$^{52}Cr(^{18}O,\alpha 3n\gamma)$ 2019Gh09

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 196,17 (2024)	30-Sep-2023

2019Gh09: E=72.5 MeV ^{18}O beam was produced from the 15-UD pelletron accelerator at the Inter University Accelerator Centre (IUAC), New Delhi. Target was 1.0 mg/cm^2 ^{52}Cr (≈99% enriched) on a 8.0 mg/cm^2 Au backing. γ rays were detected with the Indian National Gamma Array (INGA) consisting of 14 Compton-suppressed HPGe clovers. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma$(DCO), γ(pol). Deduced levels, J, π, γ-ray multipolarities, branching ratios. Comparisons with theoretical calculations.

^{63}Zn Levels

E(level)†	J^{π}‡	E(level)†	J^{π}‡	E(level)†	J^{π}‡	E(level)†	J^{π}‡
0.0	3/2−	2826.73 *28*	11/2(+)	4684.3 *8*		6385.6 *5*	
192.91 *8*	5/2−	2934.65 *30*	13/2−	4776.3 *6*		6487.5 *6*	(23/2+)
649.90 *8*	5/2−	3357.5 *6*		5076.4 *6*		6569.64 *21*	23/2−
1063.21 *7*	7/2−	3480.8 *4*	(13/2+)	5076.70 *28*	(19/2+)	7524.7 *7*	
1206.39 *13*	7/2−	3527.75 *24*	13/2−	5334.8 *5*		7610.5 *4*	25/2−
1436.52 *31*	9/2−	3764.21 *17*	17/2+	5346.23 *19*	21/2+	7926.16 *23*	27/2(−)
1703.00 *11*	9/2+	3770.00 *17*	(15/2)+	5406.62 *28*	17/2−	9096.0 *4*	(29/2−)
2050.42 *12*	9/2−	4257.3 *8*		5424.62 *26*	17/2−	9773.5 *6*	(31/2−)
2318.82 *12*	11/2−	4355.11 *26*	(15/2−)	5916.23 *27*	19/2−	11048.5 *7*	
2585.30 *14*	13/2+	4365.6 *5*		6233.84 *25*	21/2−		

† From a least-squares fit to γ-ray energies.

‡ As given in 2019Gh09, based on known assignments of low-lying levels, measured $\gamma\gamma$(DCO) and γ(pol). When considered in Adopted Levels, the firm assignments for high-spin states from this dataset will be placed in parentheses if there are no strong supporting arguments.

$\gamma(^{63}Zn)$

Eγ†	Iγ‡	E$_i$(level)	J^{π}_i	E$_f$	J^{π}_f	Mult.#	Comments
192.9 *1*	21.9 *8*	192.91	5/2−	0.0	3/2−	D&	R(DCO)=0.56 *8*.
266.5 *5*	1.2 *4*	1703.00	9/2+	1436.52	9/2−		
317.6 *5*	1.8 *5*	6233.84	21/2−	5916.23	19/2−	(D+Q)@	R(DCO)=0.68 *34*.
335.8 *5*	0.8 *4*	6569.64	23/2−	6233.84	21/2−	(D+Q)@	R(DCO)=0.76 *33*.
413.3 *1*	17.2 *8*	1063.21	7/2−	649.90	5/2−	(M1+E2)&	R(DCO)=0.56 *7*, POL=−0.02 *8*.
421.2 *5*	1.8 *7*	4776.3		4355.11	(15/2−)		
456.9 *5*	1.91 *6*	649.90	5/2−	192.91	5/2−	D[a]	R(DCO)=1.02 *34*.
491.6 *5*		5916.23	19/2−	5424.62	17/2−		
496.6 *1*	13.2 *7*	1703.00	9/2+	1206.39	7/2−	&	R(DCO)=0.71 *11*, POL=−0.15 *6*. Mult.: negative POL indicates M1, but E1 expected from ΔJ^{π}.
509.6 *5*	1.3 *7*	5916.23	19/2−	5406.62	17/2−		
530.8 *5*	1.6 *6*	3357.5		2826.73	11/2(+)		
570.0 *5*	0.8 *5*	5916.23	19/2−	5346.23	21/2+		
590.9 *5*	0.9 *4*	4355.11	(15/2−)	3764.21	17/2+		
595.6 *5*	2.3 *8*	4365.6		3770.00	(15/2)+		
615.8 *5*		2934.65	13/2−	2318.82	11/2−		
639.8 *1*	109.3 *23*	1703.00	9/2+	1063.21	7/2−	D&	R(DCO)=0.50 *4*, POL=+0.01 *5*.
649.9 *1*	16.5 *7*	649.90	5/2−	0.0	3/2−	(M1+E2)&	R(DCO)=0.48 *8*, POL=+0.03 *11*.
653.4 *5*	2.8 *5*	6569.64	23/2−	5916.23	19/2−		
654 *1*		3480.8	(13/2+)	2826.73	11/2(+)		
721.3 *5*	1.9 *6*	5076.4		4355.11	(15/2−)		

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^{52}Cr(^{18}O,α3nγ) 2019Gh09 (continued)

γ(^{63}Zn) (continued)

Eγ[†]	Iγ[‡]	Ei(level)	J^π_i	Ef	J^π_f	Mult.[#]	Comments
809.2 *3*	7.6 *7*	6233.84	21/2−	5424.62	17/2−	[@]	R(DCO)=1.8 *13*.
827.2 *3*	3.7 *5*	6233.84	21/2−	5406.62	17/2−		
870.3 *1*	13.8 *7*	1063.21	7/2−	192.91	5/2−	M1+E2[&]	R(DCO)=0.83 *19*, POL=−0.16 *17*.
874.3 *5*	1.9 *6*	4355.11	(15/2−)	3480.8	(13/2+)		
882.3 *1*	78.8 *24*	2585.30	13/2+	1703.00	9/2+	E2[@]	R(DCO)=0.99 *12*, POL=+0.11 *6*.
887.6 *5*		6233.84	21/2−	5346.23	21/2+		
899.8 *5*		4257.3		3357.5			
943.2 *5*	2.69 *6*	3770.00	(15/2)+	2826.73	11/2(+)		
987.2 *1*	12 *1*	2050.42	9/2−	1063.21	7/2−	[@]	R(DCO)=1.37 *72*.
1013.4 *3*	8.1 *7*	1206.39	7/2−	192.91	5/2−	M1[&]	R(DCO)=0.51 *15*, POL=−0.25 *22*.
1039.4 *5*	2.2 *8*	6385.6		5346.23	21/2+		
1063.2 *1*	100	1063.21	7/2−	0.0	3/2−	E2[&]	R(DCO)=0.99 *12*, POL=+0.19 *4*.
1123.7 *3*	3.1 *7*	2826.73	11/2(+)	1703.00	9/2+	(D+Q)[a]	R(DCO)=1.67 *67*.
1139.0 *5*	2.2 *4*	7524.7		6385.6			
1157.2 *5*	1.0 *4*	6233.84	21/2−	5076.70	(19/2+)		
1169.8 *5*		9096.0	(29/2−)	7926.16	27/2(−)		
1178.9 *1*	66.6 *20*	3764.21	17/2+	2585.30	13/2+	E2[&]	R(DCO)=0.97 *11*, POL=+0.15 *6*.
1184.7 *1*	13.5 *7*	3770.00	(15/2)+	2585.30	13/2+	Q[&]	R(DCO)=1.39 *31*, POL=+0.04 *14*.
1206.4 *3*	6.8 *5*	1206.39	7/2−	0.0	3/2−	E2[&]	R(DCO)=1.02 *36*, POL=+0.07 *16*.
1208.9 *5*	2.2 *6*	3527.75	13/2−	2318.82	11/2−		
1223.4 *1*	27.3 *9*	6569.64	23/2−	5346.23	21/2+	E1[&]	R(DCO)=0.49 *8*, POL=+0.15 *13*.
1243.6 *5*		1436.52	9/2−	192.91	5/2−		
1255.6 *1*	12.1 *7*	2318.82	11/2−	1063.21	7/2−	Q[@]	R(DCO)=0.98 *37*.
1306.7 *3*	5.6 *10*	5076.70	(19/2+)	3770.00	(15/2)+	[@]	R(DCO)=1.0 *5*.
1312.5 *5*	1.0 *4*	5076.70	(19/2+)	3764.21	17/2+	[@]	R(DCO)=1.01 *60*.
1326.7 *5*	2.8 *7*	4684.3		3357.5			
1356.5 *1*	11.0 *21*	7926.16	27/2(−)	6569.64	23/2−	Q[&]	R(DCO)=0.83 *18*.
1376.6 *3*	3.9 *8*	7610.5	25/2−	6233.84	21/2−		
1410.8 *5*		6487.5	(23/2+)	5076.70	(19/2+)		
1477.3 *3*	3.0 *7*	3527.75	13/2−	2050.42	9/2−		
1485.5 *5*		9096.0	(29/2−)	7610.5	25/2−		
1498.1 *5*		2934.65	13/2−	1436.52	9/2−		
1510.0 *5*	1.7 *4*	1703.00	9/2+	192.91	5/2−		
1561.1 *5*	1.8 *4*	5916.23	19/2−	4355.11	(15/2−)		
1570.6 *5*		5334.8		3764.21	17/2+		
1582.0 *1*	30.5 *10*	5346.23	21/2+	3764.21	17/2+	E2[&]	R(DCO)=0.97 *12*, POL=+0.16 *5*.
1660.4 *5*		5424.62	17/2−	3764.21	17/2+		
1769.8 *3*	6.3 *6*	4355.11	(15/2−)	2585.30	13/2+	(D+Q)[&]	R(DCO)=0.76 *20*.
1777.7 *5*	2.4 *6*	3480.8	(13/2+)	1703.00	9/2+		
1847.3 *5*		9773.5	(31/2−)	7926.16	27/2(−)		
1857.5 *5*		2050.42	9/2−	192.91	5/2−		
1878.8 *5*	1.3 *5*	5406.62	17/2−	3527.75	13/2−	[@]	R(DCO)=1.25 *80*.
1896.8 *5*		5424.62	17/2−	3527.75	13/2−		
1952.5 *5*	0.76 *28*	11048.5		9096.0	(29/2−)		
2471.9 *5*		5406.62	17/2−	2934.65	13/2−		
2489.9 *5*		5424.62	17/2−	2934.65	13/2−		

[†] The uncertainties are from 0.1 to 0.5 keV depending on intensities from a general statement in 2019Gh09. According to that, the evaluator has made the following assignments: ΔEγ=0.1 keV for Iγ≥10, 0.3 keV if Iγ≥3, and 0.5 keV if Iγ<3.

[‡] Relative to Iγ(1063.3γ)=100 (2019Gh09). The quoted uncertainty includes the fitting error plus a systematic uncertainty of 3%

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$^{52}Cr(^{18}O,\alpha 3n\gamma)$ 2019Gh09 (continued)

$\gamma(^{63}Zn)$ (continued)

due to the uncertainties in efficiency and background subtraction (2019Gh09).

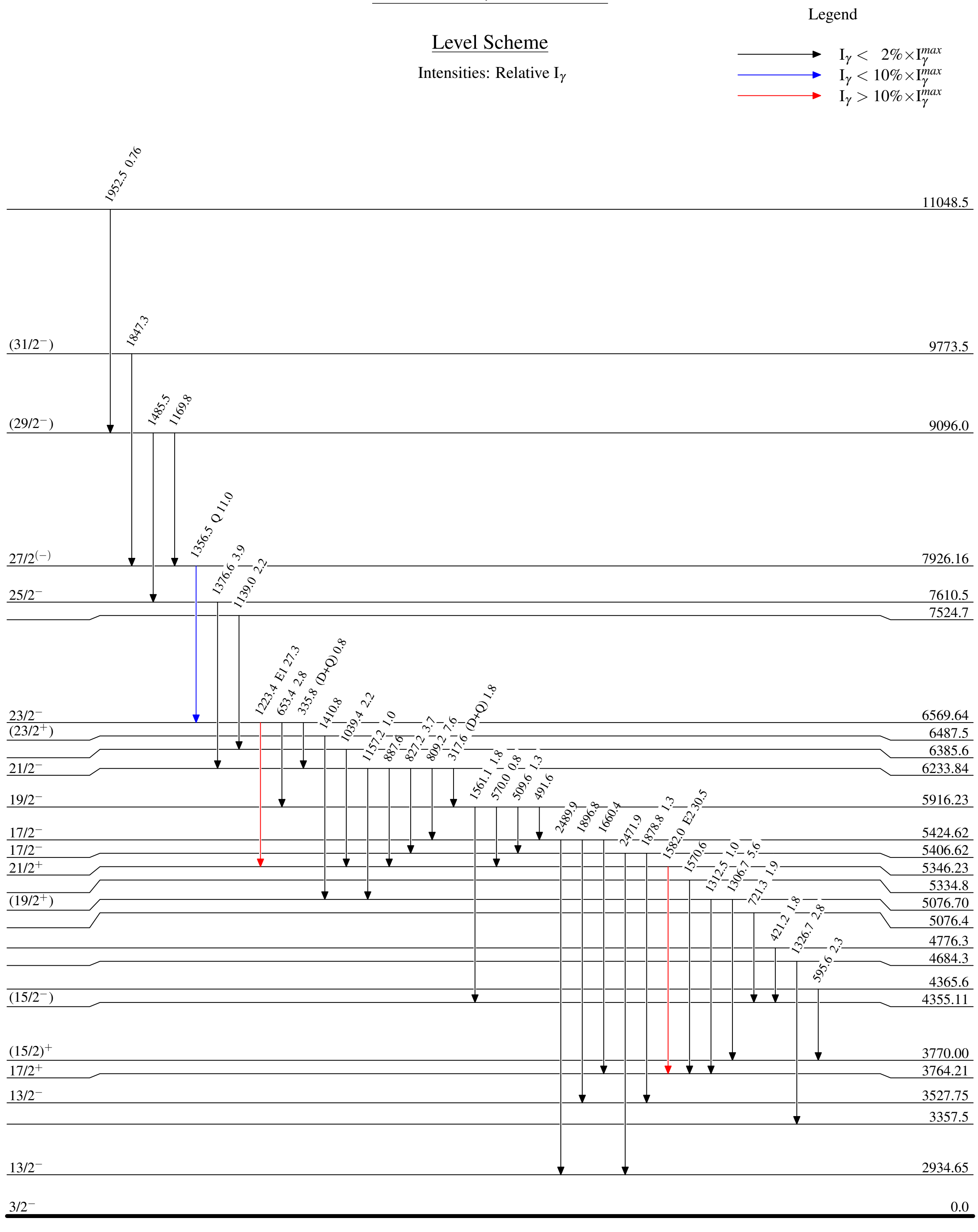
[#] Deduced by the evaluator from $\gamma\gamma$(DCO) and γ(pol) in 2019Gh09. Expected of R(DCO) for stretched dipole and quadrupole transitions are ≈0.5 (1.0) and ≈1.0 (2.0), respectively when gating on a stretched quadrupole (dipole) transition (2019Gh09). For POL values from γ(pol), positive value indicates electric nature and negative value for magnetic nature; a near zero value indicates a strong admixture (2019Gh09).

[@] DCO gate on E2, 1064γ.

[&] DCO gate on E2, 882γ.

[a] DCO gate on E1, 640γ.

^{52}Cr(^{18}O,α3nγ) 2019Gh09

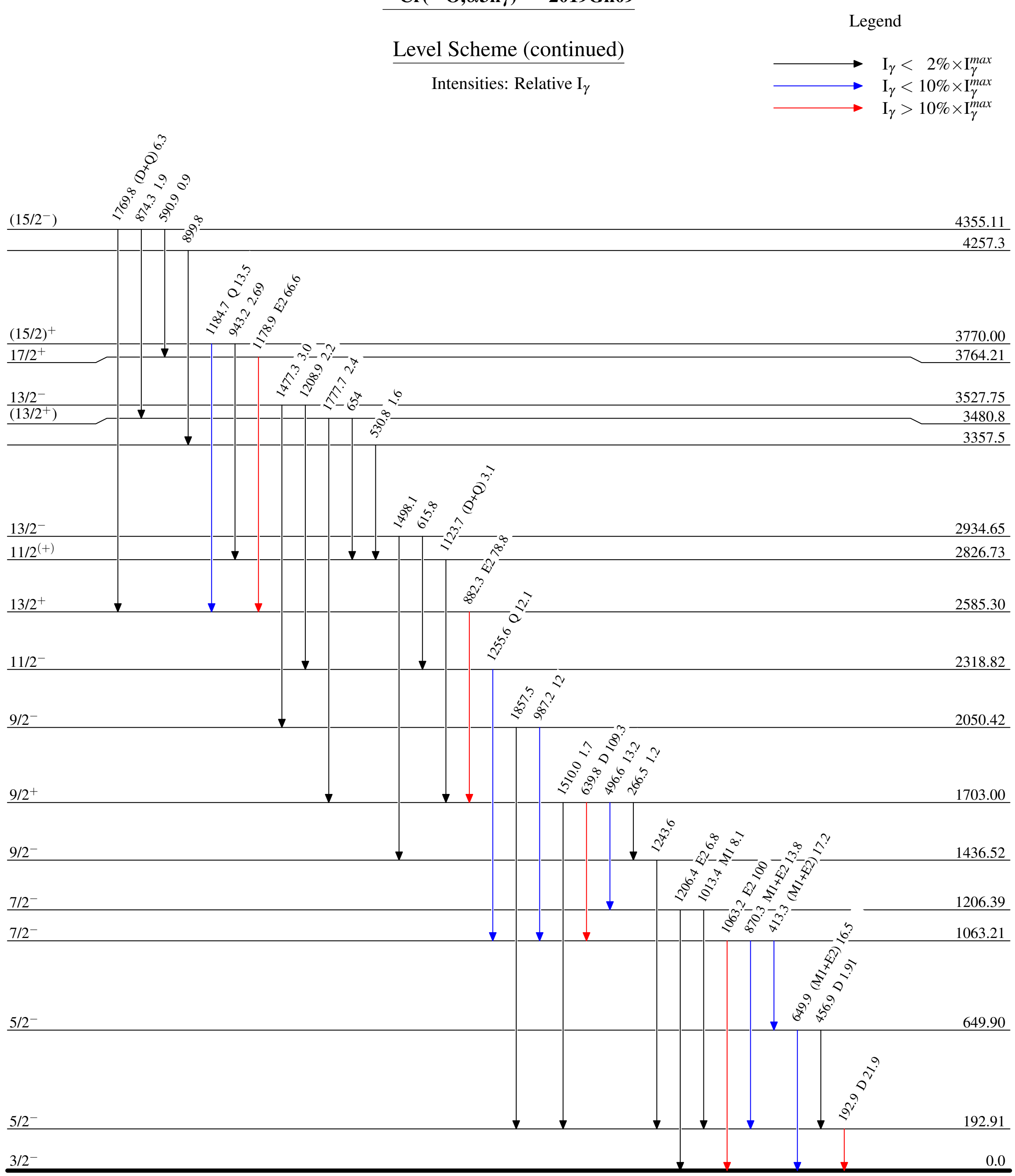


$^{63}_{30}Zn_{33}$

^{52}Cr(^{18}O,α3nγ) 2019Gh09

Level Scheme (continued)

Intensities: Relative I_γ



$^{63}_{30}Zn_{33}$