^{138}Ba(p,nγ) 1975IsZY

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 146, 1 (2017)	30-Sep-2017

1975IsZY: E=4.5-7.5 MeV proton beams were produced from the McMaster University FN Tandem Van de Graaff accelerator. Targets were barium oxide (71.9% in ^{138}Ba) with thickness about 200 μg/cm^2. γ rays were detected with a c.c. Ge(Li) detector (FWHM=0.8 keV at 122 keV), a 14 c.c. planar detector (FWHM=1.8 keV at 661 keV) and a 37 c.c. detector (FWHM≈3 keV at 1332 keV); neutrons were detected with a plastic scintillator. Measured Eγ, Iγ, γγ-coin, nγ(t). Deduced levels, half-life. 1975IsZY supersedes 1975We16.

1979Bo11: E=10 MeV. Measured γ(θ,H,t). Deduced g-factor.

Other: 1963Ma53.

The level scheme is that proposed by 1975IsZY on the basis of γγ-coincidence data and levels seen in authors' (^{3}He,d), (α,t) and (d,t) spectra. In addition to the γ placements shown, the authors note the following possible placements: 1007γ(1302 level), 1125γ(1645 level), 1191γ(1707 level), 1235γ(1426 or 1715 level).

^{138}La Levels

E(level)[†]	Jπ[‡]	$T_{1/2}$	Comments
0.0	5$^+$		
72.57 *3*	(3)$^+$	116 ns *5*	g=+0.962 *16* (1979Bo11) $T_{1/2}$: from neutron-γ(t) coincidence (1975IsZY).
116.17 *6*	(2)$^+$		
161.19 *6*	(3)$^+$		
192.18 *5*	(2)$^+$		
230.40 *7*	(4)$^+$		
292.96 *7*	(1)$^+$		
413.30 *6*	(3)$^+$		
479.25 *13*	(4)$^+$		
510.44 *6*	(3)$^+$		
518.68 *15*	(4)$^+$		
642.35 *9*	(2)$^+$		
737.67 *9*	(2)$^-$		
738.70 *20*	(4)$^-$		
823.33 *12*	(3)$^-$		
842.79 *16*			
900.5 *3*	(4)$^-$		
936.30 *19*	(5)$^-$		
947.79 *17*			
961.4 *5*	(6)$^-$		
1057.77 *16*	1$^+$,2$^+$		
1102.54 *22*			
1200.3 *3*			
1228.87 *16*	1$^+$,2$^+$		
1243.0 *3*	(4)$^-$		
1358.6 *3*	(2)$^+$		
1385.1 *3*			
1490.5 *3*			
1722.4 *5*			
1733.45 *23*	1$^+$,2$^+$		
1788.4 *4*	$^+$		

[†] From a least-squares fit to γ-ray energies.

[‡] From Adopted Levels.

^{138}Ba(p,nγ) 1975IsZY (continued)

γ(^{138}La)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π
43.6 *1*	22 *8*	116.17	$(2)^+$	72.57	$(3)^+$
45.0 *1*	6.4 *26*	161.19	$(3)^+$	116.17	$(2)^+$
72.57 *3*	201 *17*	72.57	$(3)^+$	0.0	5^+
76.01 *8*	71 *6*	192.18	$(2)^+$	116.17	$(2)^+$
85.68 *8*	18.0 *15*	823.33	$(3)^-$	737.67	$(2)^-$
88.62 *5*	50 *4*	161.19	$(3)^+$	72.57	$(3)^+$
100.78 *6*	21.5 *18*	292.96	$(1)^+$	192.18	$(2)^+$
105.0 *1*	3.1 *3*	947.79		842.79	
119.64 *5*	29 *2*	192.18	$(2)^+$	72.57	$(3)^+$
131.9 *1*	3.2 *3*	642.35	$(2)^+$	510.44	$(3)^+$
157.8 *1*	3.3 *4*	230.40	$(4)^+$	72.57	$(3)^+$
176.83 *6*	100	292.96	$(1)^+$	116.17	$(2)^+$
182.9 *1*	2.7 *3*	413.30	$(3)^+$	230.40	$(4)^+$
221.13 *5*	21.0 *17*	413.30	$(3)^+$	192.18	$(2)^+$
227.3 *1*	16.4 *14*	737.67	$(2)^-$	510.44	$(3)^+$
229.3 *2*	14.2 *12*	642.35	$(2)^+$	413.30	$(3)^+$
230.4 *2*	71 *6*	230.40	$(4)^+$	0.0	5^+
248.7 *2*	2.0 *2*	479.25	$(4)^+$	230.40	$(4)^+$
280.0 *1*	3.3 *7*	510.44	$(3)^+$	230.40	$(4)^+$
295.2 *3*	4.4 *4*	1243.0	$(4)^-$	947.79	
297.2 *3*	5.2 *5*	413.30	$(3)^+$	116.17	$(2)^+$
[x]313.6 *3*	4.4 *5*				
318.3 *1*	42 *3*	510.44	$(3)^+$	192.18	$(2)^+$
324.4 *2*	3.9 *4*	737.67	$(2)^-$	413.30	$(3)^+$
340.78 *20*	62 *5*	413.30	$(3)^+$	72.57	$(3)^+$
357.6 *2*	5.4 *6*	518.68	$(4)^+$	161.19	$(3)^+$
394.3 *1*	18.6 *15*	510.44	$(3)^+$	116.17	$(2)^+$
[x]403.6 *3*	3.8 *5*				
406.8 *2*	26 *2*	479.25	$(4)^+$	72.57	$(3)^+$
437.9 *1*	43 *4*	510.44	$(3)^+$	72.57	$(3)^+$
444.7 *3*	32 *3*	737.67	$(2)^-$	292.96	$(1)^+$
445.9 *3*	32 *3*	518.68	$(4)^+$	72.57	$(3)^+$
450.2 *2*	11 *1*	642.35	$(2)^+$	192.18	$(2)^+$
479.3 *3*	5.4 *8*	479.25	$(4)^+$	0.0	5^+
481.0 *3*	33 *5*	642.35	$(2)^+$	161.19	$(3)^+$
518.5 *4*	4.9 *6*	518.68	$(4)^+$	0.0	5^+
526.2 *3*	3.9 *3*	642.35	$(2)^+$	116.17	$(2)^+$
535.3 *3*	1.5 *4*	1358.6	$(2)^+$	823.33	$(3)^-$
545.4 *2*	15.2 *13*	737.67	$(2)^-$	192.18	$(2)^+$
569.5 *2*	19 *2*	642.35	$(2)^+$	72.57	$(3)^+$
576.4 *2*	65 *5*	737.67	$(2)^-$	161.19	$(3)^+$
612.7 *4*	4.0 *7*	842.79		230.40	$(4)^+$
621.0 *4*	4.4 *8*	1358.6	$(2)^+$	737.67	$(2)^-$
[x]661.9 *2*	13 *1*				
670.0 *3*	6.6 *8*	900.5	$(4)^-$	230.40	$(4)^+$
[x]678.2 *3*	6.0 *8*				
681.5 *3*	10.6 *11*	1200.3		518.68	$(4)^+$
706.5 *5*	10.9 *11*	936.30	$(5)^-$	230.40	$(4)^+$
717.4 *3*	10.9 *11*	947.79		230.40	$(4)^+$
[x]719.4 *3*	3.7 *7*				
738.7 *2*	24.3 *21*	738.70	$(4)^-$	0.0	5^+
765.0 *3*	11.6 *12*	1057.77	$1^+,2^+$	292.96	$(1)^+$
[x]823.7 *4*	5.1 *8*				
827.0 *6*	5.9 *9*	1788.4	$^+$	961.4	$(6)^-$
[x]833.0 *8*	7.1 *12*				
842.7 *2*	20.7 *18*	842.79		0.0	5^+
865.6 *3*	10.6 *11*	1057.77	$1^+,2^+$	192.18	$(2)^+$
874.6 *3*	9.4 *10*	1385.1		510.44	$(3)^+$
900.8 *5*	11.7 *12*	900.5	$(4)^-$	0.0	5^+
910.4‡ *3*	15.5‡ *15*	1102.54		192.18	$(2)^+$
910.4‡ *3*	15.5‡ *15*	1733.45	$1^+,2^+$	823.33	$(3)^-$
[x]917.2 *4*	5.5 *9*				
[x]932.3 *3*	13.6 *13*				
936.2‡ *2*	22.2‡ *19*	936.30	$(5)^-$	0.0	5^+
936.2‡ *2*	22.2‡ *19*	1228.87	$1^+,2^+$	292.96	$(1)^+$
941.3‡ *3*	13.1‡ *14*	1057.77	$1^+,2^+$	116.17	$(2)^+$
941.3‡ *3*	13.1‡ *14*	1102.54		161.19	$(3)^+$
961.4 *5*	5.2 *9*	961.4	$(6)^-$	0.0	5^+
971.8‡ *5*	4.4‡ *9*	1385.1		413.30	$(3)^+$
971.8‡ *5*	4.4‡ *9*	1490.5		518.68	$(4)^+$
985.3 *3*	32 *3*	1057.77	$1^+,2^+$	72.57	$(3)^+$
[x]1000.3 *3*	11.6 *13*				
[x]1007.0 *4*	9.6 *11*				
[x]1033 *1*	≈16				
[x]1037 *1*	≈20				
[x]1040 *1*	≈16				
1067.5 *3*	17.6 *17*	1228.87	$1^+,2^+$	161.19	$(3)^+$
1077.2 *3*	19.9 *19*	1490.5		413.30	$(3)^+$
[x]1083.6 *3*	13.4 *14*				
1090.8 *3*	14.0 *14*	1733.45	$1^+,2^+$	642.35	$(2)^+$
1112.2 *3*	19.1 *18*	1228.87	$1^+,2^+$	116.17	$(2)^+$
[x]1125.3 *3*	16.3 *15*				
[x]1191.1 *4*	9.6 *12*				
1200.5 *5*	8.3 *14*	1200.3		0.0	5^+
[x]1235.2 *8*	6.2 *13*				
[x]1240.1 *5*	3.9 *8*				
1243.0 *5*	3.9 *9*	1243.0	$(4)^-$	0.0	5^+
1270 *1*	6.5 *11*	1788.4	$^+$	518.68	$(4)^+$
[x]1294.8 *5*	3.7 *9*				
[x]1305.4 *5*	7.8 *11*				
1309.1‡ *5*	7.1‡ *10*	1722.4		413.30	$(3)^+$
1309.1‡ *5*	7.1‡ *10*	1788.4	$^+$	479.25	$(4)^+$
[x]1322.8 *5*	3.4 *8*				
1429.5†		1722.4		292.96	$(1)^+$

† Seen only in γγ.
‡ Multiply placed with undivided intensity.
[x] γ ray not placed in level scheme.

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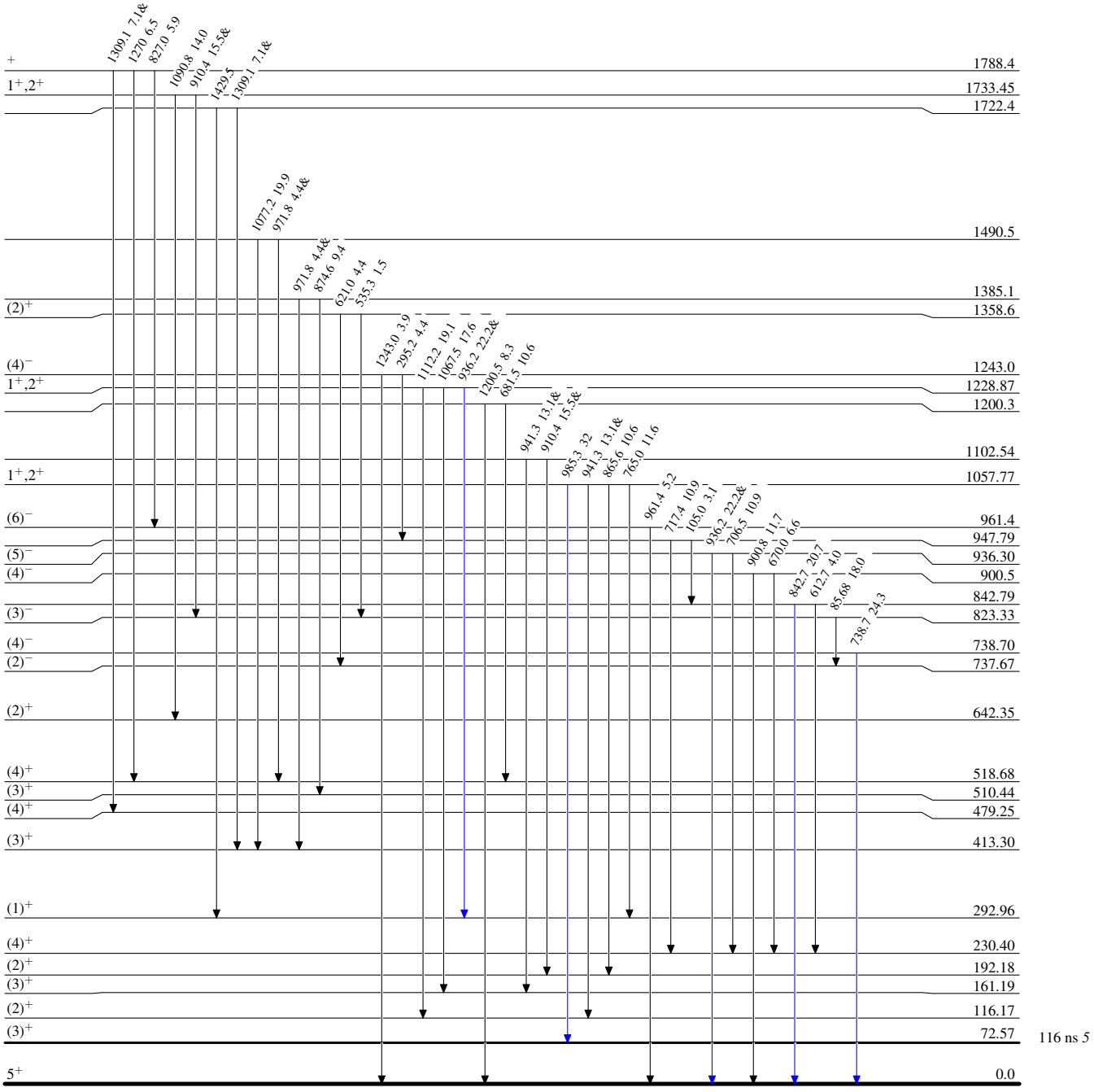
Level Scheme

Intensities: Relative I_γ
& Multiply placed: undivided intensity given

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



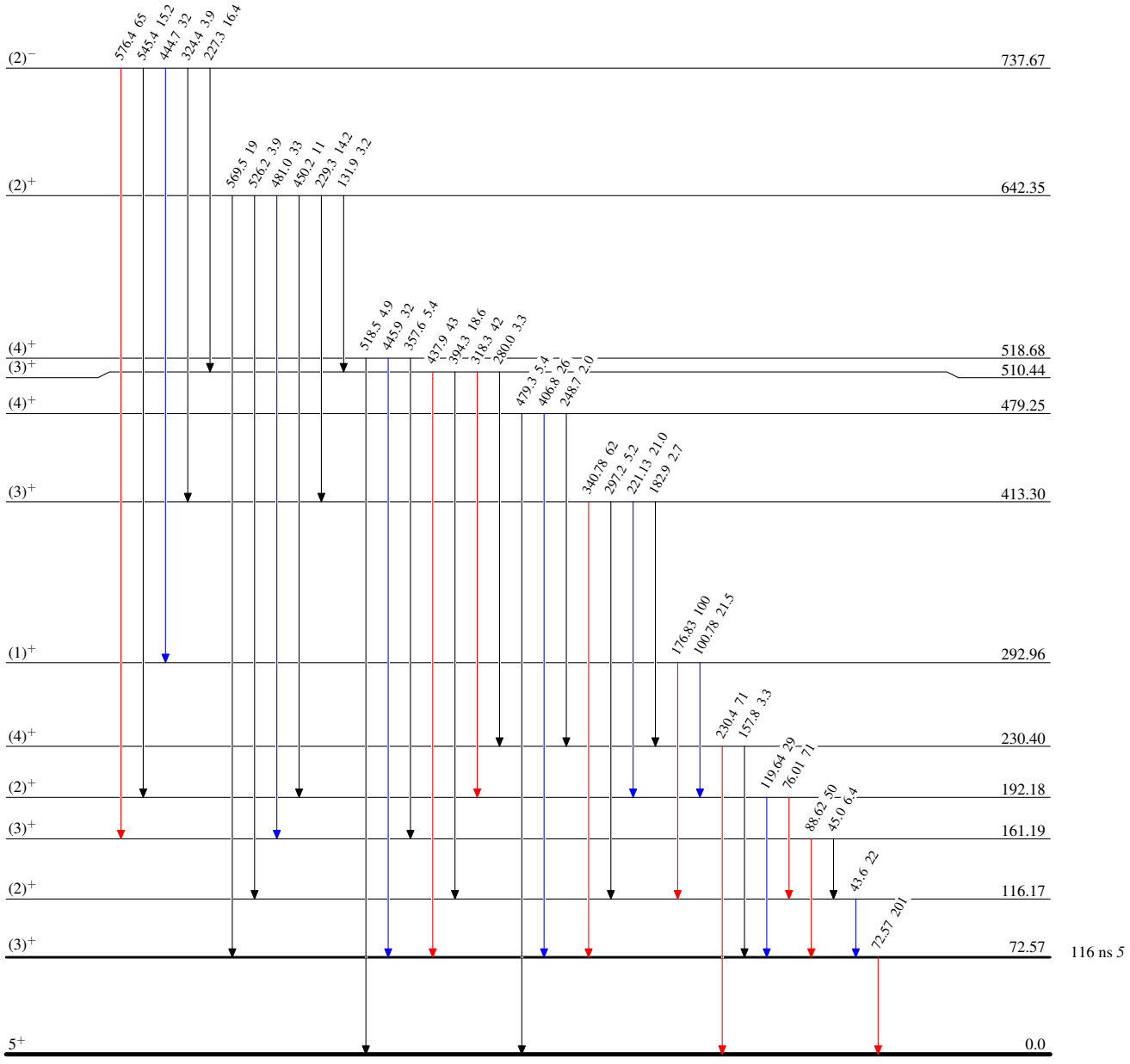
$^{138}_{57}La_{81}$

^{138}Ba(p,nγ) 1975IsZY

Level Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given

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



$^{138}_{57}La_{81}$