

$^{176}\text{Yb}(\text{n},\gamma)$ E=thermal 1972A119,1973PrZI

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	F. G. Kondev	NDS 159, 1 (2019)	30-Aug-2019

1972A119: Target: ^{176}Yb , 96.43% enriched. Measured: E_γ , I_γ . Detectors: Scint-Ge(Li) pair spectrometer; anticoin spectrometer.
Deduced E1 radiation strengths.

1973PrZI: Target: natural Yb. Measured E_γ , I_γ , conversion electrons. Detectors: Ge(Li), magnetic spectrograph.

Other: 1990Bo49 (Target: ^{176}Yb , 96.4% enriched. Measured E_γ , I_γ , $\gamma\gamma$ coin.).

 ^{177}Yb Levels

E(level) [†]	J ^π [‡]	T _{1/2} [‡]	Comments
0.0	9/2 ⁺	1.911 h 3	
104.61 18	7/2 ⁻	4.48 ns 8	
124.6 8	11/2 ⁺		
331.75 24	1/2 ⁻ #	6.41 s 2	
375.6 5	(3/2) ⁻ #		
423.6 3	(5/2) ⁻		
432.6? 6			
704.0 6	(3/2) ⁻ #		
832.6 11	(1/2,3/2) #		
866.9 5	(1/2,3/2) #		
939.6 6	(1/2,3/2) #		
997.9 6	(1/2 ⁻ ,3/2) #		
1209.0 6	(3/2 ⁻ ,5/2 ⁺) #		
1284.2 6	(1/2 ⁻ ,3/2) #		
1319.9 5	(1/2 ⁻ ,3/2) #		
1358.8 7	(3/2) ⁻ #		
1416.6 8	(1/2,3/2,5/2 ⁺) #		
1592.1 8	(1/2,3/2,5/2 ⁺) #		
1657.9 6	(1/2,3/2,5/2 ⁺) #		
1701.0 6	(1/2,3/2) #		
1825.9 15	(1/2,3/2,5/2 ⁺) #		
1920.4 8	(1/2 ⁻ ,3/2 ⁻) #		
2021.1 10	(1/2,3/2,5/2 ⁺) #		
2031.9 12	(1/2 ⁻ ,3/2,5/2 ⁺) #		
2067.7 10	(1/2,3/2,5/2 ⁺) #		
2139.7 9	(1/2,3/2) #		
2162.1 9	(3/2,5/2) ⁺ #		
2179.2 8	(1/2,3/2,5/2 ⁺) #		
2243.0 15	(1/2,3/2,5/2 ⁺) #		
2376.8 15	(1/2,3/2,5/2 ⁺) #		
2394.9 15	(1/2,3/2,5/2 ⁺) #		
2479.4 10	(1/2,3/2,5/2 ⁺) #		
2741.3 10	(1/2,3/2,5/2 ⁺) #		
2854.6 15	(1/2,3/2,5/2 ⁺) #		
2907.9 20	(1/2,3/2,5/2 ⁺) #		
3306.1 20	(1/2,3/2,5/2 ⁺) #		
5566.4 22	1/2 ⁺		Additional information 1.

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$^{176}\text{Yb}(\text{n},\gamma)$ E=thermal 1972Al19,1973PrZI (continued) ^{177}Yb Levels (continued)

<u>E(level)[†]</u>	<u>J^π[‡]</u>	<u>T_{1/2}[‡]</u>	Comments					
E(level): From 2017Wa10 . J ^π : Neutron capture state.								
[†] From a least-squares fit to E _γ . [‡] From Adopted Levels, unless otherwise stated. # Populated by a primary γ-ray transition.								
<u>γ(¹⁷⁷Yb)</u>								
<u>E_γ[†]</u>	<u>I_γ[†]</u>	<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.</u>	<u>α[@]</u>	<u>Comments</u>
^x 42.5 [‡] 2								
^x 49.3 [‡] 3								
^x 53.7 [‡] 2								
^x 66.4 [‡] 3								
^x 83.5 [‡] 2								
91.8 [‡] 2		423.6	(5/2) [−]	331.75	1/2 [−]	(E2)		Mult.: From ce(L2)/ce(L3) exp=1.0 (1973PrZI).
^x 103.0 [‡] 2								
104.5 [‡] 2	14.5	104.61	7/2 [−]	0.0	9/2 ⁺	E1		
^x 107.3 [#] 8								
^x 109.6 [‡] 2								
^x 117.2 [‡] 3								
124.6 [#] 8		124.6	11/2 ⁺	0.0	9/2 ⁺			E _γ : 121.5 keV in adopted gammas.
^x 134.3 [‡] 2								
^x 141.1 [#] 15								
^x 148.3 [‡] 2						E2		Mult.: From ce(K):ce(L2):ce(L3) exp=15:10:15 (1973PrZI).
^x 151.6 [#] 8								
^x 154.7 [‡] 3								
^x 200.9 [‡] 2								
^x 202.7 [‡] 3								
^x 203.7 [‡] 2								
^x 219.6 [‡] 3								
^x 220.6 [‡] 3								
^x 226.2 [‡] 2								
227.0 [‡] 2	6.3	331.75	1/2 [−]	104.61	7/2 [−]	M3	6.95	Mult.: From ce(K):ce(L1)+ce(L2):ce(L3):ce(M):ce(N) exp=100:32:12:18:10 (1973PrZI). E _γ : 226.6 15, using Ge(Li) detector (1973PrZI).
^x 234.3 [‡] 3								
^x 266.6 [‡] 3								
^x 282.6 [‡] 4								
^x 285.9 [‡] 3								
^x 310.5 [#] 15								
328.4 ^{&} 10	0.84	432.6?		104.61	7/2 [−]			
328.4 10	0.84	704.0	(3/2) [−]	375.6	(3/2) [−]			

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$^{176}\text{Yb}(\text{n},\gamma)$ E=thermal 1972A119,1973PrZI (continued) $\gamma(^{177}\text{Yb})$ (continued)

E_γ	I_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Comments
328.4 10	0.84	1920.4	(1/2 ⁻ ,3/2 ⁻)	1592.1	(1/2,3/2,5/2 ⁺)	
^x 344.4 [#] 8						
^x 363.9 [#] 8						
434.5 10	1.8	866.9	(1/2,3/2)	432.6?		I_γ : Contribution from capture in ^{174}Yb is subtracted.
^x 435.7 [‡] 2						
^x 442.3 [‡] 4						
^x 477.1 [#] 8						
491.9 10	4.2	866.9	(1/2,3/2)	375.6	(3/2) ⁻	
491.9 10	4.2	1358.8	(3/2) ⁻	866.9	(1/2,3/2)	
491.9 10	4.2	1701.0	(1/2,3/2)	1209.0	(3/2 ⁻ ,5/2 ⁺)	
499.7 20	0.8	832.6	(1/2,3/2)	331.75	1/2 ⁻	
^x 510.2 [‡] 3						
535.4 10	0.4	866.9	(1/2,3/2)	331.75	1/2 ⁻	I_γ : Contribution from capture in ^{174}Yb is subtracted.
550.5 10	0.39	1416.6	(1/2,3/2,5/2 ⁺)	866.9	(1/2,3/2)	
563.5 10	1.4	939.6	(1/2,3/2)	375.6	(3/2) ⁻	
^x 570.2 [‡] 4						
573.2 10	0.74	997.9	(1/2 ⁻ ,3/2)	423.6	(5/2) ⁻	
^x 588.7 10	0.57					
599.7 15	0.50	704.0	(3/2) ⁻	104.61	7/2 ⁻	
599.7 ^{&} 15	0.50	1920.4	(1/2 ⁻ ,3/2 ⁻)	1319.9	(1/2 ⁻ ,3/2)	
608.2 10	2.8	939.6	(1/2,3/2)	331.75	1/2 ⁻	
622.9 10	1.8	997.9	(1/2 ⁻ ,3/2)	375.6	(3/2) ⁻	
^x 632.6 10	1.6					
^x 637.8 [#] 15						
662.3 15	0.71	2021.1	(1/2,3/2,5/2 ⁺)	1358.8	(3/2) ⁻	
666.8 15	0.71	997.9	(1/2 ⁻ ,3/2)	331.75	1/2 ⁻	
^x 696.2 [#] 15						
^x 698.5 10	2.7					
791.3 10	2.1	1657.9	(1/2,3/2,5/2 ⁺)	866.9	(1/2,3/2)	
825.1 15	0.80	1657.9	(1/2,3/2,5/2 ⁺)	832.6	(1/2,3/2)	
833.8 ^{&} 10	0.69	1209.0	(3/2 ⁻ ,5/2 ⁺)	375.6	(3/2) ⁻	
833.8 ^{&} 10	0.69	1701.0	(1/2,3/2)	866.9	(1/2,3/2)	
^x 842.3 10	0.75					
^x 847.4 10	0.35					
859.6 10	0.61	1284.2	(1/2 ⁻ ,3/2)	423.6	(5/2) ⁻	
859.6 10	0.61	2179.2	(1/2,3/2,5/2 ⁺)	1319.9	(1/2 ⁻ ,3/2)	
^x 871.8 10	1.1					
888.1 ^{&} 10	0.44	1319.9	(1/2 ⁻ ,3/2)	432.6?		
888.1 10	0.44	1592.1	(1/2,3/2,5/2 ⁺)	704.0	(3/2) ⁻	
896.2 10	1.1	1319.9	(1/2 ⁻ ,3/2)	423.6	(5/2) ⁻	
^x 936.7 20	0.36					
943.8 10	4.7	1319.9	(1/2 ⁻ ,3/2)	375.6	(3/2) ⁻	
953.2 10	1.0	1284.2	(1/2 ⁻ ,3/2)	331.75	1/2 ⁻	
953.2 10	1.0	1657.9	(1/2,3/2,5/2 ⁺)	704.0	(3/2) ⁻	
953.2 10	1.0	2162.1	(3/2,5/2) ⁺	1209.0	(3/2 ⁻ ,5/2 ⁺)	
982.5 15	1.0	1358.8	(3/2) ⁻	375.6	(3/2) ⁻	
982.5 15	1.0	1416.6	(1/2,3/2,5/2 ⁺)	432.6?		
987.4 15	0.89	1319.9	(1/2 ⁻ ,3/2)	331.75	1/2 ⁻	
^x 993.9 15	0.68					
998.5 15	0.40	1701.0	(1/2,3/2)	704.0	(3/2) ⁻	
^x 1004.0 10	1.6					
^x 1029.6 15	0.93					
1069.5 10	0.94	2067.7	(1/2,3/2,5/2 ⁺)	997.9	(1/2 ⁻ ,3/2)	

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$^{176}\text{Yb}(\text{n},\gamma)$ E=thermal 1972Al19,1973PrZI (continued) $\gamma(^{177}\text{Yb})$ (continued)

$E_\gamma^\dagger$	$I_\gamma^\dagger$	$E_i(\text{level})$	J_i^π	E_f	J_f^π
^x 1080.1 10	4.0				
1104.1 10	0.54	1209.0	(3/2 ⁻ , 5/2 ⁺)	104.61	7/2 ⁻
1254.6 15	0.64	1358.8	(3/2 ⁻)	104.61	7/2 ⁻
^x 1303.5 15	0.30				
1367.8 15	0.51	1701.0	(1/2, 3/2)	331.75	1/2 ⁻
1488.5 & 15	0.63	1920.4	(1/2 ⁻ , 3/2 ⁻)	432.6?	
1588.0 & 20	0.41	1920.4	(1/2 ⁻ , 3/2 ⁻)	331.75	1/2 ⁻
1588.0 20	0.41	2021.1	(1/2, 3/2, 5/2 ⁺)	432.6?	
1608.0 20	0.49	2031.9	(1/2 ⁻ , 3/2, 5/2 ⁺)	423.6	(5/2 ⁻)
^x 1633.3 20	0.80				
1805.2 20	0.79	2139.7	(1/2, 3/2)	331.75	1/2 ⁻
2260.3 20	0.25	5566.4	1/2 ⁺	3306.1	(1/2, 3/2, 5/2 ⁺)
2658.5 20	0.26	5566.4	1/2 ⁺	2907.9	(1/2, 3/2, 5/2 ⁺)
2711.8 15	0.33	5566.4	1/2 ⁺	2854.6	(1/2, 3/2, 5/2 ⁺)
2825.1 10	0.40	5566.4	1/2 ⁺	2741.3	(1/2, 3/2, 5/2 ⁺)
3087.0 10	0.88	5566.4	1/2 ⁺	2479.4	(1/2, 3/2, 5/2 ⁺)
3171.5 15	0.26	5566.4	1/2 ⁺	2394.9	(1/2, 3/2, 5/2 ⁺)
3189.6 15	0.27	5566.4	1/2 ⁺	2376.8	(1/2, 3/2, 5/2 ⁺)
3323.4 15	0.49	5566.4	1/2 ⁺	2243.0	(1/2, 3/2, 5/2 ⁺)
3387.4 10	2.1	5566.4	1/2 ⁺	2179.2	(1/2, 3/2, 5/2 ⁺)
3404.6 15	0.36	5566.4	1/2 ⁺	2162.1	(3/2, 5/2) ⁺
3426.0 10	0.63	5566.4	1/2 ⁺	2139.7	(1/2, 3/2)
3498.2 15	0.23	5566.4	1/2 ⁺	2067.7	(1/2, 3/2, 5/2 ⁺)
3534.3 15	0.16	5566.4	1/2 ⁺	2031.9	(1/2 ⁻ , 3/2, 5/2 ⁺)
3545.0 15	0.07	5566.4	1/2 ⁺	2021.1	(1/2, 3/2, 5/2 ⁺)
3645.6 15	0.16	5566.4	1/2 ⁺	1920.4	(1/2 ⁻ , 3/2 ⁻)
3740.5 15	0.20	5566.4	1/2 ⁺	1825.9	(1/2, 3/2, 5/2 ⁺)
3865.0 10	0.74	5566.4	1/2 ⁺	1701.0	(1/2, 3/2)
3908.2 10	2.7	5566.4	1/2 ⁺	1657.9	(1/2, 3/2, 5/2 ⁺)
3974.0 15	0.11	5566.4	1/2 ⁺	1592.1	(1/2, 3/2, 5/2 ⁺)
4150.0 15	0.44	5566.4	1/2 ⁺	1416.6	(1/2, 3/2, 5/2 ⁺)
4207.5 15	0.10	5566.4	1/2 ⁺	1358.8	(3/2 ⁻)
4246.5 10	2.9	5566.4	1/2 ⁺	1319.9	(1/2 ⁻ , 3/2)
4282.0 10	1.2	5566.4	1/2 ⁺	1284.2	(1/2 ⁻ , 3/2)
4357.4 10	0.20	5566.4	1/2 ⁺	1209.0	(3/2 ⁻ , 5/2 ⁺)
4568.3 10	0.21	5566.4	1/2 ⁺	997.9	(1/2 ⁻ , 3/2)
4626.7 10	1.3	5566.4	1/2 ⁺	939.6	(1/2, 3/2)
4699.0 15	0.22	5566.4	1/2 ⁺	866.9	(1/2, 3/2)
4732.7 20	0.05	5566.4	1/2 ⁺	832.6	(1/2, 3/2)
4862.5 15	0.10	5566.4	1/2 ⁺	704.0	(3/2 ⁻)
5190.6 15	0.12	5566.4	1/2 ⁺	375.6	(3/2 ⁻)
5233.9 10	0.29	5566.4	1/2 ⁺	331.75	1/2 ⁻

[†] From 1972Al19, unless otherwise stated.

[‡] From ce data in 1973PrZI. ΔE_γ were estimated by the evaluator.

Measured using a Ge(Li) detector in 1973PrZI.

@ 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.

& Placement of transition in the level scheme is uncertain.

^x γ ray not placed in level scheme.

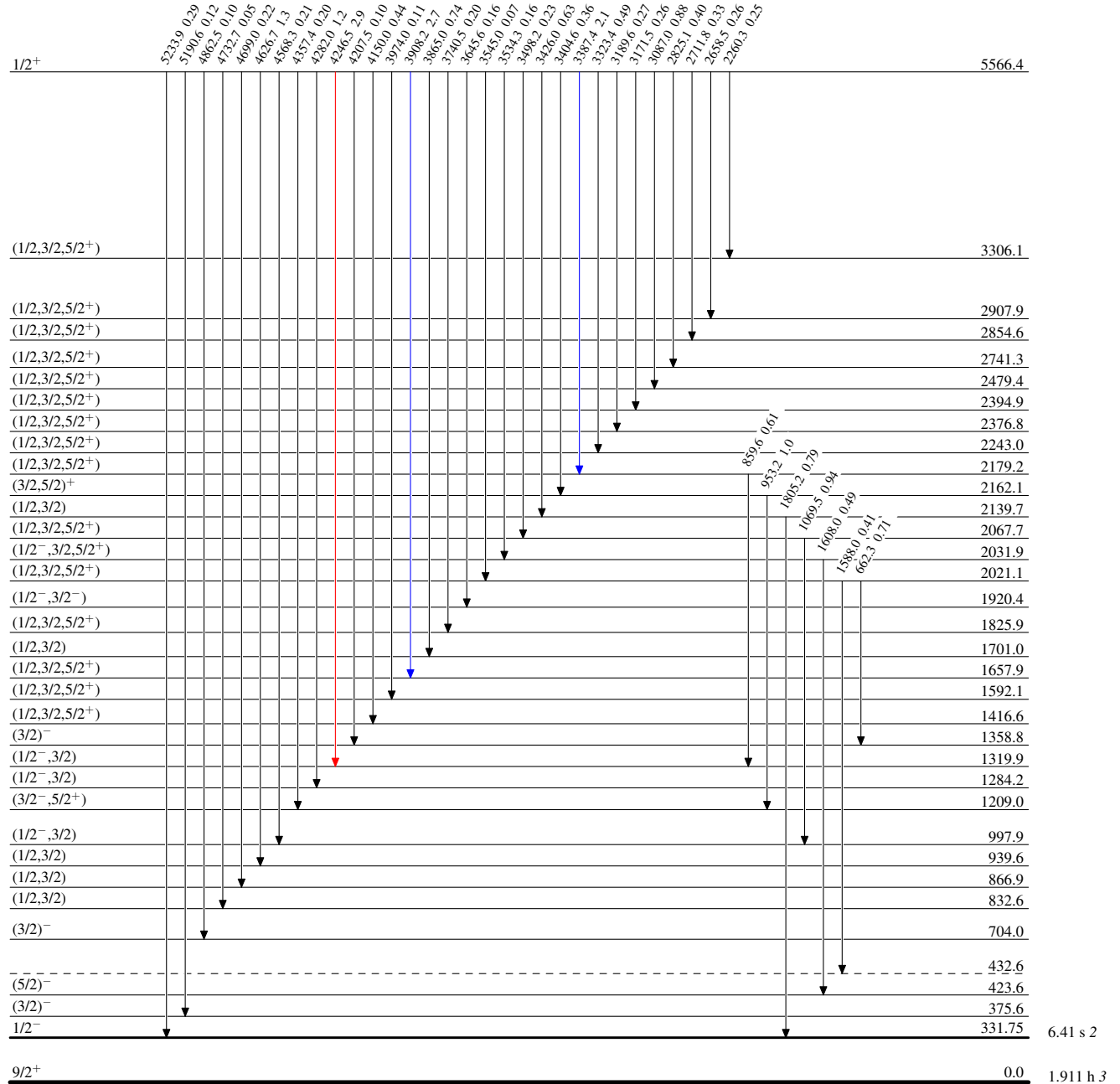
$^{176}\text{Yb}(n,\gamma)$ E=thermal 1972Al19,1973PrZI

Legend

Level Scheme

Intensities: Relative I_γ

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



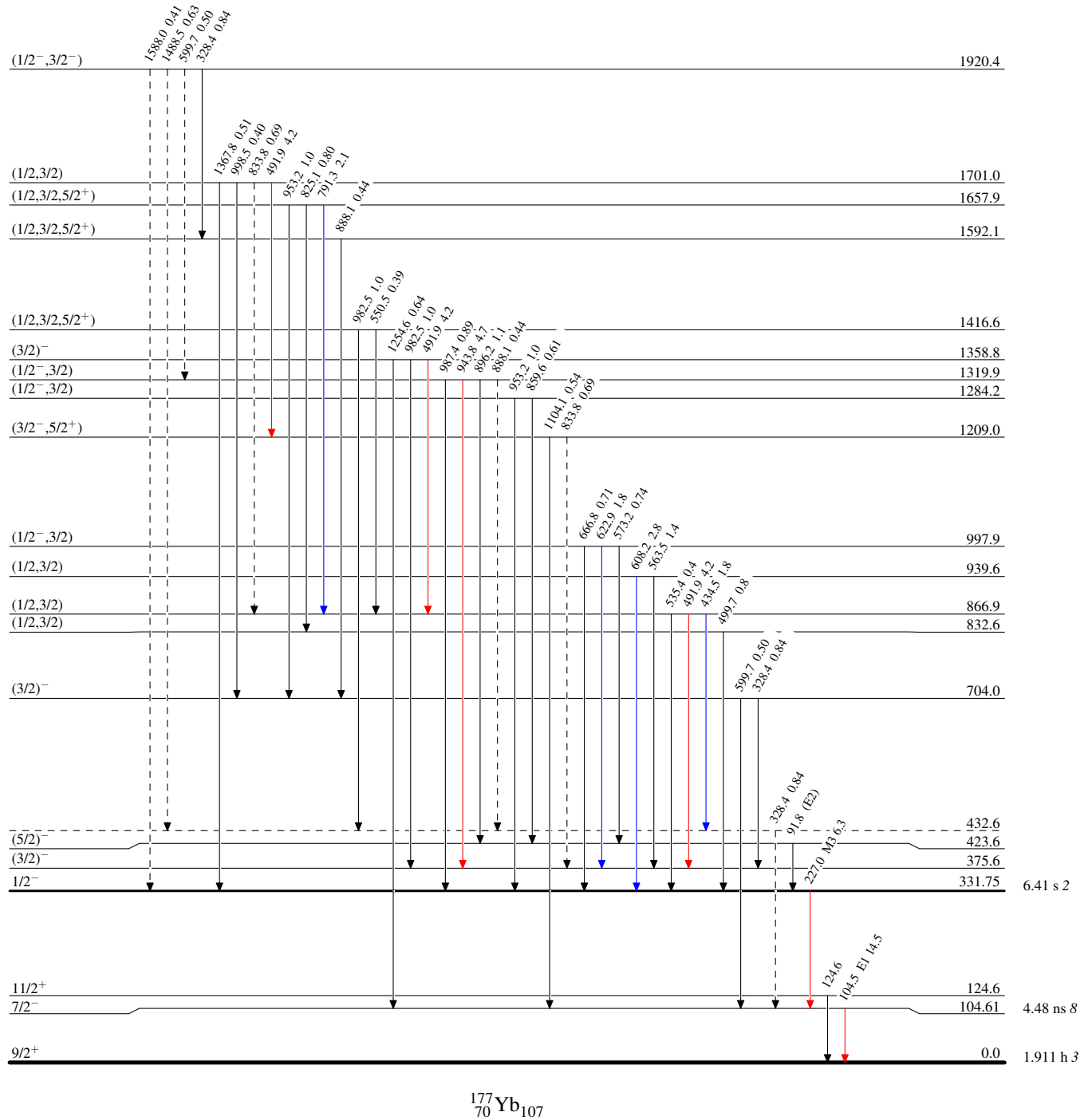
$^{176}\text{Yb}(n,\gamma)$ E=thermal 1972Al19,1973PrZI

Legend

Level Scheme (continued)

Intensities: Relative I_γ

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

 $^{177}_{70}\text{Yb}_{107}$