^{40}Ca(^{36}Ar,3pnγ) 2004Ol04

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	D. Abriola(a), A. A. Sonzogni	NDS 111,1 (2010)	1-May-2009

E=145 MeV. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma\gamma(\theta)$(DCO) and angular distribution (asymmetry) ratios using the GAMMASPHERE Ge-detector array and microball array.

The original article had $J^\pi=(3^+)$ for the ground state. Following the work of 2003Pi03, which assigned $J^\pi=1^+$ to the g.s., a private communication from R. Wadsworth (2008WaZZ) indicated that J^π for only one excited state had to change, the 229 keV level, which went from (4^+) to (3^+). The only caveat is that the 289 keV transition which shows dipole nature is now connecting levels with $\Delta J=2$.

^{72}Br Levels

E(level)†	J^π	E(level)†	J^π	E(level)†	J^π	E(level)†	J^π
0	(1^+)	1318.51# *13*	(7^-)	5323.36# *22*	(15^-)	9743.9@ *7*	(20^-)
123.7 *7*	(2^+)	1343.69@ *15*	(8^-)	5360.42 *24*		9816.8b *3*	(21^+)
131.26 *13*	(2^-)	1447.24b *17*	(9^+)	5515.2& *9*	(15^-)	10405.6‡ *3*	(22^-)
218.05 *10*	(3^-)	1611.33‡ *14*	(8^-)	5652.3a *6*	(14^+)	10542.5a *15*	(20^+)
228.94 *8*	(3^+)	1988.43& *17*	(9^-)	5990.66‡ *24*	(16^-)	11298.2# *3*	(23^-)
289.01 *8*	(3^+)	2081.50# *14*	(9^-)	6240.60@ *23*	(16^-)	11800.7@ *12*	(22^-)
332.97# *12*	(3^-)	2185.25@ *17*	(10^-)	6262.75b *23*	(17^+)	11843.8b *4*	(23^+)
397.55@ *8*	(2^-)	2478.63‡ *17*	(10^-)	6562.00# *23*	(17^-)	12366.8‡ *4*	(24^-)
402.42 *14*	(4^-)	2496.53b *18*	(11^+)	7047.6& *13*	(17^-)	12533.9a *22*	(22^+)
467.04 *10*	(5^-)	3025.6& *3*	(11^-)	7103.4a *10*	(16^+)	13381.6# *4*	(25^-)
543.45 *10*	(5^+)	3077.31# *17*	(11^-)	7375.4‡ *3*	(18^-)	13936.3b *6*	(25^+)
658.80# *12*	(5^-)	3328.30@ *19*	(12^-)	7874.47b *25*	(19^+)	14808.6‡ *6*	(26^-)
667.49@ *8*	(4^-)	3515.04‡ *20*	(12^-)	7910.8@ *3*	(18^-)	15898.5# *9*	(27^-)
715.66 *12*	(6^-)	3627.99b *19*	(13^+)	7966.1# *3*	(19^-)	16230.3b *10*	(27^+)
748.33 *15*	(5^-)	4203.32# *20*	(13^-)	8087.9 *3*		17799.7‡ *14*	(28^-)
957.68 *13*	(7^-)	4325.6& *4*	(13^-)	8752.5a *14*	(18^+)	18806b *3*	(29^+)
990.45@ *12*	(6^-)	4713.88@ *20*	(14^-)	8802.6& *17*	(19^-)	18967.2# *20*	(29^-)
1187.29 *13*	(7^-)	4717.35‡ *22*	(14^-)	8807.9‡ *3*	(20^-)		
1259.30& *15*	(7^-)	4884.74b *20*	(15^+)	9529.1# *3*	(21^-)		

† From least-squares fit to Eγ's.

‡ Band(A): $\pi g^2_{9/2}\nu g^3_{9/2}$,$\alpha$=0.

Band(a): $\pi g^2_{9/2}\nu g^3_{9/2}$,$\alpha$=1.

@ Band(B): $\pi g^3_{9/2}\nu g^4_{9/2}$,$\alpha$=0.

& Band(b): $\pi g^3_{9/2}\nu g^4_{9/2}$,$\alpha$=1.

a Band(C): $\pi g^1_{9/2}\nu g^3_{9/2}$, α=0. The band changes to $\pi g^3_{9/2}\nu g^3_{9/2}$ at higher spins. Assignment as signature partner is tentative.

b Band(c): $\pi g^3_{9/2}\nu g^3_{9/2}$,$\alpha$=1. Assignment as signature partner is tentative.

$\gamma(^{72}$Br)

A_R=Angular distribution (asymmetry) ratio.

Eγ	Iγ	E$_i$(level)	J^π_i	E$_f$	J^π_f	Comments
86.7 *1*	13.7 *11*	218.05	(3^-)	131.26	(2^-)	A_R=1.82 *7*.
103.7 *1*	30.7 *12*	1447.24	(9^+)	1343.69	(8^-)	DCO=0.51 *2* A_R=1.25 *4*.

^{40}Ca(^{36}Ar,3pnγ) 2004Ol04 (continued)

γ(^{72}Br) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Comments
115.1 *1*	12.5 *14*	332.97	(3$^-$)	218.05	(3$^-$)	DCO=0.76 *4* A_R=1.30 *5*.
124.0 *10*	11.4 *11*	123.7	(2$^+$)	0	(1$^+$)	A_R=1.41 *3*.
124.0 *1*	7.1 *3*	667.49	(4$^-$)	543.45	(5$^+$)	
135.9 *3*	3.2 *1*	467.04	(5$^-$)	332.97	(3$^-$)	DCO=0.84 *4*
171.4 *1*	3.2 *1*	4884.74	(15$^+$)	4713.88	(14$^-$)	A_R=1.23 *4*.
179.0 *1*	4.5 *4*	397.55	(2$^-$)	218.05	(3$^-$)	DCO=0.75 *4* A_R=1.21 *4*.
184.4 *1*	1.9 *6*	402.42	(4$^-$)	218.05	(3$^-$)	A_R=1.11 *4*.
192.2 *1*	2.2 *1*	658.80	(5$^-$)	467.04	(5$^-$)	
201.1 *1*	7.9 *4*	667.49	(4$^-$)	467.04	(5$^-$)	DCO=0.9 *3* A_R=1.6 *3*.
201.8 *1*	29 *3*	332.97	(3$^-$)	131.26	(2$^-$)	DCO=0.86 *6* A_R=1.01 *9*.
228.6 *1*	9.1 *11*	228.94	(3$^+$)	0	(1$^+$)	DCO=0.80 *5* A_R=1.29 *9*.
248.0 *1*	13.4 *14*	715.66	(6$^-$)	467.04	(5$^-$)	A_R=1.06 *2*.
249.2 *1*	26.7 *9*	467.04	(5$^-$)	218.05	(3$^-$)	A_R=1.06 *2*.
254.4 *1*	8.6 *5*	543.45	(5$^+$)	289.01	(3$^+$)	DCO=0.98 *4* A_R=1.25 *7*.
269.0 *1*	13.3 *8*	1259.30	(7$^-$)	990.45	(6$^-$)	A_R=1.00 *1*.
269.8 *1*	49.8 *17*	667.49	(4$^-$)	397.55	(2$^-$)	DCO=1.00 *1* A_R=1.00 *1*.
274.2 *10*	10.4 *8*	397.55	(2$^-$)	123.7	(2$^+$)	A_R=0.90 *3*.
274.2 *2*	1.6 *2*	990.45	(6$^-$)	715.66	(6$^-$)	
289.0 *1*	24.3 *11*	289.01	(3$^+$)	0	(1$^+$)	DCO=0.79 *5* A_R=1.00 *2*.
299.2 *1*	7.9 *3*	3627.99	(13$^+$)	3328.30	(12$^-$)	A_R=1.33 *5*.
311.1 *1*	19.4 *7*	2496.53	(11$^+$)	2185.25	(10$^-$)	DCO=0.81 *3* A_R=1.28 *3*.
323.1 *1*	100 *3*	990.45	(6$^-$)	667.49	(4$^-$)	DCO=1.06 *3* A_R=1.06 *11*.
325.8 *1*	26.2 *11*	658.80	(5$^-$)	332.97	(3$^-$)	DCO=1.14 *6* A_R=0.93 *7*.
346.0 *2*	2.4 *1*	748.33	(5$^-$)	402.42	(4$^-$)	DCO=0.86 *6* A_R=0.74 *2*.
353.1 *1*	89 *3*	1343.69	(8$^-$)	990.45	(6$^-$)	DCO=1.16 *3* A_R=0.93 *3*.
378.5 *1*	21.0 *7*	667.49	(4$^-$)	289.01	(3$^+$)	DCO=0.64 *3* A_R=1.15 *2*.
397.9 *1*	32.5 *25*	397.55	(2$^-$)	0	(1$^+$)	DCO=0.88 *3* A_R=1.06 *3*.
416.2 *3*	2.2 *1*	748.33	(5$^-$)	332.97	(3$^-$)	A_R=0.70 *2*.
438.2 *1*	8.7 *4*	667.49	(4$^-$)	228.94	(3$^+$)	DCO=1.00 *4* A_R=1.16 *5*.
471.1 *1*	14.4 *4*	1187.29	(7$^-$)	715.66	(6$^-$)	DCO=0.73 *14* A_R=0.92 *3*.
490.6 *1*	10.1 *5*	957.68	(7$^-$)	467.04	(5$^-$)	DCO=1.03 *4* A_R=0.96 *2*.
528.8 *1*	7.5 *2*	1187.29	(7$^-$)	658.80	(5$^-$)	A_R=0.60 *3*.
570.3 *1*	6.3 *3*	1318.51	(7$^-$)	748.33	(5$^-$)	DCO=1.33 *7* A_R=0.88 *3*.
644.6 *1*	12.3 *6*	1988.43	(9$^-$)	1343.69	(8$^-$)	DCO=0.72 *3* A_R=0.64 *19*.
653.6 *1*	13.2 *5*	1611.33	(8$^-$)	957.68	(7$^-$)	DCO=0.64 *3* A_R=1.25 *2*.

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^{40}Ca(^{36}Ar,3pnγ) 2004Ol04 (continued)

γ(^{72}Br) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Comments
659.8 *1*	18.1 *7*	1318.51	(7$^-$)	658.80	(5$^-$)	DCO=1.92 *8* A_R=0.90 *2*.
729.7 *2*	4.5 *3*	1988.43	(9$^-$)	1259.30	(7$^-$)	DCO=1.33 *12*
738.1 *2*	4.3 *3*	2185.25	(10$^-$)	1447.24	(9$^+$)	DCO=0.68 *6* A_R=1.15 *3*.
763.2 *1*	21.4 *8*	2081.50	(9$^-$)	1318.51	(7$^-$)	DCO=1.25 *3* A_R=0.55 *2*.
840.1 *10*	3.6 *4*	3025.6	(11$^-$)	2185.25	(10$^-$)	
841.4 *1*	48.5 *17*	2185.25	(10$^-$)	1343.69	(8$^-$)	DCO=1.34 *4* A_R=0.39 *1*.
867.3 *1*	27.8 *9*	2478.63	(10$^-$)	1611.33	(8$^-$)	DCO=1.23 *5* A_R=0.97 *3*.
894.0 *1*	21.9 *7*	2081.50	(9$^-$)	1187.29	(7$^-$)	DCO=1.05 *21* A_R=0.89 *2*.
895.7 *1*	9.9 *4*	1611.33	(8$^-$)	715.66	(6$^-$)	DCO=1.30 *3* A_R=0.89 *2*.
995.8 *1*	40.4 *13*	3077.31	(11$^-$)	2081.50	(9$^-$)	DCO=0.83 *9* A_R=0.91 *2*.
1036.4 *1*	27.7 *10*	3515.04	(12$^-$)	2478.63	(10$^-$)	DCO=1.07 *3* A_R=0.98 *2*.
1037.2 *2*	12.7 *7*	3025.6	(11$^-$)	1988.43	(9$^-$)	DCO=0.81 *11* A_R=0.98 *2*.
1049.4 *1*	34.1 *12*	2496.53	(11$^+$)	1447.24	(9$^+$)	DCO=1.26 *3* A_R=0.74 *3*.
1120.3 *1*	16.5 *7*	5323.36	(15$^-$)	4203.32	(13$^-$)	
1126.0 *1*	31.1 *11*	4203.32	(13$^-$)	3077.31	(11$^-$)	
1131.4 *1*	45.8 *15*	3627.99	(13$^+$)	2496.53	(11$^+$)	
1143.1 *1*	24.1 *9*	3328.30	(12$^-$)	2185.25	(10$^-$)	
1156.0 *2*	9.8 *5*	5360.42		4203.32	(13$^-$)	
1189.5 *8*	8.1 *4*	5515.2	(15$^-$)	4325.6	(13$^-$)	A_R=1.05 *1*.
1201.3 *1*	6.5 *3*	6562.00	(17$^-$)	5360.42		A_R=0.80 *1*.
1202.3 *1*	19.2 *7*	4717.35	(14$^-$)	3515.04	(12$^-$)	DCO=1.30 *3* A_R=0.80 *1*.
1238.9 *1*	12.5 *5*	6562.00	(17$^-$)	5323.36	(15$^-$)	A_R=0.69 *3*.
1256.2 *1*	29.9 *10*	4884.74	(15$^+$)	3627.99	(13$^+$)	DCO=1.22 *5* A_R=1.11 *3*.
1273.3 *1*	10.4 *4*	5990.66	(16$^-$)	4717.35	(14$^-$)	DCO=1.40 *7*
1300.0 *3*	10.2 *5*	4325.6	(13$^-$)	3025.6	(11$^-$)	DCO=0.91 *4* A_R=0.78 *1*.
1378.0 *1*	26.0 *9*	6262.75	(17$^+$)	4884.74	(15$^+$)	
1384.7 *1*	9.9 *4*	7375.4	(18$^-$)	5990.66	(16$^-$)	
1386.1 *1*	16.4 *7*	4713.88	(14$^-$)	3328.30	(12$^-$)	
1404.1 *1*	17.9 *6*	7966.1	(19$^-$)	6562.00	(17$^-$)	DCO=1.03 *4* A_R=1.24 *3*.
1432.5 *1*	8.9 *4*	8807.9	(20$^-$)	7375.4	(18$^-$)	
1449.0 *6*	2.6 *2*	5652.3	(14$^+$)	4203.32	(13$^-$)	
1451.0 *8*	1.2 *2*	7103.4	(16$^+$)	5652.3	(14$^+$)	
1526.7 *1*	13.7 *6*	6240.60	(16$^-$)	4713.88	(14$^-$)	DCO=0.81 *23* A_R=0.98 *2*.
1532.4 *10*	3.5 *3*	7047.6	(17$^-$)	5515.2	(15$^-$)	DCO=2.3 *14*
1563.0 *1*	10.1 *4*	9529.1	(21$^-$)	7966.1	(19$^-$)	DCO=0.99 *4* A_R=0.96 *2*.
1597.7 *1*	7.6 *3*	10405.6	(22$^-$)	8807.9	(20$^-$)	A_R=1.11 *3*.
1611.7 *1*	11.8 *5*	7874.47	(19$^+$)	6262.75	(17$^+$)	DCO=1.17 *4* A_R=1.00 *3*.
1649.1 *10*	0.9 *1*	8752.5	(18$^+$)	7103.4	(16$^+$)	

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^{40}Ca(^{36}Ar,3pnγ) 2004Ol04 (continued)

γ(^{72}Br) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Comments
1670.2 *2*	6.9 *3*	7910.8	(18$^-$)	6240.60	(16$^-$)	DCO=1.12 *5* A_R=1.10 *3*.
1755.0 *10*	2.0 *2*	8802.6	(19$^-$)	7047.6	(17$^-$)	
1769.0 *1*	6.2 *3*	11298.2	(23$^-$)	9529.1	(21$^-$)	DCO=0.95 *2* A_R=0.95 *2*.
1790.0 *4*	0.4 *1*	10542.5	(20$^+$)	8752.5	(18$^+$)	E_γ: from figure 1 of 2004Ol04; 1769.0 in table III is a misprint.
1833.1 *6*	1.5 *2*	9743.9	(20$^-$)	7910.8	(18$^-$)	
1847.3 *2*	3.0 *2*	8087.9		6240.60	(16$^-$)	
1942.3 *2*	5.8 *3*	9816.8	(21$^+$)	7874.47	(19$^+$)	DCO=1.05 *6* A_R=1.23 *3*.
1961.2 *2*	2.5 *2*	12366.8	(24$^-$)	10405.6	(22$^-$)	A_R=1.05 *3*.
1991.4 *16*	0.6 *1*	12533.9	(22$^+$)	10542.5	(20$^+$)	A_R=1.07 *4*.
2027.0 *3*	3.5 *1*	11843.8	(23$^+$)	9816.8	(21$^+$)	A_R=1.29 *3*.
2056.7 *10*	0.7 *1*	11800.7	(22$^-$)	9743.9	(20$^-$)	
2083.4 *2*	3.5 *2*	13381.6	(25$^-$)	11298.2	(23$^-$)	
2092.4 *4*	2.5 *2*	13936.3	(25$^+$)	11843.8	(23$^+$)	A_R=0.85 *2*.
2294.0 *8*	0.9 *1*	16230.3	(27$^+$)	13936.3	(25$^+$)	A_R=1.22 *4*.
2441.7 *5*	1.1 *1*	14808.6	(26$^-$)	12366.8	(24$^-$)	A_R=1.17 *4*.
2516.9 *8*	0.9 *1*	15898.5	(27$^-$)	13381.6	(25$^-$)	A_R=1.08 *4*.
2575.8 *24*	0.2 *1*	18806	(29$^+$)	16230.3	(27$^+$)	
2991.0 *13*	0.1	17799.7	(28$^-$)	14808.6	(26$^-$)	
3068.6 *18*	0.3	18967.2	(29$^-$)	15898.5	(27$^-$)	

^{40}Ca(^{36}Ar,3pnγ) 2004Ol04

Level Scheme

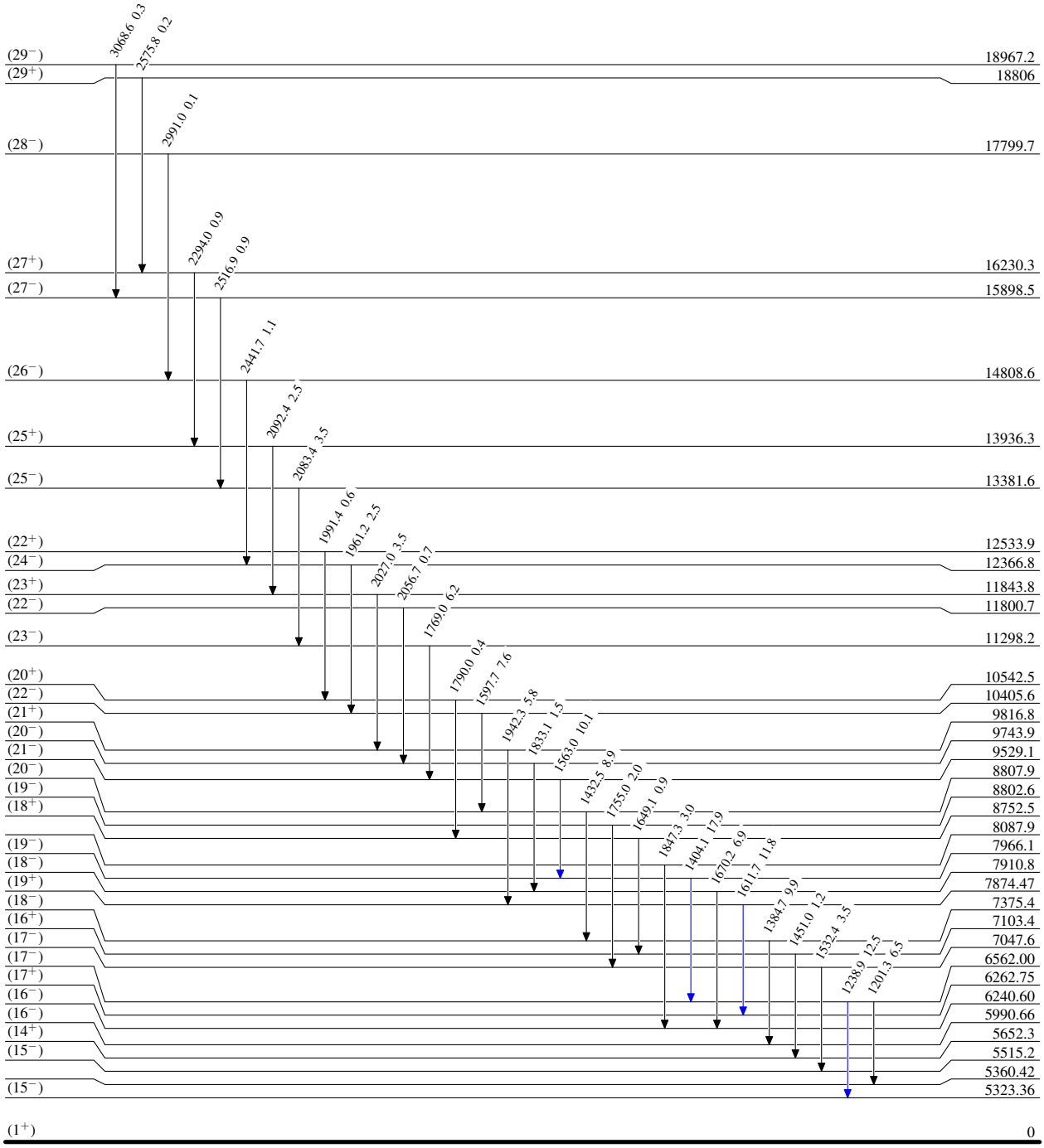
Intensities: Relative I_γ

Legend

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

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

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

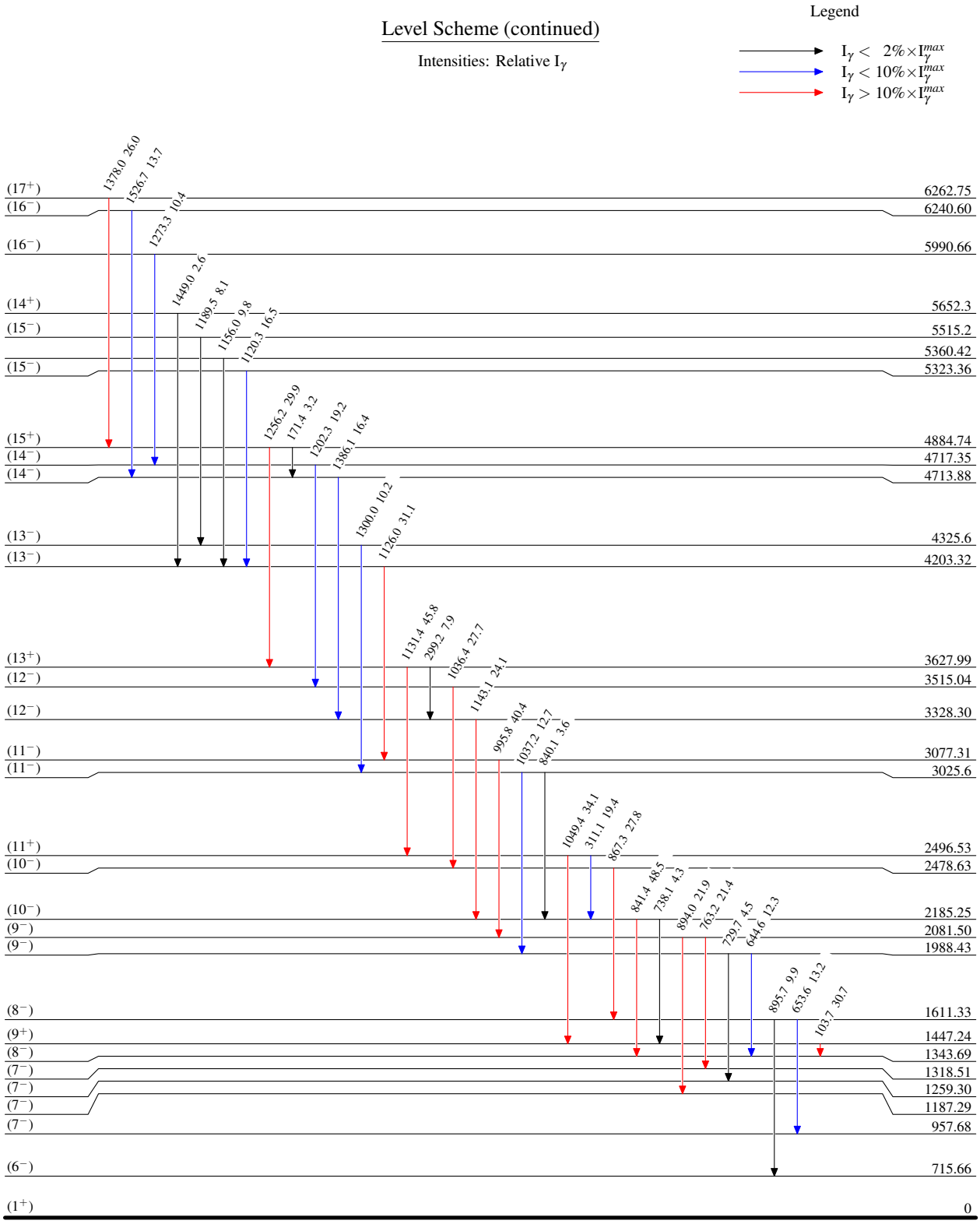


$^{72}_{35}Br_{37}$

^{40}Ca(^{36}Ar,3pnγ) 2004Ol04

Level Scheme (continued)

Intensities: Relative I_γ



$^{72}_{35}Br_{37}$

^{40}Ca(^{36}Ar,3pnγ) 2004Ol04

Level Scheme (continued)

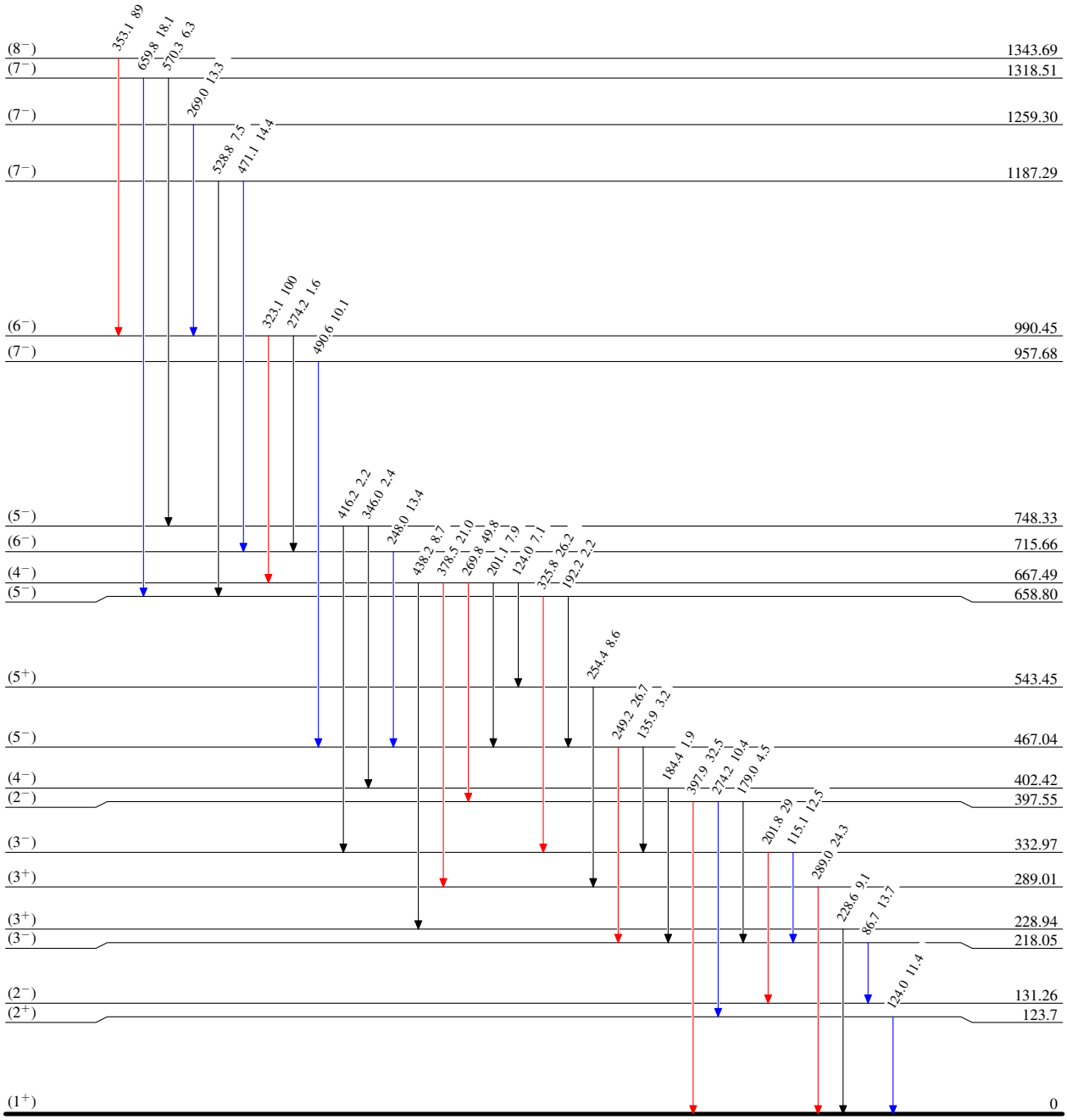
Intensities: Relative I_γ

Legend

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

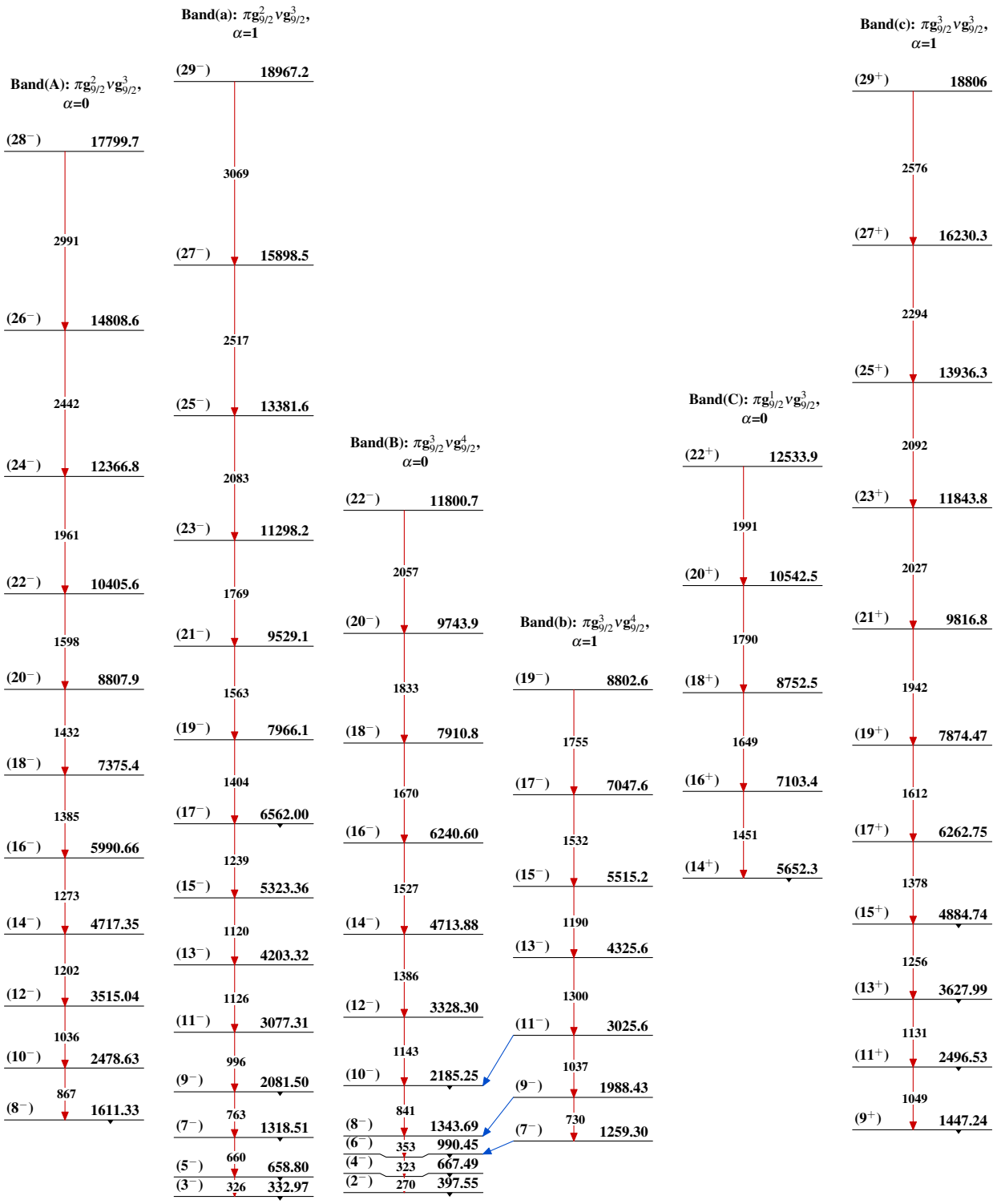
$I_\gamma < 10\% \times I_\gamma^{max}$

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



$^{72}_{35}Br_{37}$

$^{40}Ca(^{36}Ar,3pn\gamma)$ 2004Ol04



$^{72}_{35}Br_{37}$