^-$	574.1 *2*	100	1996.2	25/2$^-$				
2736.57	31/2$^-$	255.6 *2*	35.5 *25*	2480.95	29/2$^-$	M1+E2	0.125 *17*		
		627.6 *2*	100	2108.95	27/2$^-$	E2			
2786	29/2$^+$	308	16.9 *25*	2478.0	27/2$^+$				
		614	100	2172.26	25/2$^+$				
3050.89	33/2$^-$	314.4 *1*	69.4 *14*	2736.57	31/2$^-$	D			
		570.0 *2*	100	2480.95	29/2$^-$	E2			
3110	31/2$^+$	324	≤13	2786	29/2$^+$				E_γ: 1995Sm02 report Eγ=234 for this transition. The evaluator has assumed that this is a misprint.
		632	100	2478.0	27/2$^+$				
3117	(33/2$^-$)	381	86.5 *19*	2736.57	31/2$^-$				
		636	100 *6*	2480.95	29/2$^-$				
3206.4	33/2$^-$	636.1 *3*	100	2570.3	29/2$^-$				
3255.34	35/2$^-$	204.5 *1*	100	3050.89	33/2$^-$	D			
		518.4 *2*	65 *13*	2736.57	31/2$^-$				
3381	35/2$^-$	264[f]		3117	(33/2$^-$)				
		330		3050.89	33/2$^-$				
		644.2		2736.57	31/2$^-$				
3441	33/2$^+$	331	11.2 *13*	3110	31/2$^+$				
		655	100	2786	29/2$^+$				
3476.75	37/2$^-$	221.4 *1*	100	3255.34	35/2$^-$	D			
		425.9 *1*	66 *5*	3050.89	33/2$^-$				
3723?	(37/2$^-$)	342[f]		3381	35/2$^-$				
		606[f]		3117	(33/2$^-$)				
3739.7	39/2$^-$	263.0 *2*	100 *5*	3476.75	37/2$^-$				

$^{161}_{69}Tm_{92}$-7

Adopted Levels, Gammas (continued)

$\gamma(^{161}Tm)$ (continued)

E_i(level)	J_i^π	E_γ[†‡]	I_γ[#]	E_f	J_f^π	Mult.[@&a]	δ[b]	α[c]	Comments
3739.7	39/2⁻	358	12.7 *5*	3381	35/2⁻				
		484.3 *1*	59 *5*	3255.34	35/2⁻	E2			
3779	35/2⁺	338	12.7 *19*	3441	33/2⁺				
		669	100	3110	31/2⁺				
3886	(37/2⁻)	680	100	3206.4	33/2⁻				
4012.7	41/2⁻	273.1 *1*	100	3739.7	39/2⁻	[M1+E2]	<0.3	0.187 *4*	B(M1)(W.u.)=1.2 *3*; B(E2)(W.u.)<8.3×10^2
		536.2	92 *3*	3476.75	37/2⁻	[E2]			B(E2)(W.u.)=2.6×10^2 *7*
4084?	(39/2⁻)	361[f]	33 *2*	3723?	(37/2⁻)				
		703[f]	100 *3*	3381	35/2⁻				
4130	37/2⁺	351[f]	6.9 *5*	3779	35/2⁺				
		689	100 *5*	3441	33/2⁺				
4330.4	43/2⁻	317.7 *1*	92 *8*	4012.7	41/2⁻	[M1+E2]	<0.3	0.122 *4*	B(M1)(W.u.)>0.50; B(E2)(W.u.)<3.7×10^2
		590.6[e] *2*	100[e]	3739.7	39/2⁻	E2		0.01133	B(E2)(W.u.)=1.8×10^2 *5*
4492	(39/2⁺)	713	100	3779	35/2⁺				
4578	(41/2⁻)	692[d]	100[d]	3886	(37/2⁻)				
4656.0	45/2⁻	325.1	46 *3*	4330.4	43/2⁻	[M1+E2]	<0.3	0.114 *3*	B(M1)(W.u.)>0.64; B(E2)(W.u.)<2.7×10^2
		643.9	100	4012.7	41/2⁻	[E2]			B(E2)(W.u.)=2.3×10^2 *+7−13*
4867	(41/2⁺)	737	100	4130	37/2⁺				
5017.3	47/2⁻	361.5	48 *5*	4656.0	45/2⁻	[M1+E2]	<0.3	0.0862 *23*	B(M1)(W.u.)>0.64; B(E2)(W.u.)<2.2×10^2
		686.8	100	4330.4	43/2⁻	E2			B(E2)(W.u.)=2.2×10^2 *+13−22*
5267	(43/2⁺)	775	100	4492	(39/2⁺)				
5270	(45/2⁻)	692[d]	100[d]	4578	(41/2⁻)				
5394.1	49/2⁻	376.6	37 *11*	5017.3	47/2⁻	[M1+E2]	<0.3	0.0774 *21*	B(M1)(W.u.)=0.8 *3*; B(E2)(W.u.)<3.1×10^2
		738.1	100	4656.0	45/2⁻	[E2]			B(E2)(W.u.)=2.5×10^2 *6*
5675	(45/2⁺)	808	100	4867	(41/2⁺)				
5789.1	51/2⁻	394.8	63 *8*	5394.1	49/2⁻	[M1+E2]	<0.3	0.0683 *19*	B(M1)(W.u.)>0.83; B(E2)(W.u.)<4.7×10^2
		771.9	100	5017.3	47/2⁻	[E2]			B(E2)(W.u.)=2.4×10^2 *8*
5988	(49/2⁻)	718	100	5270	(45/2⁻)				
6113	(47/2⁺)	846	100	5267	(43/2⁺)				
6216.6	53/2⁻	426.7[f]		5789.1	51/2⁻				
		822.5	100	5394.1	49/2⁻	[E2]			
6560	(49/2⁺)	885	100	5675	(45/2⁺)				
6633.4	(55/2⁻)	844.3	100	5789.1	51/2⁻	[E2]			B(E2)(W.u.)=2.3×10^2 *9*
6726?	(53/2⁻)	738[f]	100	5988	(49/2⁻)				
7037?	(51/2⁺)	924[f]	100	6113	(47/2⁺)				
7110.3	(57/2⁻)	893.7	100	6216.6	53/2⁻	[E2]			B(E2)(W.u.)=2.4×10^2 *12*
7519?	(53/2⁺)	959[f]	100	6560	(49/2⁺)				

Adopted Levels, Gammas (continued)

$\gamma(^{161}Tm)$ (continued)

E_i(level)	J^π_i	E_γ[†‡]	I_γ[#]	E_f	J^π_f	Mult.[@&a]	Comments
7533.8	(59/2⁻)	900.4	100	6633.4	(55/2⁻)	[E2]	B(E2)(W.u.)=2.6×10^2 *12*
8052.8	(61/2⁻)	942.5[d]	100[d]	7110.3	(57/2⁻)	[E2]	B(E2)(W.u.)=2.1×10^2 *6*
8476.3	(63/2⁻)	942.5[d]	100[d]	7533.8	(59/2⁻)	[E2]	B(E2)(W.u.)=2.1×10^2 *6*
9034.1	(65/2⁻)	981.3[d]	100[d]	8052.8	(61/2⁻)	[E2]	B(E2)(W.u.)=1.1×10^2 *4*
9457.6	(67/2⁻)	981.3[d]	100[d]	8476.3	(63/2⁻)	[E2]	B(E2)(W.u.)=1.1×10^2 *4*
10059.6	(69/2⁻)	1025.5[d]	100[d]	9034.1	(65/2⁻)		
10483.1	(71/2⁻)	1025.5[d]	100[d]	9457.6	(67/2⁻)		
11141?	(73/2⁻)	1081[f]	100	10059.6	(69/2⁻)		
11582?	(75/2⁻)	1102[f]	100	10483.1	(71/2⁻)		
881+x	J+2	881	100	x	J		
1814+x	J+4	933	100	881+x	J+2		
2795+x	J+6	981	100	1814+x	J+4		
3825+x	J+8	1030	100	2795+x	J+6		
4904+x	J+10	1079	100	3825+x	J+8		
6034+x	J+12	1130	100	4904+x	J+10		
7215+x	J+14	1181	100	6034+x	J+12		
8446+x	J+16	1231	100	7215+x	J+14		
9738+x?	J+18	1292[f]	100	8446+x	J+16		

† See ^{161}Yb ε decay and the in-beam study of 1984Fo04 for lists of unplaced γ's that are not given here.

‡ In the two heavy-ion studies (1984Fo04, 1995Sm02) where the data sets overlap, the reported Eγ values are identical in almost all cases, except that 1995Sm02 list no uncertainties. For the Eγ data from these studies, those with listed uncertainties are from 1984Fo04 and those without them are from 1995Sm02.

\# The Iγ data for the γ's from the heavy-ion studies are mostly from 1995Sm02, whose data are more extensive than those of of 1984Fo04 and for which uncertainties are listed in most cases. 1984Fo04 do not list uncertainties for their Iγ data.

@ Assignments are based on the ce data from ^{161}Yb ε decay and the $\gamma\gamma(\theta)$ (DCO) data (1995Wa21). In the latter case, the the evaluator has made the assignments from reported data.

& For transitions having listed δ values, the multipolarities are shown as M1+E2, rather than E1+M2. This is in keeping with their interpretation as intraband transitions and permits the calculation of the relevant reduced transition probabilities where level $T_{1/2}$ values are known.

a For levels having known half-lives, the multipolarities of the crossover quadrupole (ΔJ=2) transitions can be assigned as E2, since RUL eliminates the M2 possibility.

b From ^{128}Te(^{37}Cl,4nγ), unless noted otherwise. See the comments in that data set.

c Listed values are included, where necessary, to allow the calculation of reduced transition probabilities for levels having measured $T_{1/2}$ values. Where the δ values for the ΔJ=1 transitions are not given by 1995Wa21, the evaluator has assumed that δ<0.3, according to a statement to this effect by these authors.

d Multiply placed with undivided intensity.

e Multiply placed with intensity suitably divided.

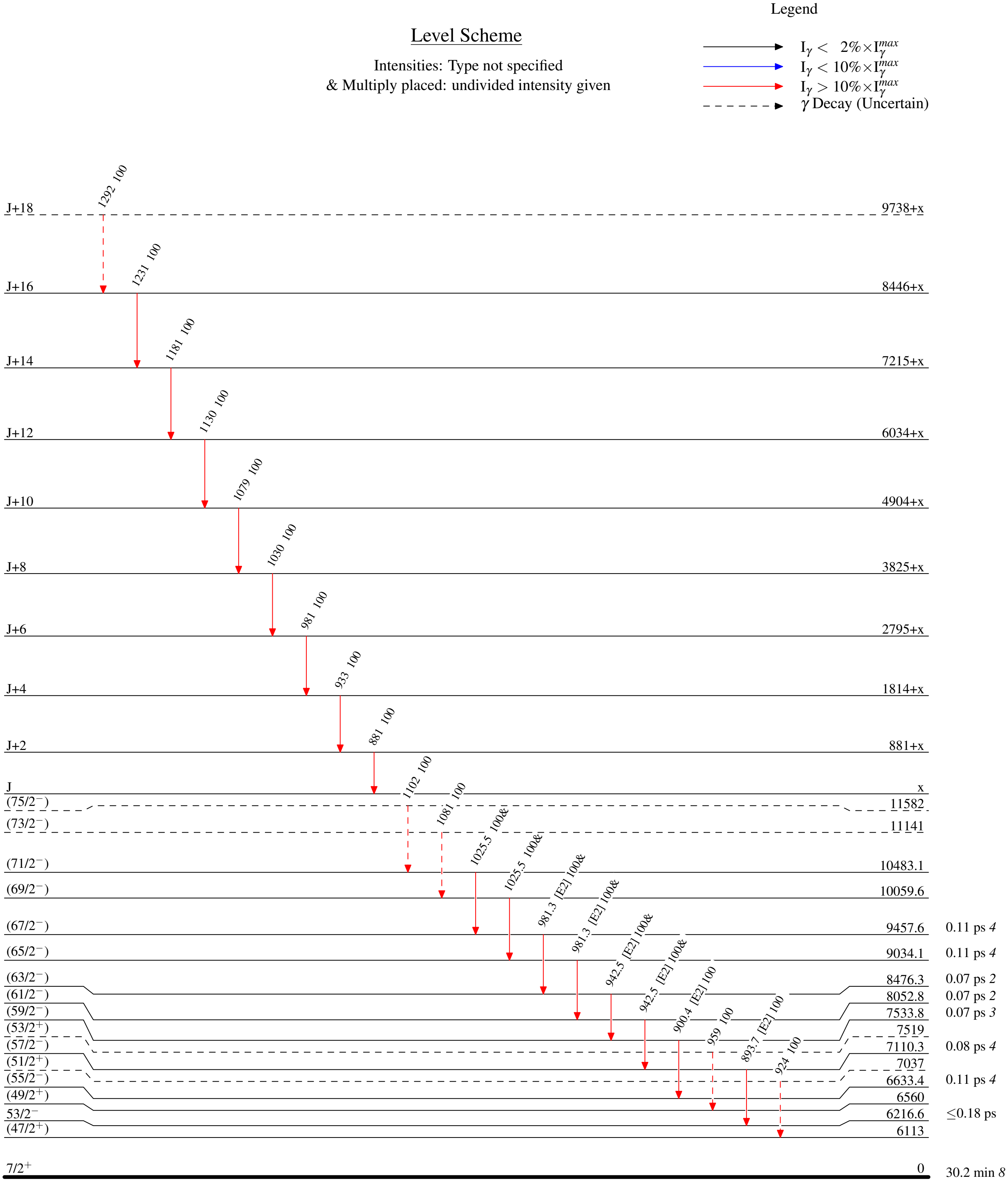
f Placement of transition in the level scheme is uncertain.

$^{161}_{69}Tm_{92}$-9

Adopted Levels, Gammas

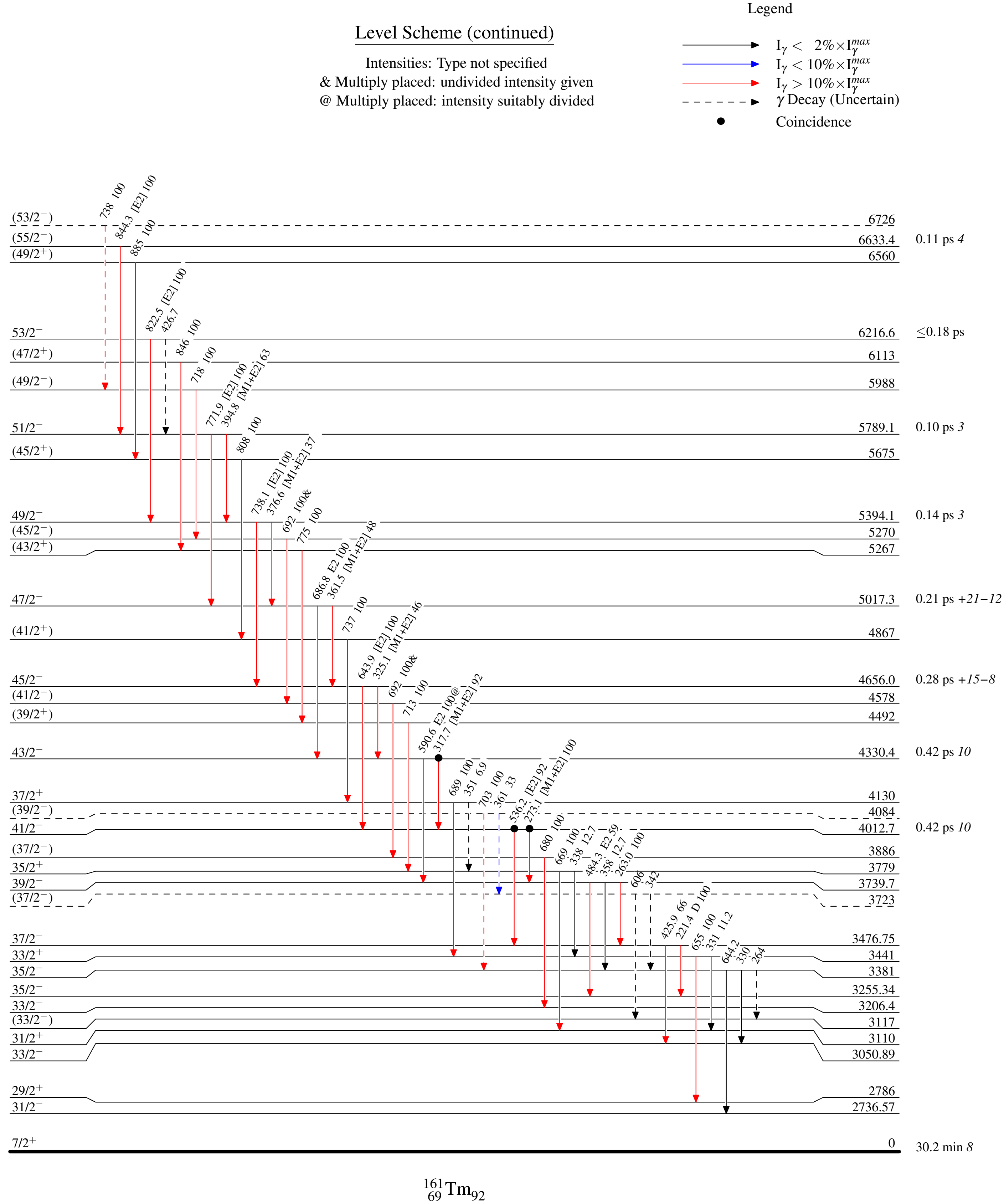
Level Scheme

Intensities: Type not specified
& Multiply placed: undivided intensity given



$^{161}_{69}Tm_{92}$

Adopted Levels, Gammas



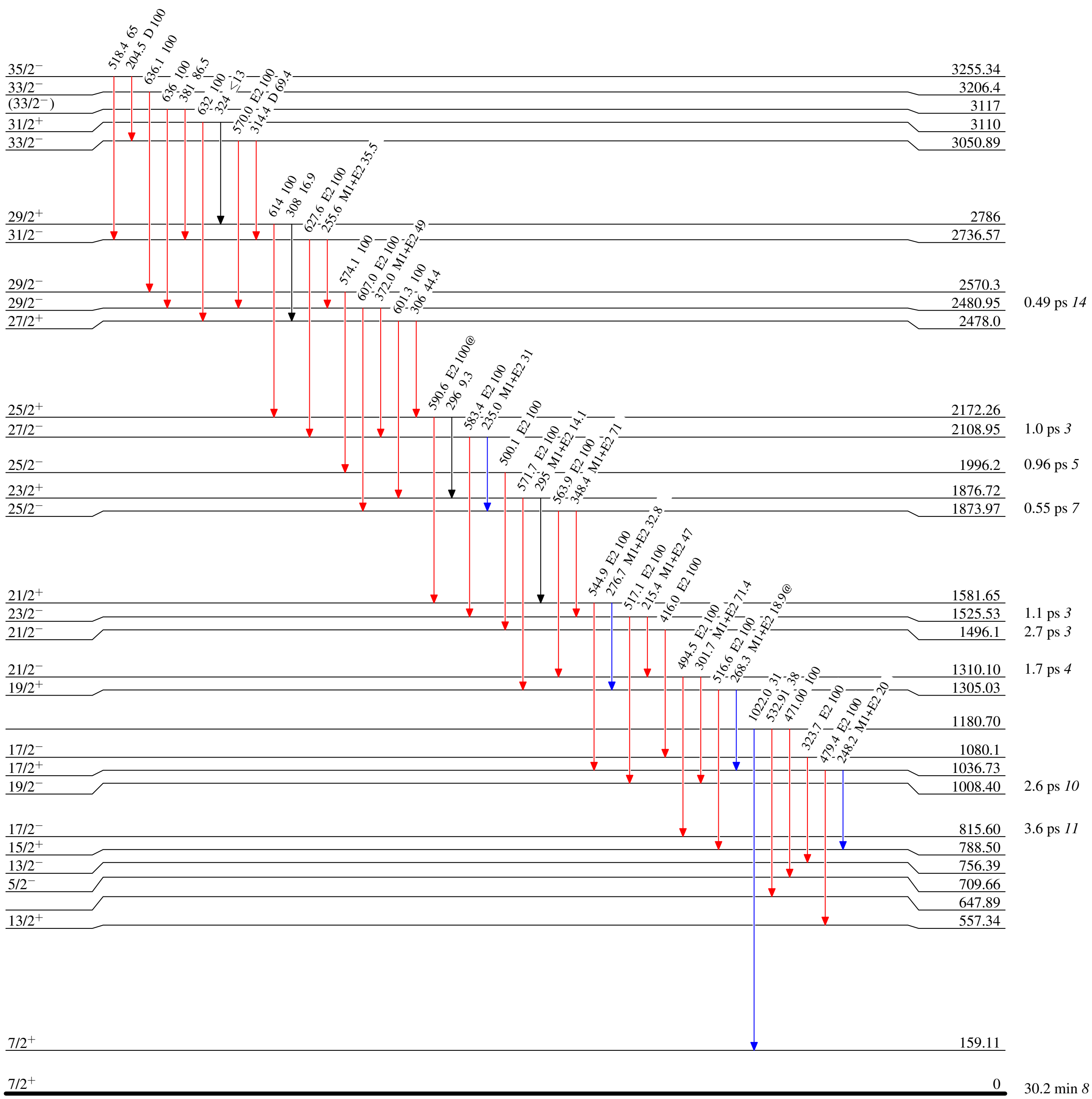
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend

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



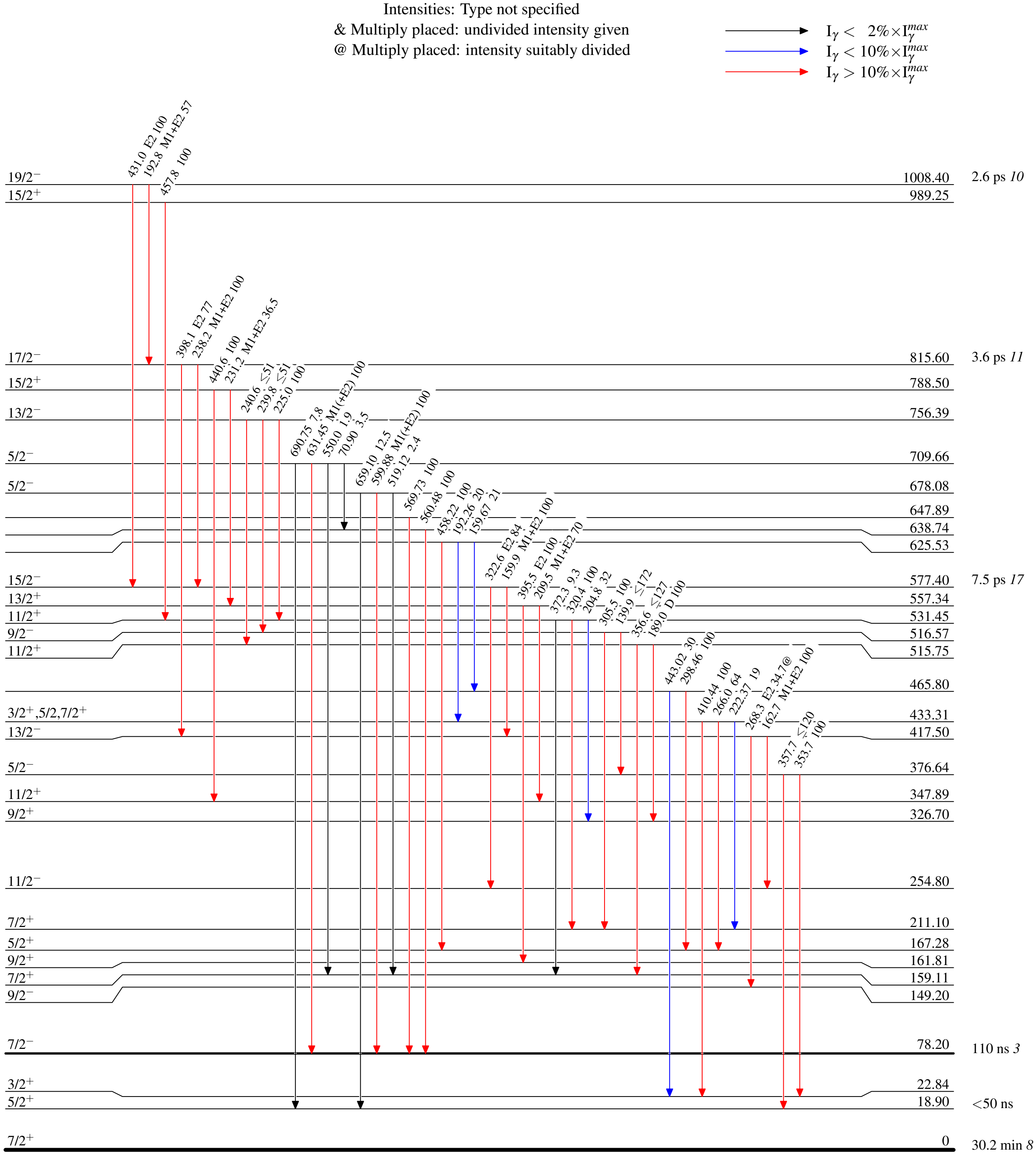
$^{161}_{69}Tm_{92}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend



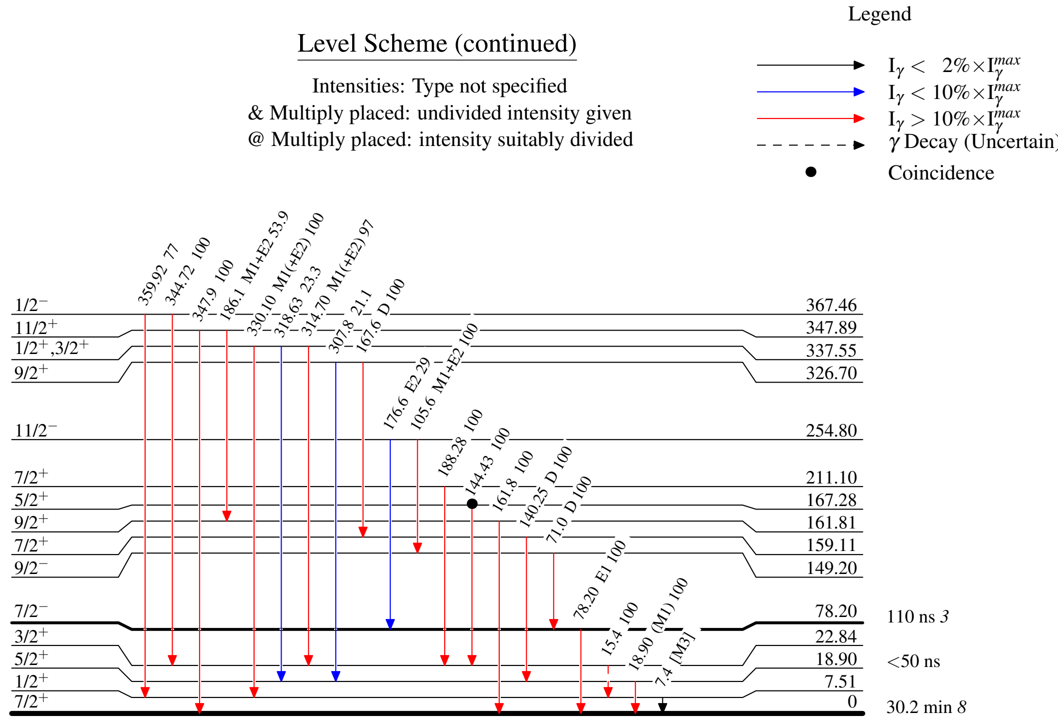
$^{161}_{69}Tm_{92}$

Adopted Levels, Gammas

Legend

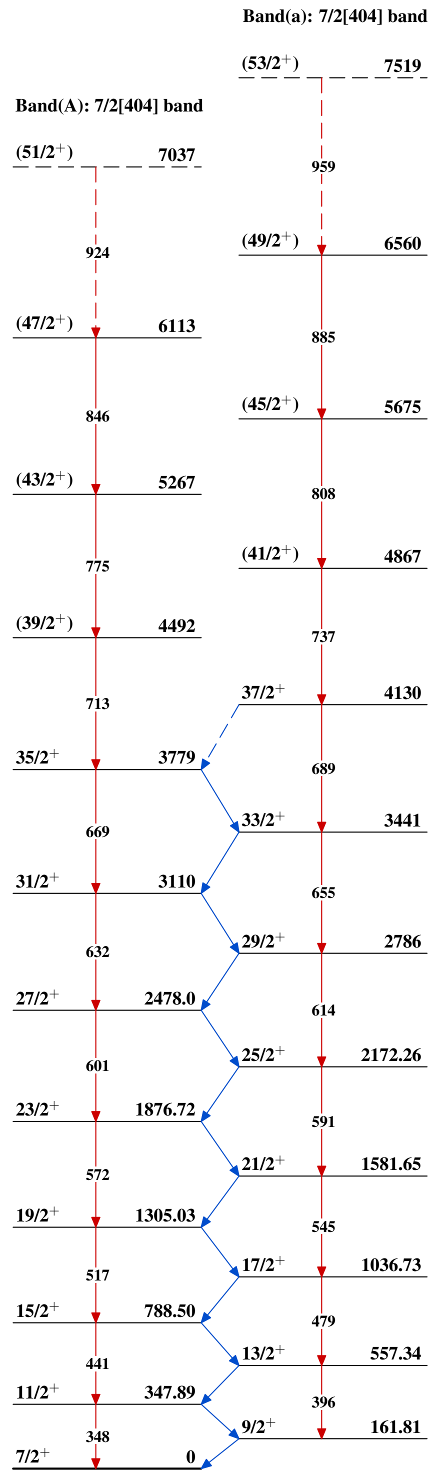
Level Scheme (continued)

Intensities: Type not specified
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided



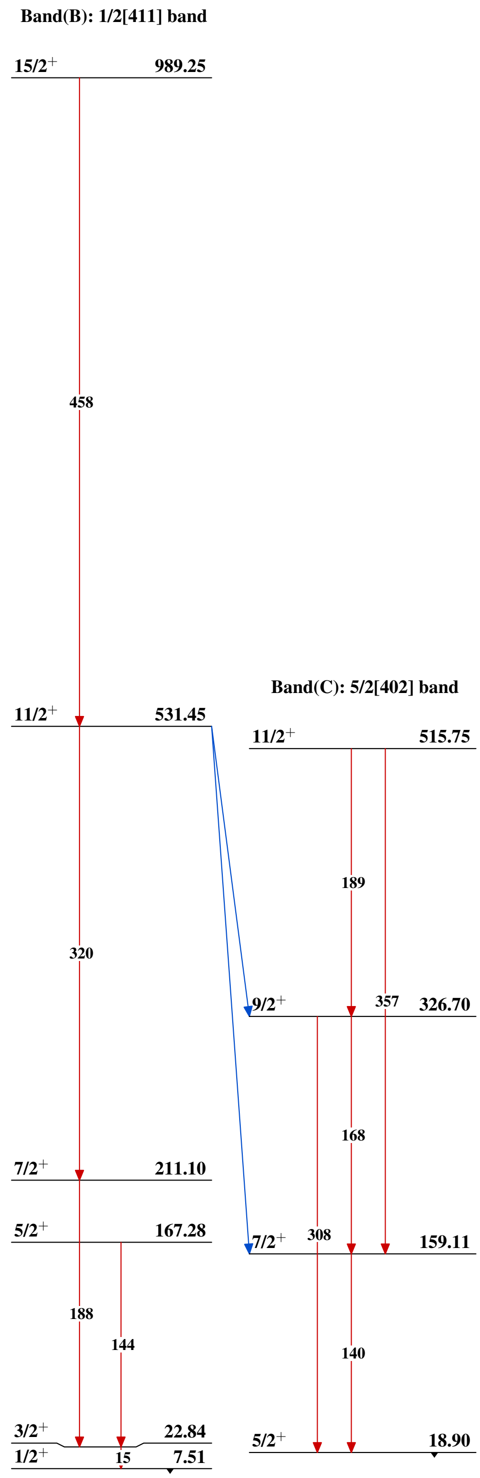
$^{161}_{69}Tm_{92}$

Adopted Levels, Gammas



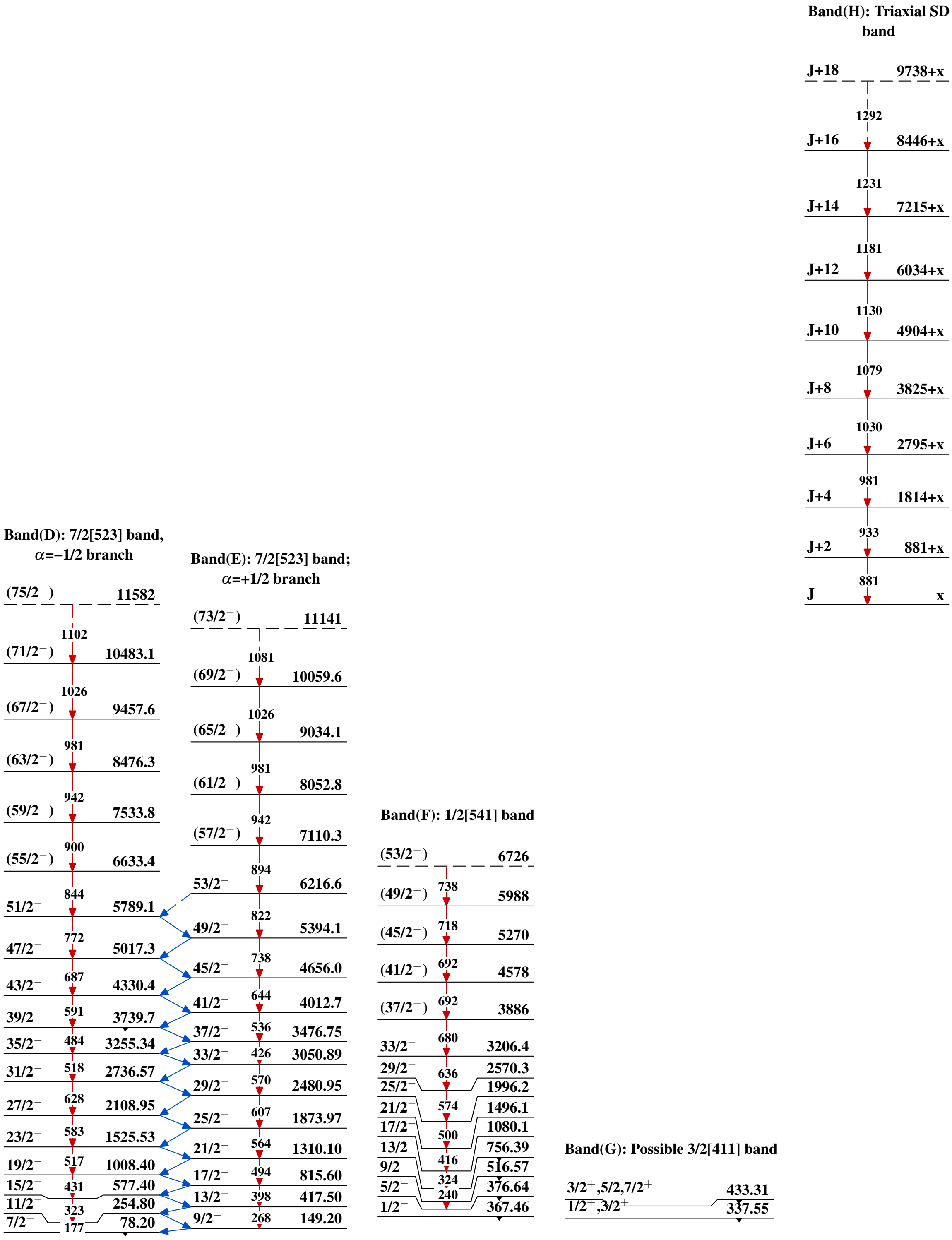
$^{161}_{69}Tm_{92}$

Adopted Levels, Gammas (continued)



$^{161}_{69}Tm_{92}$

Adopted Levels, Gammas (continued)



$^{161}_{69}Tm_{92}$