^{116}Cd(^{14}N,α3nγ) 2006Wa05

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 174, 1 (2021)	15-Apr-2021

2006Wa05 (also 2004Wa16, 2009Zh19): E=65 MeV ^{14}N beam was produced from the FN tandem accelerator at the Niels Bohr Institute. Target was 0.82 mg/cm^2 ^{116}Cd foil on a 1 mg/cm^2 Au backing. γ rays were detected with the NORDBALL detector array consisting of 19 anti-Compton HPGe detectors and a low energy photon spectrometer (LEPS) detector. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma$(ADO). Deduced levels, J, π, band structures, configurations. Comparisons with theoretical calculations.

All data are from 2006Wa05, unless otherwise stated.

^{123}I Levels

E(level)[†]	J$^\pi$[@]	E(level)[†]	J$^\pi$[@]	E(level)[†]	J$^\pi$[@]	E(level)[†]	J$^\pi$[@]
0.0[c]	5/2+	1602.3[g] 7	(15/2+)	2876.4[‡i] 9	21/2+	4326.8[b] 12	31/2−
138.4[a] 3	7/2+	1690.1[f] 6	15/2+	2936.7[e] 8	21/2+	4542.3[h] 10	(31/2+)
474.2[d] 4	7/2+	1791.1[d] 7	15/2+	3083.6[h] 7	23/2+	4606.2[‡] 16	29/2+
552.2[&] 4	9/2+	1871.3[&] 6	17/2+	3200.4[‡i] 8	23/2+	4699.7[‡i] 13	(31/2+)
641.2[e] 4	9/2+	2016.0[g] 7	(17/2+)	3324.5[h] 8	25/2+	4901.6[h] 11	(33/2+)
670.9[c] 3	9/2+	2039.7[b] 9	19/2−	3337.2[d] 14	(23/2+)	5001.3[b] 13	35/2−
793.9[a] 5	11/2+	2082.0[e] 7	17/2+	3393.1[f] 8	23/2+	5592.1[b] 14	39/2−
943.4[b] 5	11/2−	2282.3[c] 8	(17/2+)	3490.5[‡i] 8	25/2+	5819.1[h] 12	(37/2+)
972.2[f] 6	11/2+	2361.9[g] 7	(19/2+)	3512.3[b] 11	27/2−	6424.0[b] 15	41/2−
1079.9[d] 5	11/2+	2466.4[a] 7	19/2+	3688.2[‡] 12	25/2+	6776.8[b] 15	43/2−
1156.1[&] 5	13/2+	2500.8[f] 7	19/2+	3716.5[h] 8	27/2+	6863.1[#h] 16	(41/2+)
1315.3[e] 6	13/2+	2614.0[b] 10	23/2−	3861.7[e] 9	25/2+	7030.0 18	
1436.5[c] 6	(13/2+)	2647.9[d] 9	19/2+	3903.7[‡i] 9	(27/2+)	7179.0 18	
1452.9[b] 7	15/2−	2659.7[g] 9	(21/2+)	4055.3[h] 9	29/2+	7767.6[b] 16	45/2−
1576.5[a] 6	15/2+	2712.2[&] 7	21/2+	4250.6[‡i] 10	(29/2+)		

[†] From a least-squares fit to γ-ray energies, assuming ΔEγ=1 keV when not stated for fitting purpose only.

[‡] Level from 2009Zh19.

[#] 1044.0γ is placed from the 5945 level in Adopted Gammas, instead of a level at 6863 proposed by 2006Wa05.

[@] As proposed in 2006Wa05 and 2009Zh19, based on measured $\gamma\gamma$(ADO), band assignments and known assignments for low-lying states. When considered in Adopted Levels, assignments of spin and/or parity will be placed inside parenthesis by the evaluator if there is no firm evidence.

[&] Band(A): π7/2[404] oblate band, α=+1/2.

[a] Band(a): π7/2[404] oblate band, α=−1/2.

[b] Band(B): π1/2[550] band.

[c] Band(C): π5/2[413] band, α=+1/2.

[d] Band(c): π5/2[413] band, α=−1/2.

[e] Band(D): π9/2[404] band, α=+1/2.

[f] Band(d): π9/2[404] band, α=−1/2.

[g] Band(E): Dipole band based on (15/2+).

[h] Band(F): $\pi g_{7/2}\otimes\nu h^2_{11/2}$.

[i] Band(G): Possible $\pi g_{7/2}\otimes\nu h^2_{11/2}$. Possible chiral partner of $\pi g_{7/2}\otimes\nu h^2_{11/2}$ band based on 3084, 23/2+.

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γ(^{123}I)

R(ADO)=Iγ(37°)/Iγ(79°), with Iγ the total coincidence intensity observed at each angle. Measured values of R(ADO) are given under comments. Typical values of ≈1.4 and ≈0.7 correspond to ΔJ=2, stretched quadrupole and ΔJ=1, dipole, respectively (2006Wa05).

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	Comments
119.0 *10*	<2	670.9	9/2+	552.2	9/2+		
124†		3324.5	25/2+	3200.4	23/2+		
138.2 *5*	83 *6*	138.4	7/2+	0.0	5/2+	D	R(ADO)=0.89 *13*.
196.8 *5*	4 *1*	670.9	9/2+	474.2	7/2+	D	R(ADO)=0.90 *22*.
226†		3716.5	27/2+	3490.5	25/2+		
240.8 *5*	5 *1*	3324.5	25/2+	3083.6	23/2+		
241.5 *5*	6 *1*	793.9	11/2+	552.2	9/2+	D	R(ADO)=0.67 *22*.
245.5 *10*	<2	2712.2	21/2+	2466.4	19/2+		
272.3 *5*	81 *5*	943.4	11/2−	670.9	9/2+	D	R(ADO)=0.77 *10*.
290†		3490.5	25/2+	3200.4	23/2+		
294.5 *10*	<2	1871.3	17/2+	1576.5	15/2+		
297.8 *5*	8 *2*	2659.7	(21/2+)	2361.9	(19/2+)	D	R(ADO)=0.97 *20*.
324†		3200.4	23/2+	2876.4	21/2+		
330.8 *5*	27 *2*	972.2	11/2+	641.2	9/2+	D	R(ADO)=0.93 *15*.
343.3 *5*	28 *2*	1315.3	13/2+	972.2	11/2+	D	R(ADO)=0.89 *12*.
345.8 *5*	5 *1*	2361.9	(19/2+)	2016.0	(17/2+)	D	R(ADO)=0.90 *19*.
347†		4250.6	(29/2+)	3903.7	(27/2+)		
352.8 *5*	5 *2*	6776.8	43/2−	6424.0	41/2−		
356.8 *10*	<3	1436.5	(13/2+)	1079.9	11/2+		
362.3 *5*	8 *1*	1156.1	13/2+	793.9	11/2+	D	R(ADO)=0.74 *18*.
371.3 *5*	5 *1*	3083.6	23/2+	2712.2	21/2+	D	R(ADO)=0.72 *19*.
374.8 *5*	20 *2*	1690.1	15/2+	1315.3	13/2+	D	R(ADO)=0.88 *16*.
391.3 *5*	21 *3*	943.4	11/2−	552.2	9/2+	D	R(ADO)=0.77 *15*.
391.8 *5*	16 *2*	2082.0	17/2+	1690.1	15/2+	D	R(ADO)=0.92 *11*.
392.0 *10*	<3	3716.5	27/2+	3324.5	25/2+		
407†		3490.5	25/2+	3083.6	23/2+		
409.0 *10*	<2	1079.9	11/2+	670.9	9/2+	(D)	R(ADO)=0.56 *18*.
413†		3903.7	(27/2+)	3490.5	25/2+		
413.5 *5*	9 *2*	2016.0	(17/2+)	1602.3	(15/2+)	D	R(ADO)=0.86 *17*.
413.8 *5*	40 *4*	552.2	9/2+	138.4	7/2+	D	R(ADO)=0.59 *10*.
418.8 *5*	9 *1*	2500.8	19/2+	2082.0	17/2+	D	R(ADO)=0.93 *12*.
420.3 *10*	<3	1576.5	15/2+	1156.1	13/2+		
435.8 *5*	7 *1*	2936.7	21/2+	2500.8	19/2+	D	R(ADO)=0.92 *17*.
456.3 *5*	6 *1*	3393.1	23/2+	2936.7	21/2+	D	R(ADO)=0.84 *20*.
468.6 *5*	4 *1*	3861.7	25/2+	3393.1	23/2+	D	R(ADO)=0.75 *23*.
474.3 *5*	22 *2*	474.2	7/2+	0.0	5/2+	D	R(ADO)=0.52 *10*.
488†		3200.4	23/2+	2712.2	21/2+		
502.8 *5*	23 *2*	641.2	9/2+	138.4	7/2+	D	R(ADO)=0.65 *12*.
509.5 *5*		1452.9	15/2−	943.4	11/2−		
527.8 *10*	<3	1079.9	11/2+	552.2	9/2+		
532.3 *5*	25 *2*	670.9	9/2+	138.4	7/2+	D	R(ADO)=0.67 *15*.
534†		4250.6	(29/2+)	3716.5	27/2+		
552.3 *5*	35 *3*	552.2	9/2+	0.0	5/2+	Q	R(ADO)=1.32 *24*.
574.3 *5*	90 *3*	2614.0	23/2−	2039.7	19/2−	Q	Additional information 1. R(ADO)=1.32 *18*.
579†		3903.7	(27/2+)	3324.5	25/2+		
586.8 *5*	100 *3*	2039.7	19/2−	1452.9	15/2−	Q	R(ADO)=1.38 *17*.

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^{116}Cd(^{14}N,α3nγ) 2006Wa05 (continued)

γ(^{123}I) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	Comments
590.8 *5*	37 *3*	5592.1	39/2⁻	5001.3	35/2⁻	Q	R(ADO)=1.27 *22*.
596.0 *10*	<2	2466.4	19/2⁺	1871.3	17/2⁺		
603.8 *5*	50 *4*	1156.1	13/2⁺	552.2	9/2⁺	Q	R(ADO)=1.31 *20*.
605.8 *5*	16 *2*	1079.9	11/2⁺	474.2	7/2⁺	Q	R(ADO)=1.27 *21*.
606.0 *10*	<1	7030.0		6424.0	41/2⁻		
612.3 *5*	20 *2*	3324.5	25/2⁺	2712.2	21/2⁺	Q	R(ADO)=1.27 *18*.
614†		3490.5	25/2⁺	2876.4	21/2⁺		
617.3 *5*	8 *1*	3083.6	23/2⁺	2466.4	19/2⁺	Q	R(ADO)=1.27 *20*.
629.8 *5*	6 *1*	1602.3	(15/2⁺)	972.2	11/2⁺	(Q)	R(ADO)=1.18 *20*.
632.8 *5*	5 *1*	3716.5	27/2⁺	3083.6	23/2⁺	Q	R(ADO)=1.33 *23*.
641.3 *5*	17 *2*	641.2	9/2⁺	0.0	5/2⁺	Q	R(ADO)=1.22 *22*.
655.8 *5*	14 *2*	793.9	11/2⁺	138.4	7/2⁺	Q	R(ADO)=1.28 *20*.
670.8 *5*	78 *4*	670.9	9/2⁺	0.0	5/2⁺	Q	R(ADO)=1.33 *19*.
671.8 *5*	13 *2*	2361.9	(19/2⁺)	1690.1	15/2⁺	Q	R(ADO)=1.20 *22*.
674.3 *5*	9 *2*	1315.3	13/2⁺	641.2	9/2⁺	Q	R(ADO)=1.38 *17*.
674.5 *5*	50 *4*	5001.3	35/2⁻	4326.8	31/2⁻	Q	R(ADO)=1.33 *20*.
689.3 *10*	<2	3337.2	(23/2⁺)	2647.9	19/2⁺		
700.8 *5*	5 *1*	2016.0	(17/2⁺)	1315.3	13/2⁺	Q	R(ADO)=1.33 *21*.
704†		3903.7	(27/2⁺)	3200.4	23/2⁺		
711.2 *5*	12 *2*	1791.1	15/2⁺	1079.9	11/2⁺	Q	R(ADO)=1.31 *24*.
715.3 *5*	55 *4*	1871.3	17/2⁺	1156.1	13/2⁺	Q	R(ADO)=1.26 *19*.
717.8 *5*	9 *1*	1690.1	15/2⁺	972.2	11/2⁺	Q	R(ADO)=1.26 *18*.
730.8 *5*	11 *2*	4055.3	29/2⁺	3324.5	25/2⁺	Q	R(ADO)=1.39 *21*.
735†		3200.4	23/2⁺	2466.4	19/2⁺		
755.0 *10*	<1	7179.0		6424.0	41/2⁻		
760†		4250.6	(29/2⁺)	3490.5	25/2⁺		
765.5 *5*	4 *1*	1436.5	(13/2⁺)	670.9	9/2⁺		
766.8 *5*	7 *1*	2082.0	17/2⁺	1315.3	13/2⁺	Q	R(ADO)=1.25 *16*.
778†		3490.5	25/2⁺	2712.2	21/2⁺		
782.5 *5*	14 *2*	1576.5	15/2⁺	793.9	11/2⁺	Q	R(ADO)=1.29 *20*.
796†		4699.7	(31/2⁺)	3903.7	(27/2⁺)		
810.5 *5*	6 *1*	2500.8	19/2⁺	1690.1	15/2⁺	Q	R(ADO)=1.40 *20*.
814.5 *5*	60 *3*	4326.8	31/2⁻	3512.3	27/2⁻	Q	R(ADO)=1.37 *22*.
820†		3903.7	(27/2⁺)	3083.6	23/2⁺		
825.8 *5*	5 *1*	4542.3	(31/2⁺)	3716.5	27/2⁺		
831.8 *5*	20 *3*	6424.0	41/2⁻	5592.1	39/2⁻	D	R(ADO)=0.60 *17*.
840.8 *5*	38 *3*	2712.2	21/2⁺	1871.3	17/2⁺	Q	R(ADO)=1.27 *20*.
845.8 *5*	5 *1*	2282.3	(17/2⁺)	1436.5	(13/2⁺)		
846.3 *5*	7 *2*	4901.6	(33/2⁺)	4055.3	29/2⁺		
854.8 *5*	6 *1*	2936.7	21/2⁺	2082.0	17/2⁺	Q	R(ADO)=1.43 *17*.
856.8 *5*	8 *1*	2647.9	19/2⁺	1791.1	15/2⁺	Q	R(ADO)=1.4 *3*.
889.8 *5*	14 *2*	2466.4	19/2⁺	1576.5	15/2⁺	Q	R(ADO)=1.32 *22*.
892.3 *5*	4 *1*	3393.1	23/2⁺	2500.8	19/2⁺	Q	R(ADO)=1.24 *11*.
898.3 *5*	87 *4*	3512.3	27/2⁻	2614.0	23/2⁻	Q	R(ADO)=1.31 *20*.
917.5 *5*	4 *1*	5819.1	(37/2⁺)	4901.6	(33/2⁺)		
918†		4606.2	29/2⁺	3688.2	25/2⁺		
925.3 *10*	<3	3861.7	25/2⁺	2936.7	21/2⁺		
976†		3688.2	25/2⁺	2712.2	21/2⁺		
990.8 *5*	6 *2*	7767.6	45/2⁻	6776.8	43/2⁻	D	R(ADO)=0.72 *14*.
1005†		2876.4	21/2⁺	1871.3	17/2⁺		
1044.0 *10*	<2	6863.1	(41/2⁺)	5819.1	(37/2⁺)		E_γ: this γ is placed from the 5945 level in Adopted Gammas.
1184.8 *5*	6 *2*	6776.8	43/2⁻	5592.1	39/2⁻	Q	R(ADO)=1.35 *24*.

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^{116}Cd(^{14}N,α3nγ) 2006Wa05 (continued)

γ(^{123}I) (continued)

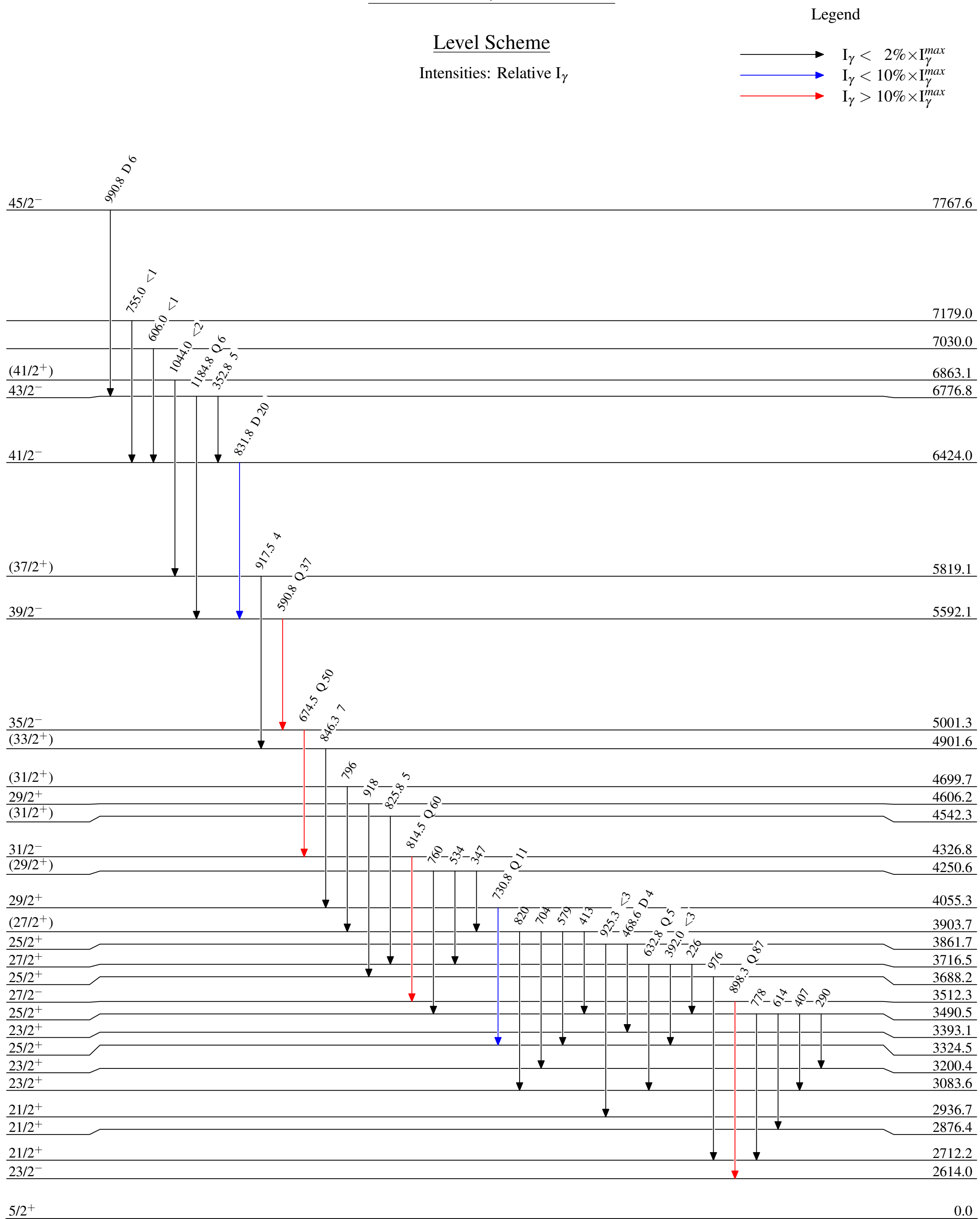
† From 2009Zh19, intensity is not available.

‡ Deduced by the evaluator based on measured R(ADO) ratios. Typical values of ≈1.4 and ≈0.7 correspond to ΔJ=2, stretched quadrupole (Q) and ΔJ=1, dipole (D), respectively (2006Wa05).

$^{116}Cd(^{14}N,\alpha 3n\gamma)$ 2006Wa05

Level Scheme

Intensities: Relative I_γ

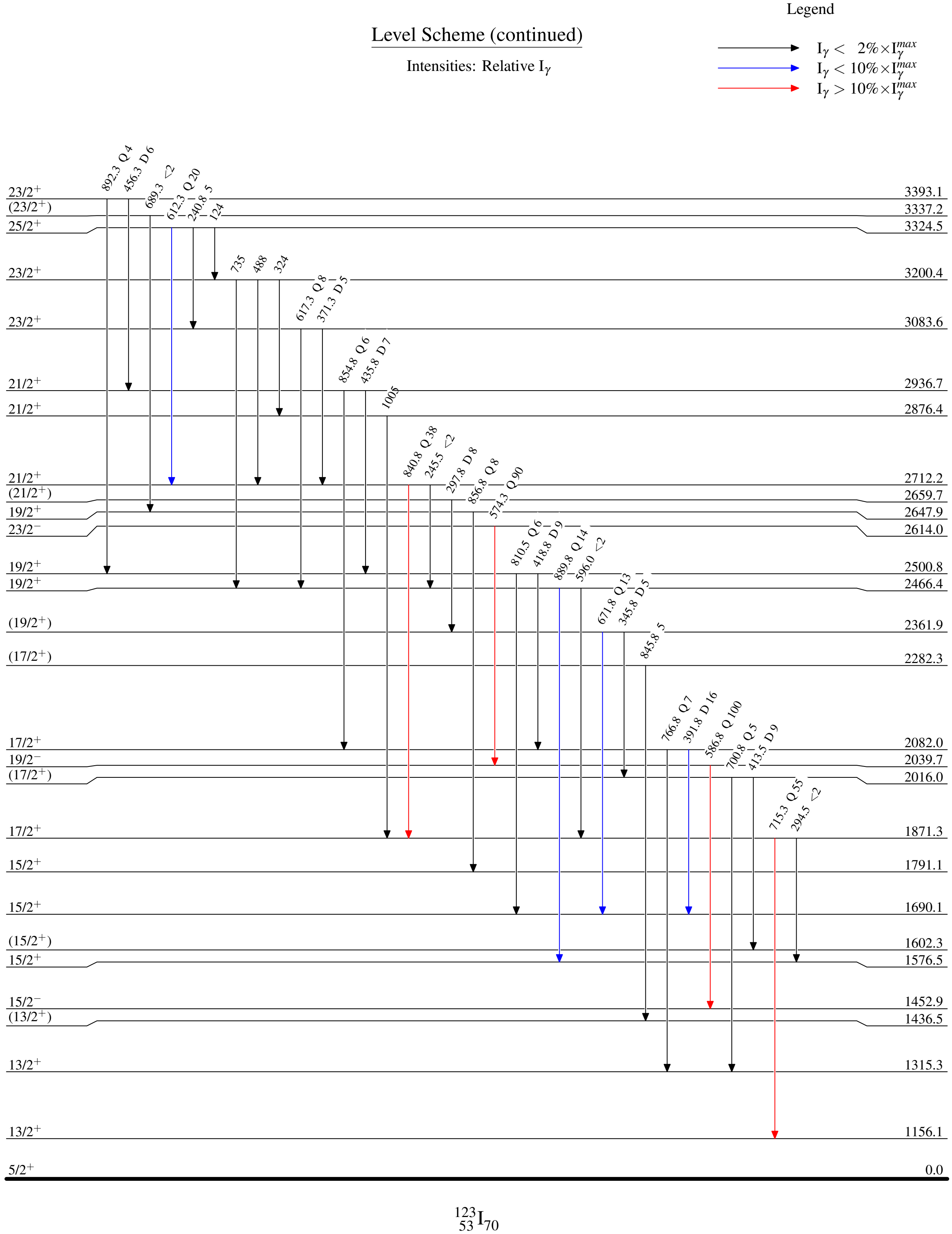


$^{123}_{53}I_{70}$

$^{116}Cd(^{14}N,\alpha 3n\gamma)$ 2006Wa05

Level Scheme (continued)

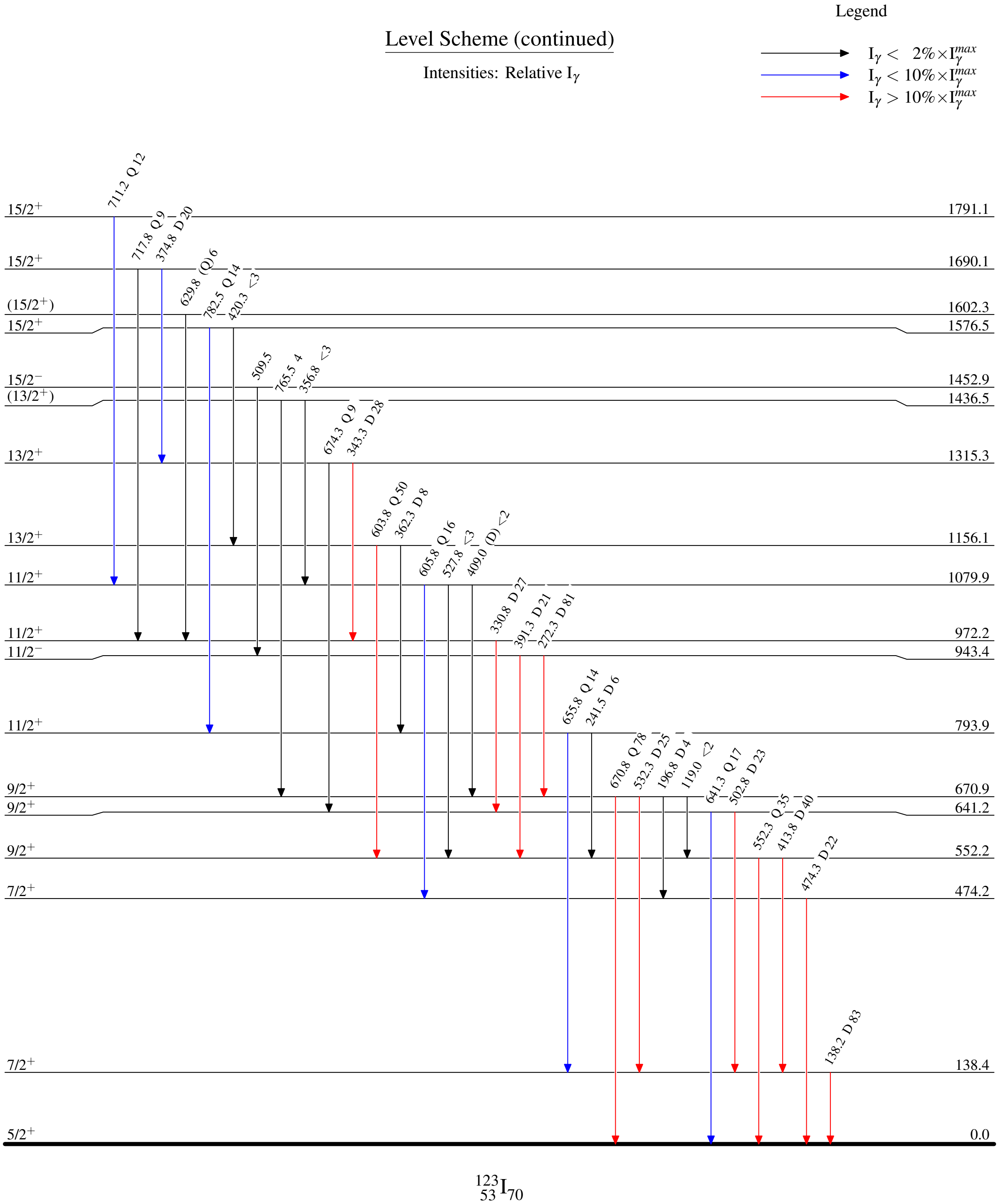
Intensities: Relative I_γ



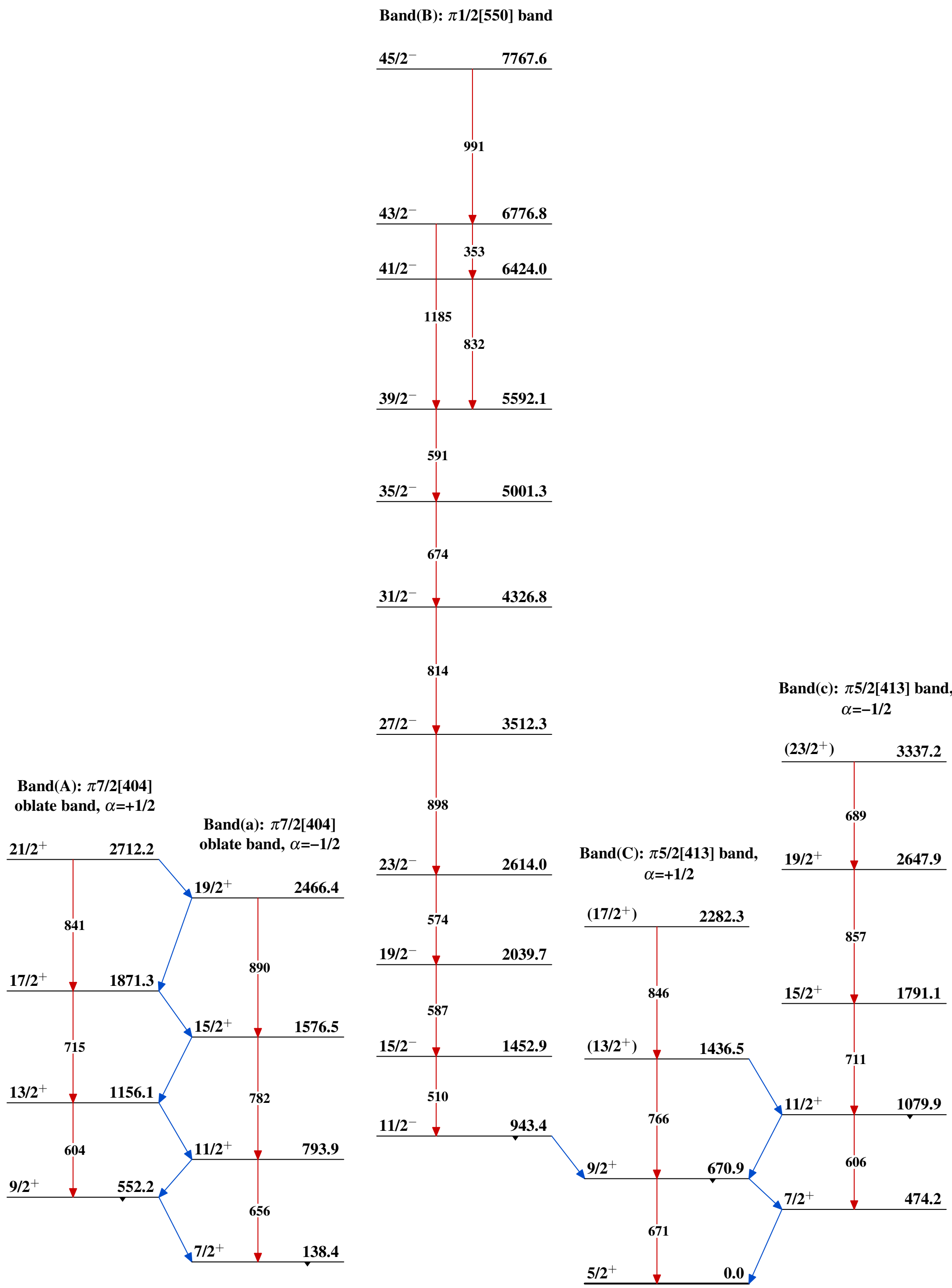
^{116}Cd(^{14}N,α3nγ) 2006Wa05

Level Scheme (continued)

Intensities: Relative I_γ

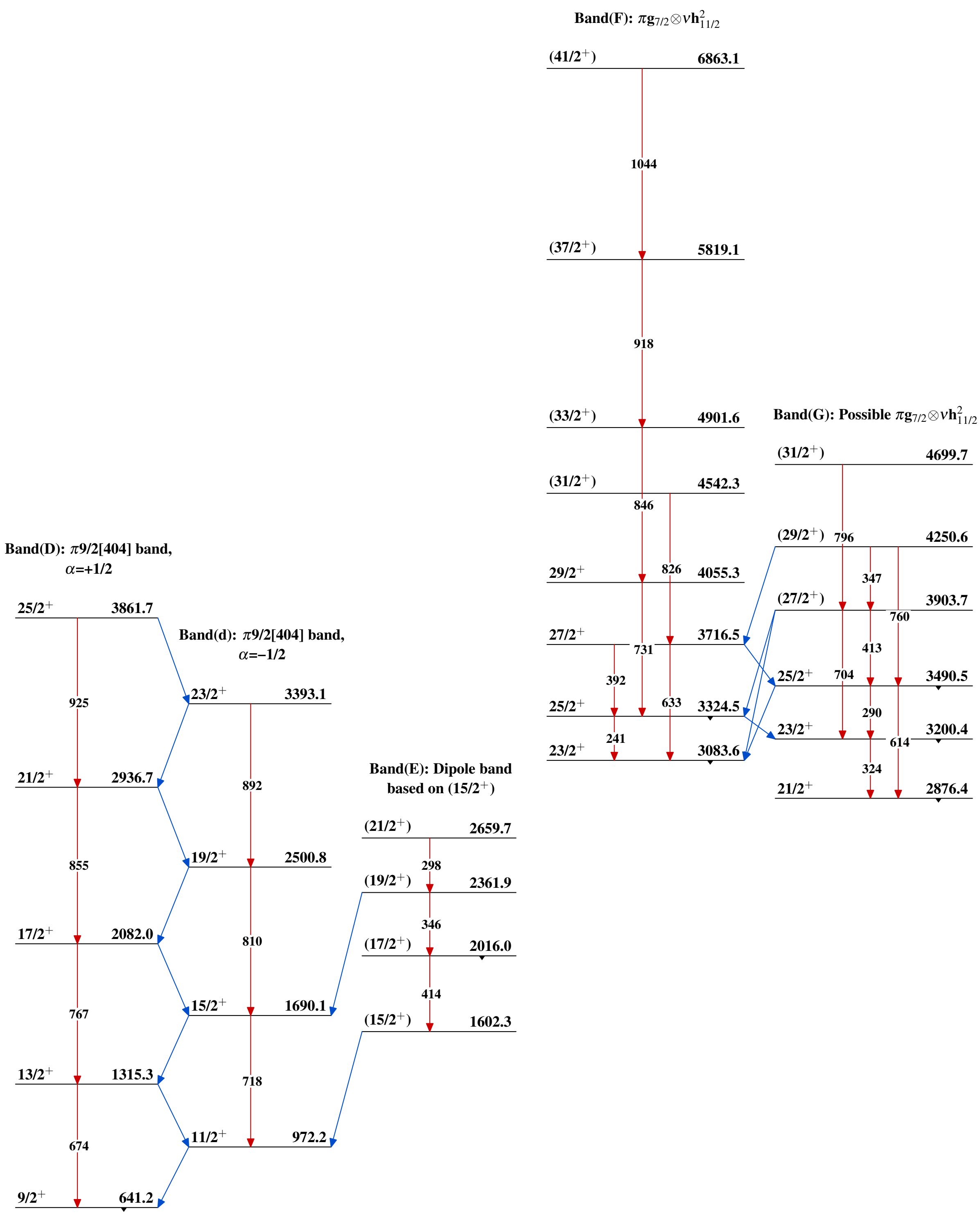


$^{116}Cd(^{14}N,\alpha 3n\gamma)$ 2006Wa05



$^{123}_{53}I_{70}$

^{116}Cd(^{14}N,α3nγ) 2006Wa05 (continued)



$^{123}_{53}I_{70}$