^{169}Tm(α,2nγ), ^{171}Yb(p,nγ) 1973Gr23,1973Ke10

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin, E. A. Mccutchan	NDS 151, 334 (2018)	30-Jun-2018

Additional reactions included in this dataset: ^{171}Yb(d,2nγ), ^{168}Er(^{7}Li,4nγ).
1973Gr23: ^{169}Tm(α,2nγ); E(α)=21, 23.5 MeV, measured E(ce), Ice (mag spectrometer); Eα=23.5 MeV, measured Eγ, Iγ, $\gamma\gamma$ coin.
1973Ke10: ^{169}Tm(α,2nγ), E(α)=23, 27 MeV, Tm metal targets; measured Eγ, Iγ (Ge(Li), FWHM=0.6 keV at 122 keV), $\gamma\gamma$ coin, $\gamma(\theta)$ (90°, 105°, 120°, 135°, 150°, 160°).
Others: 1970No02, 1971Bb01, 1971Ke05, 1972An06, 1972Ba63, 1972Hj02, 1973Sc20, 1976Sc19, 1978Gu18.
The level scheme is from 1973Ke10.
See 1974Ho38 for discussion of conflicting data in 1972Ba63, 1973Gr23 and 1973Ke10.
See 1972Hj02, 1973Gr23, 1973Ke10 for comparison of level structure with theory (including effects of rotation particle coupling).

^{171}Lu Levels

E(level)[†]	J$^{\pi}$[‡]	T$_{1/2}$[#]	Comments
0.0[@]	7/2$^+$	8.247 d *23*	
71.11[&] *10*	1/2$^-$	79 s *2*	
73.10[&] *16*	5/2$^-$		
122.08[@] *3*	9/2$^+$		
159.43[&] *16*	9/2$^-$		
206.55[&] *18*	3/2$^-$		
208.12[a] *10*	1/2$^+$	31.5 ns *21*	T$_{1/2}$: weighted average of 30 ns *3* ($\gamma\gamma$(t) in (α,2nγ), 1972An06) and 33 ns *3* ($\gamma\gamma$(t) in (p,nγ), 1972Hj02). Other: 1972Ba63.
220.72[a] *15*	3/2$^+$		
269.14[@] *5*	11/2$^+$		
295.58[b] *6*	5/2$^+$	826 ps *30*	T$_{1/2}$: Ce(t) in ^{171}Yb(p,nγ), (d,2nγ) (1978Gu18). Other values:≤1 ns (1973Sc20), 850 ps *200* (1976Sc19, (p,nγ)).
333.82[a] *16*	5/2$^+$		
336.65[&] *16*	13/2$^-$		
364.99[a] *15*	7/2$^+$		
379.50[&] *16*	7/2$^-$		
394.73[b] *8*	7/2$^+$		
440.14[@] *7*	13/2$^+$		
469.23[c] *8*	9/2$^-$	≤0.2 ns	T$_{1/2}$: $\gamma\gamma$(t) in ^{171}Yb(p,nγ) (1976Sc19). Other value:<0.5 ns (1973Sc20).
519.26[b] *13*	9/2$^+$		
559.04[a] *21*	9/2$^+$		
593.78[c] *22*	11/2$^-$		
607.01[&] *17*	17/2$^-$		
612.36[a] *16*	11/2$^+$		
620.04[&] *17*	11/2$^-$		
634.07[@] *9*	15/2$^+$		
661.9 *3*	7/2$^-$		
670.78[b] *13*	11/2$^+$		
742.82[c] *23*	13/2$^-$		
842.51[b] *19*	13/2$^+$		
849.72[@] *10*	17/2$^+$		
875.16[a] *20*	13/2$^+$		
915.13[c] *22*	15/2$^-$		

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^{169}Tm(α,2nγ), ^{171}Yb(p,nγ) 1973Gr23,1973Ke10 (continued)

^{171}Lu Levels (continued)

E(level)†	Jπ‡	Comments
933.75[&] *20*	15/2⁻	
951.92[a] *18*	15/2⁺	
968.94[&] *19*	21/2⁻	
1043.03[b] *19*	15/2⁺	
1085.88[@] *16*	19/2⁺	
1111.34[c] *22*	17/2⁻	
1241.54 *25*	(15/2)	
1248.15[b] *21*	17/2⁺	
1275.91[a] *21*	17/2⁺	
1321.42[&] *21*	19/2⁻	
1329.24[c] *22*	19/2⁻	
1341.14[@] *20*	21/2⁺	
1367.70[a] *22*	19/2⁺	
1418.4[&] *4*	25/2⁻	
1499.9[b] *3*	19/2⁺	
1565.8[c] *3*	21/2⁻	E(level): 1973Ke10 proposed that a 244.4γ and a 462.3γ deexcite this band member, but 1973Gr23 and, in a later (HI,xnγ) study, 1998Bb02 concluded otherwise. Level not adopted.
1614.2[@] *4*	23/2⁺	
1701.8?[b] *3*	21/2⁺	In Adopted Levels, the band assignments for the J=21/2 members of the 5/2[402] and 1/2[411] bands are the reverse of those shown here.
1761.8?[a] *3*	21/2⁺	In Adopted Levels, the band assignments for the J=21/2 members of the 5/2[402] and 1/2[411] bands are the reverse of those shown here.
1787.7[&] *3*	23/2⁻	
1838.5[a] *4*	23/2⁺	
1902.7[@] *4*	25/2⁺	
1948.9[&] *5*	29/2⁻	
2017.0?[b] *4*	23/2⁺	E(level): Level not adopted; deexciting γ absent in extensive (HI,xnγ) study by 1998Bb02, see (^{19}F,α4nγ) dataset.

† From a least-squares fit to Eγ, by evaluators.
‡ From $\gamma(\theta)$, coincidence data and deduced band structure in ^{169}Tm(α,2nγ) (1973Ke10, 1973Gr23); some Jπ values were confirmed with excitation curves in ^{168}Er(^{7}Li,4nγ) (1973Gr23). See ^{171}Lu Adopted Levels for evaluator's assignments.
# From Adopted Levels, except where noted.
@ Band(A): 7/2[404] band.
& Band(B): 1/2[541] band.
a Band(C): 1/2[411] band.
b Band(D): 5/2[402] band.
c Band(E): 9/2[514] band.

γ(^{171}Lu)

Eγ†	Iγ‡	Ei(level)	Jiπ	Ef	Jfπ	Comments
(1.99 *19*)		73.10	5/2⁻	71.11	1/2⁻	Eγ: deduced from energy difference between 73.1 and 71.1 levels.
71.1 *1*	0.9	71.11	1/2⁻	0.0	7/2⁺	
74.9[a] *3*	2.0	295.58	5/2⁺	220.72	3/2⁺	
76.7[af] *3*	0.6	951.92	15/2⁺	875.16	13/2⁺	

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^{169}Tm(α,2nγ), ^{171}Yb(p,nγ) 1973Gr23,1973Ke10 (continued)

$\gamma(^{171}Lu)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[@]	α[c]	Comments
[x]84.5[b] *3*									I_γ: 6 *3* at Eα=23.5 MeV, θ=90° (1973Gr23).
86.32 *5*	42	159.43	9/2$^-$	73.10	5/2$^-$	E2		6.01	α(L)exp=1.7 *7* (1973Gr23). A_2=+0.27 *2* (1973Ke10).
99.14 *5*	10.4	394.73	7/2$^+$	295.58	5/2$^+$	D+Q	+0.19 *5*		A_2=−0.05 *5* (1973Ke10).
113.11 *8*	6.7	333.82	5/2$^+$	220.72	3/2$^+$	D+Q	−0.22 *+13−19*		A_2=−0.28 *5* (1973Ke10).
[x]114.7[b] *3*									I_γ: 2.4 *4* at Eα=23.5 MeV, θ=90° (1973Gr23).
122.09 *3*	100	122.08	9/2$^+$	0.0	7/2$^+$	M1+E2	+0.45 *3*	1.99	α(L)exp=0.22 *5*, L/M=3.1 *8* (1973Gr23). A_2=+0.31 *2* (1973Ke10).
124.3[a] *3*	<34	519.26	9/2$^+$	394.73	7/2$^+$				I_γ: combined value for 124.3γ and 124.7γ. α(M)exp=0.10 *2* for doublet (1973Gr23). A_2=−0.02 *2* (1973Ke10) for doublet.
124.7[a] *3*	<34	593.78	11/2$^-$	469.23	9/2$^-$				I_γ: combined value for 124.3γ and 124.7γ. α(M)exp=0.10 *2* for doublet (1973Gr23). A_2=−0.02 *2* (1973Ke10) for doublet.
125.5 *3*		333.82	5/2$^+$	208.12	1/2$^+$				I(125.5γ):I(113.1γ)=1.2:13 for Eα=23 MeV (1973Ke10).
133.5 *2*	3.2	206.55	3/2$^-$	73.10	5/2$^-$	D(+Q)	−0.1 *+4−3*		A_2=−0.07 *17* (1973Ke10).
135.4 *2*	1.3	206.55	3/2$^-$	71.11	1/2$^-$				
137.01 *3*	69	208.12	1/2$^+$	71.11	1/2$^-$	E1		0.1532	α(L)exp=0.012 *4*.
[x]141.0[b] *3*									I_γ: 4.6 *10* at Eα=23.5 MeV, θ=90° (1973Gr23).
144.28 *5*	19	364.99	7/2$^+$	220.72	3/2$^+$	E2		0.859	α(K)exp=0.40 *6*, α(L)exp=0.34 *9* (1973Gr23). A_2=+0.25 *2* (1973Ke10).
147.08 *5*	57	269.14	11/2$^+$	122.08	9/2$^+$	M1+E2	+0.43 *3*	1.159 *18*	α(K)exp=0.89 *10*, α(L)exp=0.25 *6* (1973Gr23). A_2=+0.35 *2* (1973Ke10).
147.8[f] *3*	1	220.72	3/2$^+$	73.10	5/2$^-$				
149.1[a] *3*	21	742.82	13/2$^-$	593.78	11/2$^-$	M1+E2	+0.17 *2*	1.167 *18*	α(K)exp=0.67 *10*, α(L)exp=0.21 *7* (1973Gr23). A_2=+0.02 *2* (1973Ke10).
149.8[af] *3*		220.72	3/2$^+$	71.11	1/2$^-$				I(149.8γ):I(147.8γ)=1.1:1.8 for Eα=23 MeV (1973Ke10).
151.5 *1*	13	670.78	11/2$^+$	519.26	9/2$^+$	M1+E2	+0.07 *5*	1.125 *17*	α(K)exp=0.66 *8* (1973Gr23). A_2=−0.08 *3* (1973Ke10).
[x]160.3[a] *3*	5.1								A_2=+0.68 *6* (1973Ke10).
171.0 *1*	37	440.14	13/2$^+$	269.14	11/2$^+$	M1+E2	+0.51 *6*	0.734 *17*	α(K)exp=0.75 *8*, α(L)exp=0.12 *2* (1973Gr23) (Ice for 171.0γ+171.4γ). A_2=+0.31 *2* (1973Ke10) for 171.0γ+171.4γ.
171.6 *3*	9.5	842.51	13/2$^+$	670.78	11/2$^+$	(M1)		0.794	α(K)exp=0.75 *8*, α(L)exp=0.12 *2* (1973Gr23) (Ice for 171.0γ+171.4γ). A_2=+0.31 *2* (1973Ke10) for doublet. Mult.: probable value consistent with ce and angular distribution data.

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^{169}Tm(α,2nγ), ^{171}Yb(p,nγ) 1973Gr23,1973Ke10 (continued)

$\gamma(^{171}Lu)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[@]	α[c]	Comments
172.3 *1*	13.9	915.13	15/2$^-$	742.82	13/2$^-$	M1+E2	+0.15 *2*	0.778 *12*	α(K)exp=0.80 *20*, α(L)exp=0.07 *3* (1973Gr23). I_γ: deduced from total Iγ=16 for 172.3γ+172.9γ and total Iγ=2.1 for 172.9γ. A_2=+0.08 *2* (1973Ke10) for 172.3γ+172.9γ.
172.9[e] *2*	0.4[e]	295.58	5/2$^+$	122.08	9/2$^+$				I_γ: deduced from adopted branching from 296 level and Iγ(295.6γ)=46.
172.9[e] *2*	1.7[e]	379.50	7/2$^-$	206.55	3/2$^-$				I_γ: deduced from Iγ(220.1γ), Iγ(306.4γ), and adopted relative photon branchings from 379.4 level. Iγ=16 for doublet. A_2=+0.08 *2* (1973Ke10) for 172.9γ+172.4γ.
177.22 *3*	150	336.65	13/2$^-$	159.43	9/2$^-$	E2		0.418	α(K)exp=0.19 *4*, α(L)exp=0.18 *3* (1973Gr23). A_2=+0.32 *2* (1973Ke10).
[x]181.5[b] *2*									I_γ: 2.2 *8* at Eα=23.5 MeV, θ=90° (1973Gr23).
193.9[e] *1*	≈8.7[e]	559.04	9/2$^+$	364.99	7/2$^+$				α(K)exp=0.46 *6*, α(L)exp=0.06 *3* (1973Gr23) for 193.9γ doublet. I_γ: deduced from Iγ(225.3γ) and relative photon branchings from 559.3 level in ^{171}Hf ε decay. Iγ=27 for doublet. A_2=+0.14 *3* (1973Ke10) for doublet.
193.9[e] *1*	≈18.3[e]	634.07	15/2$^+$	440.14	13/2$^+$	(D)			α(K)exp=0.46 *6*, α(L)exp=0.06 *3* (1973Gr23) for 193.9γ doublet. I_γ: deduced from total Iγ=27 for both placements and Iγ≈8.7 for 558.9-level placement. Mult.: A_2=+0.14 *3* (1973Ke10) for doublet dominated by 634.2-level placement; (E2) determined for 559.3-level placement in ^{171}Hf ε decay.
196.1 *2*	13	1111.34	17/2$^-$	915.13	15/2$^-$	D+Q	+0.20 *6*		A_2=+0.07 *7* (1973Ke10).
200.0 *2*	6.1	469.23	9/2$^-$	269.14	11/2$^+$				A_2=−0.11 *3* (1973Ke10) for 200.0γ + 200.5γ.
200.5 *2*	8.4	1043.03	15/2$^+$	842.51	13/2$^+$				A_2=−0.11 *3* (1973Ke10) for 200.5γ+200.0γ.
[x]204.0[b] *3*									I_γ: 3.1 *10* at Eα=23.5 MeV, θ=90° (1973Gr23).
205.0 *3*	4.5	1248.15	17/2$^+$	1043.03	15/2$^+$				
210.1 *3*	1.6	1321.42	19/2$^-$	1111.34	17/2$^-$	D+Q	+0.19 *+10−9*		A_2=+0.07 *13* (1973Ke10).
215.6 *1*	9.8	849.72	17/2$^+$	634.07	15/2$^+$	D+Q	+0.45 *5*		A_2=+0.37 *3* (1973Ke10).
217.9 *1*	5.5	1329.24	19/2$^-$	1111.34	17/2$^-$	D+Q	+0.14 *4*		A_2=0.00 *6* (1973Ke10).

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^{169}Tm(α,2nγ), ^{171}Yb(p,nγ) 1973Gr23,1973Ke10 (continued)

$\gamma(^{171}Lu)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[@]	α[c]	Comments
220.06 *5*	6.0	379.50	7/2$^-$	159.43	9/2$^-$	M1+E2	+0.18 *5*	0.392 *7*	α(K)exp=0.29 *4* (1973Gr23). A_2=−0.28 *5* (1973Ke10).
223.8 *2*	5.3	519.26	9/2$^+$	295.58	5/2$^+$	(Q)			A_2=+0.23 *5* (1973Ke10).
225.2 *2*	5.3	559.04	9/2$^+$	333.82	5/2$^+$	(Q)			A_2=+0.20 *5* (1973Ke10).
232.9 *2*	2.3	1275.91	17/2$^+$	1043.03	15/2$^+$	D+Q	+0.17 *+8−7*		A_2=+0.03 *11* (1973Ke10).
236.1 *2*	5	1085.88	19/2$^+$	849.72	17/2$^+$	(M1+E2)	+0.29 *2*	0.315	I_γ: includes component from background. A_2=+0.23 *3* (1973Ke10).
236.6[b] *2*		1565.8	21/2$^-$	1329.24	19/2$^-$				
240.5 *1*	6.8	620.04	11/2$^-$	379.50	7/2$^-$	E2		0.1520	α(K)exp=0.10 *3* (1973Gr23). A_2=+0.33 *4* (1973Ke10).
x244.4[a] *3*	0.9								Proposed as 21/2 to 19/2 transition in 9/2[514] band by 1973Ke10, but 237γ is placed there by 1973Gr23 and in a subsequent (HI,xnγ) study (1998Bb02).
247.4 *1*	31	612.36	11/2$^+$	364.99	7/2$^+$	E2		0.1389	α(K)exp=0.11 *4*, α(L)exp=0.023 *7* (1973Gr23). A_2=+0.31 *2* (1973Ke10).
251.8[a] *3*	2.2	1499.9	19/2$^+$	1248.15	17/2$^+$				
255.3[a] *3*	2.8	1341.14	21/2$^+$	1085.88	19/2$^+$				
261.9[a] *3*	1.3	1761.8?	21/2$^+$	1499.9	19/2$^+$				
262.8 *2*	4.4	875.16	13/2$^+$	612.36	11/2$^+$	M1+E2	−0.11 *+7−8*	0.243 *5*	α(K)exp=0.17 *5* (1973Gr23). A_2=−0.36 *5* (1973Ke10).
269.09 *7*	57	269.14	11/2$^+$	0.0	7/2$^+$	E2		0.1067	α(L)exp=0.024 *4* for 269γ+270γ (1973Gr23). A_2=+0.33 *2* (1973Ke10).
270.33 *7*	114	607.01	17/2$^-$	336.65	13/2$^-$				α(L)exp=0.024 *4* for 269γ+270γ (1973Gr23). A_2=+0.34 *2* (1973Ke10).
273.4[d] *3*	3.8[d]	742.82	13/2$^-$	469.23	9/2$^-$				A_2=+0.30 *10* (1973Ke10) for doubly-placed γ.
273.4[df] *3*	3.8[d]	1614.2	23/2$^+$	1341.14	21/2$^+$				A_2=+0.30 *10* (1973Ke10) for multiply-placed γ.
276.0 *2*	3.9	670.78	11/2$^+$	394.73	7/2$^+$				I_γ: includes component from background. A_2=+0.22 *9* (1973Ke10) for contaminated line.
283.4 *1*	6.3	620.04	11/2$^-$	336.65	13/2$^-$	M1+E2	+0.21 *5*	0.195 *4*	α(K)exp=0.09 *1* (1973Gr23). A_2=−0.39 *4* (1973Ke10).
291.9 *1*	3.6	364.99	7/2$^+$	73.10	5/2$^-$	D			A_2=−0.23 *11* (1973Ke10).
295.58 *6*	46	295.58	5/2$^+$	0.0	7/2$^+$	M1+E2	−0.23 *2*	0.173 *3*	α(K)exp=0.12 *2*, α(L)exp=0.020 *4* (1973Gr23). L3/(L1+L2)=0.06 *2* (1978Gu18). A_2=+0.07 *1* (1973Ke10).
296.4[a] *3*	2	1248.15	17/2$^+$	951.92	15/2$^+$				
x301.2[b] *3*									I_γ: 2.4 *8* at Eα=23.5 MeV, θ=90° (1973Gr23).
306.4 *1*	7.7	379.50	7/2$^-$	73.10	5/2$^-$	M1+E2	−4.0 *+8−12*	0.077 *3*	α(K)exp=0.050 *5* (1973Gr23). A_2=−0.27 *7* (1973Ke10).
313.7 *2*	8.4	933.75	15/2$^-$	620.04	11/2$^-$	E2		0.0670	α(K)exp=0.06 *3* (1973Gr23). A_2=+0.30 *6* (1973Ke10).

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^{169}Tm(α,2nγ), ^{171}Yb(p,nγ) 1973Gr23,1973Ke10 (continued)

$\gamma(^{171}Lu)$ (continued)

E_γ †	I_γ ‡	E_i(level)	J_i^π	E_f	J_f^π	Mult.#	δ@	αc	Comments
316.1 *2*	11	875.16	13/2$^+$	559.04	9/2$^+$	E2		0.0655	α(K)exp=0.06 *3* (1973Gr23). A_2=+0.30 *6* (1973Ke10).
318.08 *8*	75	440.14	13/2$^+$	122.08	9/2$^+$	E2		0.0643	α(K)exp=0.045 *6*, α(L)exp=0.010 *5* (1973Gr23). A_2=+0.31 *2* (1973Ke10).
321.4 *2*	5.8	915.13	15/2$^-$	593.78	11/2$^-$				A_2=+0.31 *9* (1973Ke10).
323.4 *3*	5.5	842.51	13/2$^+$	519.26	9/2$^+$				
324.3[d] *3*	3.5[d]	593.78	11/2$^-$	269.14	11/2$^+$				
324.3[d] *3*	3.5[d]	1275.91	17/2$^+$	951.92	15/2$^+$				
326.8 *2*	4.5	933.75	15/2$^-$	607.01	17/2$^-$	D(+Q)	+0.03 *+9−8*		A_2=−0.19 *10* (1973Ke10).
334.0[a] *3*	1.1	1701.8?	21/2$^+$	1367.70	19/2$^+$				
339.6 *1*	29	951.92	15/2$^+$	612.36	11/2$^+$	E2		0.0531	α(K)exp=0.04 *1* (1973Gr23). A_2=+0.42 *5* (1973Ke10).
347.17 *8*	50	469.23	9/2$^-$	122.08	9/2$^+$	E1		0.01452	α(K)exp=0.010 *5* (1973Gr23). A_2=+0.29 *1* (1973Ke10).
352.3[a] *3*		1321.42	19/2$^-$	968.94	21/2$^-$	D(+Q)	−0.2 *+2−3*		I_γ: 2.8 at 90° (1973Ke10). A_2=+0.1 *3* (1973Ke10).
361.9 *1*	56	968.94	21/2$^-$	607.01	17/2$^-$	E2		0.0442	α(K)exp=0.04 *2* (1973Gr23). A_2=+0.33 *3* (1973Ke10).
364.9 *1*	61	634.07	15/2$^+$	269.14	11/2$^+$	E2		0.0432	α(K)exp=0.037 *8* (1973Gr23). A_2=+0.31 *2* (1973Ke10).
368.6 *2*	5.2	1111.34	17/2$^-$	742.82	13/2$^-$				A_2=+0.28 *10* (1973Ke10).
372.2 *3*	6.4	1043.03	15/2$^+$	670.78	11/2$^+$	(E2)		0.0408	α(K)exp=0.05 *2* (1973Gr23). A_2=+0.35 *4* (1973Ke10).
373.0[a] *3*	2.3	1248.15	17/2$^+$	875.16	13/2$^+$				E_γ: misprinted as 273.0 in table 1 of 1973Ke10.
387.8 *3*	9.6	1321.42	19/2$^-$	933.75	15/2$^-$				A_2=+0.33 *3* (1973Ke10).
391.8[b] *4*		1241.54	(15/2)	849.72	17/2$^+$				I_γ: 2.0 *10* at Eα=23.5 MeV, θ=90° (1973Gr23).
394.7 *3*	4.7	394.73	7/2$^+$	0.0	7/2$^+$	M1		0.0823	α(K)exp=0.07 *2* (1973Gr23). A_2=−0.20 *9* (1973Ke10) for 365γ+396γ.
395.6[a] *3*	3.6	1329.24	19/2$^-$	933.75	15/2$^-$				A_2=−0.20 *9* (1973Ke10) for 395.6γ+394.7γ.
397.1[b] *4*		519.26	9/2$^+$	122.08	9/2$^+$				I_γ: I(397γ):I(224γ)=2.8 *6*:4.0 *11* at Eα=23.5 MeV, θ=90° (1973Gr23).
400.7[a] *3*	5.7	1275.91	17/2$^+$	875.16	13/2$^+$				A_2=+0.32 *7* (1973Ke10).
401.8[b] *4*		670.78	11/2$^+$	269.14	11/2$^+$				I_γ: I(402γ):I(152γ)=1.6 *9*:14.0 *18* at Eα=23.5 MeV, θ=90° (1973Gr23).
405.6[a] *3*	7.2	1248.15	17/2$^+$	842.51	13/2$^+$				A_2=+0.33 *6* (1973Ke10).
406.4[a] *3*	≈2	1321.42	19/2$^-$	915.13	15/2$^-$				
409.6 *1*	48	849.72	17/2$^+$	440.14	13/2$^+$	E2		0.0313	α(K)exp=0.021 *7* (1973Gr23). A_2=+0.31 *3* (1973Ke10).
414.2 *3*	7.1	1329.24	19/2$^-$	915.13	15/2$^-$				A_2=+0.39 *14* (1973Ke10).
415.9 *2*	11	1367.70	19/2$^+$	951.92	15/2$^+$				A_2=+0.36 *5* (1973Ke10).
426.0[a] *3*	1.4	1701.8?	21/2$^+$	1275.91	17/2$^+$				
433.5[a] *3*	2.8	1275.91	17/2$^+$	842.51	13/2$^+$				
449.5 *3*	23	1418.4	25/2$^-$	968.94	21/2$^-$				A_2=+0.41 *6* (1973Ke10).
451.9 *2*	31	1085.88	19/2$^+$	634.07	15/2$^+$				A_2=+0.37 *4* (1973Ke10).
453.1[a] *3*	≈4	612.36	11/2$^+$	159.43	9/2$^-$				
454.4 *4*		1565.8	21/2$^-$	1111.34	17/2$^-$				E_γ: placement from 1973Gr23. Probably a doublet.

Continued on next page (footnotes at end of table)

^{169}Tm(α,2nγ), ^{171}Yb(p,nγ) 1973Gr23,1973Ke10 (continued)

$\gamma(^{171}Lu)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[@]	α[c]	Comments
									I(454γ doublet)I(237γ)=4.3 *21*:1.8 *11* at Eα=23.5 MeV and θ=90° (1973Gr23).
454.4[f] *4*	≈3	1701.8?	21/2$^+$	1248.15	17/2$^+$				E_γ: placement from 1973Ke10. Probably a doublet. I_γ: from coincidence data.
456.9[a] *3*	4.2	1499.9	19/2$^+$	1043.03	15/2$^+$				A_2=+0.12 *16* (1973Ke10).
458.9[af] *3*	1.4	1787.7	23/2$^-$	1329.24	19/2$^-$				
460.7 *2*	11	620.04	11/2$^-$	159.43	9/2$^-$	M1+E2	−1.6 *6*	0.032 *7*	α(K)exp=0.033 *6* (1973Gr23). A_2=−0.74 *8* (1973Ke10).
[x]462.3[a] *3*	1.6								Proposed as J=21/2 to 17/2 transition in 9/2[514] band in 1973Ke10, but 454γ placed there by 1973Gr23 and in a subsequent (HI,xnγ) study (1998Bb02). 1973Gr23 placed γ as intraband transition feeding J=19/2 member of 9/2[514] band, also inconsistent with the Adopted Gammas.
466.4[a] *3*	3.4	1787.7	23/2$^-$	1321.42	19/2$^-$				A_2=+0.18 *9* (1973Ke10).
469.3 *2*	28	469.23	9/2$^-$	0.0	7/2$^+$	E1		0.00726	α(K)exp=0.010 *5* (1973Gr23). A_2=−0.16 *2* (1973Ke10).
471.4[d] *3*	14[d]	593.78	11/2$^-$	122.08	9/2$^+$				A_2=+0.11 *5* (1973Ke10) for doubly-placed γ.
471.4[d] *3*	14[d]	1838.5	23/2$^+$	1367.70	19/2$^+$				A_2=+0.11 *5* (1973Ke10) for doubly-placed γ.
[x]473.5[b] *4*									I_γ: 4.8 *25* at Eα=23.5 MeV, θ=90° (1973Gr23). Placed by 1973Gr23 from J=13/2 member of 9/2[514] band but is absent in other studies.
485.9[a] *3*	3.6	1761.8?	21/2$^+$	1275.91	17/2$^+$				A_2=+0.47 *13* (1973Ke10).
491.4 *2*	19	1341.14	21/2$^+$	849.72	17/2$^+$				A_2=+0.37 *4* (1973Ke10).
[x]512[b] *2*									I_γ: 2.0 *10* at Eα=23.5 MeV, θ=90° (1973Gr23). Proposed by 1973Gr23 as the J=29/2 to 25/2 transition in the 1/2[541] band but adopted Eγ=530.4 for that transition.
517.1[af] *3*	5.1	2017.0?	23/2$^+$	1499.9	19/2$^+$				
528.3[a] *3*	12	1614.2	23/2$^+$	1085.88	19/2$^+$				A_2=+0.32 *8* (1973Ke10).
530.5[a] *3*	4.2	1948.9	29/2$^-$	1418.4	25/2$^-$				A_2=+0.40 *26* (1973Ke10).
539.9[b] *4*		661.9	7/2$^-$	122.08	9/2$^+$				I_γ: 4.4 *13* at Eα=23.5 MeV, θ=90° (1973Gr23). May be a doublet; I(540γ)/I(662γ)=0.51 is much larger than adopted value (0.13).
561.6[a] *3*	5.2	1902.7	25/2$^+$	1341.14	21/2$^+$				A_2=+0.33 *11* (1973Ke10).
597.2 *3*	12	933.75	15/2$^-$	336.65	13/2$^-$	D+Q	−1.9 *7*		A_2=−0.67 *5* (1973Ke10).
607.5[b] *4*		1241.54	(15/2)	634.07	15/2$^+$				I_γ: 5.8 *18* at Eα=23.5 MeV, θ=90° (1973Gr23).
[x]610.4[b] *4*									I_γ: 5.1 *19* at Eα=23.5 MeV, θ=90° (1973Gr23).
615.3[a] *3*	3.6[&]	951.92	15/2$^+$	336.65	13/2$^-$				A_2=−0.34 *13* (1973Ke10).

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^{169}Tm(α,2nγ), ^{171}Yb(p,nγ) 1973Gr23,1973Ke10 (continued)

$\gamma(^{171}Lu)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[@]	Comments
661.9[b] 4		661.9	7/2$^-$	0.0	7/2$^+$			I_γ: 8.6 *18* at Eα=23.5 MeV, θ=90° (1973Gr23).
[x]709.1[b] 4								I_γ: 20 *4* at Eα=23.5 MeV, θ=90° (1973Gr23).
714.4[a] 3	8.6[&]	1321.42	19/2$^-$	607.01	17/2$^-$	D+Q	−1.8 *9*	A_2=−0.78 *17* (1973Ke10).
722.1[a] 3	2.0[&]	1329.24	19/2$^-$	607.01	17/2$^-$			A_2=−0.9 *9* (1973Ke10).
[x]748.7[b] 6								I_γ: 4.4 *12* at Eα=23.5 MeV, θ=90° (1973Gr23).
760.3[a] 3		1367.70	19/2$^+$	607.01	17/2$^-$			I_γ: 7.2 at 90° (1973Ke10).
801.4[b] 4		1241.54	(15/2)	440.14	13/2$^+$			I_γ: 23 *3* at Eα=23.5 MeV, θ=90° (1973Gr23).
[x]814.6[b] 5								I_γ: 9.5 *19* at Eα=23.5 MeV, θ=90° (1973Gr23).
818.7[a] 3		1787.7	23/2$^-$	968.94	21/2$^-$			I_γ: 4.2 at 90° (1973Ke10).
[x]837.1[b] 6								I_γ: 1.0 *6* at Eα=23.5 MeV, θ=90° (1973Gr23).
869.6[a] 3		1838.5	23/2$^+$	968.94	21/2$^-$			I_γ: 4.8 at 90° (1973Ke10).
[x]871.9[b] 5								I_γ: 7.3 *19* at Eα=23.5 MeV, θ=90° (1973Gr23).

[†] From 1973Gr23, except as noted; agreement with data from 1973Ke10 is excellent. For Eγ>500, 1973Ke10 report only those lines whose isotopic assignment is confirmed by $\gamma\gamma$ coincidence data.

[‡] Arbitrary units for ^{169}Tm(α,2nγ), E(α)=27 MeV, θ=125°; ΔIγ=10-30% (1973Ke10). See 1973Gr23 for Iγ(90°) from (α,2nγ) at Eα=23.5 MeV and for ratios of those intensities to Iγ from ^{168}Er(^{7}Li,4nγ) at E(^{7}Li)=36 MeV. 1973Ke10 also report Iγ from (α,2nγ) at Eα=23 MeV.

[#] From ce data and/or $\gamma(\theta)$, except where noted. For α(K)exp and α(L)exp data, the photon and ce intensity scales were normalized through α(K)=0.0725 (E2 theory) for 269.1γ+270.4γ. Assignments for which $\Delta\pi$ is not given are based on $\gamma(\theta)$ alone.

[@] From analysis by 1976Kr21 of $\gamma(\theta)$ data in 1973Ke10, except where noted.

[&] Corrected for anisotropy.

[a] From 1973Ke10 who report ΔE=0.1-0.3 keV, depending on Iγ and on complexity of spectrum; evaluator assigns 0.3 keV.

[b] Not reported by 1973Ke10.

[c] 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.

[d] Multiply placed with undivided intensity.

[e] Multiply placed with intensity suitably divided.

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

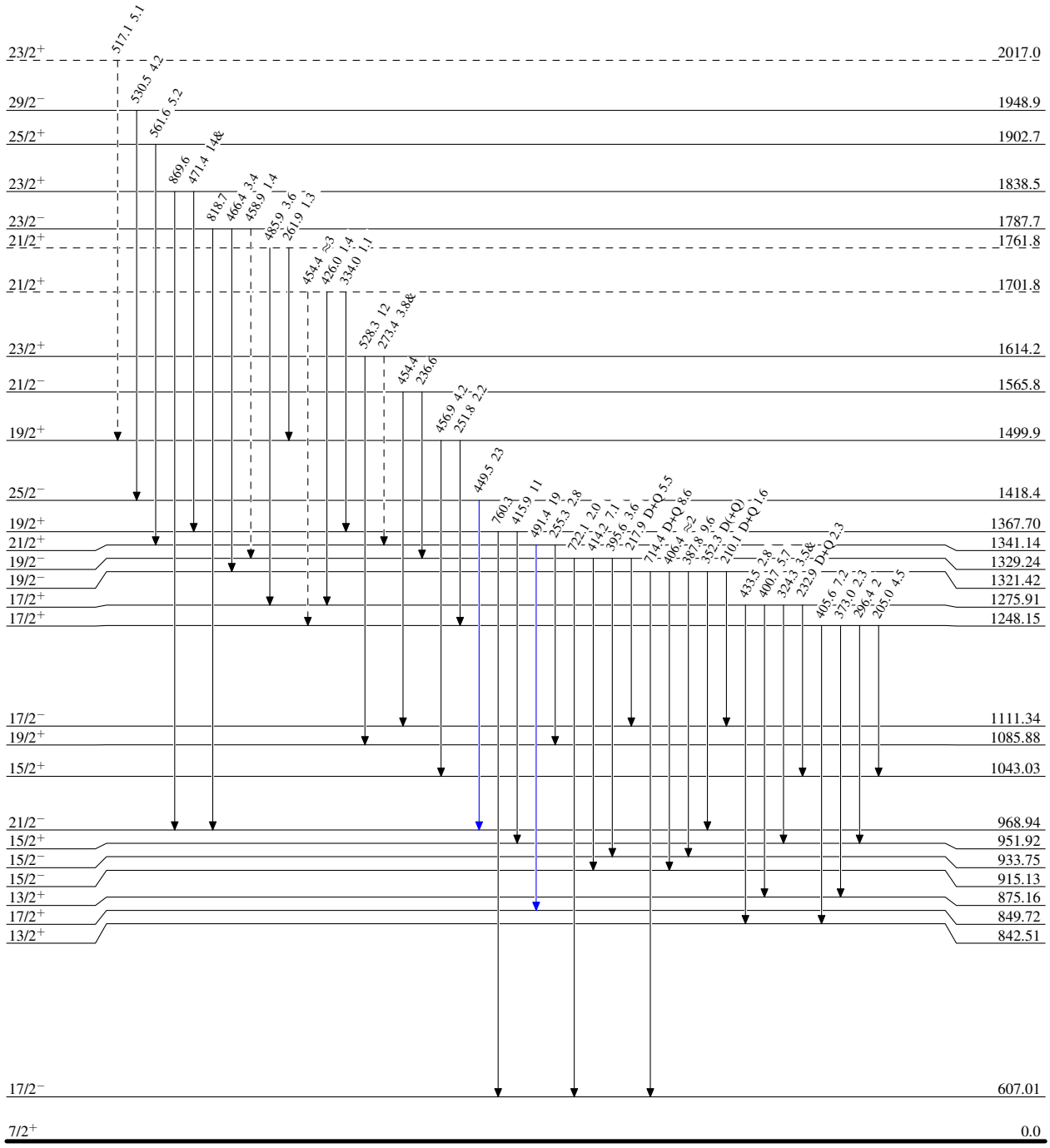
[x] γ ray not placed in level scheme.

^{169}Tm(α,2nγ), ^{171}Yb(p,nγ) 1973Gr23,1973Ke10

Level Scheme

Intensities: Relative Iγ for ^{169}Tm(α,2nγ), E(α)=27 MeV, θ=125°
& Multiply placed: undivided intensity given

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)



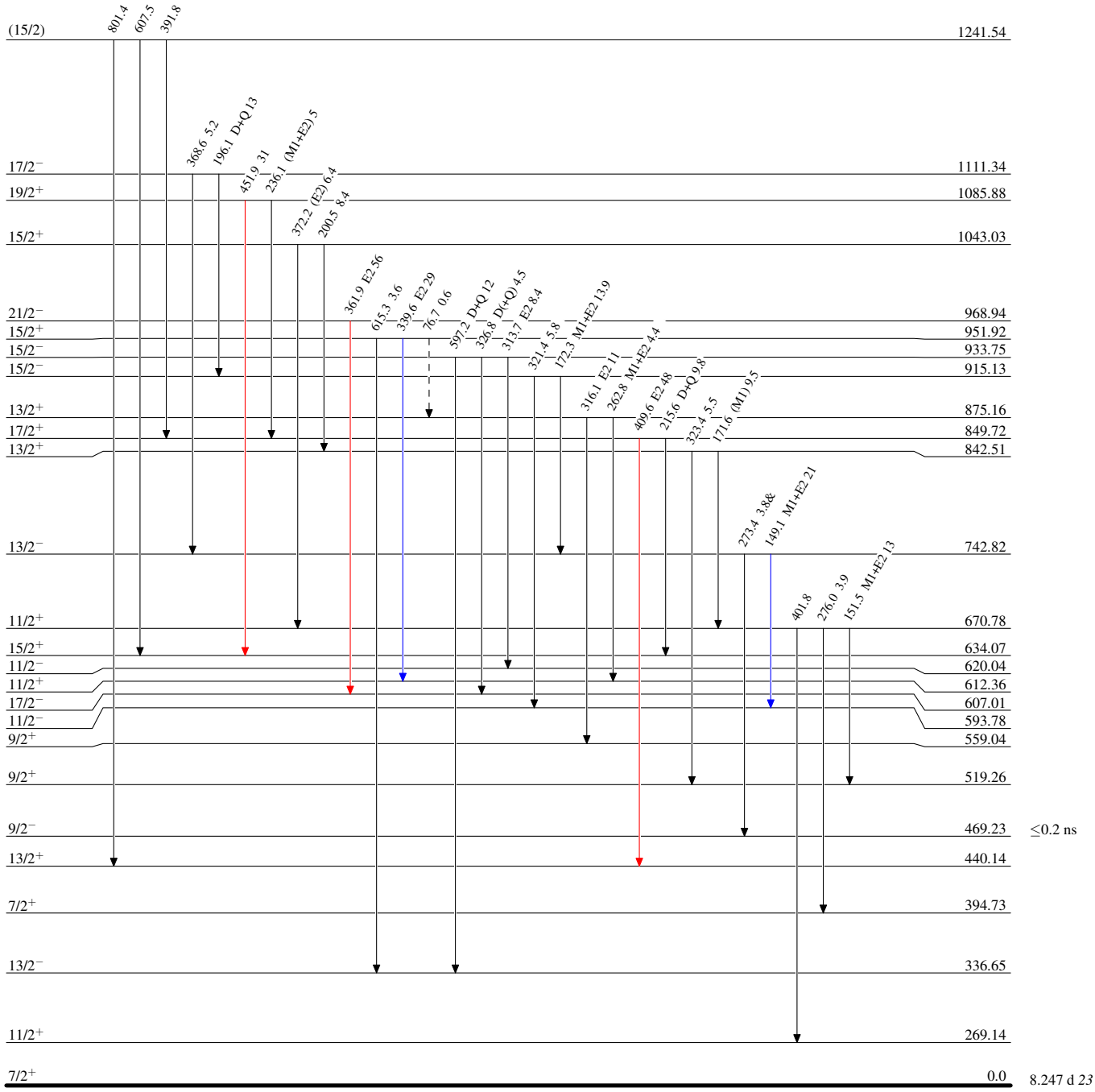
$^{171}_{71}Lu_{100}$

^{169}Tm(α,2nγ), ^{171}Yb(p,nγ) 1973Gr23,1973Ke10

Level Scheme (continued)

Intensities: Relative Iγ for ^{169}Tm(α,2nγ), E(α)=27 MeV, θ=125°
& Multiply placed: undivided intensity given

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)



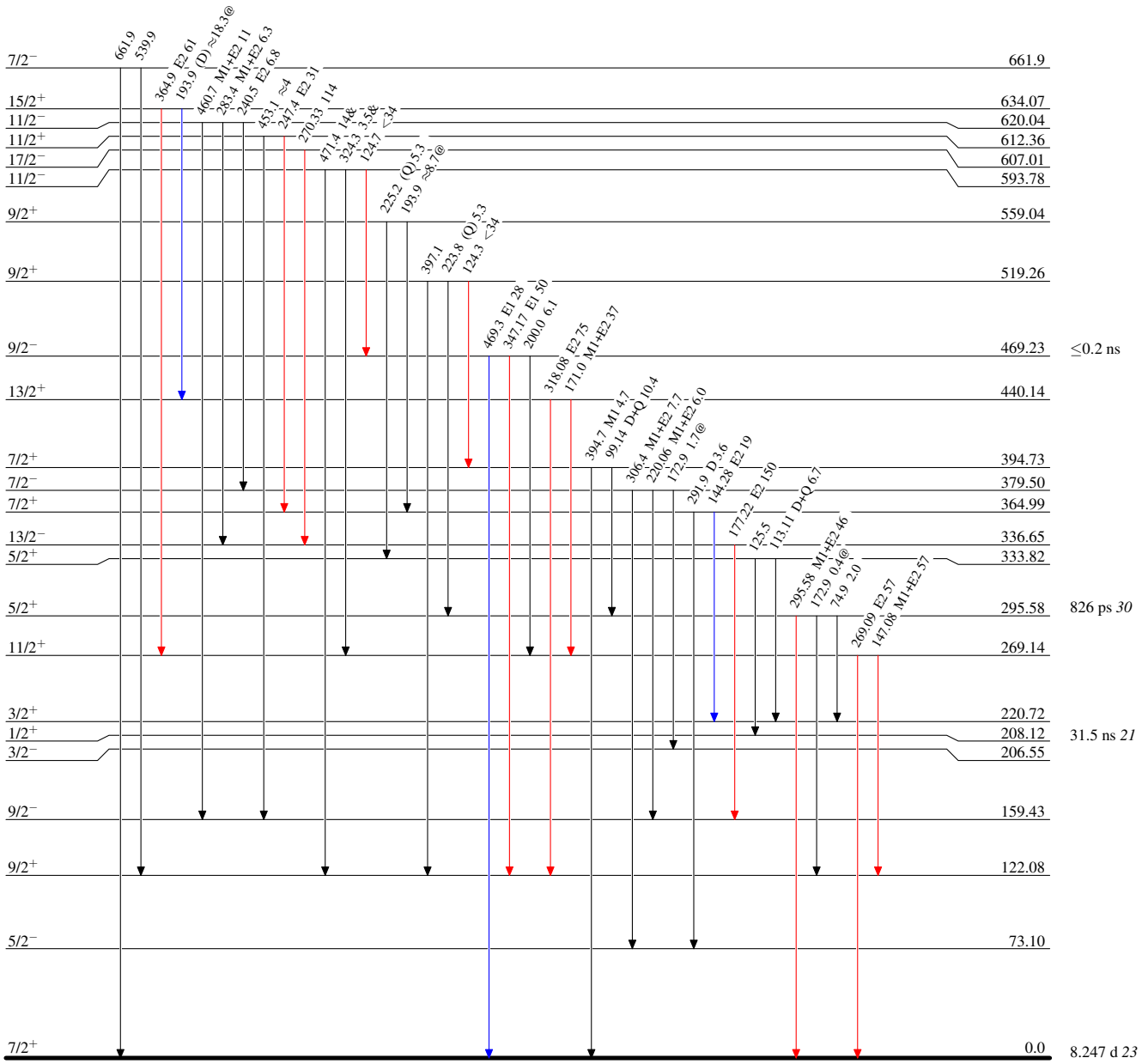
$^{171}_{71}Lu_{100}$

^{169}Tm(α,2nγ), ^{171}Yb(p,nγ) 1973Gr23,1973Ke10

Level Scheme (continued)

Intensities: Relative Iγ for ^{169}Tm(α,2nγ), E(α)=27 MeV, θ=125°
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

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



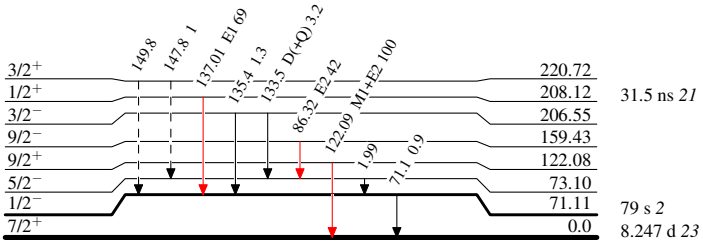
$^{171}_{71}Lu_{100}$

^{169}Tm(α,2nγ), ^{171}Yb(p,nγ) 1973Gr23,1973Ke10

Level Scheme (continued)

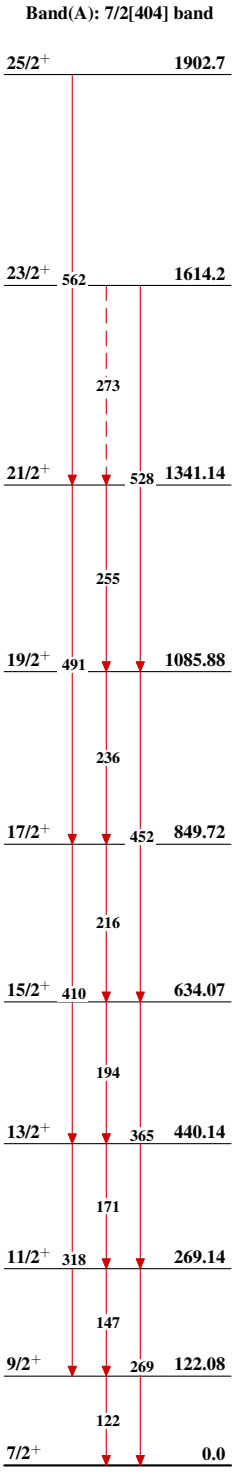
Intensities: Relative Iγ for ^{169}Tm(α,2nγ), E(α)=27 MeV, θ=125°
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)



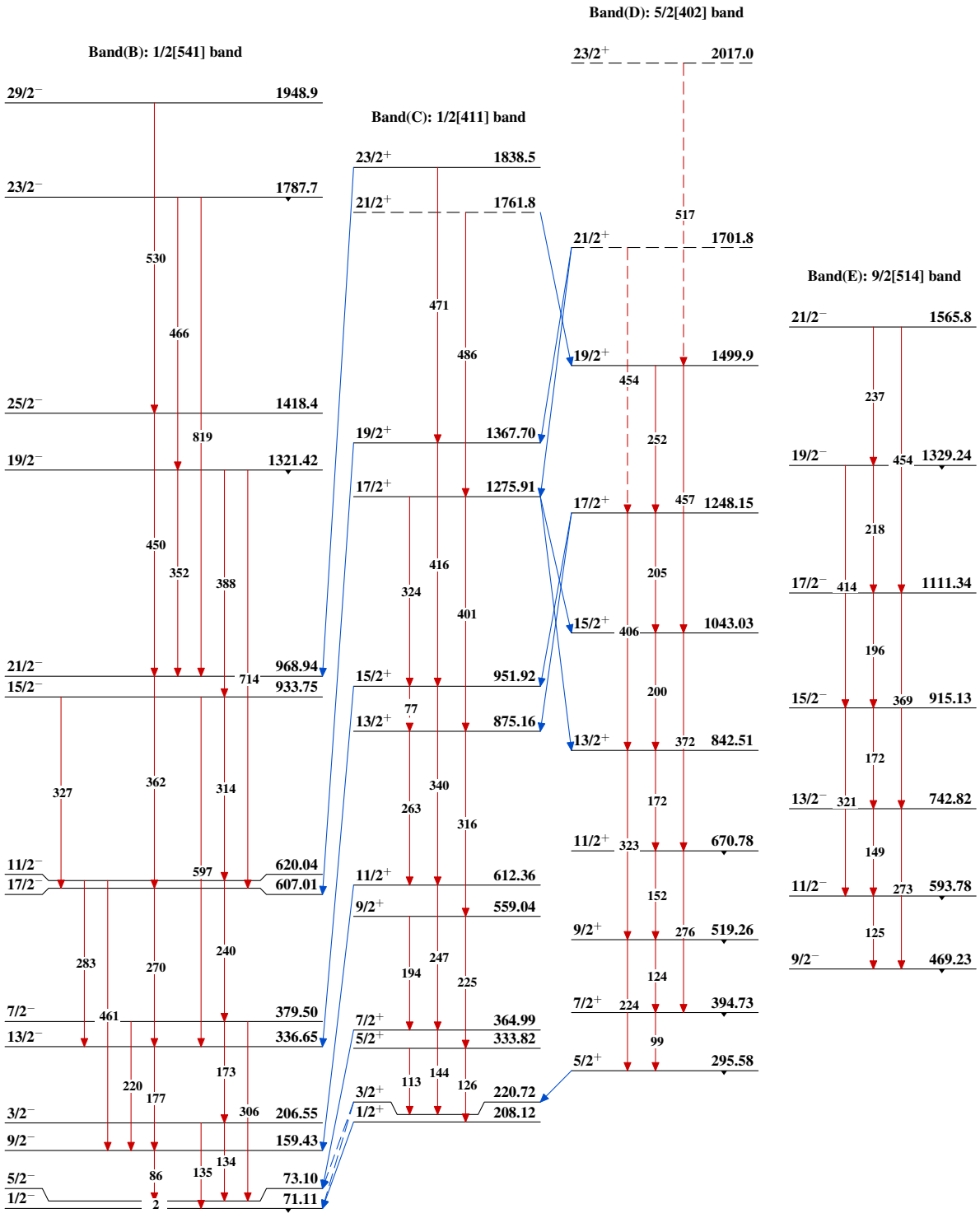
$^{171}_{71}Lu_{100}$

^{169}Tm(α,2nγ), ^{171}Yb(p,nγ) 1973Gr23,1973Ke10



$^{171}_{71}Lu_{100}$

^{169}Tm(α,2nγ), ^{171}Yb(p,nγ) 1973Gr23,1973Ke10 (continued)



$^{171}_{71}Lu_{100}$