^{106}Cd(^{35}Cl,p2nγ) 1994Pa14,1997Br02

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

1994Pa14: E=105 MeV ^{35}Cl beam was produced from the tandem Van de Graaff accelerator of the Nuclear Structure Facility at Daresbury Laboratory. Target was a thin self-supporting ^{106}Cd with a thickness of 500 μg/cm^2. Recoils were separated by the Daresbury recoil separator. γ rays were detected with the Eurogam I spectrometer consisting of 45 large-volume Compton-suppressed HPGe detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, γ(DCO). Deduced levels, J, π, γ-ray multipolarities, band structures. Comparisons with shell-model calculations.

1997Br02: E=150 MeV ^{35}Cl beam was produced from the 14UD tandem accelerator at the Australian National Laboratory incident on a 10 mg/cm^2 enriched (86%) ^{106}Cd target. Measured Eγ, $\gamma\gamma$-coin, γ(t). First observation of (8$^-$) isomer. Deduced T$_{1/2}$ of the isomer.

^{138}Gd Levels

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$	Comments
0[#]	0$^+$		
220.80[#] *20*	2$^+$		
605.2[#] *3*	4$^+$		
1080.4[@] *4*	(4$^+$)		
1094.1[#] *4*	6$^+$		
1608.1[@] *4*	(6$^+$)		
1649.6[#] *4*	8$^+$		
2202.7[@] *4*	(8$^+$)		
2232.8 *11*	(8$^-$)	6 μs *1*	E(level): observed in 1997Br02. T$_{1/2}$: from a single exponential fit using a sum of 221γ(t) and 384γ(t) in 1997Br02.
2266.3[#] *4*	10$^+$		
2300.3[&] *4*	(7$^-$)		
2633.3[@] *4*	(10$^+$)		
2728.5 *4*	(8$^-$)		
2756.1[&] *4*	(9$^-$)		
2952.1[#] *4*	12$^+$		
3175.8[@] *5*	(12$^+$)		
3294.9[&] *4*	(11$^-$)		
3713.9[#] *5*	14$^+$		
3785.8[@] *5*	(14$^+$)		
3908.0[&] *4*	(13$^-$)		
4467.9[@] *6*	(16$^+$)		
4551.7[#] *5*	16$^+$		
4591.5[&] *5*	(15$^-$)		
5269.4[@] *6*	(18$^+$)		
5342.6[&] *5*	(17$^-$)		
5460.2[#] *6*	18$^+$		
6165.0[&] *6*	(19$^-$)		
6168.5[@] *6*	(20$^+$)		
6429.6[#] *6*	(20$^+$)		
7146.6[@] *7*	(22$^+$)		
7443.0[#] *6*	(22$^+$)		

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^{106}Cd(^{35}Cl,p2nγ) 1994Pa14,1997Br02 (continued)

^{138}Gd Levels (continued)

† From a least-squares fit to γ-ray energies.
‡ From 1994Pa14, based on deduced γ-ray multipolarities and band structure.
# Band(A): g.s. band.
@ Band(B): π=+ band configuration=$\pi h^2_{11/2}$, the lower 4^+, 6^+, 8^+ members are probably members of the γ-vibrational band in ^{138}Gd (1994Pa14).
& Band(C): π=− band configuration=$\pi h_{11/2} \otimes \pi g_{7/2}$.

$\gamma(^{138}Gd)$

E_γ †	I_γ ‡	E_i(level)	J^π_i	E_f	J^π_f	Mult.#	Comments
220.8 *2*	100	220.80	2^+	0	0^+	E2	R(DCO)=0.9 *1* at 134°, 0.9 *1* at 158° (1994Pa14).
384.4 *2*	95.2	605.2	4^+	220.80	2^+	E2	R(DCO)=1.0 *1* at 134°, 1.1 *1* at 158° (1994Pa14).
430.6 *2*	13.4	2633.3	(10^+)	2202.7	(8^+)	E2	R(DCO)=1.1 *2* at 134°, 0.9 *2* at 158° (1994Pa14).
456.1 *2*	2.8	2756.1	(9^-)	2300.3	(7^-)		
475.2 *2*	2.5	1080.4	(4^+)	605.2	4^+		R(DCO)=1.3 *4* at 134° (1994Pa14).
489.1 *2*	88.1	1094.1	6^+	605.2	4^+	E2	R(DCO)=1.1 *1* at 134°, 1.0 *1* at 158° (1994Pa14).
514.0 *2*	5.2	1608.1	(6^+)	1094.1	6^+		
527.6 *2*	2.8	1608.1	(6^+)	1080.4	(4^+)		
539.1 *2*	17.3	3294.9	(11^-)	2756.1	(9^-)	E2	R(DCO)=1.2 *2* at 134°, 1.3 *2* at 158° (1994Pa14).
542.5 *2*	17.1	3175.8	(12^+)	2633.3	(10^+)	E2	R(DCO)=1.1 *2* at 134°, 1.2 *2* at 158° (1994Pa14).
553.5 *2*	6.8	2202.7	(8^+)	1649.6	8^+		
555.6 *2*	80.6	1649.6	8^+	1094.1	6^+	E2	R(DCO)=1.2 *1* at 134°, 1.2 *1* at 158° (1994Pa14).
583.2		2232.8	(8^-)	1649.6	8^+	[E1]	E_γ: from 1997Br02.
594.4 *2*	11.5	2202.7	(8^+)	1608.1	(6^+)	E2	R(DCO)=1.2 *4* at 134°, 1.8 *5* at 158° (1994Pa14).
610.0 *2*	17.5	3785.8	(14^+)	3175.8	(12^+)	E2	R(DCO)=1.3 *4* at 134°, 1.3 *5* at 158° (1994Pa14).
613.0 *2*	13.6	3908.0	(13^-)	3294.9	(11^-)	E2	R(DCO)=0.8 *3* at 134°, 1.2 *5* at 158° (1994Pa14).
616.4 *2*	65.3	2266.3	10^+	1649.6	8^+	E2	R(DCO)=1.2 *2* at 134°, 1.3 *3* at 158° (1994Pa14).
682.1 *2*	16.6	4467.9	(16^+)	3785.8	(14^+)	E2	R(DCO)=1.2 *5* at 134° for a composite peak of 682.1+683.5 (1994Pa14).
683.5 *2*	13.3	4591.5	(15^-)	3908.0	(13^-)	E2	R(DCO)=1.2 *5* at 134° for a composite peak of 682.1+683.5 (1994Pa14).
686.0 *2*	40.8	2952.1	12^+	2266.3	10^+	E2	R(DCO)=1.1 *1* at 134°, 1.2 *1* at 158° (1994Pa14).
751.1 *2*	11.9	5342.6	(17^-)	4591.5	(15^-)		
761.7 *2*	35.6	3713.9	14^+	2952.1	12^+	E2	R(DCO)=1.2 *3* at 134°, 1.1 *2* at 158° (1994Pa14).
801.5 *2*	16.0	5269.4	(18^+)	4467.9	(16^+)		
822.4 *2*	<1	6165.0	(19^-)	5342.6	(17^-)		
837.8 *2*	28.6	4551.7	16^+	3713.9	14^+	E2	R(DCO)=1.4 *5* at 134° (1994Pa14).
899.1 *2*	11.7	6168.5	(20^+)	5269.4	(18^+)		
908.5 *2*	17.2	5460.2	18^+	4551.7	16^+	E2	R(DCO)=1.2 *5* at 134° (1994Pa14).
956.0 *2*	<1	3908.0	(13^-)	2952.1	12^+		
969.4 *2*	7.4	6429.6	(20^+)	5460.2	18^+		
978.1 *2*	3.2	7146.6	(22^+)	6168.5	(20^+)		
1002.7 *2*	<1	1608.1	(6^+)	605.2	4^+		
1013.4 *2*	5.3	7443.0	(22^+)	6429.6	(20^+)		
1028.2 *2*	16.9	3294.9	(11^-)	2266.3	10^+		
1078.9 *2*	6.4	2728.5	(8^-)	1649.6	8^+		
1106.5 *2*	14.4	2756.1	(9^-)	1649.6	8^+	(E1)	R(DCO)=0.9 *1* at 134° for a composite peak of 1106.5+1108.3 (1994Pa14).
1108.3 *2*	15.4	2202.7	(8^+)	1094.1	6^+	(E2)	R(DCO)=0.9 *1* at 134° for a composite peak of 1106.5+1108.3 (1994Pa14).
1206.5 *2*	3.4	2300.3	(7^-)	1094.1	6^+		

† From 1994Pa14, unless otherwise noted.

Continued on next page (footnotes at end of table)

^{106}Cd(^{35}Cl,p2nγ) 1994Pa14,1997Br02 (continued)

γ(^{138}Gd) (continued)

‡ From 1994Pa14, relative to Iγ(220.8γ)=100. Errors are estimated to typically ≤5% (1994Pa14).

From 1994Pa14, assuming E2 for Q from γ(DCO). DCO ratios were obtained as R(DCO)=Iγ(134°,90°)/Iγ(90°,134°) at 134° or Iγ(158°,90°)/Iγ(90°,158°) at 158°, by gating on E2 transitions. Expected values are ≥1.0 for a stretched quadrupole transition and 0.6-0.7 for a pure stretched dipole transition (1994Pa14).

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Level Scheme

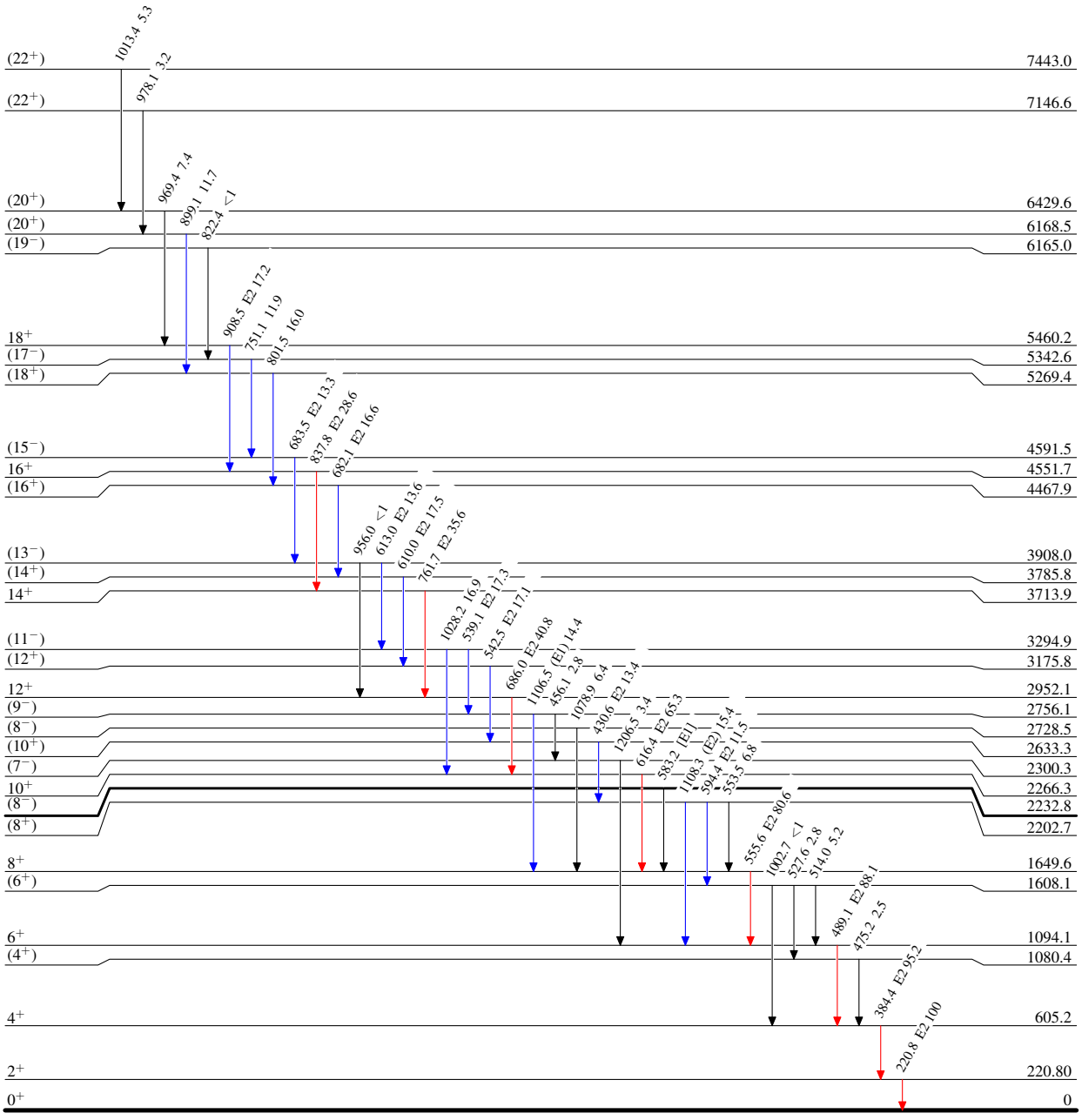
Intensities: Relative I_γ

Legend

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

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

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



$^{138}_{64}Gd_{74}$

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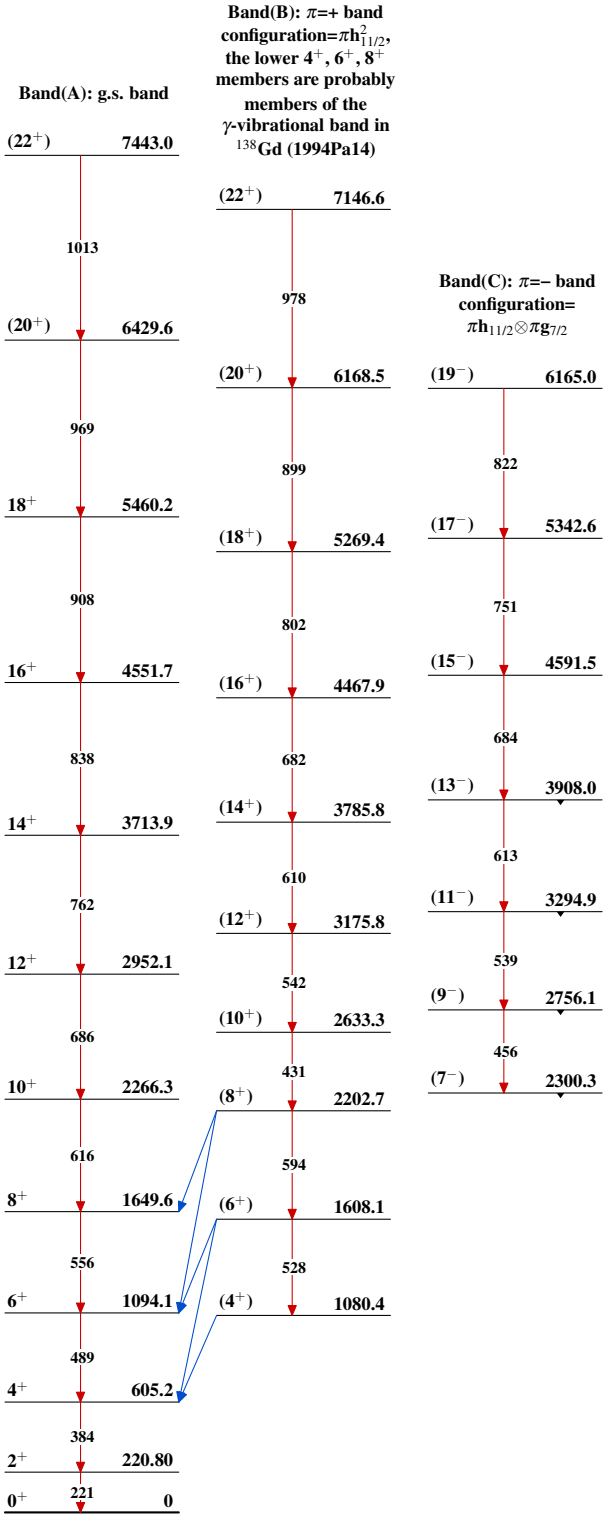

$^{138}_{64}Gd_{74}$