^{96}Zr(^{48}Ca,5nγ):E=195 MeV 2011Bh07

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	P. K. Joshi, B. Singh, S. Singh, A. K. Jain	NDS 138, 1 (2016)	15-Oct-2016

2011Bh07: E=195 MeV ^{48}Ca beam was produced at the Vivitron tandem accelerator at IReS, Strasbourg. Target of a self-supporting ^{96}Zr foil of 735 μg/cm^2 thickness. The γ rays were detected by the Euroball array consisting of 30 single, tapered Ge detectors, 15 cluster, and 26 clover composite Ge detectors, each surrounded by a BGO Compton-suppression shield. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma(\theta)$(DCO) and angular anisotropy ratios. Deduced levels, J, π, multipolarities. Comparison with cranked-shell model calculations.

^{139}Nd Levels

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$	Comments
0.0	3/2$^+$		
231.00[j] *19*	11/2$^-$	5.50 h	%IT=13.0 *10*; %ε+%β^+=87.0 *10* T$_{1/2}$ and decay modes are from Adopted Levels.
402.00 *19*	5/2$^+$		
896.40[j] *20*	15/2$^-$		
932.00[e] *23*	7/2$^-$		
1098.20 *20*	13/2$^-$		
1464.00[e] *24*	11/2$^-$		
1944.11 *21*	15/2$^+$		
1967.31 *20*	17/2$^-$		
1990.61 *21*	15/2$^+$		
2023.00[e] *22*	15/2$^-$		
2053.91[j] *21*	19/2$^-$		
2246.81 *21*	17/2$^+$		
2548.00[e] *23*	19/2$^-$		
2572.21 *21*	19/2$^+$		
2617.21 *22*	17/2$^+$		
2623.31[j] *21*	21/2$^-$		
2712.41 *22*	23/2$^-$		
2721.41 *21*	19/2$^+$		
2843.81[#] *21*	21/2$^+$		
2902.02 *25*	21/2$^-$		
3067.32[#] *22*	23/2$^+$		
3078.91 *23*	21/2$^+$		
3237.99 *24*	23/2$^+$		
3300.94[#] *23*	25/2$^+$		
3302.98[e] *25*	23/2$^-$		
3487.0 *3*	25/2$^+$		
3532.44[#] *25*	27/2$^+$		
3825.01 *23*	25/2$^-$		
3840.12 *21*	25/2$^-$		
3968.4[#] *3*	29/2$^+$		
3972.92[e] *23*	25/2$^-$		
3980.21[@] *22*	27/2$^-$		
3985.0 *3*	25/2$^-$		
4167.06 *22*	27/2$^-$		
4293.0[@] *3*	29/2$^-$		
4335.0[#] *3*	31/2$^+$		
4716.36 *25*	31/2$^-$		
4756.3[@] *3*	31/2$^-$		

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$^{96}Zr(^{48}Ca,5n\gamma)$:E=195 MeV 2011Bh07 (continued)

^{139}Nd Levels (continued)

E(level)[†]	J^{π}[‡]
4823.0[#] *3*	33/2+
4856.0[h] *3*	33/2+
4913.0[f] *3*	33/2+
4937.1[&] *3*	31/2−
4957.6[g] *3*	35/2+
5114.0[#] *3*	35/2+
5250.3[h] *3*	35/2+
5289.9[&] *3*	33/2−
5385.0[f] *3*	35/2+
5392.5[@] *3*	33/2−
5441.1[a] *3*	31/2−
5521.0 *4*	35/2+
5550.8 *3*	35/2−
5560.0[h] *3*	37/2+
5572.6 *3*	35/2−
5612.1[a] *4*	33/2−
5695.5[@] *3*	35/2−
5721.1[b] *4*	35/2−
5762.2[g] *3*	39/2+
5777.0[f] *3*	37/2+
5861.1[b] *4*	37/2−
5873.1[a] *5*	35/2−
5883.9[&] *4*	35/2−
6017.1[b] *5*	39/2−
6070.8[@] *3*	37/2−
6139.0[d] *3*	37/2−
6211.1[b] *5*	41/2−
6232.9[&] *4*	37/2−
6258.0[f] *4*	39/2+
6267.1[a] *5*	37/2−
6288.0 *4*	39/2+
6428.3 *3*	39/2−
6472.1[b] *6*	43/2−
6490.9[@] *4*	39/2−
6586.9[&] *5*	39/2−
6673.0[g] *4*	43/2+
6730.1[a] *5*	39/2−
6771.0[h] *4*	41/2+
6866.2[b] *6*	45/2−
6932.4[d] *3*	41/2−
7003.3[i] *4*	41/2−
7018.5 *4*	41/2−
7103.0[c] *4*	41/2−
7166.1[a] *5*	41/2−
7341.3[b] *6*	47/2−
7343.0[c] *4*	43/2−
7633.0[c] *4*	45/2−
7651.1 *4*	45/2−

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$^{96}Zr(^{48}Ca,5n\gamma)$:E=195 MeV 2011Bh07 (continued)

^{139}Nd Levels (continued)

E(level)[†]	Jπ[‡]	Comments
7702.1[g] 4	47/2+	
7718.0[i] 4	45/2−	
7718.6[d] 3	45/2−	
7721.1 4	47/2+	
8002.0[c] 5	47/2−	
8074.0 5	47/2−	
8149.1[g] 4	49/2+	
8336.0[c] 5	49/2−	
8361.0[i] 4	49/2−	
8745.4[d] 3	49/2−	
9134.1[k] 3	49/2−	
9395.0[i] 4	53/2−	
9717.0[k] 3	53/2−	
10459.0[k] 4	57/2−	
10517.0[l] 4	57/2−	
11089.1[l] 5	61/2−	
11353.0[k] 4	61/2−	
11827.1[l] 5	65/2−	
12414.5[k] 4	65/2−	
12789.1[l] 5	69/2−	
13663.3[k] 4	69/2−	
13975.3[l] 5	73/2−	
15110.5[k] 4	73/2−	
15392.2[l] 5	77/2−	
16741.5[k] 4	77/2−	
17023.2[l] 5	81/2−	
18525.5[k] 5	81/2−	
18839.2[l] 6	85/2−	
20854.2[l] 6	(89/2−)	
x[m]	J≈(51/2)	Additional information 1.
794.00+x[m] 10	J+2	
1662.01+x[m] 15	J+4	
2666.01+x[m] 18	J+6	
3849.01+x[m] 20	J+8	
5191.0+x[m] 3	J+10	
6650.0+x[m] 4	J+12	
8228.0+x[m] 4	J+14	
9953.1+x[m] 5	J+16	
11828.1+x[m] 5	(J+18)	

† From least-squares fit to Eγ data.

‡ As proposed in 2011Bh07 based on angular distribution and DCO data, band associations, and earlier known assignments for low-lying levels.

\# Band(A): ΔJ=1 band based on 21/2+.

@ Band(B): ΔJ=1 band based on 27/2−.

& Band(C): ΔJ=1 band based on 31/2−.

a Band(D): ΔJ=1 band based on 31/2−.

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^{96}Zr(^{48}Ca,5nγ):E=195 MeV 2011Bh07 (continued)

^{139}Nd Levels (continued)

[b] Band(E): ΔJ=1 band based on 35/2⁻.
[c] Band(F): ΔJ=1 band based on 41/2⁻.
[d] Band(G): ΔJ=2 band based on 37/2⁻.
[e] Band(H): Band based on 7/2⁻.
[f] Band(I): ΔJ=1 band based on 33/2⁺.
[g] Band(J): Band based on 35/2⁺.
[h] Band(K): Band based on 33/2⁺.
[i] Band(L): ΔJ=2 γ cascade based on 41/2⁻.
[j] Band(M): γ cascade based on 11/2⁻.
[k] Band(N): ΔJ=2 band based on 49/2⁻. The floating ΔJ=2 band based on 11/2⁻ may be signature partner of ΔJ=2 band.
[l] Band(O): ΔJ=2 band based on 57/2⁻.
[m] Band(P): ΔJ=2 band.

γ(^{139}Nd)

DCO ratios correspond to gates on ΔJ=2, quadrupole transitions. Expected ratios are 1.0 for ΔJ=2, quadrupole and 0.5 for ΔJ=1, dipole.
R_θ=Angular anisotropy ratio.
Additional information 2.

E_γ [†]	I_γ [†]	E_i(level)	J^π_i	E_f	J^π_f	Mult. [‡]	Comments
58.2 *2*	0.9 *2*	2902.02	21/2⁻	2843.81	21/2⁺	D [#]	α=1.12 for E1. R_θ=0.47.
89.1 *1*	11.6 *12*	2712.41	23/2⁻	2623.31	21/2⁻	D	DCO=0.42 α=1.97 for M1. R_θ=0.38.
104.2 *2*	2.7 *6*	2721.41	19/2⁺	2617.21	17/2⁺	D	DCO=0.40 α=1.26 for M1. R_θ=0.45.
122.4 *1*	10.6 *11*	2843.81	21/2⁺	2721.41	19/2⁺	D	DCO=0.48 α=0.797 for M1. R_θ=0.44.
140.0 *2*	1.1 *2*	5861.1	37/2⁻	5721.1	35/2⁻	D	DCO=0.37 α=0.546 for M1.
140.1 *1*	23.7 *24*	3980.21	27/2⁻	3840.12	25/2⁻	D	DCO=0.47 α=0.545 for M1. R_θ=0.45.
149.2 *1*	7.5 *8*	2721.41	19/2⁺	2572.21	19/2⁺	D [#]	DCO=0.55 α=0.457 for M1.
155.2 *1*	8.2 *8*	3980.21	27/2⁻	3825.01	25/2⁻	D	DCO=0.47 α=0.409 for M1. R_θ=0.56.
156.0 *2*	0.9 *2*	6017.1	39/2⁻	5861.1	37/2⁻	D	DCO=0.56 α=0.403 for M1. R_θ=0.48.
159.1 *2*	1.4 *3*	3237.99	23/2⁺	3078.91	21/2⁺	D	DCO=0.48 α=0.382 for M1. R_θ=0.50.
171.0 *2*	1.6 *3*	5612.1	33/2⁻	5441.1	31/2⁻	D	α=0.312 for M1. R_θ=0.39.
182.0 *2*	0.51 *10*	4167.06	27/2⁻	3985.0	25/2⁻	D	α=0.263 for M1. R_θ=0.57.

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$^{96}Zr(^{48}Ca,5n\gamma)$:E=195 MeV 2011Bh07 (continued)

$\gamma(^{139}Nd)$ (continued)

E_γ†	I_γ†	E_i(level)	J^π_i	E_f	J^π_f	Mult.‡	Comments
194.0 *2*	0.8 *2*	6211.1	41/2−	6017.1	39/2−		
194.2 *1*	13.8 *14*	4167.06	27/2−	3972.92	25/2−	D#	DCO=0.52 α=0.220 for M1. R_θ=0.51.
223.5 *1*	48.0	3067.32	23/2+	2843.81	21/2+	D	DCO=0.48 α=0.150 for M1. R_θ=0.52.
231.0 *2*		231.00	11/2−	0.0	3/2+	M4	Mult.: from Adopted Gammas.
231.5 *1*	34.1 *35*	3532.44	27/2+	3300.94	25/2+	D	DCO=0.47 α=0.137 for M1. R_θ=0.52.
233.6 *1*	42.0 *40*	3300.94	25/2+	3067.32	23/2+	D	DCO=0.48 α=0.133 for M1. R_θ=0.51.
240.0 *2*	3.1 *6*	7343.0	43/2−	7103.0	41/2−	D	DCO=0.55 R_θ=0.6.
249.0 *2*	1.8 *4*	3487.0	25/2+	3237.99	23/2+	D	DCO=0.62 α=0.112 for M1. R_θ=0.61.
256.2 *1*	16.9 *17*	2246.81	17/2+	1990.61	15/2+	D	DCO=0.53 R_θ=0.52.
261.0@ *2*	1.12@ *22*	5873.1	35/2−	5612.1	33/2−	D	α=0.099 for M1. R_θ=0.41.
261.0@ *2*	@	6472.1	43/2−	6211.1	41/2−		
271.0 *1*	6.9 *7*	5385.0	35/2+	5114.0	35/2+	D#	DCO=0.50 R_θ=0.51.
271.6 *1*	30.0 *30*	2843.81	21/2+	2572.21	19/2+	D	DCO=0.56 R_θ=0.52.
290.0 *1*	4.1 *4*	7633.0	45/2−	7343.0	43/2−	D	DCO=0.55 R_θ=0.55.
291.0 *2*	3.3 *7*	5114.0	35/2+	4823.0	33/2+	D	DCO=0.53 R_θ=0.55.
302.7 *1*	10.2 *10*	2246.81	17/2+	1944.11	15/2+	D	DCO=0.53 R_θ=0.56.
303.0 *1*	15.2 *15*	5695.5	35/2−	5392.5	33/2−	D	DCO=0.52 R_θ=0.56.
309.7 *1*	4.1 *4*	5560.0	37/2+	5250.3	35/2+	D	DCO=0.53 R_θ=0.51.
312.7 *1*	44.2 *44*	4293.0	29/2−	3980.21	27/2−	D	DCO=0.51 R_θ=0.50.
325.4 *1*	7.5 *8*	2572.21	19/2+	2246.81	17/2+	D	DCO=0.56 R_θ=0.42.
326.9 *1*	9.4 *10*	4167.06	27/2−	3840.12	25/2−	D	DCO=0.49 R_θ=0.50.
334.0 *2*	2.5 *5*	8336.0	49/2−	8002.0	47/2−	D	DCO=0.47
339.7 *2*	1.3 *3*	7343.0	43/2−	7003.3	41/2−	D	DCO=0.59 R_θ=0.60.
349.0 *2*	1.21 *24*	6232.9	37/2−	5883.9	35/2−	D	R_θ=0.42.
352.8 *2*	1.5 *3*	5289.9	33/2−	4937.1	31/2−	D	DCO=0.53
354.0 *2*	0.95 *20*	6586.9	39/2−	6232.9	37/2−		
357.5 *1*	4.1 *4*	3078.91	21/2+	2721.41	19/2+	D	DCO=0.6 R_θ=0.55.
366.6 *1*	18.8 *19*	4335.0	31/2+	3968.4	29/2+	D	DCO=0.48 R_θ=0.43.
369.0 *2*	2.1 *4*	8002.0	47/2−	7633.0	45/2−	D	DCO=0.58

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^{96}Zr(^{48}Ca,5nγ):E=195 MeV 2011Bh07 (continued)

γ(^{139}Nd) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	Comments
375.3 *1*	17.6 *18*	6070.8	37/2−	5695.5	35/2−	D	DCO=0.52 R_θ=0.51.
388.6 *1*	8.1 *8*	9134.1	49/2−	8745.4	49/2−	D#	DCO=0.53 R_θ=0.57.
392.0 *1*	7.1 *7*	5777.0	37/2+	5385.0	35/2+	D	DCO=0.52 R_θ=0.54.
394.0 *2*	0.9 *2*	6267.1	37/2−	5873.1	35/2−	D	DCO=0.42
394.1 *2*		6866.2	45/2−	6472.1	43/2−		
394.3 *1*	5.2 *5*	5250.3	35/2+	4856.0	33/2+	D	DCO=0.53 R_θ=0.52.
402.0 *2*	1.2 *24*	402.00	5/2+	0.0	3/2+	D	DCO=0.58
405.6 *1*	8.0 *8*	5695.5	35/2−	5289.9	33/2−	D	DCO=0.51 R_θ=0.53.
420.1 *1*	15.8 *16*	6490.9	39/2−	6070.8	37/2−	D	DCO=0.51 R_θ=0.56.
423.4 *1*	11.5 *12*	4716.36	31/2−	4293.0	29/2−	D	DCO=0.48 R_θ=0.46.
428.0 *2*	1.1 *2*	8149.1	49/2+	7721.1	47/2+	D	DCO=0.51
436.0@ *1*	33.0@ *33*	3968.4	29/2+	3532.44	27/2+	D	DCO=0.52 R_θ=0.55.
436.0@ *2*	3.1@ *6*	7166.1	41/2−	6730.1	39/2−	D	R_θ=0.53.
441.0 *2*	2.6 *5*	8074.0	47/2−	7633.0	45/2−	D	DCO=0.52 R_θ=0.55.
447.0 *2*	2.3 *5*	8149.1	49/2+	7702.1	47/2+	D	DCO=0.52 R_θ=0.56.
463.0 *1*	3.6 *4*	6730.1	39/2−	6267.1	37/2−	D	R_θ=0.62.
463.3 *1*	34.0 *35*	4756.3	31/2−	4293.0	29/2−	D	DCO=0.52 R_θ=0.51.
472.0 *1*	6.8 *7*	5385.0	35/2+	4913.0	33/2+	D	R_θ=0.57. DCO=0.5.
474.6 *1*	20.0 *20*	2721.41	19/2+	2246.81	17/2+	D	DCO=0.53 R_θ=0.57.
475.1 *2*	0.8 *2*	7341.3	47/2−	6866.2	45/2−	D	DCO=0.45
481.0 *1*	4.4 *5*	6258.0	39/2+	5777.0	37/2+	D	DCO=0.68
493.2 *2*		3980.21	27/2−	3487.0	25/2+		
504.0 *1*	6.5 *7*	6932.4	41/2−	6428.3	39/2−	D	DCO=0.52 R_θ=0.54.
511.0 *1*	4.5 *5*	6288.0	39/2+	5777.0	37/2+	D	DCO=0.43 R_θ=0.50.
512.4 *1*	10.6 *11*	7003.3	41/2−	6490.9	39/2−	D	DCO=0.52 R_θ=0.52.
521.0 *1*	7.1 *7*	4856.0	33/2+	4335.0	31/2+	D	DCO=0.52 R_θ=0.48.
525.0 *2*	1.3 *3*	2548.00	19/2−	2023.00	15/2−	Q	DCO=1.03
527.6 *1*	5.2 *5*	7018.5	41/2−	6490.9	39/2−	D	DCO=0.55 R_θ=0.6.
530.0 *2*	1.0 *2*	932.00	7/2−	402.00	5/2+	D	DCO=0.73
532.0 *2*	1.0 *2*	1464.00	11/2−	932.00	7/2−	Q	DCO=0.82
533.6 *1*	9.5 *10*	5289.9	33/2−	4756.3	31/2−	D	DCO=0.54 R_θ=0.50.
549.3 *1*	22.0 *22*	4716.36	31/2−	4167.06	27/2−	Q	DCO=1.03 R_θ=0.98.
559.0 *2*	1.0 *2*	2023.00	15/2−	1464.00	11/2−	Q	DCO=0.94
566.4 *2*	2.2 *5*	6139.0	37/2−	5572.6	35/2−	D	DCO=0.56 R_θ=0.48.
569.4 *1*	33.0 *33*	2623.31	21/2−	2053.91	19/2−	D	DCO=0.50 R_θ=0.51.

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$^{96}Zr(^{48}Ca,5n\gamma)$:E=195 MeV 2011Bh07 (continued)

$\gamma(^{139}Nd)$ (continued)

E_γ [†]	I_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [‡]	Comments
572.1 *1*	18.6 *19*	11089.1	61/2⁻	10517.0	57/2⁻	Q	DCO=0.83 R_θ=1.18.
578.0 *1*	10.8 *11*	4913.0	33/2⁺	4335.0	31/2⁺	D	DCO=0.67 R_θ=0.62.
581.6 *1*	7.1 *7*	2572.21	19/2⁺	1990.61	15/2⁺	Q	DCO=0.88 R_θ=0.93.
583.0 *1*	20.2 *20*	9717.0	53/2⁻	9134.1	49/2⁻	Q	DCO=0.92
588.3 *1*	18.8 *19*	6139.0	37/2⁻	5550.8	35/2⁻	D	DCO=0.56
594.0 *2*	1.4 *3*	5883.9	35/2⁻	5289.9	33/2⁻	D	DCO=0.62
597.0 *2*	2.8 *6*	2843.81	21/2⁺	2246.81	17/2⁺	Q	DCO=0.82
602.1 *2*	3.1 *6*	3840.12	25/2⁻	3237.99	23/2⁺	D	DCO=0.64 R_θ=0.62.
604.9 *1*	47.0 *50*	2572.21	19/2⁺	1967.31	17/2⁻	D	DCO=0.66 R_θ=0.69.
612.2 *2*	1.9 *4*	7103.0	41/2⁻	6490.9	39/2⁻	D	DCO=0.59
622.6 *1*	8.7 *9*	4957.6	35/2⁺	4335.0	31/2⁺	Q	DCO=0.85 R_θ=0.83.
632.6 *2*	1.5 *3*	7651.1	45/2⁻	7018.5	41/2⁻	Q	DCO=0.86 R_θ=0.82.
636.2 *1*	17.6 *18*	5392.5	33/2⁻	4756.3	31/2⁻	D	DCO=0.52 R_θ=0.54.
643.0 *2*	1.2 *3*	8361.0	49/2⁻	7718.0	45/2⁻	Q	DCO=0.83
644.1 *2*	2.3 *5*	4937.1	31/2⁻	4293.0	29/2⁻	D	DCO=0.67 R_θ=0.59.
647.8 *2*	1.2 *3*	7651.1	45/2⁻	7003.3	41/2⁻	Q	DCO=1.11
656.0 *1*	6.6 *7*	2623.31	21/2⁻	1967.31	17/2⁻	Q	DCO=1.01 R_θ=0.82.
658.5 *1*	6.2 *6*	2712.41	23/2⁻	2053.91	19/2⁻	Q	DCO=0.82 R_θ=0.83.
665.4 *1*	100 *10*	896.40	15/2⁻	231.00	11/2⁻	Q	DCO=1.02 R_θ=1.13.
670.0 *2*	0.85 *17*	3972.92	25/2⁻	3302.98	23/2⁻	D	DCO=0.61
679.2 *2*	2.7 *6*	3980.21	27/2⁻	3300.94	25/2⁺	D	DCO=0.7 R_θ=0.71.
682.0 *2*	0.34 *7*	3985.0	25/2⁻	3302.98	23/2⁻		
710.0 *2*	1.5 *3*	8361.0	49/2⁻	7651.1	45/2⁻	Q	DCO=0.84
714.7 *2*	1.3 *3*	7718.0	45/2⁻	7003.3	41/2⁻	Q	DCO=0.81
730.8 *1*	3.8 *4*	2721.41	19/2⁺	1990.61	15/2⁺	Q	DCO=0.8
735.0 *2*		3972.92	25/2⁻	3237.99	23/2⁺		
738.0 *1*	17.8 *18*	11827.1	65/2⁻	11089.1	61/2⁻	Q	DCO=0.95 R_θ=0.87.
742.0 *1*	20.1 *20*	10459.0	57/2⁻	9717.0	53/2⁻	Q	DCO=0.88
755.0 *2*	2.8 *6*	3302.98	23/2⁻	2548.00	19/2⁻	Q	DCO=1.02 R_θ=0.9.
772.8 *1*	3.8 *4*	3840.12	25/2⁻	3067.32	23/2⁺	D	DCO=0.77 R_θ=0.75.
779.0 *2*	2.1 *4*	5114.0	35/2⁺	4335.0	31/2⁺	Q	DCO=0.89 R_θ=0.95.
786.2 *1*	24.6 *25*	7718.6	45/2⁻	6932.4	41/2⁻	Q	DCO=0.93 R_θ=1.00.
793.6 *1*	18.6 *19*	6932.4	41/2⁻	6139.0	37/2⁻	Q	DCO=1.03 R_θ=0.93.
794.0 *1*	3.9 *4*	794.00+x	J+2	x	J≈(51/2)	Q	DCO=1.03 R_θ=0.92.
802.6 *1*	12.1 *12*	4335.0	31/2⁺	3532.44	27/2⁺	Q	DCO=0.85 R_θ=0.86.

Continued on next page (footnotes at end of table)

$^{96}Zr(^{48}Ca,5n\gamma)$:E=195 MeV 2011Bh07 (continued)

$\gamma(^{139}Nd)$ (continued)

E_γ †	I_γ †	E_i(level)	J^π_i	E_f	J^π_f	Mult. ‡	Comments
804.6 1	6.1 6	5762.2	39/2+	4957.6	35/2+	Q	DCO=0.96 R_θ=0.87.
834.4 1	28.0 28	5550.8	35/2−	4716.36	31/2−	Q	DCO=0.91 R_θ=0.89.
845.9 1	6.4 7	1944.11	15/2+	1098.20	13/2−	D	DCO=0.61
854.6 2	3.5 7	4823.0	33/2+	3968.4	29/2+	Q	DCO=0.83 R_θ=0.79.
856.3 2	3.1 6	5572.6	35/2−	4716.36	31/2−	Q	DCO=0.86
866.1 2	0.74 15	4167.06	27/2−	3300.94	25/2+	D	
867.2 1	38.1 38	1098.20	13/2−	231.00	11/2−	D	DCO=0.59 R_θ=0.55.
868.0 1	3.7 4	1662.01+x	J+4	794.00+x	J+2	Q	DCO=0.93 R_θ=0.96.
869.1 1	5.1 5	1967.31	17/2−	1098.20	13/2−	Q	DCO=1.08 R_θ=1.0.
877.4 1	7.0 7	6428.3	39/2−	5550.8	35/2−	Q	DCO=1.05 R_θ=0.93.
887.6 2	0.80 16	4856.0	33/2+	3968.4	29/2+	Q	DCO=0.89 R_θ=0.93.
892.4 1	26.1 26	1990.61	15/2+	1098.20	13/2−	D	DCO=0.77
894.0 1	19.1 19	11353.0	61/2−	10459.0	57/2−	Q	DCO=0.89 R_θ=1.08.
905.7 2		3972.92	25/2−	3067.32	23/2+		
910.8 1	3.8 4	6673.0	43/2+	5762.2	39/2+	Q	DCO=1.15 R_θ=0.91.
938.1 2	2.1 4	3840.12	25/2−	2902.02	21/2−	Q	DCO=0.89 R_θ=0.87.
961.9 1	15.6 16	12789.1	69/2−	11827.1	65/2−	Q	DCO=0.99 R_θ=1.09.
964.8 2	0.80 16	5721.1	35/2−	4756.3	31/2−	Q	R_θ=0.84.
971.4 1	8.5 9	9717.0	53/2−	8745.4	49/2−	Q	DCO=0.96 R_θ=0.87.
1004.0 1	4.7 5	2666.01+x	J+6	1662.01+x	J+4	Q	DCO=0.87 R_θ=0.91.
1025.0 1	7.3 7	3078.91	21/2+	2053.91	19/2−	D	DCO=0.58
1026.4 1	20.1 20	8745.4	49/2−	7718.6	45/2−	Q	DCO=1.1 R_θ=0.96.
1029.0 2	1.7 3	7702.1	47/2+	6673.0	43/2+	Q	R_θ=1.1.
1034.0 1	6.8 7	9395.0	53/2−	8361.0	49/2−	Q	DCO=1.02 R_θ=0.95.
1047.7 2	1.1 2	1944.11	15/2+	896.40	15/2−	D#	DCO=0.78
1048.0 2	1.8 3	7721.1	47/2+	6673.0	43/2+	Q	DCO=0.99
1061.5 1	15.5 15	12414.5	65/2−	11353.0	61/2−	Q	DCO=0.97 R_θ=1.10.
1070.9 1	47.8 48	1967.31	17/2−	896.40	15/2−	D	DCO=0.52 R_θ=0.46.
1112.6 1	7.7 8	3825.01	25/2−	2712.41	23/2−	D	DCO=0.59 R_θ=0.59.
1122.0 1	5.7 6	10517.0	57/2−	9395.0	53/2−	Q	DCO=0.92 R_θ=0.94.
1127.7 1	24.4 25	3840.12	25/2−	2712.41	23/2−	D	DCO=0.49 R_θ=0.41.
1157.5 1	41.7 42	2053.91	19/2−	896.40	15/2−	Q	DCO=1.05 R_θ=1.03.
1183.0 1	3.6 4	3849.01+x	J+8	2666.01+x	J+6	Q	DCO=1.02 R_θ=0.97.

Continued on next page (footnotes at end of table)

$^{96}Zr(^{48}Ca,5n\gamma)$:E=195 MeV 2011Bh07 (continued)

$\gamma(^{139}Nd)$ (continued)

E_γ †	I_γ †	E_i(level)	J^π_i	E_f	J^π_f	Mult. ‡	Comments
1186.0 *2*	0.9 *2*	5521.0	35/2+	4335.0	31/2+	Q	R_θ=1.01.
1186.2 *1*	9.6 *10*	13975.3	73/2−	12789.1	69/2−	Q	DCO=1.17 R_θ=1.20.
1201.7	1.0 *2*	3825.01	25/2−	2623.31	21/2−	Q	DCO=1.03 R_θ=1.01.
1211.0 *2*	1.5 *3*	6771.0	41/2+	5560.0	37/2+	Q	DCO=0.97
1216.8 *1*	7.1 *7*	3840.12	25/2−	2623.31	21/2−	Q	DCO=1.03 R_θ=1.07.
1248.8 *1*	9.5 *10*	13663.3	69/2−	12414.5	65/2−	Q	DCO=1.06 R_θ=1.18.
1274.0 *2*	2.8 *6*	5441.1	31/2−	4167.06	27/2−	Q	R_θ=0.86.
1342.0 *2*	3.5 *7*	5191.0+x	J+10	3849.01+x	J+8	Q	DCO=1.04
1350.4 *2*	1.2 *2*	2246.81	17/2+	896.40	15/2−	D	DCO=0.8 Evaluators′ note: DCO=0.8 seems too large for ΔJ=1, dipole.
1415.8 *1*	6.9 *7*	9134.1	49/2−	7718.6	45/2−	Q	DCO=1.01
1416.9 *1*	6.9 *7*	15392.2	77/2−	13975.3	73/2−	Q	DCO=1.05 R_θ=1.07.
1447.2 *1*	7.2 *7*	15110.5	73/2−	13663.3	69/2−	Q	DCO=1.11
1459.0 *2*	2.3 *5*	6650.0+x	J+12	5191.0+x	J+10	Q	DCO=1.07 R_θ=1.12.
1578.0 *2*	1.5 *3*	8228.0+x	J+14	6650.0+x	J+12	Q	DCO=1.26
1631.0@ *1*	4.0@ *4*	16741.5	77/2−	15110.5	73/2−	Q	DCO=1.08 R_θ=1.07.
1631.0@ *2*	3.5@ *7*	17023.2	81/2−	15392.2	77/2−	Q	DCO=1.02
1651.6 *2*		2548.00	19/2−	896.40	15/2−		
1720.8 *1*	9.7 *10*	2617.21	17/2+	896.40	15/2−	D	DCO=0.74
1725.0 *2*	1.1 *2*	9953.1+x	J+16	8228.0+x	J+14	Q	R_θ=1.19.
1784.0 *2*	2.2 *5*	18525.5	81/2−	16741.5	77/2−	Q	R_θ=1.15.
1792.0 *2*		2023.00	15/2−	231.00	11/2−		
1816.0 *2*	2.1 *4*	18839.2	85/2−	17023.2	81/2−	Q	DCO=1.07
1875.0 *2*		11828.1+x	(J+18)	9953.1+x	J+16		
2015.0 *2*	1.3 *3*	20854.2	(89/2−)	18839.2	85/2−		

† Uncertainties are: ΔEγ=0.1 keV for Iγ>3.5 and 0.2 keV for Iγ≤3.5, corresponding ΔIγ=10% and 20% (private communication with authors of 2011Bh07).

‡ Assignments are based on DCO ratios and angular anisotropies. Since such measurements are insensitive to parity assignment, the evaluators assign mult=Q for stretched quadrupoles (E2 assigned in 2011Bh07), and mult=D for ΔJ=1 transitions (M1 or E1 assigned in 2011Bh07). As indicated, there are only six ΔJ=0, dipole transitions (two assumed E1 and four M1).

ΔJ=0, dipole transition.

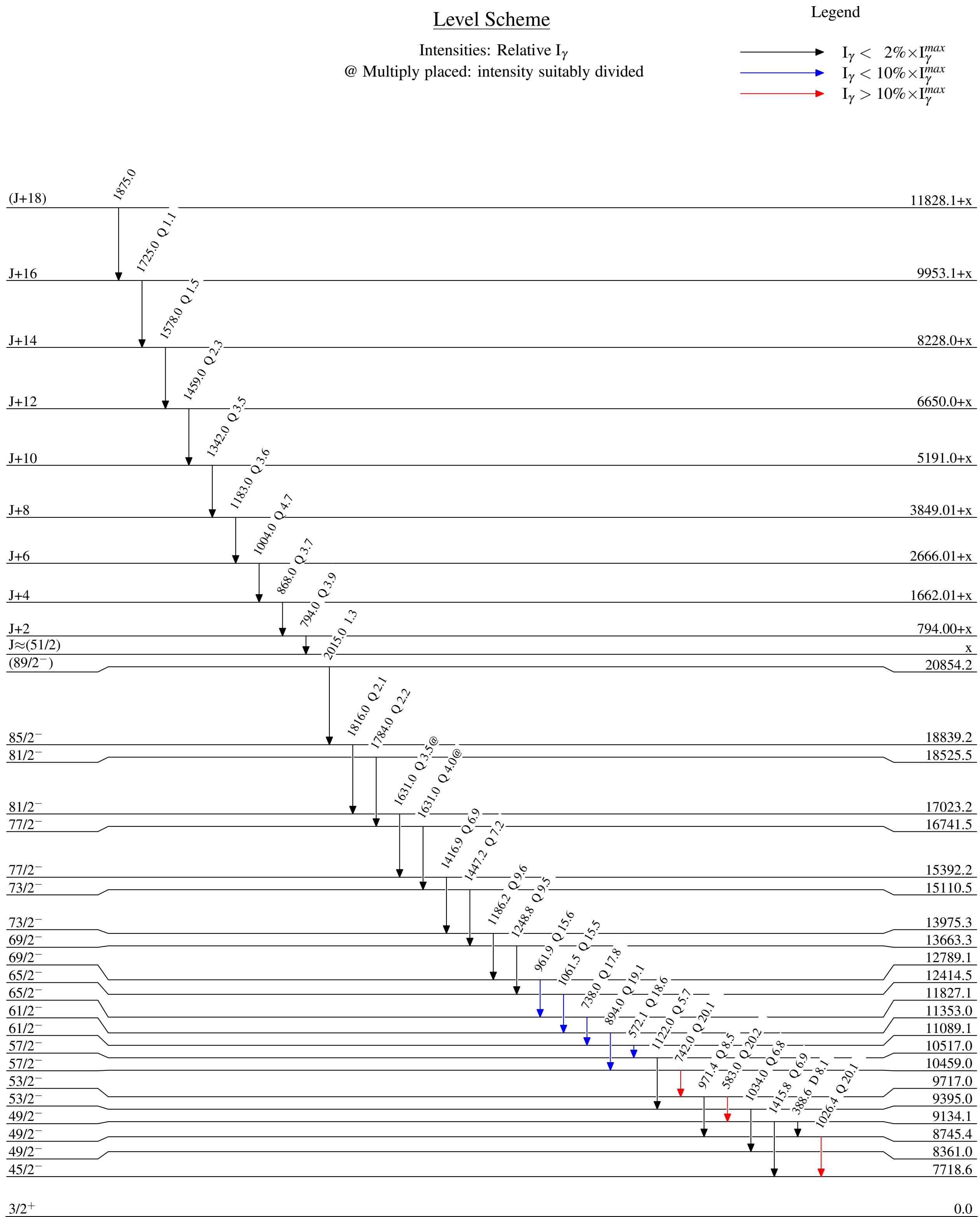
@ Multiply placed with intensity suitably divided.

$^{96}Zr(^{48}Ca,5n\gamma)$:E=195 MeV 2011Bh07

Level Scheme

Intensities: Relative I_γ

@ Multiply placed: intensity suitably divided



$^{139}_{60}Nd_{79}$

^{96}Zr(^{48}Ca,5nγ):E=195 MeV 2011Bh07

Level Scheme (continued)

Intensities: Relative I_γ

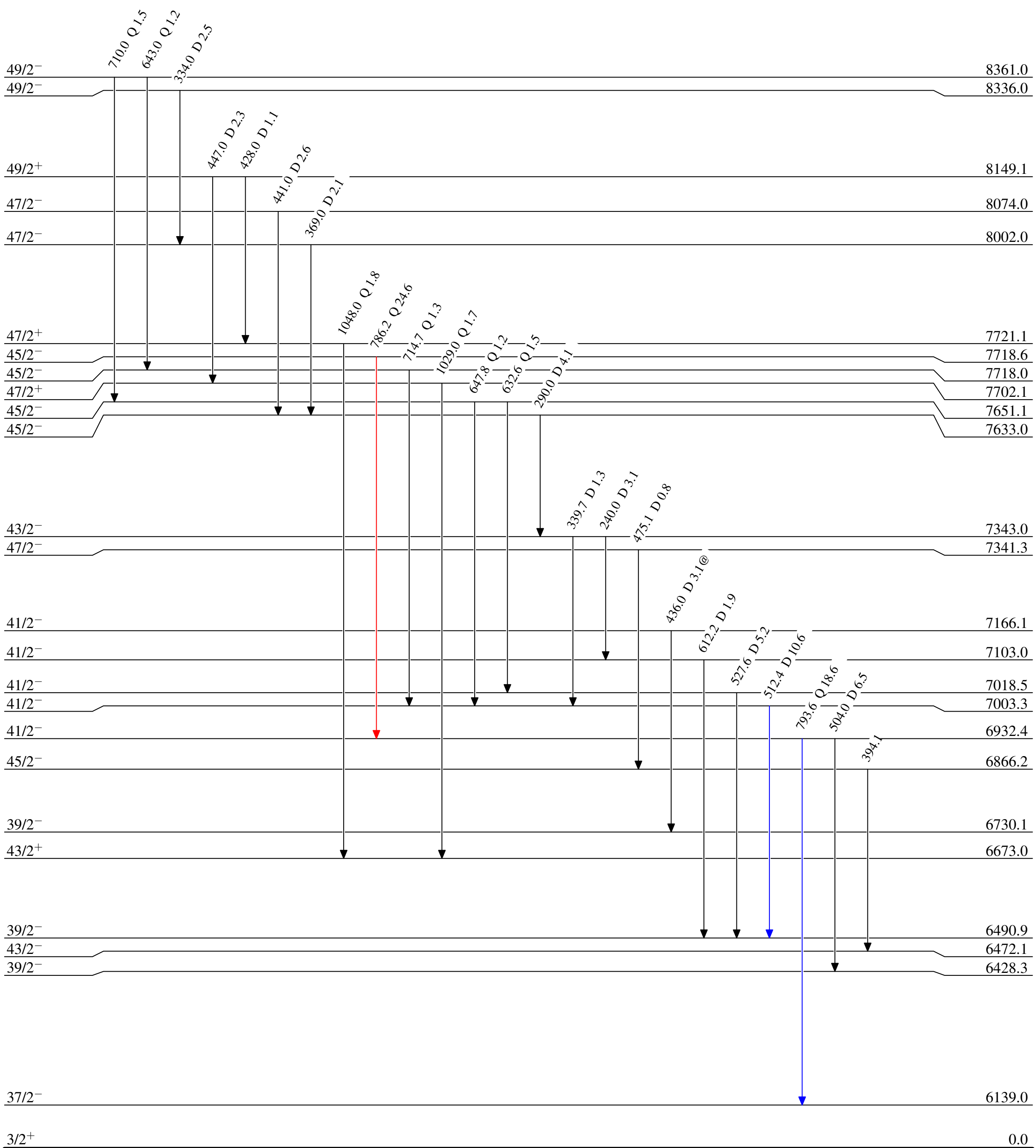
@ Multiply placed: intensity suitably divided

Legend

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

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

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



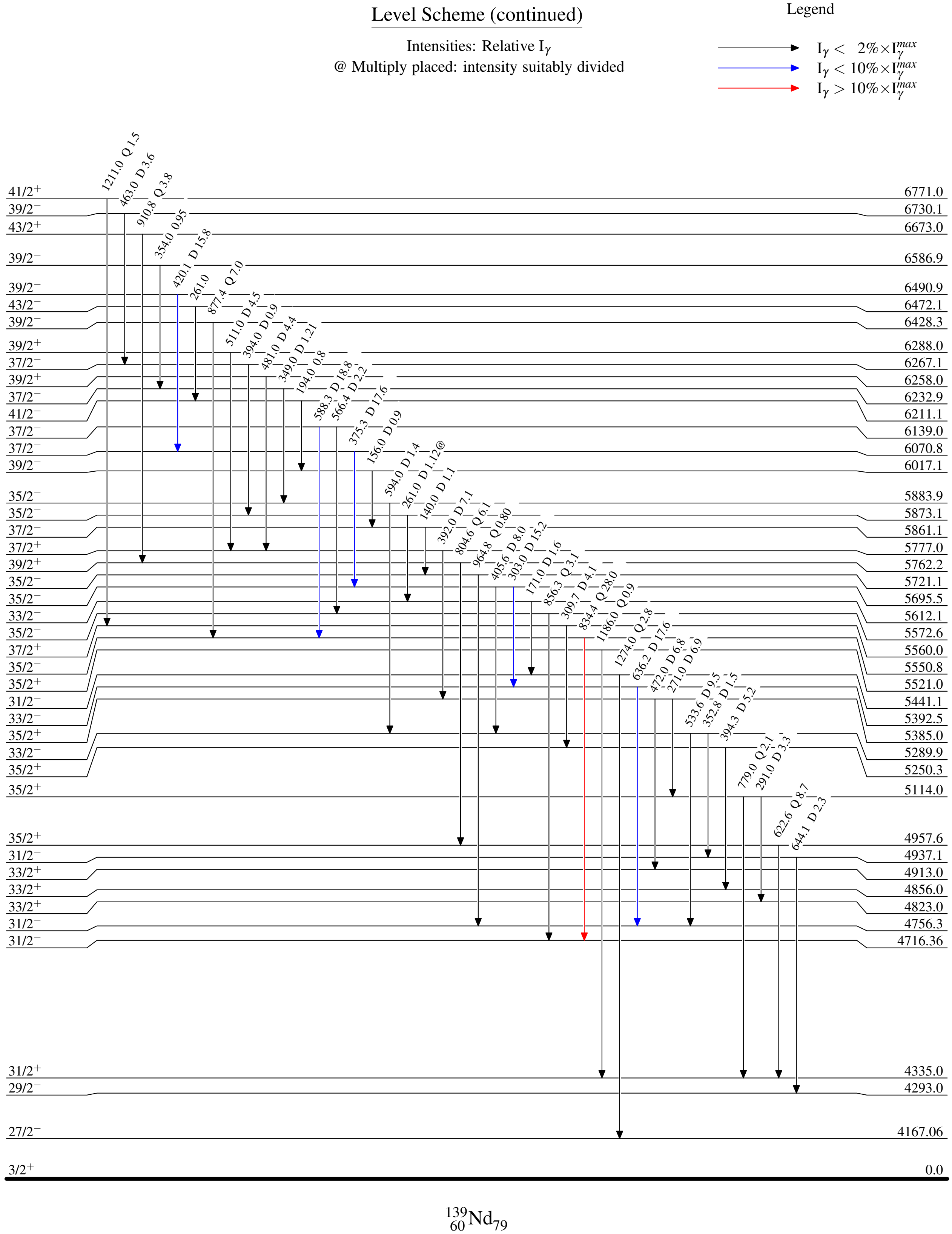
$^{139}_{60}Nd_{79}$

$^{96}Zr(^{48}Ca,5n\gamma)$:E=195 MeV 2011Bh07

Level Scheme (continued)

Intensities: Relative I_γ

@ Multiply placed: intensity suitably divided

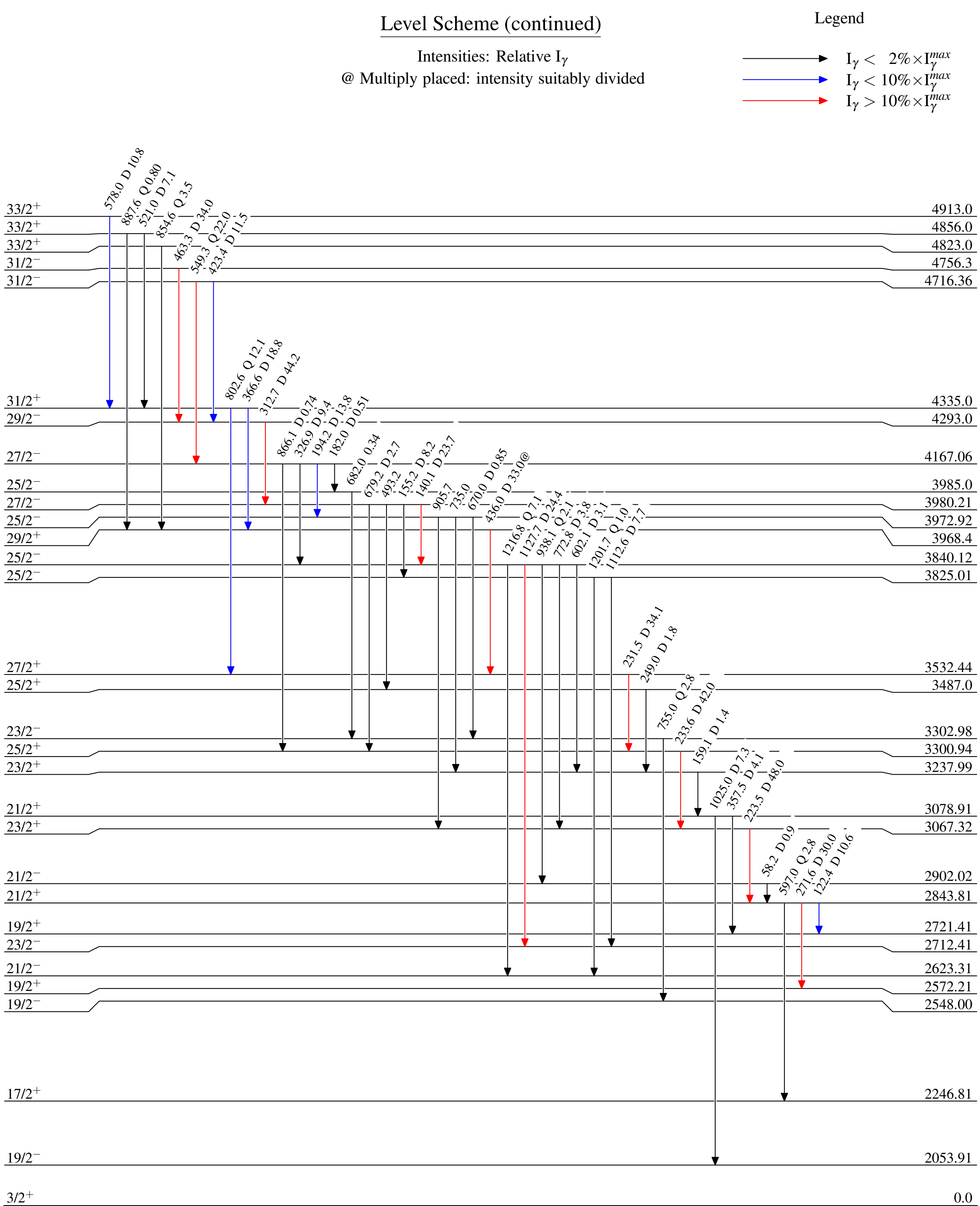


$^{96}Zr(^{48}Ca,5n\gamma)$:E=195 MeV 2011Bh07

Level Scheme (continued)

Intensities: Relative I_γ

@ Multiply placed: intensity suitably divided



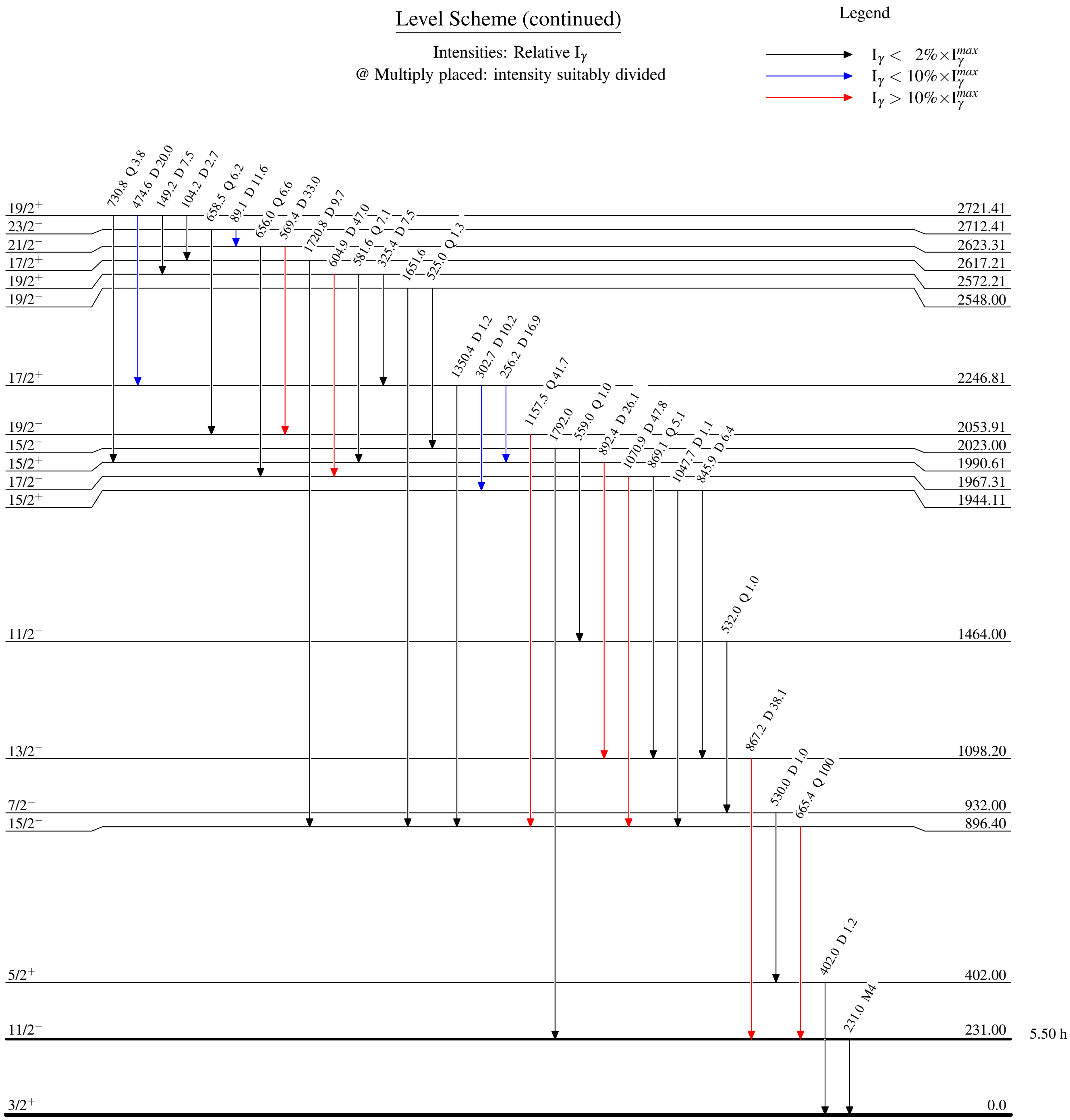
$^{139}_{60}Nd_{79}$

$^{96}Zr(^{48}Ca,5n\gamma)$:E=195 MeV 2011Bh07

Level Scheme (continued)

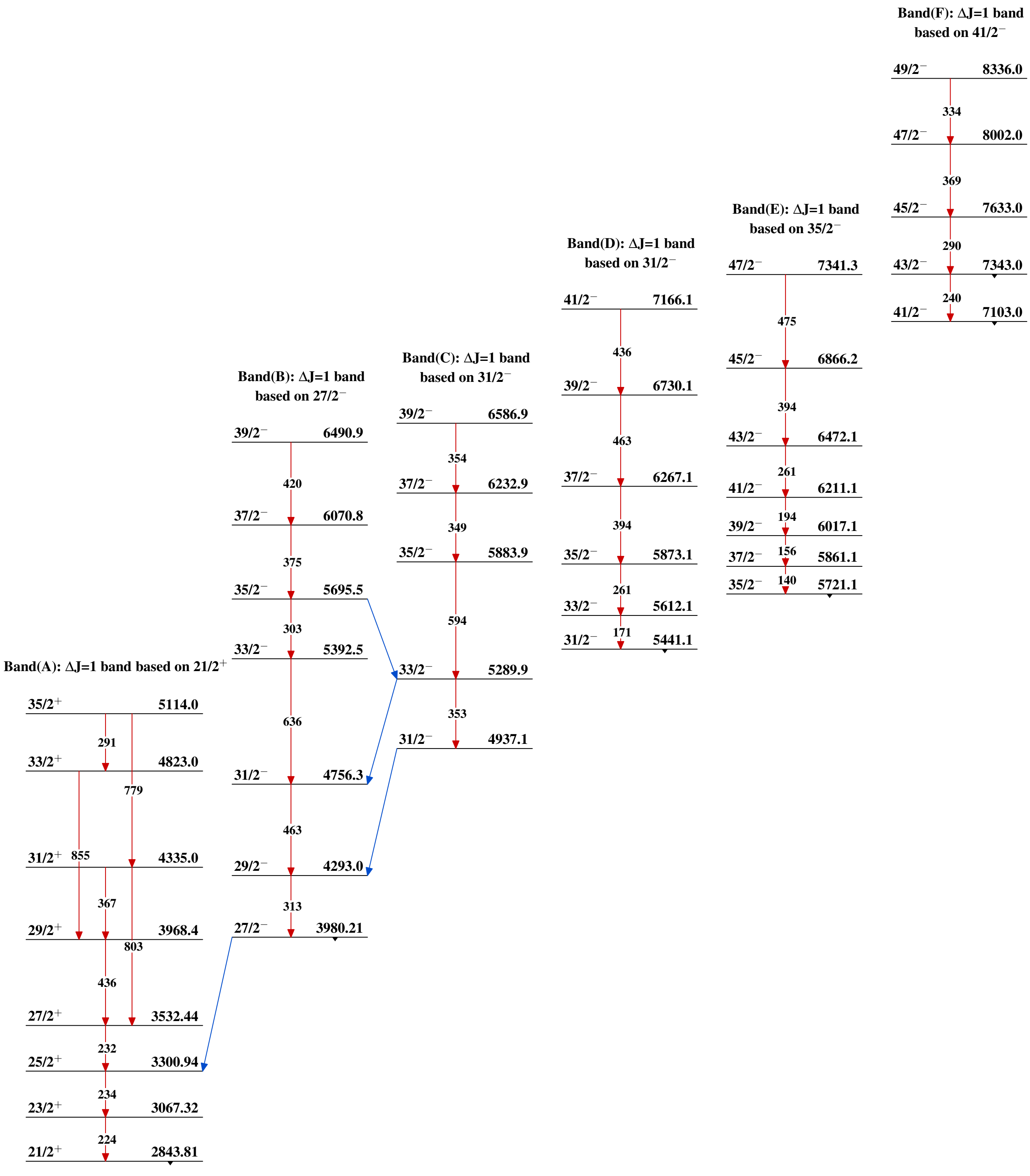
Intensities: Relative I_γ

@ Multiply placed: intensity suitably divided



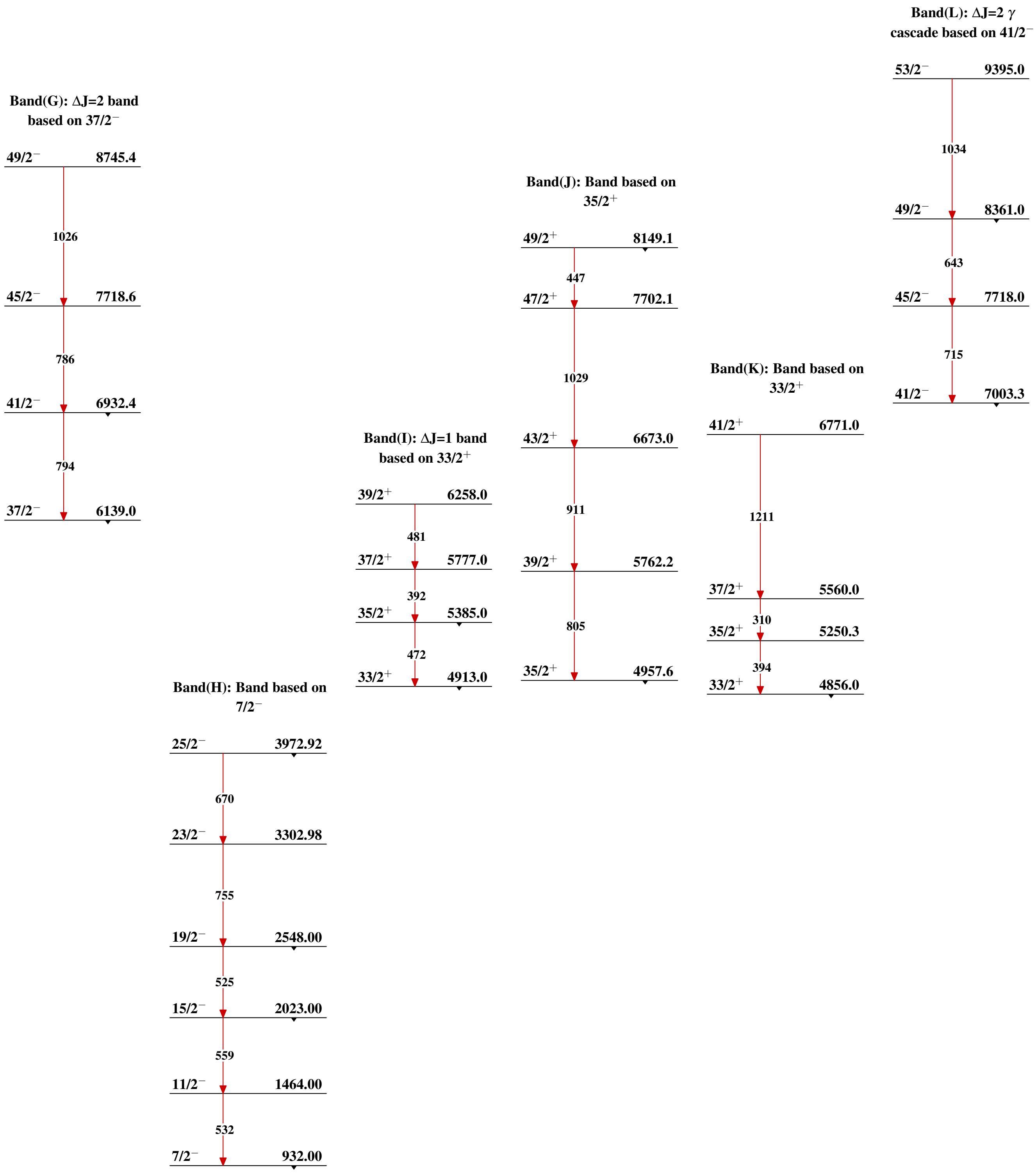
$^{139}_{60}Nd_{79}$

$^{96}Zr(^{48}Ca,5n\gamma)$:E=195 MeV 2011Bh07



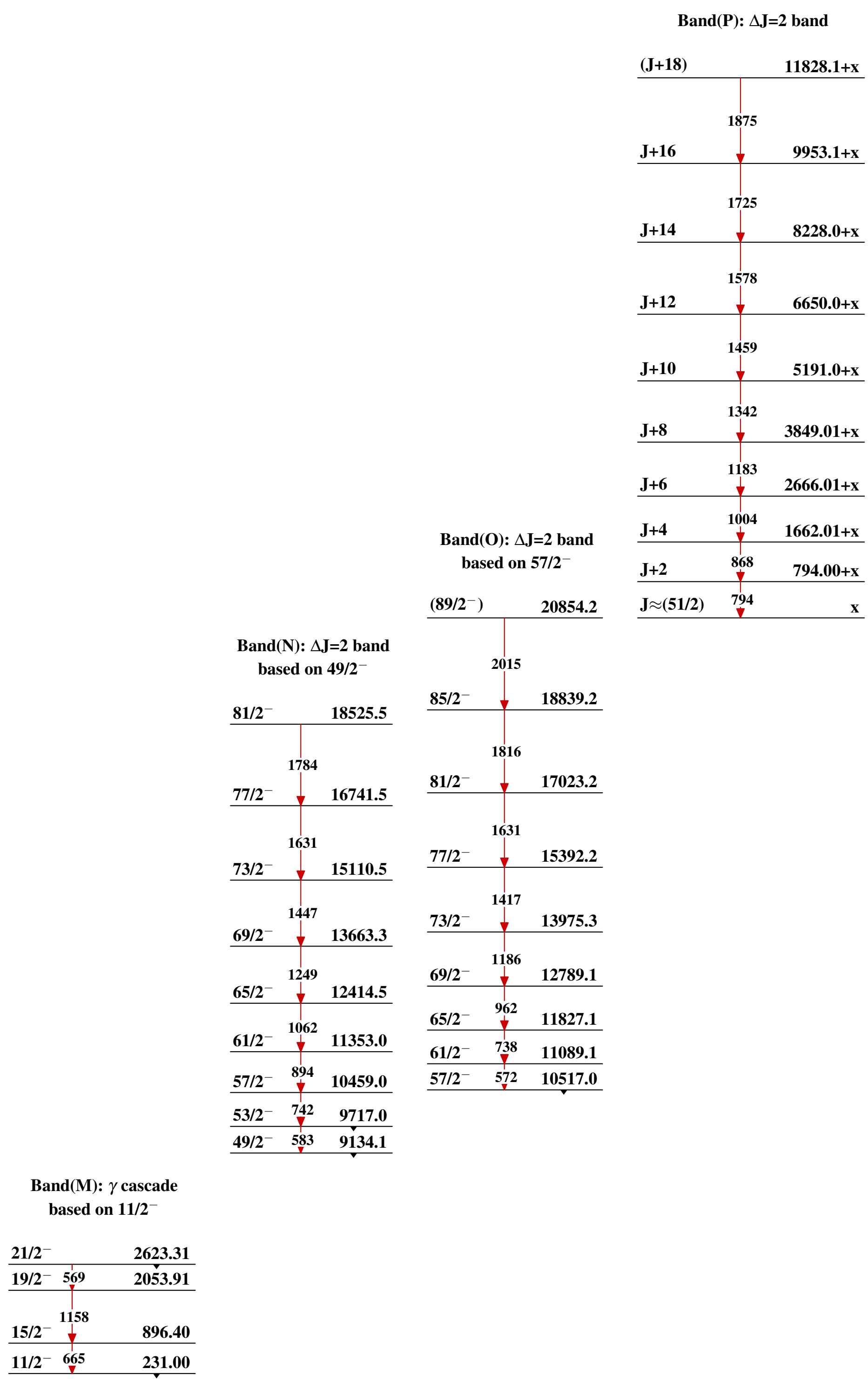
$^{139}_{60}Nd_{79}$

$^{96}Zr(^{48}Ca,5n\gamma)$:E=195 MeV 2011Bh07 (continued)



$^{139}_{60}Nd_{79}$

$^{96}Zr(^{48}Ca,5n\gamma)$:E=195 MeV 2011Bh07 (continued)



$^{139}_{60}Nd_{79}$