^{72}Ge(^{35}Cl,p3nγ) 2007Ch74

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	D. De Frenne	NDS 110, 2081 (2009)	1-Mar-2009

2007Ch74: ^{72}Ge(^{35}Cl,p3nγ): E=135 MeV beam provided by ATLAS facility at Argonne. Measured: Eγ, Iγ, $\gamma(\theta)$, $\gamma\gamma$ coin using GAMMASPHERE array. Comparisons with core+particle coupling model.

^{103}Cd Levels

E(level)‡	Jπ†	E(level)‡	Jπ†	E(level)‡	Jπ†	E(level)‡	Jπ†
0.0&	5/2$^+$	3883.6 *4*		5633.8 *4*	(31/2$^+$)	7193.3 *11*	
188.07# *16*	7/2$^+$	4000.4a *3*	23/2$^-$	5714.6a *5*	31/2$^-$	7343.6 *6*	
739.81& *10*	9/2$^+$	4025.1# *4*	27/2$^+$	5837.3 *4*	(31/2$^+$)	7357.8 *7*	
908.15# *17*	11/2$^+$	4096.2& *4*	(23/2$^+$)	5837.5& *6*	(31/2$^+$)	7483.7 *9*	
1511.47& *22*	13/2$^+$	4352.9& *4*	(27/2$^+$)	5909.3# *4*	(31/2$^+$)	7789.9 *7*	
1670.5a *3*	11/2$^-$	4545.9@ *5*	(25/2$^+$)	5983.2 *5*	(31/2$^+$)	8011.7a *9*	39/2$^-$
1829.42# *22*	15/2$^+$	4581.4 *11*		6045.3 *4*	(31/2$^+$)	8260.8 *9*	
2184.1& *3*	17/2$^+$	4729.4 *4*	(27/2$^+$)	6218.1& *7*	(33/2$^+$)	8555.9 *6*	
2313.7a *3*	15/2$^-$	4778.9& *4*	(29/2$^+$)	6272.8 *5*		8609.9 *9*	
2452.2# *3*	19/2$^+$	4813.4a *4*	27/2$^-$	6375.9# *5*	(33/2$^+$)	8621.6 *10*	
2570.7# *3*	21/2$^+$	4836.3# *4*	(29/2$^+$)	6462.7 *11*		8775.4 *10*	
2611.6@ *4*	19/2$^+$	5041.1 *4*	(29/2$^+$)	6489.4& *5*	(35/2$^+$)	8861.1 *11*	
2779.9 *4*	(23/2$^+$)	5098.1 *4*	(27/2$^+$)	6549.2 *11*		9163.1 *11*	
2798.55@ *24*	(19/2$^+$)	5202.3 *4*	(27/2$^+$)	6631.5 *7*		9686.8 *9*	
3077.0& *4*	21/2$^+$	5230.8 *10*	(31/2)	6633.5 *9*	(35/2$^+$)	9687.4 *8*	
3132.3a *3*	19/2$^-$	5371.9 *4*	(29/2$^+$)	6687.4 *5*	(33/2$^+$)	9707.1a *11*	(43/2$^-$)
3252.9 *4*		5518.8& *7*	(29/2$^+$)	6772.0 *8*		9725.4 *10*	
3596.4# *3*	23/2$^+$	5547.6@ *10*	(29/2$^+$)	6777.5a *5*	35/2$^-$	11877.7a *15*	(47/2$^-$)
3658.5@ *6*	(21/2$^+$)	5570.7 *4*		7051.8 *11*			
3765.8# *4*	25/2$^+$	5587.6 *4*	(29/2$^+$)	7070.5# *9*	(35/2$^+$)		

† Based on $\gamma(\theta)$, and observed cascades in ^{72}Ge(^{35}Cl,p3nγ); Also the general argument was used that levels populated in heavy-ion reactions usually have spins increasing with excitation energy. Apart from parentheses the Adopted values are the same.
‡ From a least squares fit of observed γ's.
# Band(A): γ cascade based on 7/2$^+$.
@ Band(B): γ cascade based on 19/2$^+$.
& Band(C): γ cascade based on (5/2)$^+$ g.s.
a Band(D): γ cascade based on 11/2$^-$.

γ(^{103}Cd)

DCO: Gated on ΔJ=2, quadrupole transitions, unless otherwise noted.
DCO: Gating on a stretched quadrupole transition a value for the DCO ratio of about 1.0 is expected for a stretched quadrupole transition and about 0.5 for a stretched pure dipole transition. By gating on a stretched pure dipole one would get about 2.0 for a quadrupole and about 1.0 for a pure dipole transition. For a mixed dipole/quadrupole transition the DCO ratio depends on the value of the mixing ratio.

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^{72}Ge(^{35}Cl,p3nγ) 2007Ch74 (continued)

γ(^{103}Cd) (continued)

E_γ[†]	I_γ[†‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	α[&]	Comments
118.7 *3*	38 *4*	2570.7	21/2$^+$	2452.2	19/2$^+$	M1	0.286 *5*	DCO=0.53 *10*
168.4 *2*	1.8 *2*	908.15	11/2$^+$	739.81	9/2$^+$	M1	0.1094 *17*	DCO=0.56 *19*
170.4 *5*	10.2 *10*	3765.8	25/2$^+$	3596.4	23/2$^+$	M1	0.1059 *16*	DCO=0.52 *3*
187.7[#] *2*	100	188.07	7/2$^+$	0.0	5/2$^+$	M1	0.0816 *12*	DCO=0.99 *11*
187.7 *6*	2.3 *2*	2798.55	(19/2$^+$)	2611.6	19/2$^+$			
208.30 *17*		6045.3	(31/2$^+$)	5837.3	(31/2$^+$)			
209.1 *4*	8.0 *8*	2779.9	(23/2$^+$)	2570.7	21/2$^+$	M1	0.061 *3*	DCO=0.52 *14*
249.7[#] *7*	6.0 *6*	5837.5	(31/2$^+$)	5587.6	(29/2$^+$)	M1	0.0383 *6*	DCO=0.81 *13*
256.60 *16*	1.7 *1*	4352.9	(27/2$^+$)	4096.2	(23/2$^+$)	E2	0.0547 *8*	DCO=0.77 *14*
259.1 *2*	32 *3*	4025.1	27/2$^+$	3765.8	25/2$^+$	M1	0.0348 *5*	DCO=0.49 *8*
270.9[#] *8*	4.6 *5*	6489.4	(35/2$^+$)	6218.1	(33/2$^+$)	M1	0.0310 *5*	DCO=0.91 *16*
287.8 *3*	2.9 *3*	6777.5	35/2$^-$	6489.4	(35/2$^+$)	E1		DCO=0.53 *13*
318.20 *11*	9.6 *10*	1829.42	15/2$^+$	1511.47	13/2$^+$	M1	0.0205 *3*	DCO=0.5 *3* E_γ: Level energy difference=317.96.
318.6[#] *6*	4.4 *5*	5837.5	(31/2$^+$)	5518.8	(29/2$^+$)	M1	0.0204 *3*	DCO=0.72 *18*
330.6 *5*	5.4 *5*	6045.3	(31/2$^+$)	5714.6	31/2$^-$	E1		DCO=0.87 *15*
354.70 *15*	5.1 *5*	2184.1	17/2$^+$	1829.42	15/2$^+$	M1	0.01556 *22*	DCO=0.54 *23*
358.7 *5*		6631.5		6272.8				
380.4[#] *5*	14.0 *13*	6218.1	(33/2$^+$)	5837.5	(31/2$^+$)	M1	0.01305 *19*	DCO=1.1 *3*
385.30[#] *14*	3.2 *4*	5587.6	(29/2$^+$)	5202.3	(27/2$^+$)	M1	0.01264 *18*	DCO=0.80 *13*
415.4[#] *5*	7.7 *7*	6633.5	(35/2$^+$)	6218.1	(33/2$^+$)	M1		DCO=1.1 *3*
417.3[a]		6462.7		6045.3	(31/2$^+$)			
425.7 *6*	10.8 *10*	4778.9	(29/2$^+$)	4352.9	(27/2$^+$)	M1		DCO=0.49 *11*
443.7 *4*	9.9 *10*	6489.4	(35/2$^+$)	6045.3	(31/2$^+$)	E2		DCO=0.91 *14*
449.6 *3*	1.5 *2*	4545.9	(25/2$^+$)	4096.2	(23/2$^+$)			
451.9[#] *9*	4.4 *5*	5230.8	(31/2)	4778.9	(29/2$^+$)	D		DCO=0.91 *18*
466.60[#] *13*	7.7 *7*	6375.9	(33/2$^+$)	5909.3	(31/2$^+$)	M1		DCO=0.88 *13*
537.4[#] *3*	0.7 *1*	5909.3	(31/2$^+$)	5371.9	(29/2$^+$)	M1		DCO=0.88 *16*
551.9[#] *6*	8.9 *9*	739.81	9/2$^+$	188.07	7/2$^+$	M1		DCO=0.99 *5*
562.4[a]		7051.8		6489.4	(35/2$^+$)			
566.10 *23*	2.3 *3*	7343.6		6777.5	35/2$^-$			
580.3 *4*	0.60 *5*	7357.8		6777.5	35/2$^-$			
587.1[a]		6631.5		6045.3	(31/2$^+$)			
598.2 *3*	0.80 *7*	8609.9		8011.7	39/2$^-$			
604.6 *6*	13.7 *13*	1511.47	13/2$^+$	908.15	11/2$^+$	M1		DCO=0.50 *7* E_γ: Level energy difference=603.3.
609.9 *5*	0.70 *8*	8621.6		8011.7	39/2$^-$			
623.2 *2*	61 *6*	2452.2	19/2$^+$	1829.42	15/2$^+$	E2		DCO=0.99 *6* E_γ: Level energy difference=622.8.
630.70 *14*	0.5 *1*	3883.6		3252.9				
641.1 *4*	5.6 *5*	3252.9		2611.6	19/2$^+$			
642.30[#] *11*	4.4 *5*	5371.9	(29/2$^+$)	4729.4	(27/2$^+$)	M1		DCO=0.97 *13*
643.1 *3*	22.5 *21*	2313.7	15/2$^-$	1670.5	11/2$^-$	E2		DCO=0.94 *4*
672.3 *8*	10.3 *10*	2184.1	17/2$^+$	1511.47	13/2$^+$	E2		DCO=1.01 *6*
673.10[#] *14*	3.7 *4*	6045.3	(31/2$^+$)	5371.9	(29/2$^+$)	M1		DCO=0.89 *15* E_γ: Level energy difference=673.42.
689.2 *6*	0.3 *1*	3765.8	25/2$^+$	3077.0	21/2$^+$			
694.6[#] *7*	8.2 *8*	7070.5	(35/2$^+$)	6375.9	(33/2$^+$)	M1		DCO=0.83 *11*
704.10[#] *17*	2.3 *3*	6687.4	(33/2$^+$)	5983.2	(31/2$^+$)	M1		DCO=0.99 *14*
719.7[#] *2*	91 *9*	908.15	11/2$^+$	188.07	7/2$^+$	E2		DCO=1.69 *5*
739.8[#] *8*	6.1 *6*	5518.8	(29/2$^+$)	4778.9	(29/2$^+$)	M1		DCO=1.9 *3*
739.9 *1*	65 *6*	739.81	9/2$^+$	0.0	5/2$^+$	E2		DCO=0.88 *9*

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^{72}Ge(^{35}Cl,p3nγ) 2007Ch74 (continued)

γ(^{103}Cd) (continued)

E_γ[†]	I_γ[†‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	Comments
763.7 *4*	0.60 *7*	8775.4		8011.7	39/2$^-$		
773.1 *4*	33 *3*	1511.47	13/2$^+$	739.81	9/2$^+$	E2	DCO=0.84 *4* E_γ: Poor fit. Level energy difference=771.6.
782.4 *5*	13.0 *12*	2611.6	19/2$^+$	1829.42	15/2$^+$	E2	DCO=1.18 *9*
796.3 *7*		7483.7		6687.4	(33/2$^+$)		
801.1 *4*	19.6 *19*	2313.7	15/2$^-$	1511.47	13/2$^+$	E1	DCO=0.51 *21* E_γ: Level energy difference=802.2.
808.80[#] *18*	2.0 *2*	5587.6	(29/2$^+$)	4778.9	(29/2$^+$)	M1	DCO=1.89 *22*
811.2[#] *5*	10.8 *11*	4836.3	(29/2$^+$)	4025.1	27/2$^+$	M1	DCO=0.76 *10*
813.3 *3*	37 *4*	4813.4	27/2$^-$	4000.4	23/2$^-$	E2	DCO=0.97 *6*
815.6[a]		4581.4		3765.8	25/2$^+$		
818.5[#] *1*	42 *4*	3132.3	19/2$^-$	2313.7	15/2$^-$	E2	DCO=1.82 *13*
841.30[a] *13*		5570.7		4729.4	(27/2$^+$)		
849.30[#] *22*	3.2 *4*	5202.3	(27/2$^+$)	4352.9	(27/2$^+$)	M1	DCO=1.8 *3*
849.4 *6*	0.30 *4*	8861.1		8011.7	39/2$^-$		
860.1 *9*	8.2 *8*	3658.5	(21/2$^+$)	2798.55	(19/2$^+$)	M1	DCO=0.56 *13*
867.4 *3*	36 *3*	4000.4	23/2$^-$	3132.3	19/2$^-$	E2	DCO=0.93 *5* E_γ: Level energy difference=868.1.
868.30[#] *25*	1.8 *2*	5909.3	(31/2$^+$)	5041.1	(29/2$^+$)	M1	DCO=0.78 *15*
887.4 *6*	9.1 *9*	4545.9	(25/2$^+$)	3658.5	(21/2$^+$)	E2	DCO=0.95 *8*
892.2 *8*	10.8 *10*	3077.0	21/2$^+$	2184.1	17/2$^+$	E2	DCO=0.98 *4*
901.4 *3*	26.0 *25*	5714.6	31/2$^-$	4813.4	27/2$^-$	E2	DCO=0.88 *14*
917.2 *7*	1.2 *2*	8260.8		7343.6			
920.8 *2*	79 *8*	1829.42	15/2$^+$	908.15	11/2$^+$	E2	DCO=0.94 *3* E_γ: Level energy difference=921.3.
923.3 *2*	0.8 *1*	4000.4	23/2$^-$	3077.0	21/2$^+$		
930.6 *3*	25.9 *25*	1670.5	11/2$^-$	739.81	9/2$^+$	E1	DCO=0.50 *14*
942.2[#] *4*	0.10 *2*	5983.2	(31/2$^+$)	5041.1	(29/2$^+$)	M1	DCO=0.97 *18*
947.50 *17*	0.7 *1*	6045.3	(31/2$^+$)	5098.1	(27/2$^+$)	E2	DCO=0.60 *15*
947.8 *8*	4.2 *4*	3132.3	19/2$^-$	2184.1	17/2$^+$	E1	DCO=0.49 *13*
963.4 *8*	5.3 *5*	4096.2	(23/2$^+$)	3132.3	19/2$^-$	(M2)	DCO=1.01 *15*
963.50[#] *11*	5.0 *5*	4729.4	(27/2$^+$)	3765.8	25/2$^+$	M1	DCO=1.04 *13*
969.10 *11*	6.4 *6*	2798.55	(19/2$^+$)	1829.42	15/2$^+$	E2	DCO=0.98 *7*
1001.10[#] *18*	2.7 *3*	5837.3	(31/2$^+$)	4836.3	(29/2$^+$)	M1	DCO=0.88 *13*
1001.7 *8*	10.6 *10*	5547.6	(29/2$^+$)	4545.9	(25/2$^+$)	E2	DCO=0.88 *9*
1004.00[#] *17*	1.8 *2*	6045.3	(31/2$^+$)	5041.1	(29/2$^+$)	M1	DCO=1.00 *21*
1012.4 *4*	0.30 *4*	7789.9		6777.5	35/2$^-$		
1015.90 *11*	5.0 *5*	5041.1	(29/2$^+$)	4025.1	27/2$^+$	M1	DCO=0.43 *14*
1025.4[#] *4*	14.2 *13*	3596.4	23/2$^+$	2570.7	21/2$^+$	M1	DCO=1.16 *8*
1046.8 *9*	4.2 *4*	3658.5	(21/2$^+$)	2611.6	19/2$^+$	M1	DCO=0.53 *12*
1057.4[a] *6*	0.20 *3*	6772.0		5714.6	31/2$^-$		
1063.4 *4*	12.9 *12*	6777.5	35/2$^-$	5714.6	31/2$^-$	E2	DCO=0.81 *18*
1072.90[#] *11*	4.1 *4*	5909.3	(31/2$^+$)	4836.3	(29/2$^+$)	M1	DCO=0.93 *16*
1099.90 *15*	1.4 *1*	4352.9	(27/2$^+$)	3252.9			
1108.40 *25*	1.1 *1*	5837.3	(31/2$^+$)	4729.4	(27/2$^+$)		
1131.5 *5*	0.30 *4*	9687.4		8555.9			
1144.40 *16*	2.6 *3*	3596.4	23/2$^+$	2452.2	19/2$^+$		
1146.90[#] *22*	1.9 *2*	5983.2	(31/2$^+$)	4836.3	(29/2$^+$)	M1	DCO=0.85 *16*
1151.4[a] *7*	0.50 *4*	9163.1		8011.7	39/2$^-$		
1182.60 *24*	1.1 *1*	4778.9	(29/2$^+$)	3596.4	23/2$^+$		
1194.5 *3*	28 *3*	3765.8	25/2$^+$	2570.7	21/2$^+$	E2	DCO=0.99 *6* E_γ: Level energy difference=1195.1.

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^{72}Ge(^{35}Cl,p3nγ) 2007Ch74 (continued)

γ(^{103}Cd) (continued)

E_γ[†]	I_γ[†‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	Comments
1210.1[a]		7193.3		5983.2	(31/2$^+$)		
1234.2 *7*	4.1 *4*	8011.7	39/2$^-$	6777.5	35/2$^-$	E2	DCO=0.71 *17*
1332.40[#] *10*	1.3 *1*	5098.1	(27/2$^+$)	3765.8	25/2$^+$	M1	DCO=0.86 *17*
1346.70[#] *17*	1.0 *1*	5371.9	(29/2$^+$)	4025.1	27/2$^+$	M1	DCO=1.04 *17*
1429.90 *14*	1.5 *2*	4000.4	23/2$^-$	2570.7	21/2$^+$		
1436.5 *3*	0.10 *2*	6272.8		4836.3	(29/2$^+$)		
1465.3[a]		6045.3	(31/2$^+$)	4581.4			
1539.5 *4*	0.6 *1*	6375.9	(33/2$^+$)	4836.3	(29/2$^+$)	E2	DCO=0.61 *18*
1572.90 *12*	2.1 *2*	4352.9	(27/2$^+$)	2779.9	(23/2$^+$)	E2	DCO=0.43 *14*
1606.3[a]		5202.3	(27/2$^+$)	3596.4	23/2$^+$		
1608.60 *10*	1.0 *1*	5633.8	(31/2$^+$)	4025.1	27/2$^+$	E2	DCO=0.50 *18*
1675.1 *3*	0.40 *4*	9686.8		8011.7	39/2$^-$		
1695.4 *6*	0.40 *4*	9707.1	(43/2$^-$)	8011.7	39/2$^-$	(E2)	
1712.9[a]		6549.2		4836.3	(29/2$^+$)		
1713.7[a] *5*	0.30 *4*	9725.4		8011.7	39/2$^-$		
1778.4 *3*	0.40 *5*	8555.9		6777.5	35/2$^-$		
2170.6[a]		11877.7	(47/2$^-$)	9707.1	(43/2$^-$)	(E2)	

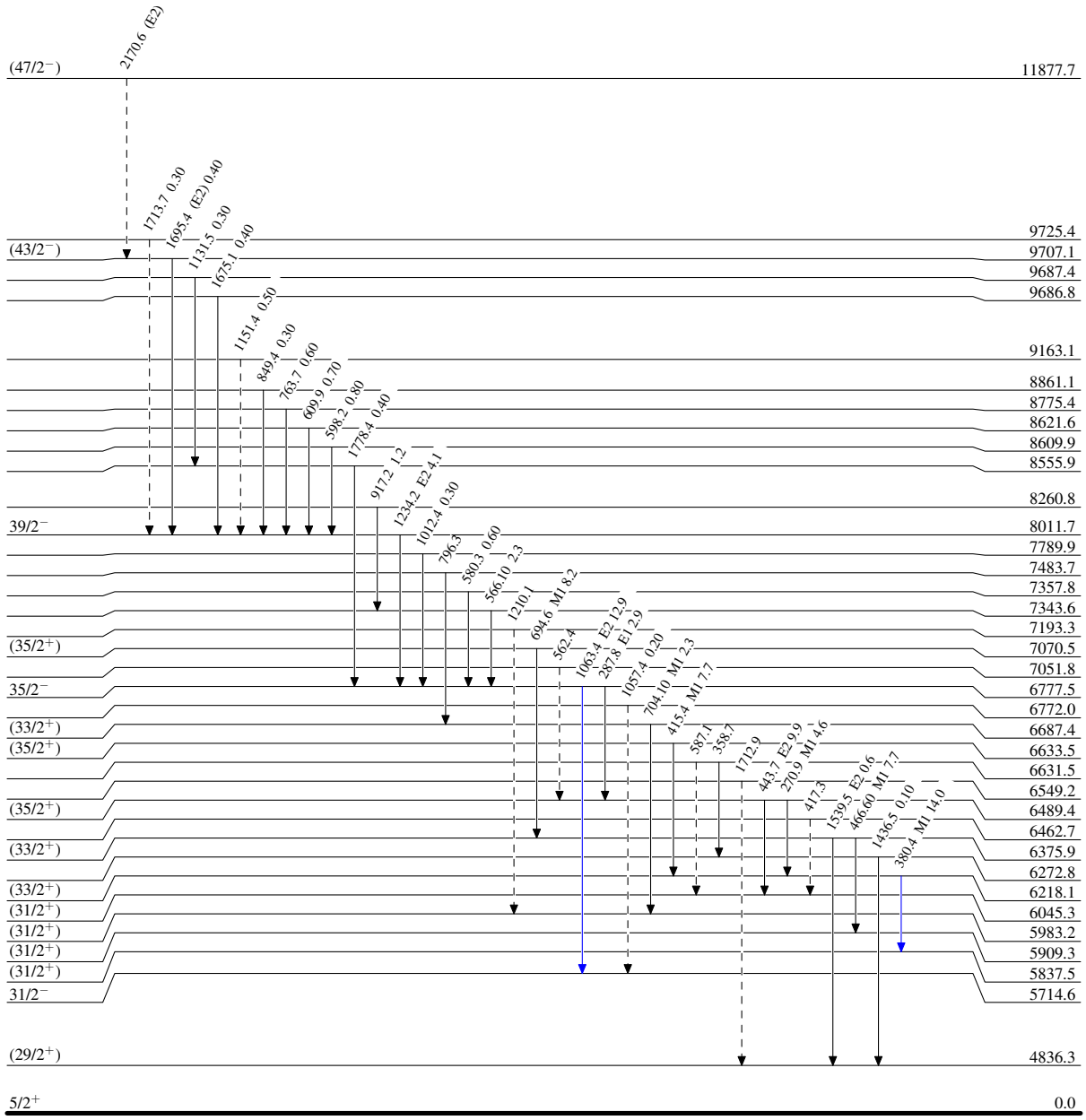
[†] From ^{72}Ge(^{35}Cl,p3nγ): E^{35}Cl=135 MeV (2007Ch74).
[‡] Weak intensity γ ray when not stated.
[#] DCO corresponds to gate on ΔJ=1, dipole transition.
[@] From DCO values. It was assumed that stretched quadrupole transitions were E2′s, pure dipoles either E1 or M1 depending on the level scheme and mixed transitions were expected to be M1+E2.
[&] 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.
[a] Placement of transition in the level scheme is uncertain.

^{72}Ge(^{35}Cl,p3nγ) 2007Ch74

Level Scheme

Intensities: Relative I_γ

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



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Level Scheme (continued)

Intensities: Relative I_γ

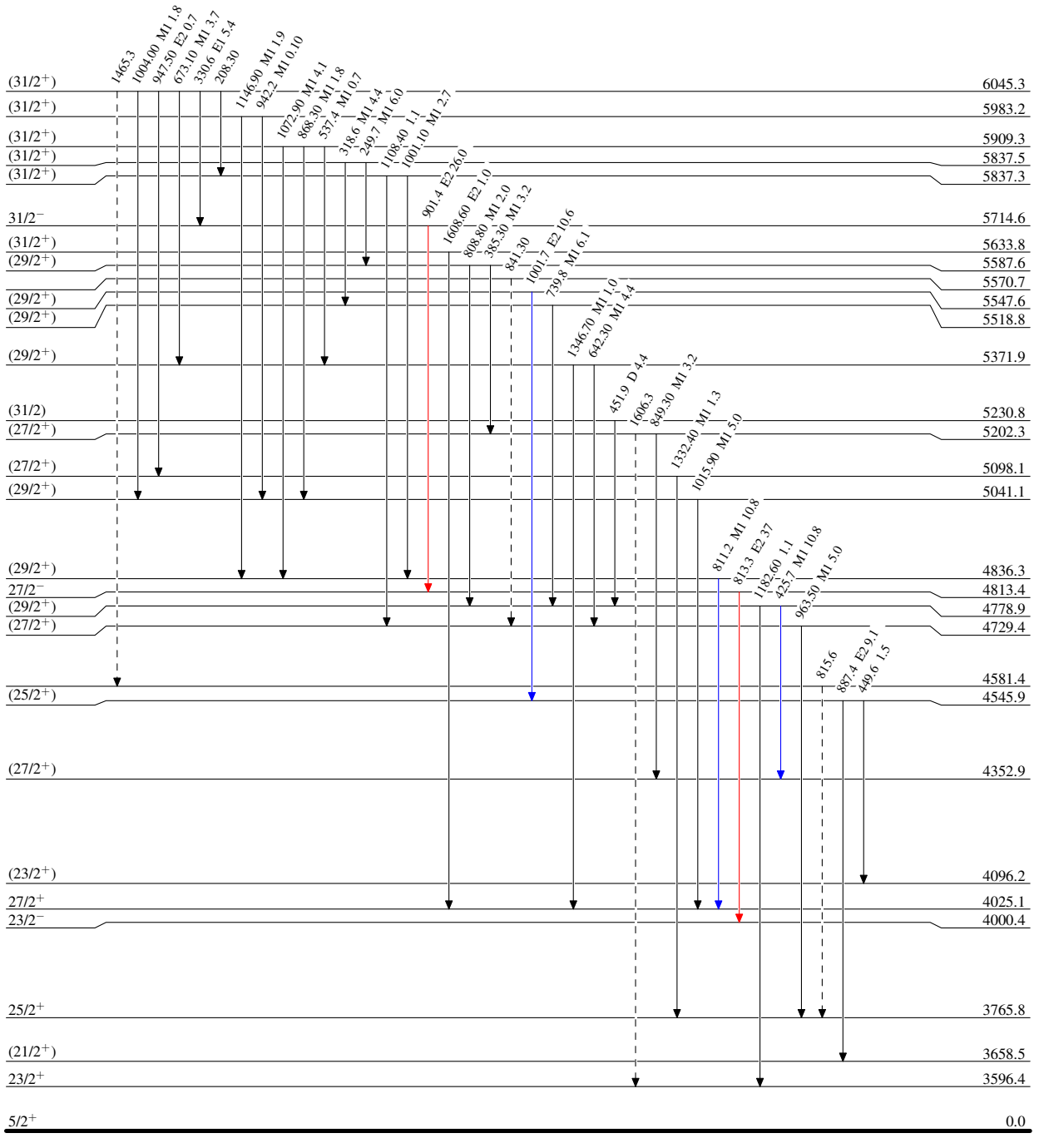
Legend

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

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

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

γ Decay (Uncertain)

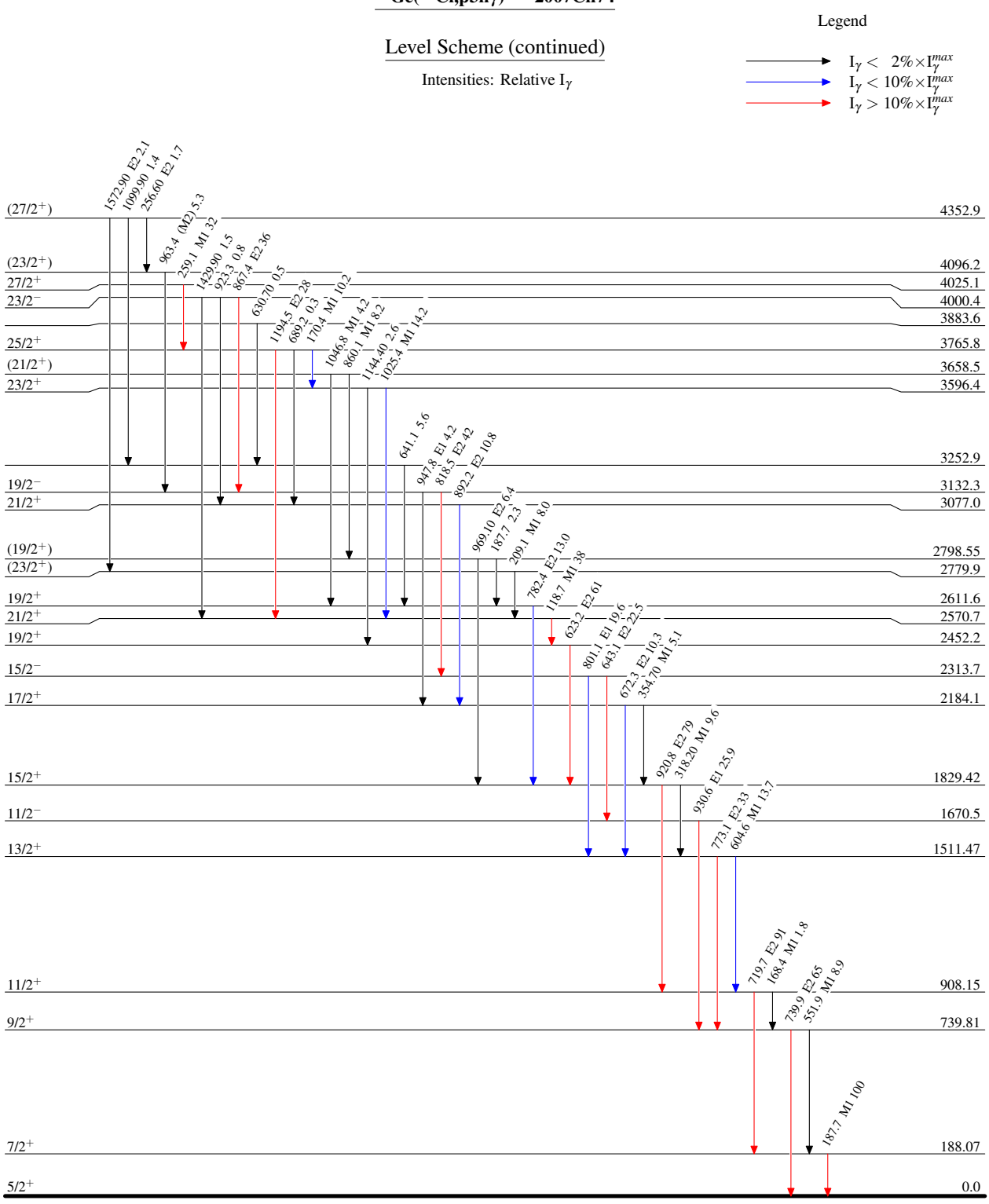


$^{103}_{48}Cd_{55}$

^{72}Ge(^{35}Cl,p3nγ) **2007Ch74**

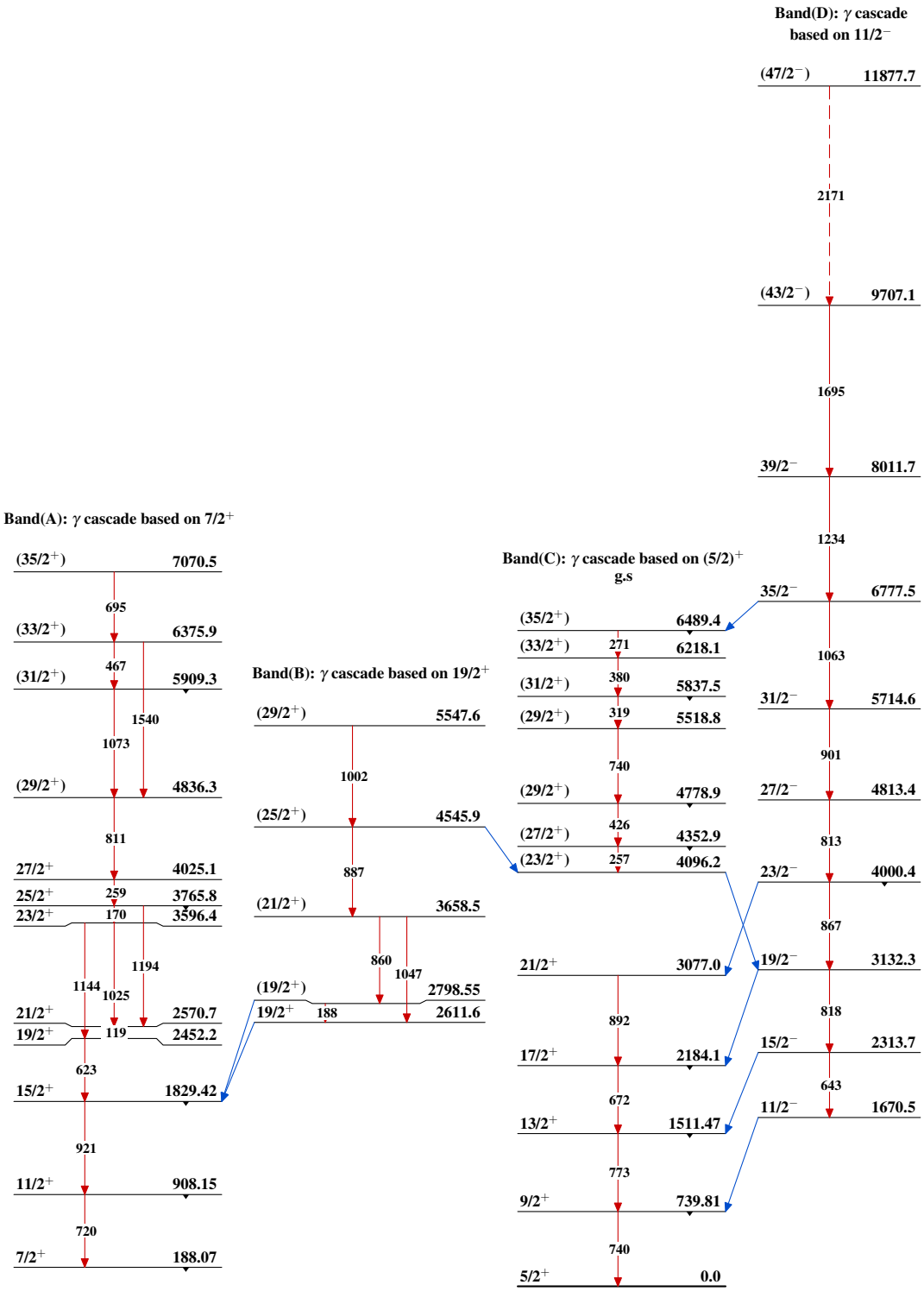
Level Scheme (continued)

Intensities: Relative I_γ



$^{103}_{48}Cd_{55}$

^{72}Ge(^{35}Cl,p3nγ) 2007Ch74



$^{103}_{48}Cd_{55}$