^{136}Ba(n,γ) E=thermal 1995Bo03

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, J. K. Tuli	NDS 108,2173 (2007)	1-Oct-2006

1995Bo03: measured γ, $\gamma\gamma$, HPGe.

1991Bo57: measured coincident γ-ray pairs adding to 6898.5 (cascade to g.s.), 6619.5(cascade to 279 level), 4998.4, (cascade to 1900 level), and 4718.4 (cascade to 2180 level). The evaluators assume that this work has been superseded by 1995Bo03.

Measured: γ (1969Gr31,1977BaXW), circular polarization (1977BaXW).

^{137}Ba Levels

E(level)[†]	J$^{\pi}$[‡]	E(level)[†]	J$^{\pi}$[‡]	E(level)[†]	J$^{\pi}$[‡]	E(level)[†]	J$^{\pi}$[‡]
0.0	3/2^{+}	1907.52 *14*	3/2^{+}	3221.6? *4*		3976.82 *19*	1/2,3/2
283.50 *5*	1/2^{+}	2041.2 *5*	(5/2)$^{+}$	3316.25 *12*	1/2^{-},3/2^{-}	4150.03 *11*	1/2^{+},3/2
661.49 *8*	11/2^{-}	2182.21 *5*	3/2^{-}[#]	3402.67 *9*	3/2^{-}	4206.6 *3*	1/2,3/2
1251.74 *15*	7/2^{+}	2271.1 *5*	(3/2^{+},5/2)	3606.9 *7*		4216.03 *15*	1/2,3/2
1293.88 *8*	5/2^{+}	2355.6 *4*	1/2,3/2	3680.68 *16*	1/2^{-},3/2^{-}	4550.4 *4*	1/2,3/2
1463.93 *11*	3/2^{+}	2662.69 *5*	1/2^{-}[#]	3720.8 *3*	1/2,3/2	4595.05 *20*	1/2,3/2
1481.83 *11*	(3/2^{+},5/2^{+})	2873.90 *18*	(5/2)$^{-}$	3799.01 *16*	(1/2^{-},3/2^{-})	4764.9 *4*	1/2,3/2
1797.99 *13*	7/2^{-}	2964.3 *3*	1/2,3/2	3850.3 *7*	1/2,3/2	(6905.71 *7*)	1/2^{+}
1838.12 *23*	1/2^{+}	3085.61 *25*	1/2,3/2	3851.9 *7*	1/2,3/2		
1897.95 *13*	3/2^{+}	3127.33 *10*	1/2,3/2	3963.2 *6*	1/2,3/2		

[†] From 1995Bo03.

[‡] Levels with J=1/2 or 3/2 are based on population by capture γ rays (with assumed dipolar multipolarity) from a J$^{\pi}$=1/2^{+} neutron capture state, unless otherwise specified.

[#] J$^{\pi}$=3/2^{-} or 1/2^{-} from L(d,p)=1. Circular polarization consistent with J(2182)=3/2, not 1/2 for 2179. Similarly, circular polarization data consistent with J(2644)=1/2, not 3/2.

γ(^{137}Ba)

Iγ normalization: normalized by the authors assuming Σ (Iγ feeding g.s.)=95% +5-10. Σ (unplaced γ's)=9.5%. Yields for 283γ, 1899γ, 4723γ were determined to be 0.498 *12*, 0.345 *7*, 0.262 *6*, respectively.

E$_{\gamma}$	I$_{\gamma}$[a]	E$_{i}$(level)	J$^{\pi}_{i}$	E$_{f}$	J$^{\pi}_{f}$
230.0 *4*	4.4 *8*	3316.25	1/2^{-},3/2^{-}	3085.61	1/2,3/2
^{x}236.5 *3*	5.6 *8*				
283.39 *7*	741 *7*	283.50	1/2^{+}	0.0	3/2^{+}
384.59 *17*	4.6 *8*	2182.21	3/2^{-}	1797.99	7/2^{-}
^{x}476.2 *4*	4.0 *10*				
480.61 *7*	64.1 *20*	2662.69	1/2^{-}	2182.21	3/2^{-}
661.57 *8*	13.6 *6*	661.49	11/2^{-}	0.0	3/2^{+}
747.36 *16*	1.3 *3*	4150.03	1/2^{+},3/2	3402.67	3/2^{-}
755.24 *21*	3.9 *4*	2662.69	1/2^{-}	1907.52	3/2^{+}
763.4 *4*	1.0 *4*	2662.69	1/2^{-}	1897.95	3/2^{+}
794.3 *13*	1.0 *5*	4595.05	1/2,3/2	3799.01	(1/2^{-},3/2^{-})
^{x}884.8 *4*	2.4 *3*				
^{x}934.5[&] *3*	1.0 *3*				
945[†]	1.5[†]	3127.33	1/2,3/2	2182.21	3/2^{-}
^{x}1033.9 *6*	1.7 *4*				
1057.4[b] *12*	0.7[b] *3*	2964.3	1/2,3/2	1907.52	3/2^{+}
1057.4[b] *12*	0.7[b] *3*	3720.8	1/2,3/2	2662.69	1/2^{-}

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^{136}Ba(n,γ) E=thermal **1995Bo03** (continued)

γ(^{137}Ba) (continued)

E$_\gamma$	I$_\gamma$[a]	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$
1075.91 *13*	3.3 *6*	2873.90	$(5/2)^-$	1797.99	$7/2^-$
1134[†]	1.4[†]	3316.25	$1/2^-,3/2^-$	2182.21	$3/2^-$
1136.78 *15*	10.0 *10*	1797.99	$7/2^-$	661.49	$11/2^-$
1198.46 *16*	13.0 *20*	1481.83	$(3/2^+,5/2^+)$	283.50	$1/2^+$
1220[†]	1.3[†]	3402.67	$3/2^-$	2182.21	$3/2^-$
1251.73 *15*	7.5 *8*	1251.74	$7/2^+$	0.0	$3/2^+$
[x]1284.6 *5*	1.9 *4*				
1293.88 *8*	13.8 *20*	1293.88	$5/2^+$	0.0	$3/2^+$
[x]1399.5 *4*	1.2 *3*				
1416[†]	1.7[†]	3316.25	$1/2^-,3/2^-$	1897.95	$3/2^+$
1463.93 *11*	17.7 *10*	1463.93	$3/2^+$	0.0	$3/2^+$
[x]1472.5[&] *5*	3.0 *8*				
1481.72 *13*	15.6 *10*	1481.83	$(3/2^+,5/2^+)$	0.0	$3/2^+$
1527.9 *4*	3.8 *7*	3799.01	$(1/2^-,3/2^-)$	2271.1	$(3/2^+,5/2)$
1553.39 *14*	6.0 *20*	4216.03	1/2,3/2	2662.69	$1/2^-$
1614.15 *13*	7.8 *8*	1897.95	$3/2^+$	283.50	$1/2^+$
1623.54 *22*	7.4 *8*	1907.52	$3/2^+$	283.50	$1/2^+$
[x]1705.8 *9*	3.4 *5*				
1781[†d]	1.6[†]	3680.68	$1/2^-,3/2^-$	1897.95	$3/2^+$
[x]1806.8 *5*	2.4 *4*				
1838.11 *23*	7.9 *8*	1838.12	$1/2^+$	0.0	$3/2^+$
1898.70 *5*	559 *5*	2182.21	$3/2^-$	283.50	$1/2^+$
1908.0 *7*	6.6 *18*	1907.52	$3/2^+$	0.0	$3/2^+$
2041.2 *5*	3.7 *4*	2041.2	$(5/2)^+$	0.0	$3/2^+$
2072.6 *6*	5.8 *9*	2355.6	1/2,3/2	283.50	$1/2^+$
2107.6 *9*	2.7 *7*	3402.67	$3/2^-$	1293.88	$5/2^+$
2140.3 *5*	3.8[@] *7*	(6905.71)	$1/2^+$	4764.9	1/2,3/2
[x]2146.6 *8*	3.0 *7*				
2182.23 *9*	13.8 *10*	2182.21	$3/2^-$	0.0	$3/2^+$
[x]2189.0 *4*	3.9 *9*				
2198.3 *12*	2.1 *8*	3680.68	$1/2^-,3/2^-$	1481.83	$(3/2^+,5/2^+)$
[x]2243.5 *3*	1.6 *6*				
2310.62 *19*	7.6[#] *8*	(6905.71)	$1/2^+$	4595.05	1/2,3/2
[x]2343.5[&] *9*	2.3 *6*				
2355.4[c] *4*	3.0[c] *9*	2355.6	1/2,3/2	0.0	$3/2^+$
2355.4[c] *4*	2.7[c@] *5*	(6905.71)	$1/2^+$	4550.4	1/2,3/2
2379.07 *7*	51.3 *20*	2662.69	$1/2^-$	283.50	$1/2^+$
2662.68 *7*	73.6 *20*	2662.69	$1/2^-$	0.0	$3/2^+$
[x]2675.5[&] *6*	1.8 *6*				
2690.1 *5*	4.1 *9*	(6905.71)	$1/2^+$	4216.03	1/2,3/2
2699.0 *3*	7.7 *11*	(6905.71)	$1/2^+$	4206.6	1/2,3/2
[x]2721.6[&] *5*	4.6 *12*				
2755.69 *11*	13.7 *10*	(6905.71)	$1/2^+$	4150.03	$1/2^+,3/2$
[x]2791.6 *6*	2.5 *7*				
2800.9 *6*	2.1 *6*	3085.61	1/2,3/2	283.50	$1/2^+$
2843.80 *19*	7.2 *9*	3127.33	1/2,3/2	283.50	$1/2^+$
2856.6[c] *5*	1.8[c] *7*	4150.03	$1/2^+,3/2$	1293.88	$5/2^+$
2856.6[c] *5*	1.4[c]	4764.9	1/2,3/2	1907.52	$3/2^+$
[x]2904.5 *3*	4.4 *6*				
[x]2918.9 *5*	2.8 *6*				
2928.86 *17*	9.9 *8*	(6905.71)	$1/2^+$	3976.82	1/2,3/2
2942.4 *6*	2.4 *7*	(6905.71)	$1/2^+$	3963.2	1/2,3/2
2964.9 *4*	7.3 *11*	2964.3	1/2,3/2	0.0	$3/2^+$

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^{136}Ba(n,γ) E=thermal **1995Bo03** (continued)

γ(^{137}Ba) (continued)

E_γ	I_γ[a]	E_i(level)	J_i^π	E_f	J_f^π
3033.06 *15*	18.6 *9*	3316.25	$1/2^-,3/2^-$	283.50	$1/2^+$
3052[b]	1.3[b#] *10*	(6905.71)	$1/2^+$	3851.9	1/2,3/2
3055.6[b] *8*	0.9[b@] *4*	(6905.71)	$1/2^+$	3850.3	1/2,3/2
3086.9[c] *7*	1.1[c] *10*	3085.61	1/2,3/2	0.0	$3/2^+$
3086.9[c] *7*	2.3[c] *12*	4550.4	1/2,3/2	1463.93	$3/2^+$
^{x}3093.5[&] *9*	2.4 *7*				
3106.60 *17*	9.9 *7*	(6905.71)	$1/2^+$	3799.01	$(1/2^-,3/2^-)$
3118.95 *11*	23.6 *14*	3402.67	$3/2^-$	283.50	$1/2^+$
3127.41 *14*	12.9 *9*	3127.33	1/2,3/2	0.0	$3/2^+$
3184.9 *4*	3.8 *7*	(6905.71)	$1/2^+$	3720.8	1/2,3/2
3221	1.4[#] *7*	3221.6?		0.0	$3/2^+$
3225.5 *4*	17 *4*	(6905.71)	$1/2^+$	3680.68	$1/2^-,3/2^-$
^{x}3241.5[&] *21*	1.6 *7*				
3298	1.6[#] *6*	(6905.71)	$1/2^+$	3606.9	
3316[†]	1.0[†] *6*	3316.25	$1/2^-,3/2^-$	0.0	$3/2^+$
3397.25 *17*	11.9 *7*	3680.68	$1/2^-,3/2^-$	283.50	$1/2^+$
3402[†]	1.3[†] *6*	3402.67	$3/2^-$	0.0	$3/2^+$
3437.4 *4*	2.1 *4*	3720.8	1/2,3/2	283.50	$1/2^+$
^{x}3464.9 *4*	2.1 *4*				
^{x}3488.7 *4*	3.8 *4*				
3502.73 *12*	22.9 *10*	(6905.71)	$1/2^+$	3402.67	$3/2^-$
3515.2 *3*	5.5 *7*	3799.01	$(1/2^-,3/2^-)$	283.50	$1/2^+$
^{x}3527.6 *6*	3.1 *9*				
^{x}3538.46 *19*	10.9 *10*				
^{x}3547.2 *9*	2.2 *6*				
3567[†]	1.1[†‡] *6*	3850.3	1/2,3/2	283.50	$1/2^+$
3589.63 *16*	27.9 *14*	(6905.71)	$1/2^+$	3316.25	$1/2^-,3/2^-$
3606[†]	1.6[†] *6*	3606.9		0.0	$3/2^+$
^{x}3655.2 *7*	1.1 *5*				
3680[†]	1.4[†] *7*	3680.68	$1/2^-,3/2^-$	0.0	$3/2^+$
3684.0 *4*	4.4 *9*	(6905.71)	$1/2^+$	3221.6?	
3721[†]	1.8[†] *6*	3720.8	1/2,3/2	0.0	$3/2^+$
3778.51 *17*	15.5 *13*	(6905.71)	$1/2^+$	3127.33	1/2,3/2
^{x}3786.8 *4*	7.0 *7*				
3798.9 *5*	3.7 *7*	3799.01	$(1/2^-,3/2^-)$	0.0	$3/2^+$
^{x}3813.4 *6*	3.8 *7*				
3820.6 *4*	5.6 *8*	(6905.71)	$1/2^+$	3085.61	1/2,3/2
3850[†]	1.3[†‡] *10*	3851.9	1/2,3/2	0.0	$3/2^+$
3866[†]	1.7[†] *5*	4150.03	$1/2^+,3/2$	283.50	$1/2^+$
3942.5 *5*	4.1 *7*	(6905.71)	$1/2^+$	2964.3	1/2,3/2
3963[†]	2.0[†] *8*	3963.2	1/2,3/2	0.0	$3/2^+$
3977[†]	2.4[†] *8*	3976.82	1/2,3/2	0.0	$3/2^+$
^{x}3978.5 *6*	4.3 *7*				
^{x}3999.8 *5*	5.8 *12*				
^{x}4083.8 *6*	3.9 *7*				
^{x}4133.8 *6*	2.6 *9*				
^{x}4150.3 *6*	2.7 *9*				
4150.3 *6*	2.7 *9*	4150.03	$1/2^+,3/2$	0.0	$3/2^+$
^{x}4166.2 *7*	2.9 *8*				
4206[†]	2.0[†] *10*	4206.6	1/2,3/2	0.0	$3/2^+$
4215[†]	1.8[†] *10*	4216.03	1/2,3/2	0.0	$3/2^+$

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^{136}Ba(n,γ) E=thermal 1995Bo03 (continued)

γ(^{137}Ba) (continued)

E_γ	I_γ[a]	E_i(level)	J_i^π	E_f	J_f^π
4243.07 *16*	159 *4*	(6905.71)	1/2$^+$	2662.69	1/2$^-$
4267[†]	2.7[†] *5*	4550.4	1/2,3/2	283.50	1/2$^+$
[x]4288.8 *5*	2.3 *4*				
4312[†]	1.8[†] *7*	4595.05	1/2,3/2	283.50	1/2$^+$
4482[†]	1.7[†] *6*	4764.9	1/2,3/2	283.50	1/2$^+$
4550	0.8[@] *6*	(6905.71)	1/2$^+$	2355.6	1/2,3/2
4595[†]	2.3[†] *7*	4595.05	1/2,3/2	0.0	3/2$^+$
4723.25 *14*	483 *5*	(6905.71)	1/2$^+$	2182.21	3/2$^-$
4996.8 *4*	3.2 *4*	(6905.71)	1/2$^+$	1907.52	3/2$^+$
5006.7 *4*	4.7 *7*	(6905.71)	1/2$^+$	1897.95	3/2$^+$
6622.72 *24*	37.9 *25*	(6905.71)	1/2$^+$	283.50	1/2$^+$
6905.4 *4*	1.9 *6*	(6905.71)	1/2$^+$	0.0	3/2$^+$

[†] From $\gamma\gamma$ coin. Intensity of two-step cascade from $\gamma\gamma$ coin. Uncertainty for Eγ is not given by the authors.

[‡] Intensity for a possible doublet.

[#] Intensity of the two-step cascade to g.s. per 1000 n captures.

[@] Intensity of the two-step cascade to 283.4 level per 1000 n captures.

[&] Coin with 283γ.

[a] For intensity per 100 neutron captures, multiply by 0.1.

[b] Multiply placed with undivided intensity.

[c] Multiply placed with intensity suitably divided.

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

[x] γ ray not placed in level scheme.

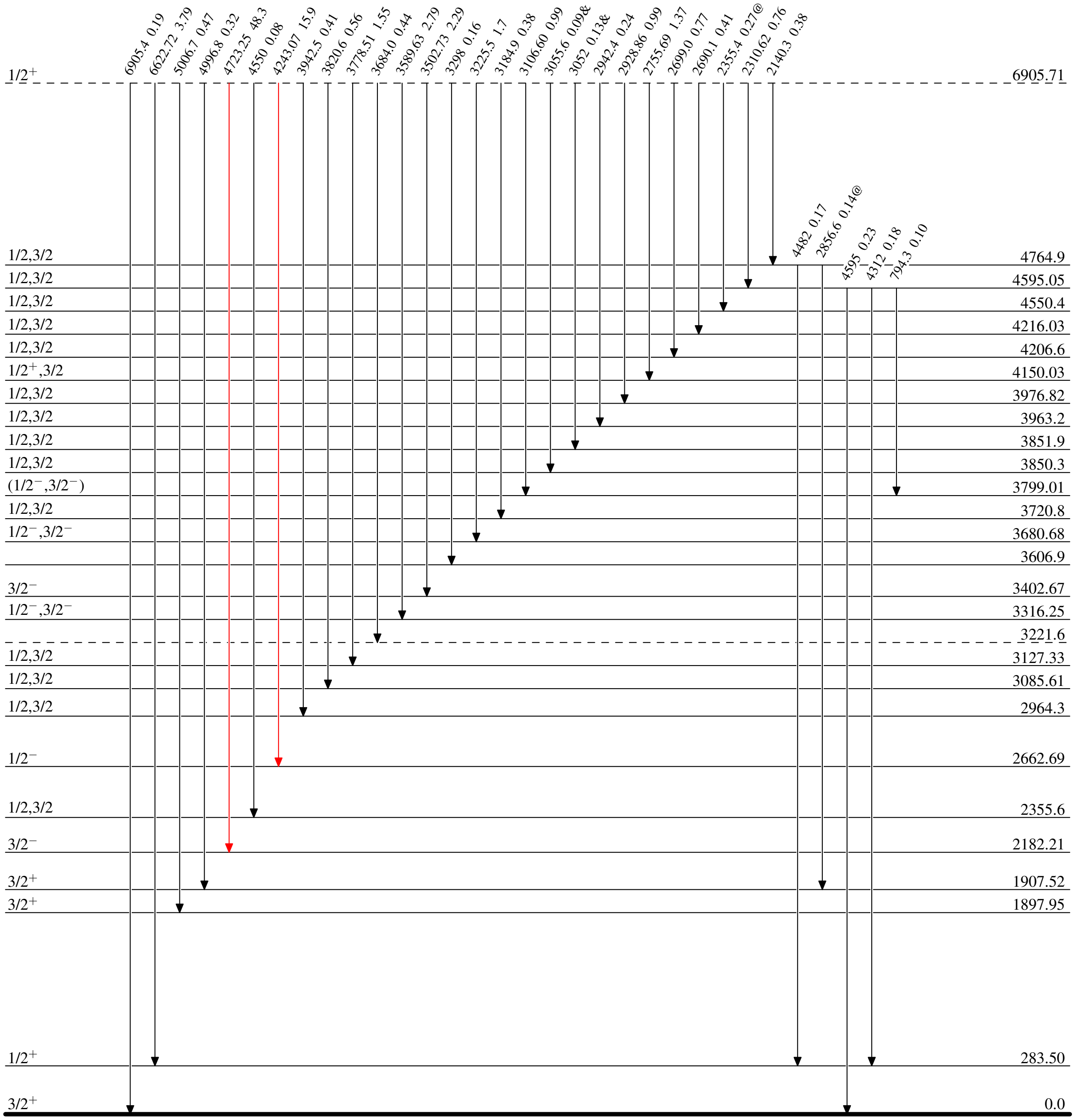
^{136}Ba(n,γ) E=thermal 1995Bo03

Level Scheme

Intensities: I_γ per 100 neutron captures
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend

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



$^{137}_{56}$Ba$_{81}$

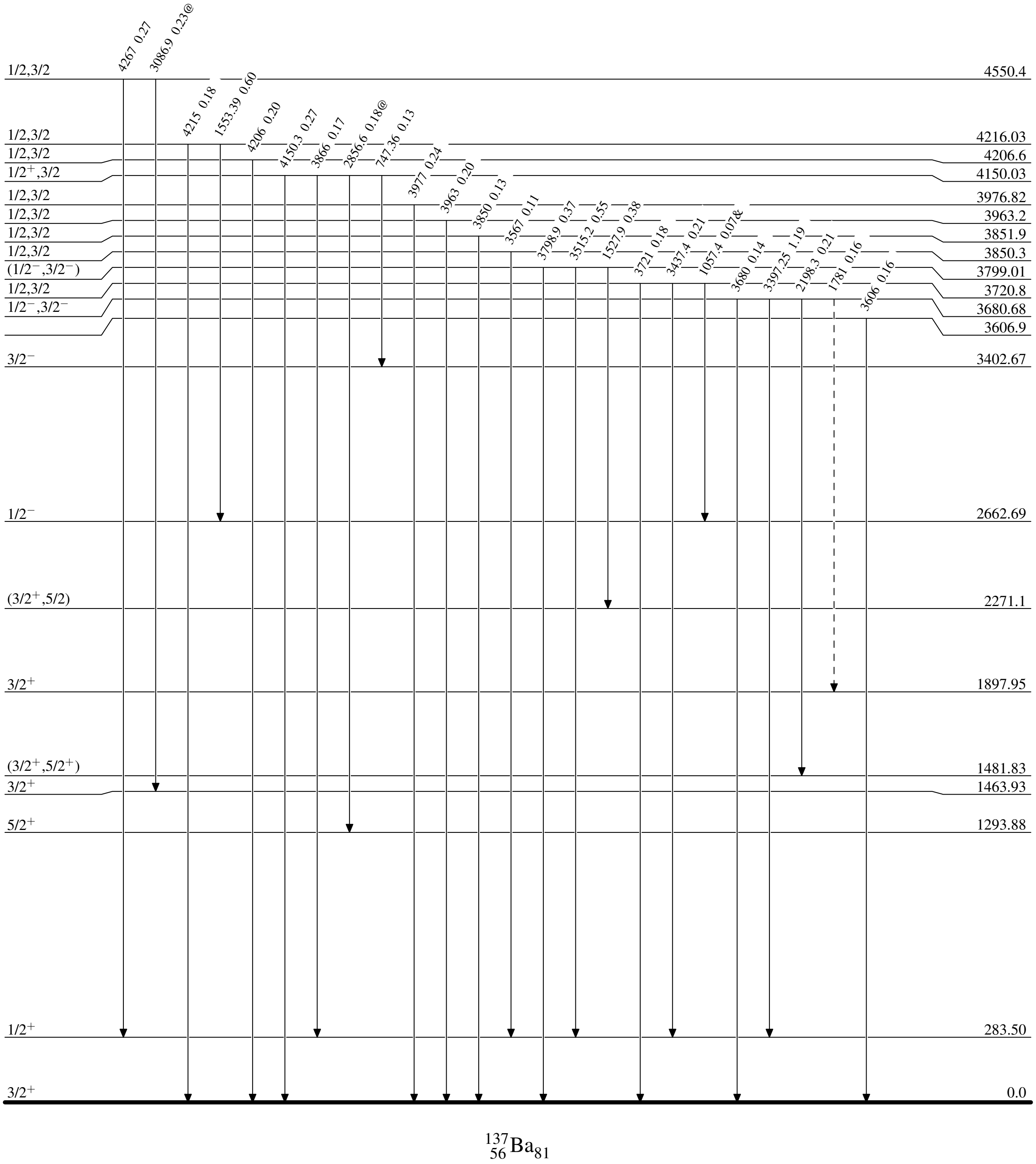
^{136}Ba(n,γ) E=thermal 1995Bo03

Level Scheme (continued)

Intensities: I$_\gamma$ per 100 neutron captures
& 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)



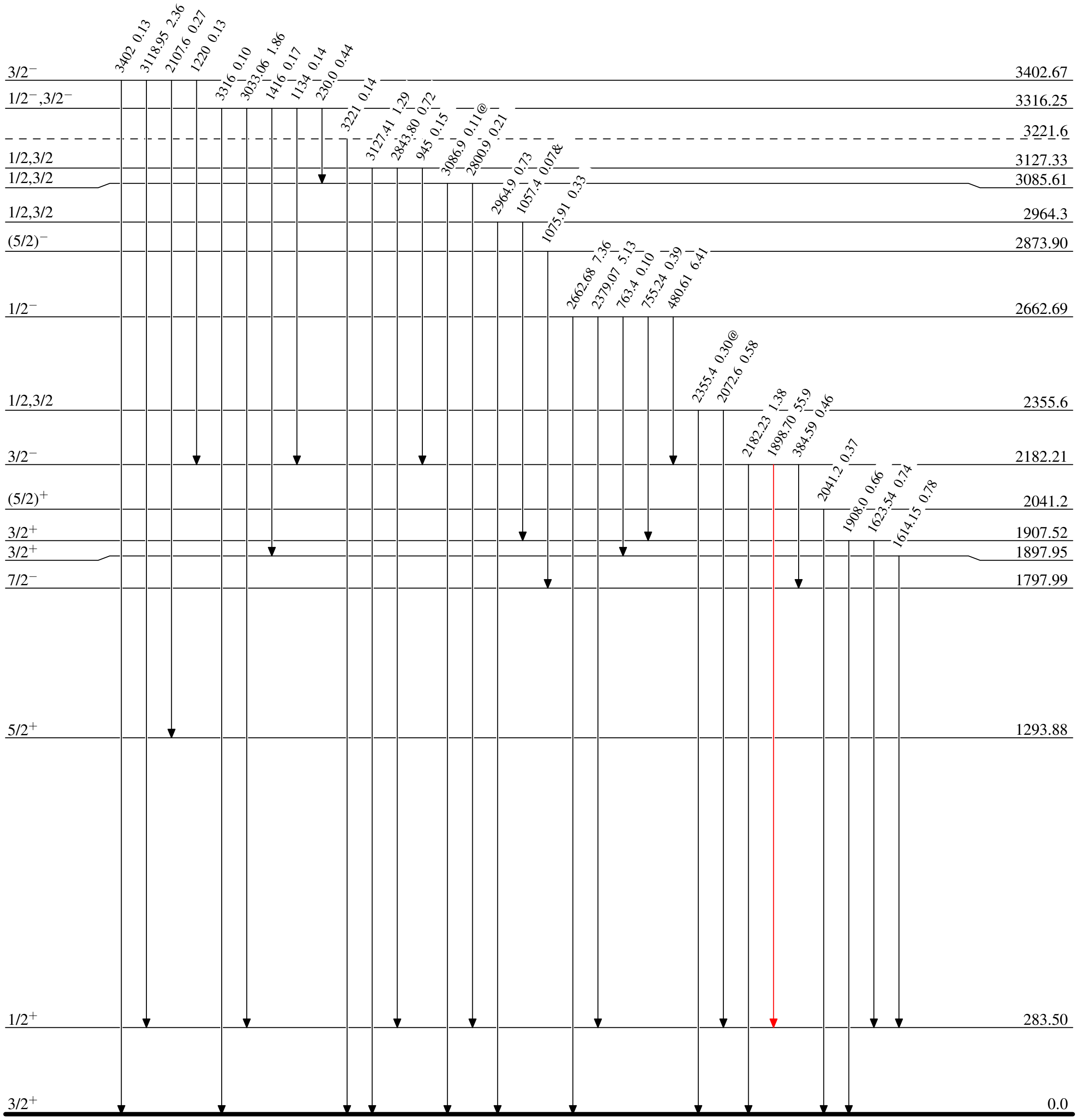
^{136}Ba(n,γ) E=thermal 1995Bo03

Level Scheme (continued)

Intensities: I_γ per 100 neutron captures
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend

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



$^{137}_{56}$Ba$_{81}$

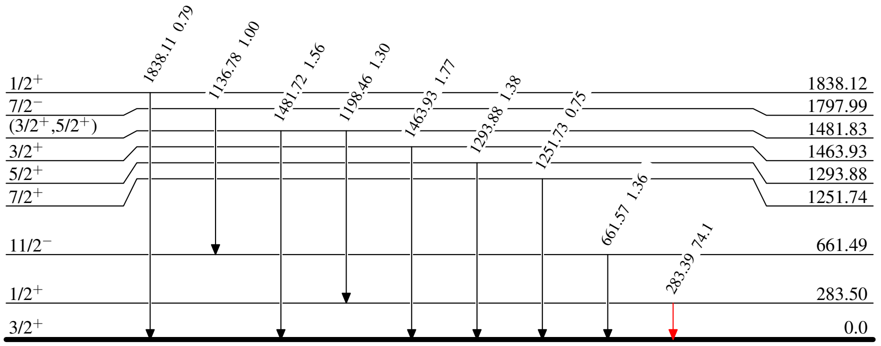
^{136}Ba(n,γ) E=thermal 1995Bo03

Level Scheme (continued)

Intensities: I_γ per 100 neutron captures
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend

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



$^{137}_{56}\mathrm{Ba}_{81}$