^{170}Yb(n,γ) E=thermal 1972Wa10

History

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

σ_n=9.9 *18* (2006MuZX).

2007ChZX: Evaluation of (n,γ) E=thermal data; includes new elemental target measurements; Ge detector.

1972Wa10: internal Yb targets enriched to 81.4% in ^{170}Yb; measured Eγ, Iγ (3-crystal Ge(Li) pair spect for Eγ>2100 keV, anti-Compton spect for Eγ<1523 keV), radiation strengths.

Other: 1969Na08.

The level scheme and all data are from 1972Wa10.

^{171}Yb Levels

E(level)	Jπ†	E(level)	Jπ†	E(level)	Jπ†	E(level)	Jπ†
0.0	1/2⁻	991.5 *10*	(3/2⁻)	1829.9 *15*	1/2,3/2	2290.6 *21*	1/2,3/2
66.72‡	3/2⁻	1038.8 *10*	(1/2⁻,3/2⁻)	1870.9 *12*	(1/2⁻,3/2⁻)	2373.4 *21*	(1/2⁻,3/2⁻)
75.88‡	5/2⁻	1331.1 *13*	(3/2⁻)	1888.8 *21*	(1/2⁻,3/2⁻)	2446.5 *14*	1/2,3/2
95.27‡	7/2⁺	1388.1 *15*	(1/2,3/2)	1912.4 *14*	1/2,3/2	2468.8 *16*	(1/2⁻,3/2⁻)
122.42‡	5/2⁻	1435.2 *13*	1/2,3/2	1972.0 *12*	1/2,3/2	2478.0 *13*	(1/2⁻,3/2⁻)
766.4 *9*	(3/2⁺)	1492.3 *9*	(1/2,3/2)	2007.0 *12*	1/2,3/2	2494.5 *21*	(1/2⁻,3/2⁻)
906.4 *11*	1/2,3/2	1536.6 *11*	1/2,3/2	2047.8 *16*	1/2,3/2	(6614.7# *6*)	1/2⁺@
953.5 *13*	(1/2⁻)	1701.2 *14*	1/2,3/2	2137.4 *16*	(1/2⁻,3/2⁻)		
988.2 *15*	(1/2⁻,3/2⁻)	1716.5 *21*	1/2,3/2	2262.3 *15*	1/2,3/2		

† From the Adopted Levels.

‡ Rounded-off value from Adopted Levels; value held fixed during least-squares fit to Eγ.

From least-squares fit to Eγ (cf. S(n)=6614.21 *1* (2017Wa10)).

@ s-wave capture by even-even nucleus.

γ(^{171}Yb)

Eγ†#	Iγ‡#a	Ei(level)	J_i^π	E_f	J_f^π	Comments
57.47& *6*		122.42	5/2⁻	66.72	3/2⁻	
64.81& *10*		66.72	3/2⁻	0.0	1/2⁻	
74.91& *7*		75.88	5/2⁻	0.0	1/2⁻	
669.6b *15*	0.80b	766.4	(3/2⁺)	95.27	7/2⁺	other Eγ (Iγ): 669.95 *7* (0.40 *5*) (2007ChZX).
669.6b *15*	0.80b	1435.2	1/2,3/2	766.4	(3/2⁺)	
691.1 *15*	0.41	766.4	(3/2⁺)	75.88	5/2⁻	
698.9 *15*	0.38	766.4	(3/2⁺)	66.72	3/2⁻	
776.4 *15*	1.2	2478.0	(1/2⁻,3/2⁻)	1701.2	1/2,3/2	other Eγ (Iγ): 774.42 *9* (0.139 *6*) (2007ChZX).
804.7c *15*	1.4	2137.4	(1/2⁻,3/2⁻)	1331.1	(3/2⁻)	
832.6b *15*	1.1b	953.5	(1/2⁻)	122.42	5/2⁻	
832.6bc *15*	1.1b	1870.9	(1/2⁻,3/2⁻)	1038.8	(1/2⁻,3/2⁻)	
840.4b *15*	0.83b	906.4	1/2,3/2	66.72	3/2⁻	
840.4bc *15*	0.83b	1829.9	1/2,3/2	991.5	(3/2⁻)	
845.3c *15*	0.81	1829.9	1/2,3/2	988.2	(1/2⁻,3/2⁻)	
869.7 *15*	0.43	991.5	(3/2⁻)	122.42	5/2⁻	
876.0 *15*	0.22	1829.9	1/2,3/2	953.5	(1/2⁻)	
886.3 *15*	0.81	953.5	(1/2⁻)	66.72	3/2⁻	
906.4 *20*	0.73	906.4	1/2,3/2	0.0	1/2⁻	other Eγ (Iγ): 906.15 *14* (0.133 *23*) (2007ChZX).

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^{170}Yb(n,γ) E=thermal 1972Wa10 (continued)

γ(^{171}Yb) (continued)

E_γ †#	I_γ ‡#a	E_i(level)	J_i^π	E_f	J_f^π	Mult.@	Comments
909.7 *20*	0.89	2446.5	1/2,3/2	1536.6	1/2,3/2		
921.5[b] *15*	0.80[b]	988.2	(1/2⁻,3/2⁻)	66.72	3/2⁻		
921.5[bc] *15*	0.80[b]	1912.4	1/2,3/2	991.5	(3/2⁻)		other Eγ (Iγ): 923.4 *3* (0.063 *20*) (2007ChZX).
963.9[bc] *15*	0.80[b]	1038.8	(1/2⁻,3/2⁻)	75.88	5/2⁻		I_γ: includes component from ^{172}Yb.
963.9[bc] *15*	0.80[b]	1870.9	(1/2⁻,3/2⁻)	906.4	1/2,3/2		other Eγ (Iγ): 963.15 *9* (0.39 *5*) (2007ChZX).
991.3 *15*	0.83	991.5	(3/2⁻)	0.0	1/2⁻		other Eγ (Iγ): 990.18 *15* (0.17 *4*) (2007ChZX).
1039.4[c] *15*	0.56	1038.8	(1/2⁻,3/2⁻)	0.0	1/2⁻		other Eγ (Iγ): 1041.13 *14* (0.68 *8*) (2007ChZX). I_γ: includes component from ^{172}Yb (1972Wa10).
1099 *2*	0.35	2137.4	(1/2⁻,3/2⁻)	1038.8	(1/2⁻,3/2⁻)		other Eγ (Iγ): 1099.82 *19* (0.133 *23*) (2007ChZX).
1116.0 *20*	0.30	2446.5	1/2,3/2	1331.1	(3/2⁻)		
[x]1129.2 *15*	0.32						
1141.9 *15*	0.18	2047.8	1/2,3/2	906.4	1/2,3/2		other Eγ (Iγ): 1138.9 *3* (0.14 *4*) (2007ChZX).
1205.4 *10*	0.55	1972.0	1/2,3/2	766.4	(3/2⁺)		
1240.5[c] *10*	0.77	2007.0	1/2,3/2	766.4	(3/2⁺)		I_γ: includes component from ^{174}Yb.
1256 *2*		1331.1	(3/2⁻)	75.88	5/2⁻		E_γ: doublet (broader than normal peak); includes component from ^{13}C.
1264 *2*		1331.1	(3/2⁻)	66.72	3/2⁻		E_γ: doublet (broader than normal peak); includes component from ^{13}C. other Eγ (Iγ): 1265.10 *22* (0.27 *4*) (2007ChZX).
1370.5[b] *10*	0.67[b]	1435.2	1/2,3/2	66.72	3/2⁻		
1370.5[b] *10*	0.67[b]	1492.3	(1/2,3/2)	122.42	5/2⁻		other Eγ (Iγ): 1371.3 *4* (0.076 *27*) (2007ChZX).
1388.1[c] *15*	0.35	1388.1	(1/2,3/2)	0.0	1/2⁻		I_γ: includes component from ^{172}Yb.
1434.9 *15*	0.50	1435.2	1/2,3/2	0.0	1/2⁻		
1470.0 *15*	0.75	1536.6	1/2,3/2	66.72	3/2⁻		other Eγ (Iγ): 1469.79 *17* (0.32 *5*) (2007ChZX).
1491.0[b] *15*	0.65[b]	1492.3	(1/2,3/2)	0.0	1/2⁻		
1491.0[b] *15*	0.65[b]	2478.0	(1/2⁻,3/2⁻)	988.2	(1/2⁻,3/2⁻)		other Eγ (Iγ): 1493.3 *4* (0.09 *3*) (2007ChZX).
2194.7 *20*	0.41	2262.3	1/2,3/2	66.72	3/2⁻		
2401.3[c] *20*	0.52	2468.8	(1/2⁻,3/2⁻)	66.72	3/2⁻		I_γ: includes component from ^{172}Yb.
2479 *2*	0.10	2478.0	(1/2⁻,3/2⁻)	0.0	1/2⁻		
[x]2625 *2*	0.18						
[x]2959.0 *20*	0.22						
[x]3257 *3*	0.16						
[x]3422.3 *20*	0.19						
[x]3600.3 *20*	0.24						
[x]3727 *3*	0.05						
[x]3753 *2*	0.05						
[x]3810 *2*	0.05						
[x]3822 *2*	0.10						
[x]3974.4 *20*	0.15						
4120.1 *20*	0.18	(6614.7)	1/2⁺	2494.5	(1/2⁻,3/2⁻)	(E1)	
4136.8 *20*	0.27	(6614.7)	1/2⁺	2478.0	(1/2⁻,3/2⁻)	(E1)	
4144.7 *25*	0.20	(6614.7)	1/2⁺	2468.8	(1/2⁻,3/2⁻)	(E1)	
4168.3 *20*	0.11	(6614.7)	1/2⁺	2446.5	1/2,3/2		
4241.2 *20*	0.17	(6614.7)	1/2⁺	2373.4	(1/2⁻,3/2⁻)	(E1)	
4324.0 *20*	0.12	(6614.7)	1/2⁺	2290.6	1/2,3/2		
4351.5 *20*	0.13	(6614.7)	1/2⁺	2262.3	1/2,3/2		

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^{170}Yb(n,γ) E=thermal 1972Wa10 (continued)

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

E_γ[†#]	I_γ[‡#a]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	Comments
4477.6 *20*	0.23	(6614.7)	1/2$^+$	2137.4	(1/2$^-$,3/2$^-$)	(E1)	
[x]4494.3[c] *25*	0.06						
[x]4512[c] *2*	0.05						
[x]4537.7[c] *20*	0.05						
4568.2 *25*	0.11	(6614.7)	1/2$^+$	2047.8	1/2,3/2		
4607.6 *20*	0.16	(6614.7)	1/2$^+$	2007.0	1/2,3/2		
4642.2 *20*	0.08	(6614.7)	1/2$^+$	1972.0	1/2,3/2		
4703.1 *20*	0.15	(6614.7)	1/2$^+$	1912.4	1/2,3/2		
4725.8 *20*	0.25	(6614.7)	1/2$^+$	1888.8	(1/2$^-$,3/2$^-$)	(E1)	
4743.5 *20*	0.22	(6614.7)	1/2$^+$	1870.9	(1/2$^-$,3/2$^-$)	(E1)	
4783.9 *20*	0.10	(6614.7)	1/2$^+$	1829.9	1/2,3/2		
4898.1 *20*	0.05	(6614.7)	1/2$^+$	1716.5	1/2,3/2		
4913.9 *15*	0.11	(6614.7)	1/2$^+$	1701.2	1/2,3/2		
5078.4 *15*	0.17	(6614.7)	1/2$^+$	1536.6	1/2,3/2		
5122.7[c] *20*	0.04	(6614.7)	1/2$^+$	1492.3	(1/2,3/2)		
5178.9 *20*	0.09	(6614.7)	1/2$^+$	1435.2	1/2,3/2		
5226.0[c] *20*	0.04	(6614.7)	1/2$^+$	1388.1	(1/2,3/2)		
5284.3 *20*	0.09	(6614.7)	1/2$^+$	1331.1	(3/2$^-$)		Doublet (peak broader than normal). I_γ: includes component from ^{174}Yb. other Eγ (Iγ): 5284.9 *5* (4.9 *5*) (2007ChZX).
5575.7 *15*	0.24	(6614.7)	1/2$^+$	1038.8	(1/2$^-$,3/2$^-$)	(E1)	
≈5624	0.43	(6614.7)	1/2$^+$	991.5	(3/2$^-$)		I_γ: combined value for 5624γ and 5627γ.
≈5627	0.43	(6614.7)	1/2$^+$	988.2	(1/2$^-$,3/2$^-$)	(E1)	I_γ: combined value for 5624γ and 5627γ.
5661.4 *20*	0.02	(6614.7)	1/2$^+$	953.5	(1/2$^-$)		I_γ: includes component from ^{174}Yb.
5708.2 *15*	0.15	(6614.7)	1/2$^+$	906.4	1/2,3/2		other Eγ (Iγ): 5712.5 *6* (0.19 *3*) (2007ChZX).
6547.6 *15*	0.40	(6614.7)	1/2$^+$	66.72	3/2$^-$		
6614.6 *15*	2.2	(6614.7)	1/2$^+$	0.0	1/2$^-$		

[†] Eγ data given in 1972Wa10 for primary transitions had been corrected for recoil; the evaluator has removed that correction, thereby reducing Eγ by 0.1 keV for Eγ≥4120.

[‡] Relative photon intensity normalized so I(6615γ)=2.2 (1972Wa10); ΔIγ ranges from 10% for strong peaks up to ≈ 100% for weak peaks. 1972Wa10 report Iγ scale as absolute (per 100 neutron captures), but do not give sufficient information for comparing old and recent cross-section data.

[#] From 1972Wa10. Data from 1972Wa10 and 2007ChZX are in very poor agreement.

[@] From radiation strengths of primary transitions (1972Wa10).

[&] From 2007ChZX.

[a] Intensity per 100 neutron captures.

[b] Multiply placed with undivided intensity.

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

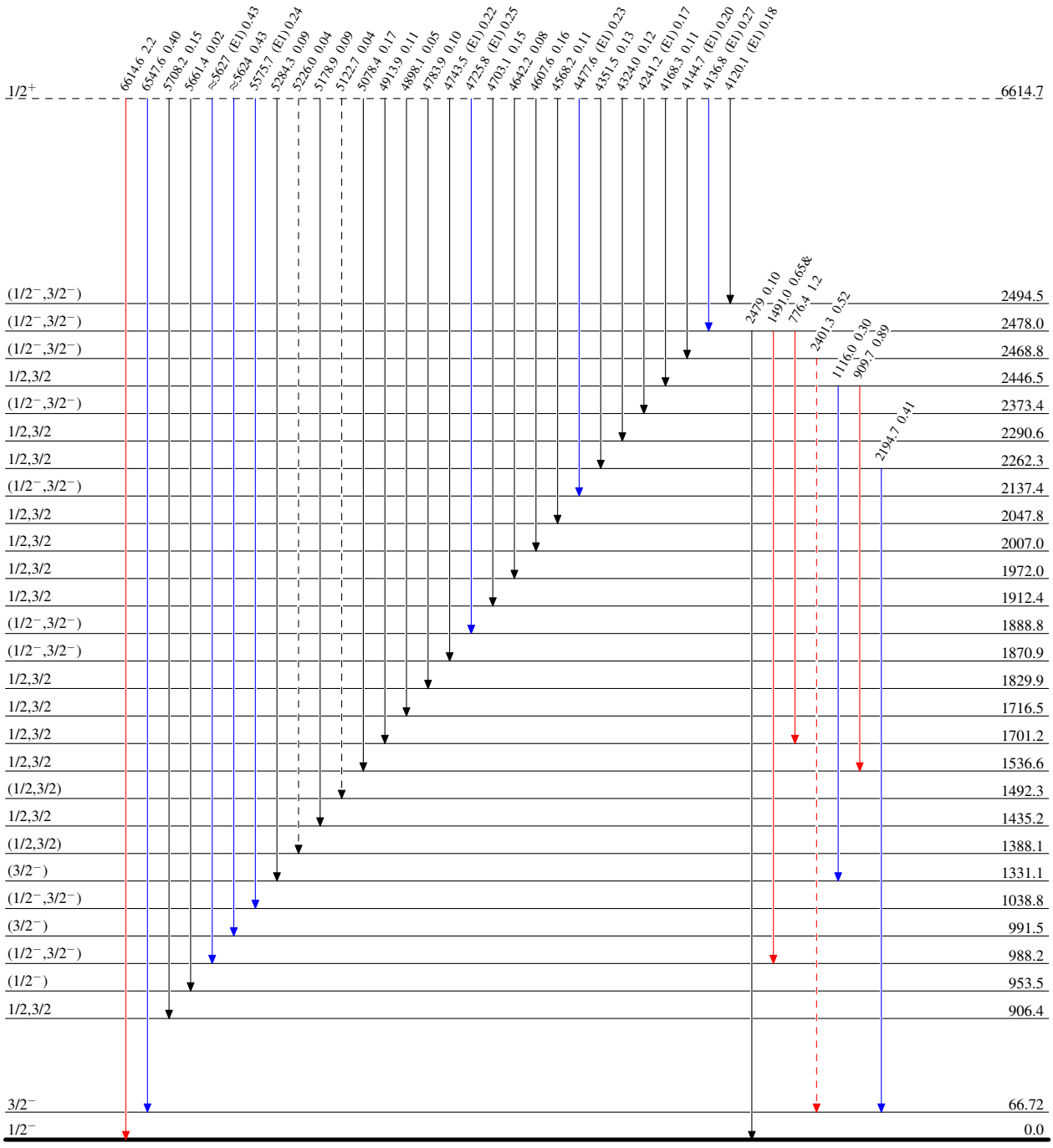
[x] γ ray not placed in level scheme.

^{170}Yb(n,γ) E=thermal 1972Wa10

Level Scheme

Intensities: Relative I_γ
& Multiply placed: undivided intensity given

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



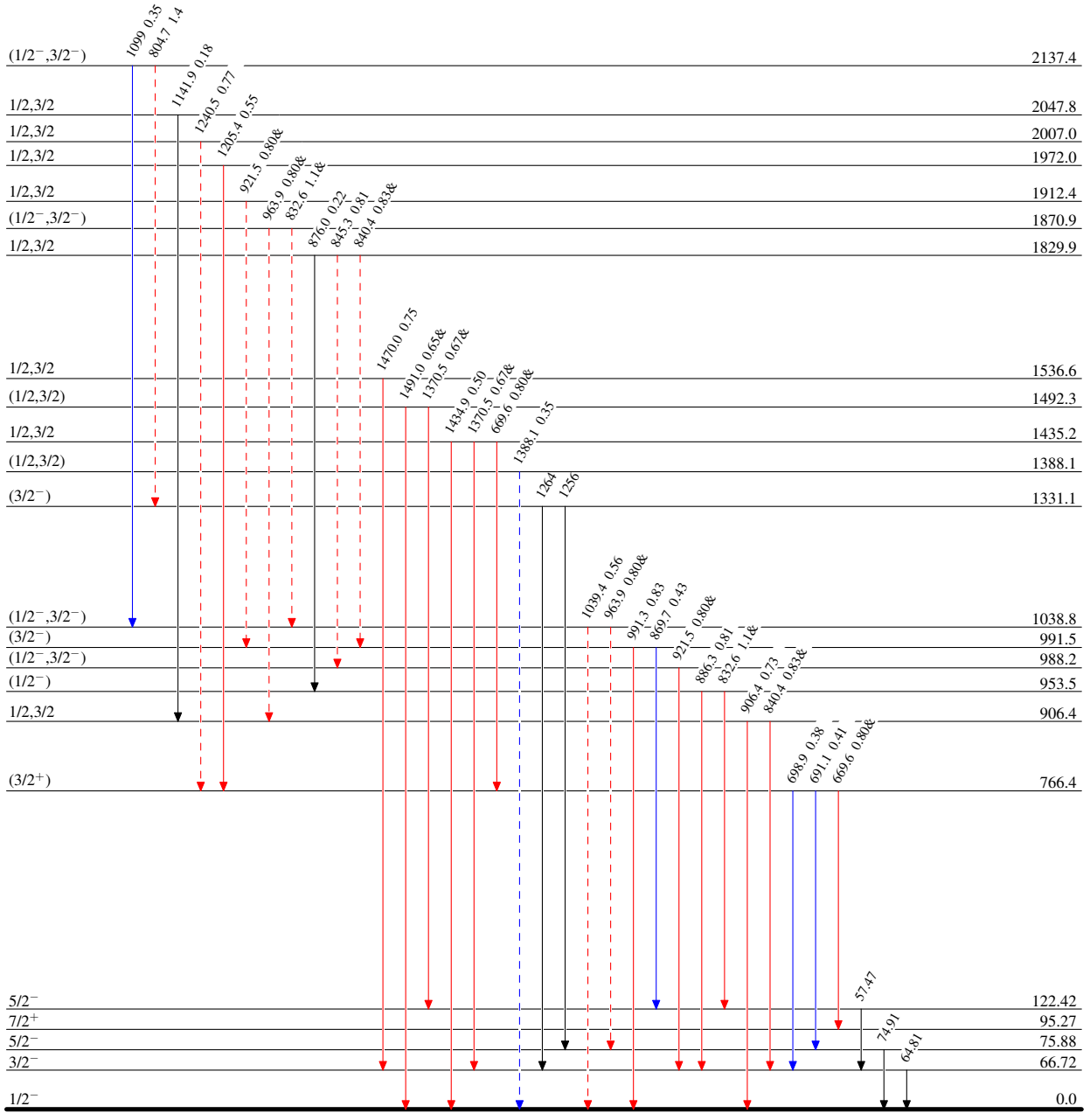
$^{171}_{70}Yb_{101}$

^{170}Yb(n,γ) E=thermal 1972Wa10

Level Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given

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



$^{171}_{70}Yb_{101}$