^{63}Cu(α,2nγ) 1997Bb14

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 202,59 (2025)	25-Feb-2025

1997Bb14: Eα=30 MeV from the Cyclotron at the Variable Energy Cyclotron Centre, Calcutta. γ rays were detected with two large-volume HPGe detectors and one large-volume HPGe detector with an anti-Compton shield. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma(\theta)$, $\gamma\gamma(\theta)$(DCO), Doppler-shift attenuation. Deduced levels, J, π, band structures, γ-ray multipolarities, mixing ratios.

1974Ha09: Eα=24 and 31 MeV from Research Institute for Physics, Stockholm. γ rays were detected with Ge(Li) detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin. Deduced levels. Authors also study ^{65}Ga using ^{64}Zn(d,nγ) reaction, but no details are given.

^{65}Ga Levels

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$[#]	Comments
0[@]	3/2$^-$		
190.80[@] *24*	5/2$^-$		
649.7	1/2$^-$,3/2$^-$		
816.7	3/2$^-$		
1075.31 *24*	7/2$^-$		
1287.1[@] *4*	9/2$^-$		
1325.7			
1371.7			
2037.3[&] *3*	9/2$^+$		
2789.2[@] *4*	13/2$^-$	≤0.69 ps	
2814.7 *4*	11/2$^-$	0.55 ps *21*	
3064.3[&] *4*	13/2$^+$		
3075.9			
3093.7			
3733.2[a] *4*	15/2$^+$		
4122.2[&] *5*	17/2$^+$	≤0.62 ps	
4330.5 *5*	(15/2$^+$)		J$^\pi$: (17/2$^+$) in Adopted Levels.
4432.3 *5*			Level from Table 1 of 1997Bb14 (not given in Figure 2).
4547.5[a] *5*	19/2$^+$	≥2.1 ps	
5022.2[&] *6*	21/2$^+$	≈1.4 ps	
5643.5[a] *6*	(23/2$^+$)		
7035.4[a] *7*	(27/2$^+$)		

[†] From least-squares fit to γ-ray energies, assuming ΔEγ=0.5 keV.
[‡] As proposed in 1997Bb14 based on measured $\gamma(\theta)$ and band assignments.
[#] From DSAM in 1997Bb14.
[@] Seq.(C): Sequence based on 3/2$^-$.
[&] Band(A): Band based on 9/2$^+$.
[a] Band(B): Band based on 15/2$^+$.

γ(^{65}Ga)

A$_2$ and A$_4$ values under comments are from 1997Bb14.

E$_\gamma$[†]	I$_\gamma$[†]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Comments
190.8	100 *5*	190.80	5/2$^-$	0	3/2$^-$	E$_\gamma$: other: 190.7 with Iγ=100 (1974Ha09).
310.1	1.5 *5*	4432.3		4122.2	17/2$^+$	E$_\gamma$,I$_\gamma$: From Table 1 of 1997Bb14 (not given in Figure 2).
424	<1	4547.5	19/2$^+$	4122.2	17/2$^+$	

Continued on next page (footnotes at end of table)

^{63}Cu(α,2nγ) 1997Bb14 (continued)

$\gamma(^{65}Ga)$ (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	Comments
459[#]		649.7	$1/2^-,3/2^-$	190.80	$5/2^-$			
626[#]		816.7	$3/2^-$	190.80	$5/2^-$			
653.4[#@]		649.7	$1/2^-,3/2^-$	0	$3/2^-$			
668.9	3.6 *4*	3733.2	$15/2^+$	3064.3	$13/2^+$			
750.2	≈28	2037.3	$9/2^+$	1287.1	$9/2^-$			E_γ: other: 750.7 with Iγ≈35 (1974Ha09).
814.3	6.5 *8*	4547.5	$19/2^+$	3733.2	$15/2^+$	E2		A_2=+0.31 *14*, A_4=−0.05 *18*.
884.5	10.2 *7*	1075.31	$7/2^-$	190.80	$5/2^-$			E_γ: other: 883.9 with Iγ≤5 (1974Ha09).
900.0	5.2 *6*	5022.2	$21/2^+$	4122.2	$17/2^+$	E2		A_2=+0.23 *9*.
918.5	<1	3733.2	$15/2^+$	2814.7	$11/2^-$			
944.0	9.5 *7*	3733.2	$15/2^+$	2789.2	$13/2^-$	D(+Q)	−0.05 *6*	A_2=−0.29 *16*, A_4=+0.05 *21*.
962.0	12.1 *20*	2037.3	$9/2^+$	1075.31	$7/2^-$	D		E_γ: other: 962.1 with Iγ≤5 (1974Ha09). I_γ: 9 in figure 2 of 1997Bb14. A_2=−0.10 *7*, A_4=−0.03 *8*.
1027.0	24.4 *13*	3064.3	$13/2^+$	2037.3	$9/2^+$	E2		A_2=+0.36 *6*, A_4=+0.01 *7*.
1039[#]		3075.9		2037.3	$9/2^+$			
1056.8[#]		3093.7		2037.3	$9/2^+$			
1057.8	11.5 *7*	4122.2	$17/2^+$	3064.3	$13/2^+$	E2		A_2=+0.27 *14*, A_4=−0.05 *19*.
1075.3	14.9 *20*	1075.31	$7/2^-$	0	$3/2^-$			E_γ: other: 1075.6 with Iγ≤5 (1974Ha09).
1096.0	≈5	5643.5	$(23/2^+)$	4547.5	$19/2^+$			
1096.3	≈76	1287.1	$9/2^-$	190.80	$5/2^-$			E_γ: other: 1095.5 with Iγ≈45 (1974Ha09).
1135[#]		1325.7		190.80	$5/2^-$			
1181[#]		1371.7		190.80	$5/2^-$			
1266.2		4330.5	$(15/2^+)$	3064.3	$13/2^+$			
1391.8	4.9 *6*	7035.4	$(27/2^+)$	5643.5	$(23/2^+)$	Q		A_2=+0.26 *9*.
1502.1	16.0 *13*	2789.2	$13/2^-$	1287.1	$9/2^-$	E2		A_2=+0.35 *9*, A_4=0.00 *11*.
1527.6	7.3 *8*	2814.7	$11/2^-$	1287.1	$9/2^-$	M1+E2	−3.0 *8*	A_2=−0.29 *12*.
1846.5	1.6 *5*	2037.3	$9/2^+$	190.80	$5/2^-$			

[†] From 1997Bb14, unless otherwise noted.
[‡] From $\gamma(\theta)$ in 1997Bb14, with magetic or electric character determined based on RUL and measured $T_{1/2}$ where available.
[#] From 1974Ha09; not reported in 1997Bb14.
[@] Placement of transition in the level scheme is uncertain.

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Level Scheme

Intensities: Relative I_γ

Legend

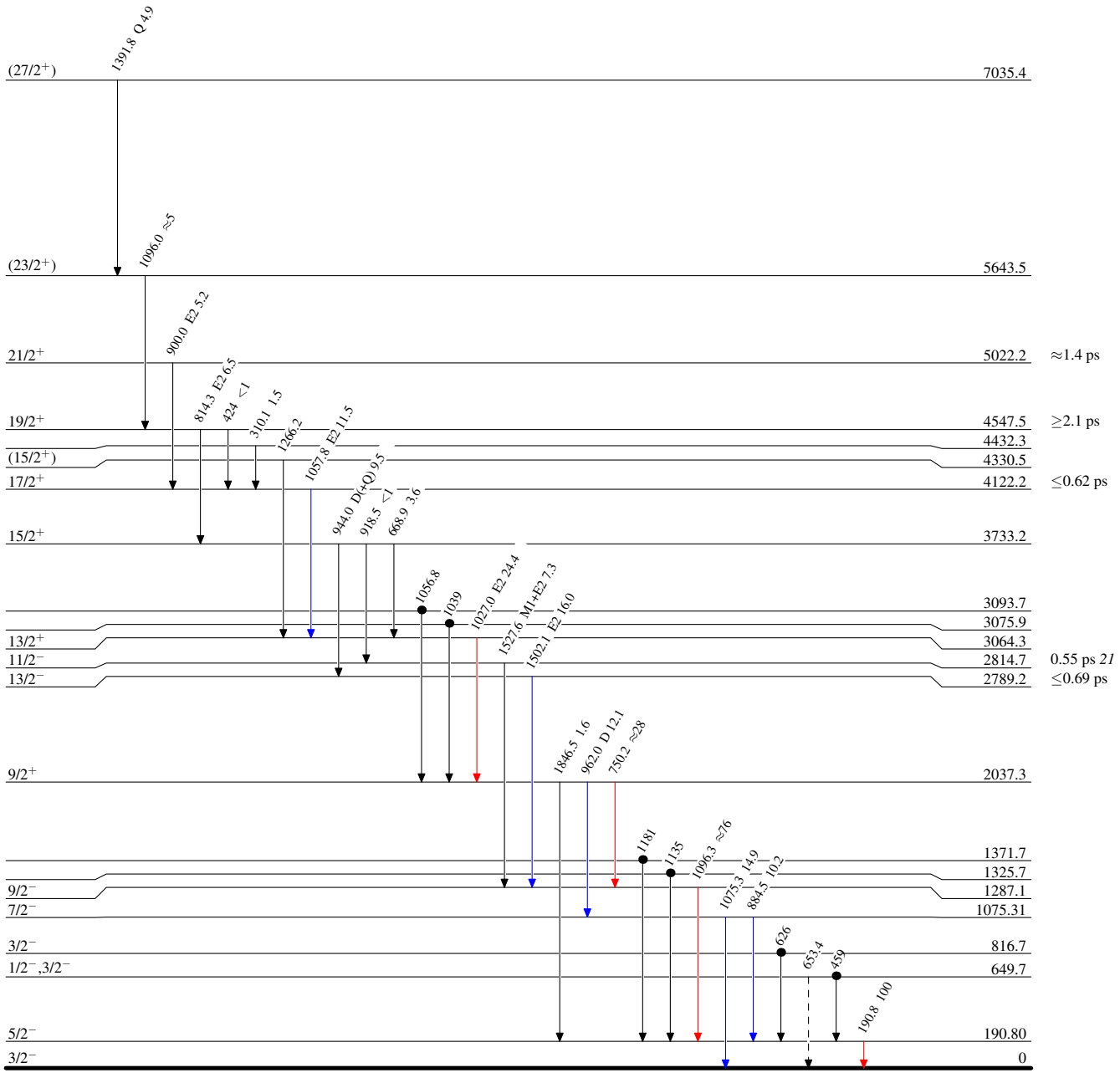
$I_\gamma < 2\% \times I_\gamma^{max}$

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

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

γ Decay (Uncertain)

Coincidence



$^{65}_{31}Ga_{34}$

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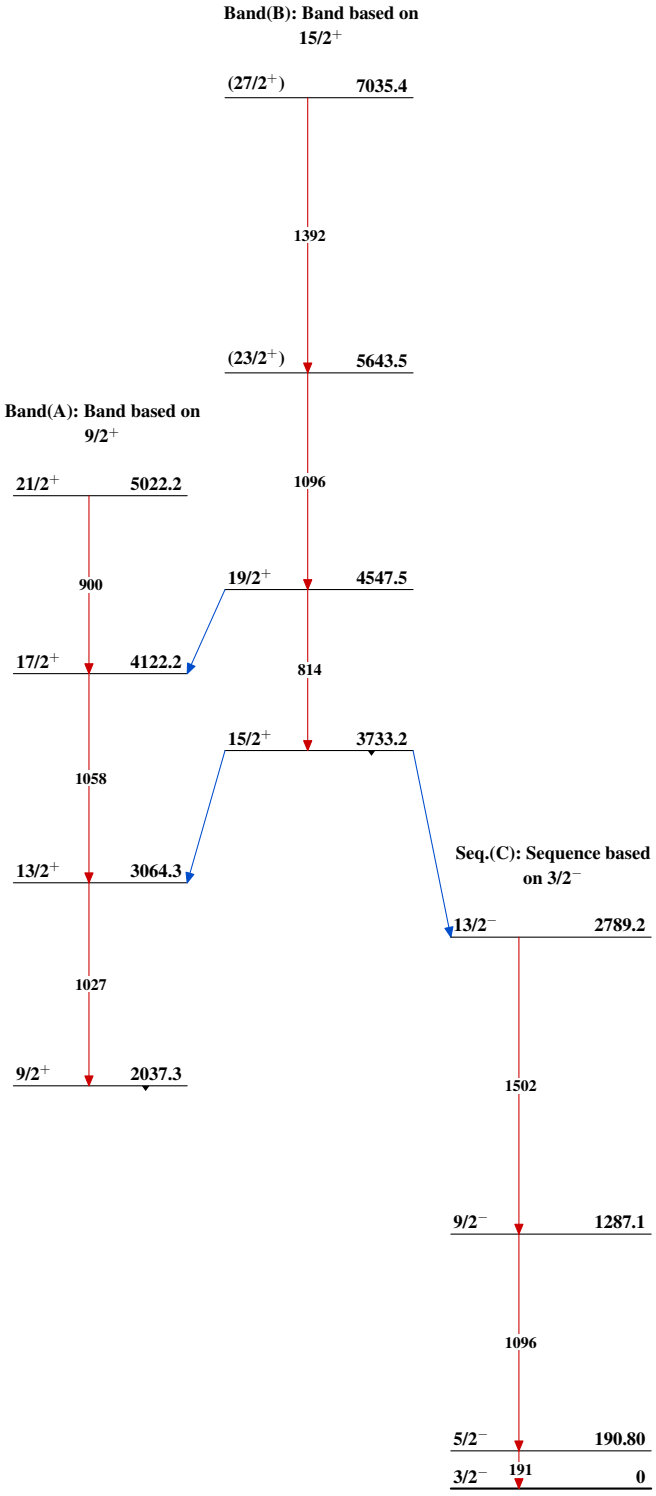

$^{65}_{31}Ga_{34}$