^{165}Ho(α,4nγ),^{166}Er(p,2nγ) 1972Gi12,1975Fo14

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Ashok K. Jain and Anwesha Ghosh, Balraj Singh	NDS 107, 1075 (2006)	15-Apr-2006

1972Gi12: (α,4nγ) E=38, 50 MeV. Measured Eγ, Iγ, $\gamma\gamma$, excitation functions. (p,2nγ) E=30 MeV; this reaction used to measure Iγ(α,4nγ)/Iγ(p,2nγ).

1975Fo14: (α,4nγ) E=53 MeV. Measured γ, $\gamma\gamma$, excitation functions, $\gamma(\theta)$.

Others:

1976Sv01: (p,2nγ) E=8-12 MeV. Measured Eγ, $\gamma\gamma$, ce, $\gamma\gamma$(t).

1974PoZR: (α,4nγ). Measured Eγ, Iγ, γ(t).

1967Co26: (p,2nγ) E=5-17.5 MeV. Measured lifetime of 81 level by (x ray)γ(t).

The level scheme and bands originally reported by 1972Gi12 have been significantly modified by 1975Fo14, whose level scheme is adopted in this dataset. Many gamma rays from 1972Gi12 have been reassigned.

^{165}Tm Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	Comments
0.0[c]	1/2$^+$		
11.93[d] *21*	3/2$^+$		
81.00[b] *23*	7/2$^+$	80 μs *3*	$T_{1/2}$: (x ray)γ(t) In (p,2nγ) (1967Co26).
130.20[c] *10*	5/2$^+$		
159.26[d] *22*	7/2$^+$	322 ps *20*	$T_{1/2}$: from $\gamma\gamma$(t) in (p,2nγ) (1976Sv01).
161.30[&] *25*	7/2$^-$	9 μs	$T_{1/2}$: from (α,4nγ) (1974PoZR), authors claim that 80.3γ has a component with $T_{1/2}$=80 μs, but it is not accounted for in the level scheme.
182.12[e] *25*	5/2$^-$		
211.19[a] *24*	9/2$^+$		
253.3[@] *3*	9/2$^-$		
293.91[e] *23*	9/2$^-$		
362.68[c] *21*	9/2$^+$		
366.74[b] *25*	11/2$^+$		
370.0[&] *3*	11/2$^-$		
414.23[d] *22*	11/2$^+$		
498.37[e] *23*	13/2$^-$		
512.5[@] *3*	13/2$^-$		
545.9[a] *3*	13/2$^+$		
676.6[&] *3*	15/2$^-$		
690.1[c] *3*	13/2$^+$		
747.1[b] *3*	15/2$^+$		
769.44[d] *25*	15/2$^+$		
796.89[e] *25*	17/2$^-$		
867.7[@] *3*	17/2$^-$		
969.0[a] *4*	17/2$^+$		
1074.2[&] *4*	19/2$^-$		
1103.7[c] *4*	17/2$^+$		
1186.5[e] *3*	21/2$^-$		
1206.8[b] *4*	19/2$^+$		
1217.1[d] *4*	19/2$^+$		
1310.8[@] *4*	21/2$^-$		
1467.9[a] *5*	21/2$^+$		
1552.3[&] *4*	23/2$^-$		

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^{165}Ho(α,4nγ),^{166}Er(p,2nγ) 1972Gi12,1975Fo14 (continued)

^{165}Tm Levels (continued)

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
1591.8[c] 5	21/2+	2099.0[&] 5	27/2−	2624.6[a] 10	29/2+	3156.3[#a] 11	33/2+
1661.1[e] 5	25/2−	2138.4[c] 8	25/2+	2666.3[c] 9	29/2+	3270.7[&] 8	35/2−
1730.6[b] 5	23/2+	2213.0[e] 7	29/2−	2698.0[&] 7	31/2−	3506.7[e] 13	37/2−
1747.3[d] 6	23/2+	2308.5[b] 6	27/2+	2831.7[e] 9	33/2−		
1830.0[@] 5	25/2−	2332.3[d] 7	27/2+	2862.1[b] 8	31/2+		
2029.7[a] 9	25/2+	2411.5[@] 6	29/2−	3019.0[@] 8	33/2−		

† From least-squares fit to Eγ′s, assuming Δ(Eγ)=0.5 or 1 keV when not stated.
‡ As proposed by 1972Gi12 and 1975Fo14, based on γ(θ) and γ-decay patterns of the members of rotational bands. All assignments are consistent with those in 'Adopted Levels', except that some are in parentheses there due to lack of strong supporting arguments.
# This level is not reported by 2001Je09, instead a 531.5γ is assigned In the same band higher up from a 39/2+ level At 3905. Thus this level is not listed under 'Adopted Levels'.
@ Band(A): π7/2[523] band, α=+1/2.
& Band(a): π7/2[523] band, α=−1/2.
a Band(B): π7/2[404] band, α=+1/2.
b Band(b): π7/2[404] band, α=−1/2.
c Band(C): π1/2[411] band, α=+1/2.
d Band(c): π1/2[411] band, α=−1/2.
e Band(D): π1/2[541] band, α=+1/2.

γ(^{165}Tm)

Eγ‡	Iγ‡	Ei(level)	Jiπ	Ef	Jfπ	Eγ‡	Iγ‡	Ei(level)	Jiπ	Ef	Jfπ
[x]35.4 3	47 15					[x]139.8 3	12 6				
[x]40.9 3	56 20					[x]141.1 3	10 5				
[x]41.7 3	59 20					142.5 1	185 13	512.5	13/2−	370.0	11/2−
[x]62.6 1	36 4					147.3 12	19 15	159.26	7/2+	11.93	3/2+
69.1[@] 1	41 4	81.00	7/2+	11.93	3/2+	155.6 1	70 7	366.74	11/2+	211.19	9/2+
[x]73.0 1	11 2					[x]160.9 3	10 3				
80.3 11	92 10	161.30	7/2−	81.00	7/2+	164.2 1	167 20	676.6	15/2−	512.5	13/2−
[x]81.6 3	7 3					[x]168.6 3	23 5				
84.2 1	30 3	498.37	13/2−	414.23	11/2+	170.2 2	79 10	182.12	5/2−	11.93	3/2+
[x]85.3 3	6 2					[x]176.4 3	12 2				
92.0 1	100 5	253.3	9/2−	161.30	7/2−	179.2 2	36 5	545.9	13/2+	366.74	11/2+
[x]96.0 3	6 2					[x]187.8 3	22 4				
[x]98.4 2	14 2					191.1 1	137 15	867.7	17/2−	676.6	15/2−
[x]100.0 3	6 2					[x]197.4 2	27 5				
[x]110.1 2	4 1					201.2 3	25 5	747.1	15/2+	545.9	13/2+
111.8 2	17 3	293.91	9/2−	182.12	5/2−	203.2 4	52 15	362.68	9/2+	159.26	7/2+
116.7 1	175 22	370.0	11/2−	253.3	9/2−	204.4 1	205 25	498.37	13/2−	293.91	9/2−
118.3 2	89 12	130.20	5/2+	11.93	3/2+	206.4 2	115 17	1074.2	19/2−	867.7	17/2−
120.4 2	39 5	414.23	11/2+	293.91	9/2−	[x]207.8 3	34 9				
[x]122.0 3	16 4					208.8 3	28 9	370.0	11/2−	161.30	7/2−
[x]128.7 2	10 3					[x]212.3 3	10 3				
130.2[&] 1	100[&] 10	130.20	5/2+	0.0	1/2+	[x]215.6 3	11 3				
130.2[&] 1	100[&]	211.19	9/2+	81.00	7/2+	[x]217.5 3	8 3				
134.6 1	292 15	293.91	9/2−	159.26	7/2+	[x]219.1 3	17 4				

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^{165}Ho(α,4nγ),^{166}Er(p,2nγ) 1972Gi12,1975Fo14 (continued)

γ(^{165}Tm) (continued)

E_γ ‡	I_γ ‡	E_i(level)	J_i^π	E_f	J_f^π	E_γ ‡	I_γ ‡	E_i(level)	J_i^π	E_f	J_f^π
221.8 *3*	18 *5*	969.0	17/2$^+$	747.1	15/2$^+$	403.7 *5*	25 *10*	769.44	15/2$^+$	366.74	11/2$^+$
x229.9 *3*	16 *3*					x409.0 *5*	28 *6*				
232.5 *2*	34 *5*	362.68	9/2$^+$	130.20	5/2$^+$	409.0 *5*	28 *6*	1206.8	19/2$^+$	796.89	17/2$^-$
236.6 *2*	95 *12*	1310.8	21/2$^-$	1074.2	19/2$^-$	413.2 *4*	52 *13*	1103.7	17/2$^+$	690.1	13/2$^+$
238†		1206.8	19/2$^+$	969.0	17/2$^+$	420.1 *6*	29 *9*	1217.1	19/2$^+$	796.89	17/2$^-$
x239.8 *3*	10 *3*					423.0 *4*	89 *18*	969.0	17/2$^+$	545.9	13/2$^+$
241.5 *2*	52 *10*	1552.3	23/2$^-$	1310.8	21/2$^-$	438.5 *5*	48 *10*	1206.8	19/2$^+$	769.44	15/2$^+$
x242.8 *3*	37 *7*					442.9 *4*	89 *18*	1310.8	21/2$^-$	867.7	17/2$^-$
251.6 *3*	17 *2*	3270.7	35/2$^-$	3019.0	33/2$^-$	447.4 *4*	54 *11*	1217.1	19/2$^+$	769.44	15/2$^+$
255.0 *1*	133 *10*	414.23	11/2$^+$	159.26	7/2$^+$	x459.8 *4*	79 *16*				
259.1 *2*	36 *5*	512.5	13/2$^-$	253.3	9/2$^-$	470.2 *7*	34 *9*	1217.1	19/2$^+$	747.1	15/2$^+$
261.6 *5*	7 *3*	1467.9	21/2$^+$	1206.8	19/2$^+$	474.7 *4*	121 *20*	1661.1	25/2$^-$	1186.5	21/2$^-$
269.0 *2*	33 *7*	2099.0	27/2$^-$	1830.0	25/2$^-$	478.3 *4*	87 *17*	1552.3	23/2$^-$	1074.2	19/2$^-$
271.1 *2*	46 *9*	769.44	15/2$^+$	498.37	13/2$^-$	488.1 *7*	39 *10*	1591.8	21/2$^+$	1103.7	17/2$^+$
275.8 *3*	48 *12*	690.1	13/2$^+$	414.23	11/2$^+$	498.6 *4*	106 *20*	1467.9	21/2$^+$	969.0	17/2$^+$
277.7 *3*	39 *10*	1830.0	25/2$^-$	1552.3	23/2$^-$	519.1 *10*	65 *13*	1830.0	25/2$^-$	1310.8	21/2$^-$
285.8 *2*	63 *10*	366.74	11/2$^+$	81.00	7/2$^+$	523.7 *5*	45 *9*	1730.6	23/2$^+$	1206.8	19/2$^+$
286.8 *5*	9 *5*	2698.0	31/2$^-$	2411.5	29/2$^-$	527.9†		2666.3	29/2$^+$	2138.4	25/2$^+$
x292.6 *4*	15 *3*					529.3 *7*	39 *12*	1747.3	23/2$^+$	1217.1	19/2$^+$
x296.8 *4*	13 *6*					531.7†		3156.3	33/2$^+$	2624.6	29/2$^+$
298.5 *1*	224 *18*	796.89	17/2$^-$	498.37	13/2$^-$	544†		1730.6	23/2$^+$	1186.5	21/2$^-$
x299.6 *3*	52 *8*					546.6& *5*	77& *15*	2099.0	27/2$^-$	1552.3	23/2$^-$
306.6 *2*	93 *12*	676.6	15/2$^-$	370.0	11/2$^-$	546.6&	77&	2138.4	25/2$^+$	1591.8	21/2$^+$
312.2†		2411.5	29/2$^-$	2099.0	27/2$^-$	551.9 *5*	44 *10*	2213.0	29/2$^-$	1661.1	25/2$^-$
x315.4 *4*	38 *8*					553.6†		2862.1	31/2$^+$	2308.5	27/2$^+$
x317.2 *5*	17 *6*					561.8& *7*	41& *10*	1747.3	23/2$^+$	1186.5	21/2$^-$
321.1 *5*	18 *4*	3019.0	33/2$^-$	2698.0	31/2$^-$	561.8& *7*	41& *10*	2029.7	25/2$^+$	1467.9	21/2$^+$
327.4 *3*	46 *9*	690.1	13/2$^+$	362.68	9/2$^+$	572.8†		3270.7	35/2$^-$	2698.0	31/2$^-$
334.4& *3*	113& *16*	545.9	13/2$^+$	211.19	9/2$^+$	577.7†		2308.5	27/2$^+$	1730.6	23/2$^+$
334.4& *3*	113& *16*	1103.7	17/2$^+$	769.44	15/2$^+$	581.9†		2411.5	29/2$^-$	1830.0	25/2$^-$
x336.5 *5*	15 *6*					585.1†		2332.3	27/2$^+$	1747.3	23/2$^+$
355.2& *2*	191& *16*	769.44	15/2$^+$	414.23	11/2$^+$	594.9†#	48 *12*	2624.6	29/2$^+$	2029.7	25/2$^+$
355.2& *2*	191& *20*	867.7	17/2$^-$	512.5	13/2$^-$	598.8 *10*	50 *12*	2698.0	31/2$^-$	2099.0	27/2$^-$
x358.7 *4*	30 *6*					606.5 *10*	28 *7*	3019.0	33/2$^-$	2411.5	29/2$^-$
374.7†		1591.8	21/2$^+$	1217.1	19/2$^+$	x616.1 *10*	12 *3*				
x380.3 *3*	83 *13*					618.7†	20 *5*	2831.7	33/2$^-$	2213.0	29/2$^-$
380.3 *3*	83 *13*	747.1	15/2$^+$	366.74	11/2$^+$	647.6†		2308.5	27/2$^+$	1661.1	25/2$^-$
389.7 *2*	174 *16*	1186.5	21/2$^-$	796.89	17/2$^-$	671†		2332.3	27/2$^+$	1661.1	25/2$^-$
397.6 *3*	127 *19*	1074.2	19/2$^-$	676.6	15/2$^-$	675†		3506.7	37/2$^-$	2831.7	33/2$^-$

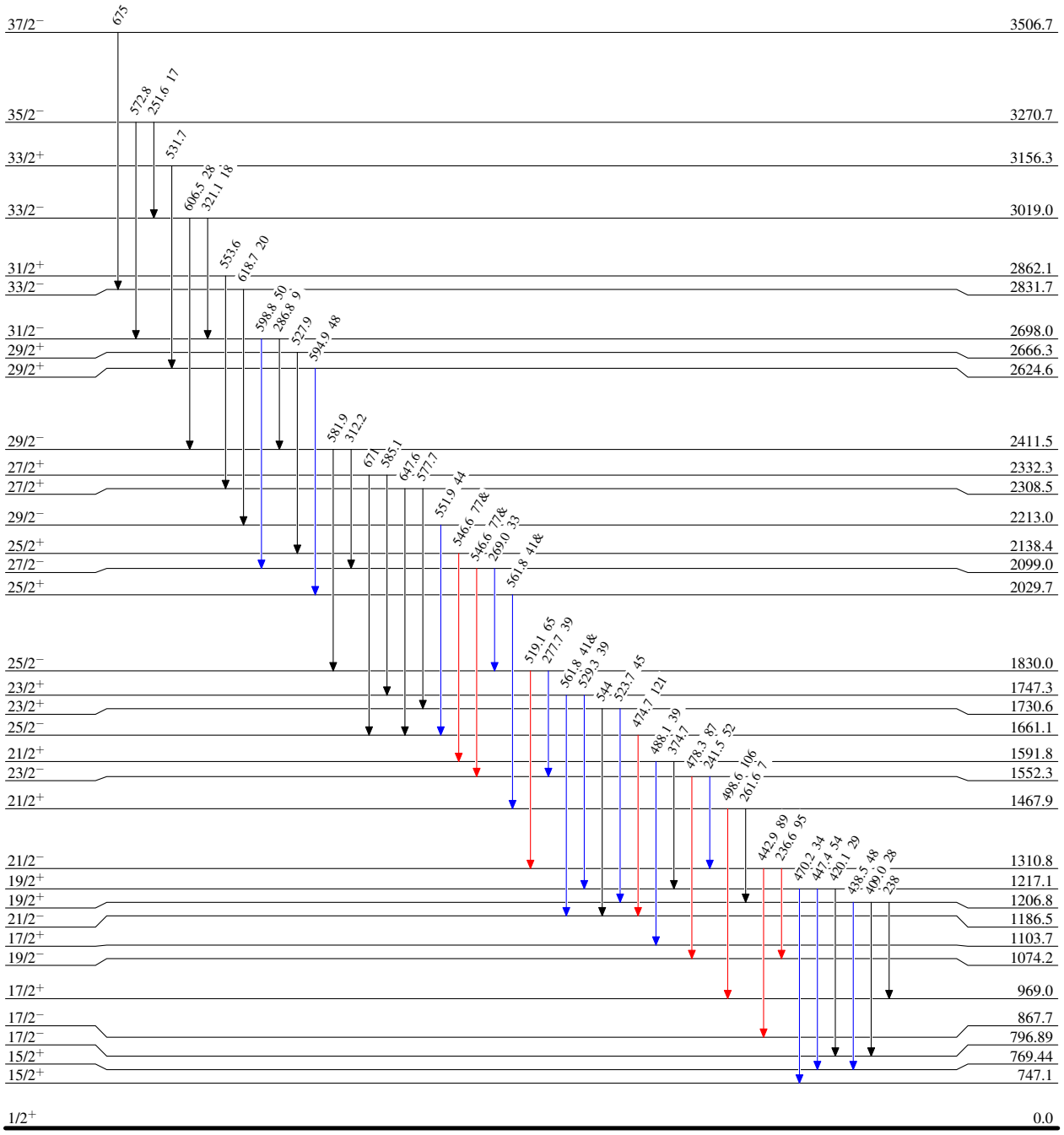
† Reported only in 1975Fo14.
‡ From 1972Gi12, unless otherwise stated.
# 631 In level-scheme figure 4 of 1972Gi12.
@ Mult=E1 suggested by 1967Co26 from α(K)exp=0.9 *5* from I(x ray)/I(69γ); but the band assignments suggest E2.
& Multiply placed with undivided intensity.
x γ ray not placed in level scheme.

^{165}Ho(α,4nγ),^{166}Er(p,2nγ) 1972Gi12,1975Fo14

Level Scheme

Intensities: Relative I_γ
& Multiply placed: undivided intensity given

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



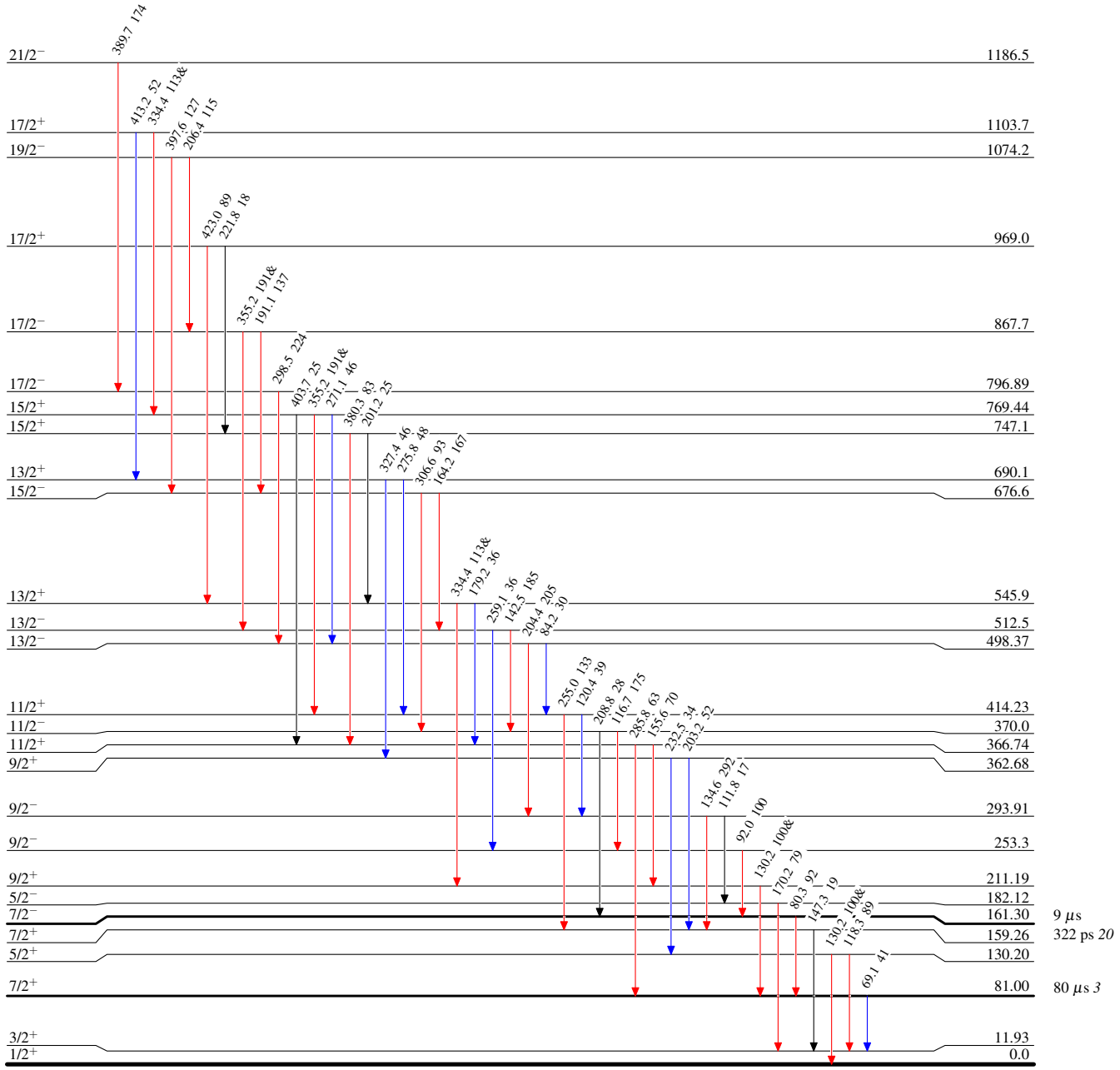
$^{165}_{69}Tm_{96}$

^{165}Ho(α,4nγ),^{166}Er(p,2nγ) 1972Gi12,1975Fo14

Level Scheme (continued)

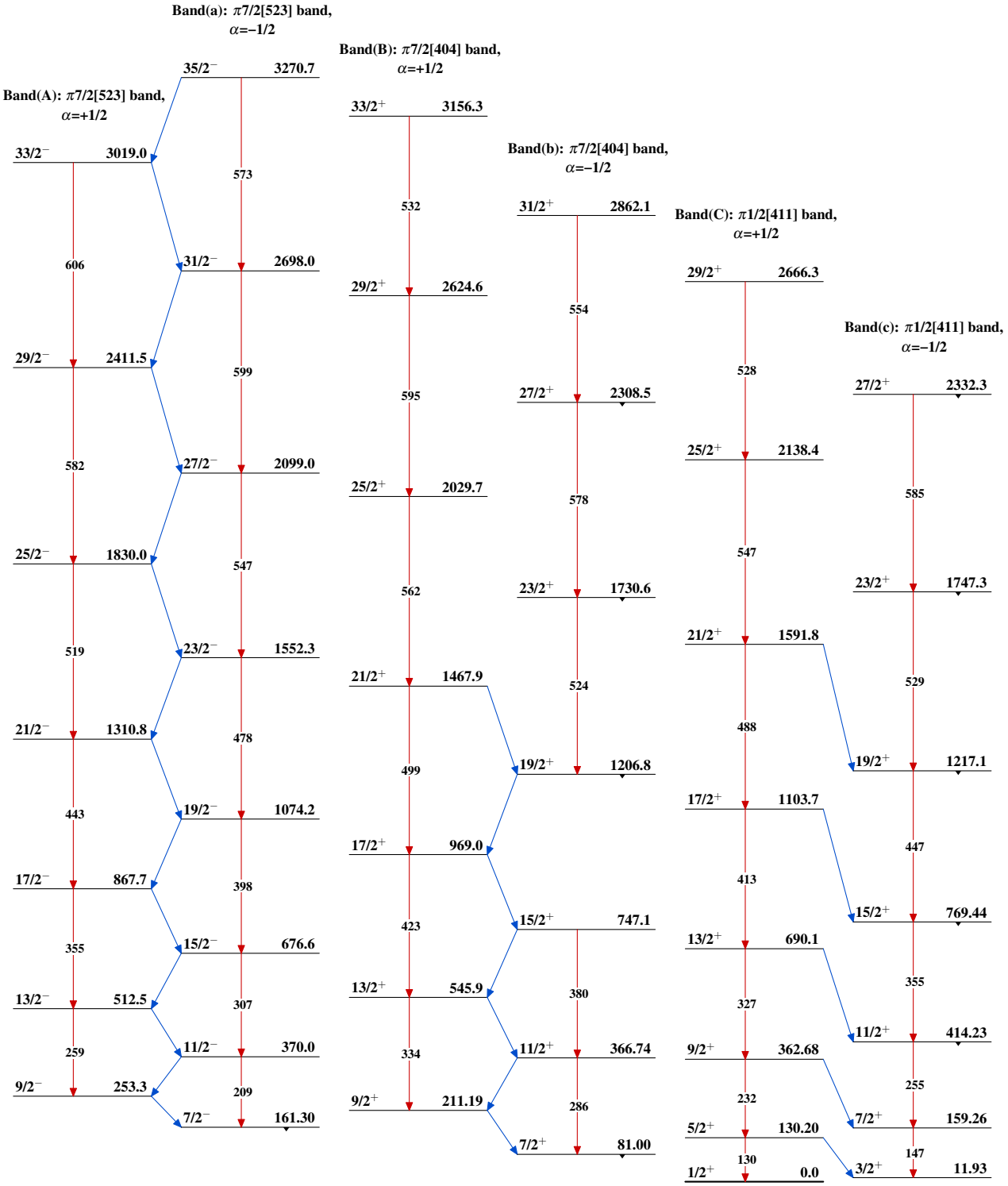
Intensities: Relative I_γ
& Multiply placed: undivided intensity given

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



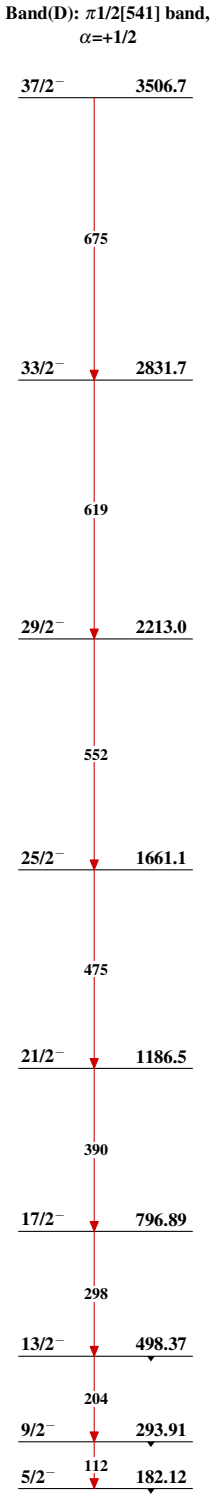
$^{165}_{69}Tm_{96}$

^{165}Ho(α,4nγ),^{166}Er(p,2nγ) 1972Gi12,1975Fo14



$^{165}_{69}Tm_{96}$

^{165}Ho(α,4nγ),^{166}Er(p,2nγ) 1972Gi12,1975Fo14 (continued)



$^{165}_{69}Tm_{96}$