^{26}Mg(^{48}Ca,3np2$\alpha\gamma$) 2022Se03

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh, Huang Xiaolong, and Wang Xianghan	NDS 204,1 (2025)	30-Jun-2023

2022Se03: E(^{48}Ca)=275,290,320 MeV. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma(\theta)$ at 17.3°, 31.7°, 37.4°, 50.1°, 58.3°, 69.8°, 79.9°, and 90.0° with respect to the beam direction, $\gamma\gamma(\theta)$(ADO ratios) using Gammasphere array with 101 Compton suppressed HPGe detectors, the Fragment Mass Analyzer (FMA), a Micro-Channel Plate (MCP) detector to provide clean channel selection and a threefold ionization chamber at the ATLAS-ANL facility. Deduced a magnetic dipole rotational band from particle-rotor model (PRM) calculations. Comparison with large-scale shell-model calculations using the NuShellX code in the full *fp* model space with the GXPF1A interaction.

^{62}Co Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	Comments
22[#] *5*	(5)$^+$	13.86 min *9*	E(level): level energy without uncertainty held fixed in the least-squares fit. E(level),J$^\pi$,$T_{1/2}$: from the Adopted Levels.
610.5 *2*	5$^+$		
910.0 *2*	4$^+$		
1216.9[#] *2*	6$^+$		
1542.6[#] *2*	7$^+$		
2130.3 *4*	8$^+$		
2281.0 *10*	6$^+$		
2309.0[#] *2*	8$^+$		
2798.0 *3*	8$^+$		
2960.0 *20*	4$^+$		
3122.6 *10*	9$^+$		
3155 *3*	(5$^+$)		
3169.1[#] *2*	9$^+$		
3331 *5*	(7$^+$)		
3564.9[@] *7*	9$^+$		
3590 *4*	10$^+$		
3598.3 *11*	9$^+$		
3608.0 *5*	10$^+$		
3704 *4*	10$^+$		
3978.5 *3*	11$^+$		
4048.9[@] *4*	10$^+$		
4284 *8*	12$^+$		
4304.6 *14*	10$^+$		
4381.0 *11*	11$^+$		
4508.0 *14*	11$^+$		
4723.2[@] *4*	11$^+$		
5000.5 *11*	12$^+$		
5812.7[@] *8*	12$^+$		
6947.9[@] *12*	(13$^+$)		
x	J		E(level),J$^\pi$: based on intensity and coincidence considerations, 2022Se03 suggest x≥4.5 MeV, and probable J≥10$^+$.
547.0+x[&] *3*	J+1		
1030.5+x[&] *5*	J+2		
1686.0+x[&] *6*	J+3		
2480.9+x[&] *7*	J+4		
3368.9+x[&] *7*	J+5		
4379+x[&] *9*	J+6		

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^{26}Mg(^{48}Ca,3np2$\alpha\gamma$) 2022Se03 (continued)

^{62}Co Levels (continued)

† From least-squares fit to Eγ values.
‡ As given in 2022Se03, based on ΔJ and multipolarities deduced from $\gamma(\theta)$ and $\gamma\gamma(\theta)$ data, band associations, and comparison with shell-model calculations.
# Seq.(C): γ cascade based on $(5)^+$.
@ Band(A): ΔJ=1 band based on 9^+.
& Band(B): ΔJ=1, magnetic-dipole band. Proposed configuration=$\pi f_{7/2}^{-1}\otimes\nu(1g_{9/2}^2,2p_{3/2}^{-1})$ (2022Se03).

$\gamma(^{62}Co)$

For $\gamma(\theta)$ data, 2022Se03 associate positive A_2 value with pure ΔJ=2 (E2) transitions and a negative A_2 with ΔJ=1 transitions.
R_{ac}=[Iγ_2(forward or backward angles), gated on γ_1 at all angles]/[Iγ_2(middle), gated on γ_1 at all angles], where forward angles were 31.7°, 37.4° and 50.1°; backward angles of 129.9°, 142.6°, 148.3° and 162.7°; and middle angles of 69.8°, 79.2°, 80.7°, 90.0°, 99.3°, 100.8° and 110.2°. In this arrangement, expected R_{ac} values are >1.0 for ΔJ=2, quadrupole, and <0.8 for ΔJ=1 transitions.

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.†	Comments
306.8 *2*	8 *1*	1216.9	6^+	910.0	4^+	Q	A_2=+0.35 *16*; A_4=+0.01 *21* Mult.: E2 in 2022Se03. R_{ac}=1.03 *9*.
325.7 *1*	58 *3*	1542.6	7^+	1216.9	6^+	D+Q	A_2=−0.24 *6*; A_4=−0.05 *8* Mult.: M1+E2 in 2022Se03. R_{ac}=0.83 *4*.
371 *1*	4 *1*	3169.1	9^+	2798.0	8^+	D+Q	Mult.: M1+E2 in 2022Se03. R_{ac}=0.77 *31*.
438.9 *4*	1 *1*	3608.0	10^+	3169.1	9^+	D+Q	Mult.: M1+E2 in 2022Se03. R_{ac}=0.72 *19*.
483.4 *9*	4 *1*	4048.9	10^+	3564.9	9^+	D+Q	Mult.: M1+E2 in 2022Se03. R_{ac}=0.84 *13*.
483.5 *3*	3 *1*	1030.5+x	J+2	547.0+x	J+1	D+Q	A_2=−0.32 *13*; A_4=+0.10 *19* Mult.: M1+E2 in 2022Se03. R_{ac}=0.71 *7*.
489.0‡ *2*	3 *1*	2798.0	8^+	2309.0	8^+	(D+Q)	Mult.: M1+E2 in 2022Se03. ΔJ=0 transition. R_{ac}=0.81 *57*.
547.0 *3*	5 *1*	547.0+x	J+1	x	J	D+Q	A_2=−0.64 *11*; A_4=−0.18 *15* Mult.: M1+E2 in 2022Se03. R_{ac}=0.82 *20*.
587.7 *3*	9 *1*	2130.3	8^+	1542.6	7^+	D+Q	A_2=−0.37 *19*; A_4=−0.05 *27* Mult.: M1+E2 in 2022Se03. R_{ac}=0.89 *16*.
588.4 *2*	15 *2*	610.5	5^+	22	$(5)^+$	D+Q	A_2=−0.34 *19*; A_4=−0.21 *24* Mult.: M1+E2 in 2022Se03. ΔJ=0 transition. R_{ac}=0.83 *8*.
606.2 *2*	13 *1*	1216.9	6^+	610.5	5^+	D+Q	A_2=−0.45 *9*; A_4=−0.09 *12* Mult.: M1+E2 in 2022Se03. R_{ac}=0.89 *9*.
655.5 *3*	5 *1*	1686.0+x	J+3	1030.5+x	J+2	D+Q	A_2=−0.50 *10*; A_4=−0.16 *13* Mult.: M1+E2 in 2022Se03. R_{ac}=0.77 *22*.
674.4 *4*	2 *1*	4723.2	11^+	4048.9	10^+	D+Q	A_2=−0.37 *18*; A_4=−0.18 *26* Mult.: M1+E2 in 2022Se03. R_{ac}=0.80 *22*.
679 *2*	3 *1*	2960.0	4^+	2281.0	6^+	(Q)	Mult.: E2 in 2022Se03. R_{ac}=1.31 *45*.
694 *6*	<0.6	4284	12^+	3590	10^+	(Q)	I_γ: 0.1 *5* in 2022Se03.

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^{26}Mg(^{48}Ca,3np2$\alpha\gamma$) 2022Se03 (continued)

γ(^{62}Co) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.†	Comments
							Mult.: E2 in 2022Se03. R_{ac}=1.20 *64*.
744.7 *4*	3 *1*	4723.2	11^+	3978.5	11^+	D+Q	Mult.: M1+E2 in 2022Se03. ΔJ=0 transition. R_{ac}=0.77 *16*.
766.4 *1*	54 *3*	2309.0	8^+	1542.6	7^+	D+Q	A_2=−0.29 *9*; A_4=−0.12 *13* Mult.: M1+E2 in 2022Se03. R_{ac}=0.90 *3*.
773 *1*	1 *1*	4381.0	11^+	3608.0	10^+	D+Q	Mult.: M1+E2 in 2022Se03. R_{ac}=0.80 *17*.
794.9 *4*	3 *1*	2480.9+x	J+4	1686.0+x	J+3	D+Q	A_2=−0.56 *12*; A_4=−0.30 *17* Mult.: M1+E2 in 2022Se03. R_{ac}=0.82 *36*.
809.4 *2*	11 *1*	3978.5	11^+	3169.1	9^+	Q	A_2=+0.53 *23*; A_4=+0.05 *25* Mult.: E2 in 2022Se03. R_{ac}=1.20 *11*.
813.6 *9*	<1.0	3122.6	9^+	2309.0	8^+	(D+Q)	I_γ: 0.4 *6* in 2022Se03. Mult.: M1+E2 in 2022Se03. R_{ac}=0.96 *32*.
860.1 *1*	26 *2*	3169.1	9^+	2309.0	8^+	D+Q	A_2=−0.23 *13*; A_4=−0.08 *20* Mult.: M1+E2 in 2022Se03. R_{ac}=0.86 *5*.
880.0 *4*	4 *1*	4048.9	10^+	3169.1	9^+	D+Q	Mult.: M1+E2 in 2022Se03. R_{ac}=0.73 *18*.
887.9 *3*	15 *3*	910.0	4^+	22	$(5)^+$	D+Q	A_2=−0.34 *13*; A_4=+0.06 *17* Mult.: M1+E2 in 2022Se03. R_{ac}=0.92 *18*.
888.0 *2*	4 *1*	3368.9+x	J+5	2480.9+x	J+4	(D+Q)	Mult.: M1+E2 in 2022Se03. R_{ac}=0.91 *13*.
909.7 *8*	1 *1*	4508.0	11^+	3598.3	9^+	Q	Mult.: E2 in 2022Se03. R_{ac}=1.13 *19*.
1010 *9*	<0.4	4379+x	J+6	3368.9+x	J+5		I_γ: 0.1 *3* in 2022Se03. Mult.: (M1+E2) in 2022Se03.
1022 *1*	<0.8	5000.5	12^+	3978.5	11^+	D+Q	I_γ: 0.3 *5* in 2022Se03. Mult.: M1+E2 in 2022Se03. R_{ac}=0.65 *30*.
1050 *5*	3 *3*	3331	(7^+)	2281.0	6^+		Mult.: (M1+E2) in 2022Se03.
1089.4 *6*	2 *1*	5812.7	12^+	4723.2	11^+	(D+Q)	Mult.: M1+E2 in 2022Se03. R_{ac}=0.90 *11*.
1135.2 *9*	1 *1*	6947.9	(13^+)	5812.7	12^+		Mult.: (M1+E2) in 2022Se03.
1182 *1*	2 *1*	4304.6	10^+	3122.6	9^+	D+Q	Mult.: M1+E2 in 2022Se03. R_{ac}=0.71 *13*.
1194.9 *1*	44 *5*	1216.9	6^+	22	$(5)^+$	D+Q	A_2=−0.26 *5*; A_4=−0.13 *7* Mult.: M1+E2 in 2022Se03. R_{ac}=0.86 *4*.
1255.4 *8*	1 *1*	3564.9	9^+	2309.0	8^+	(D+Q)	Mult.: M1+E2 in 2022Se03. R_{ac}=0.74 *48*.
1371 *1*	3 *1*	2281.0	6^+	910.0	4^+	(Q)	Mult.: E2 in 2022Se03. R_{ac}=1.23 *63*.
1460 *4*	5 *1*	3590	10^+	2130.3	8^+	Q	Mult.: E2 in 2022Se03. R_{ac}=1.37 *16*.
1468 *1*	2 *1*	3598.3	9^+	2130.3	8^+	(D+Q)	Mult.: M1+E2 in 2022Se03. R_{ac}=0.97 *21*.
1574 *4*	1 *1*	3704	10^+	2130.3	8^+	(Q)	Mult.: E2 in 2022Se03. R_{ac}=1.24 *43*.
1581 *4*	1 *1*	2798.0	8^+	1216.9	6^+	(Q)	Mult.: E2 in 2022Se03. R_{ac}=1.36 *83*.

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^{26}Mg(^{48}Ca,3np2$\alpha\gamma$) 2022Se03 (continued)

$\gamma(^{62}Co)$ (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Comments
2050 *4*	3 *1*	2960.0	4^+	910.0	4^+	Mult.: (M1+E2) in 2022Se03.
2245 *3*	1 *1*	3155	(5^+)	910.0	4^+	

† Assigned by the evaluators based on $\gamma(\theta)$ and $\gamma\gamma(\theta)$ data in 2022Se03. All M1+E2 assignments in 2022Se03 are assigned D+Q, and E2 as Q, since angular distribution/correlation data are parity-insensitive.
‡ Placement of transition in the level scheme is uncertain.

^{26}Mg(^{48}Ca,3np2$\alpha\gamma$) 2022Se03

Level Scheme

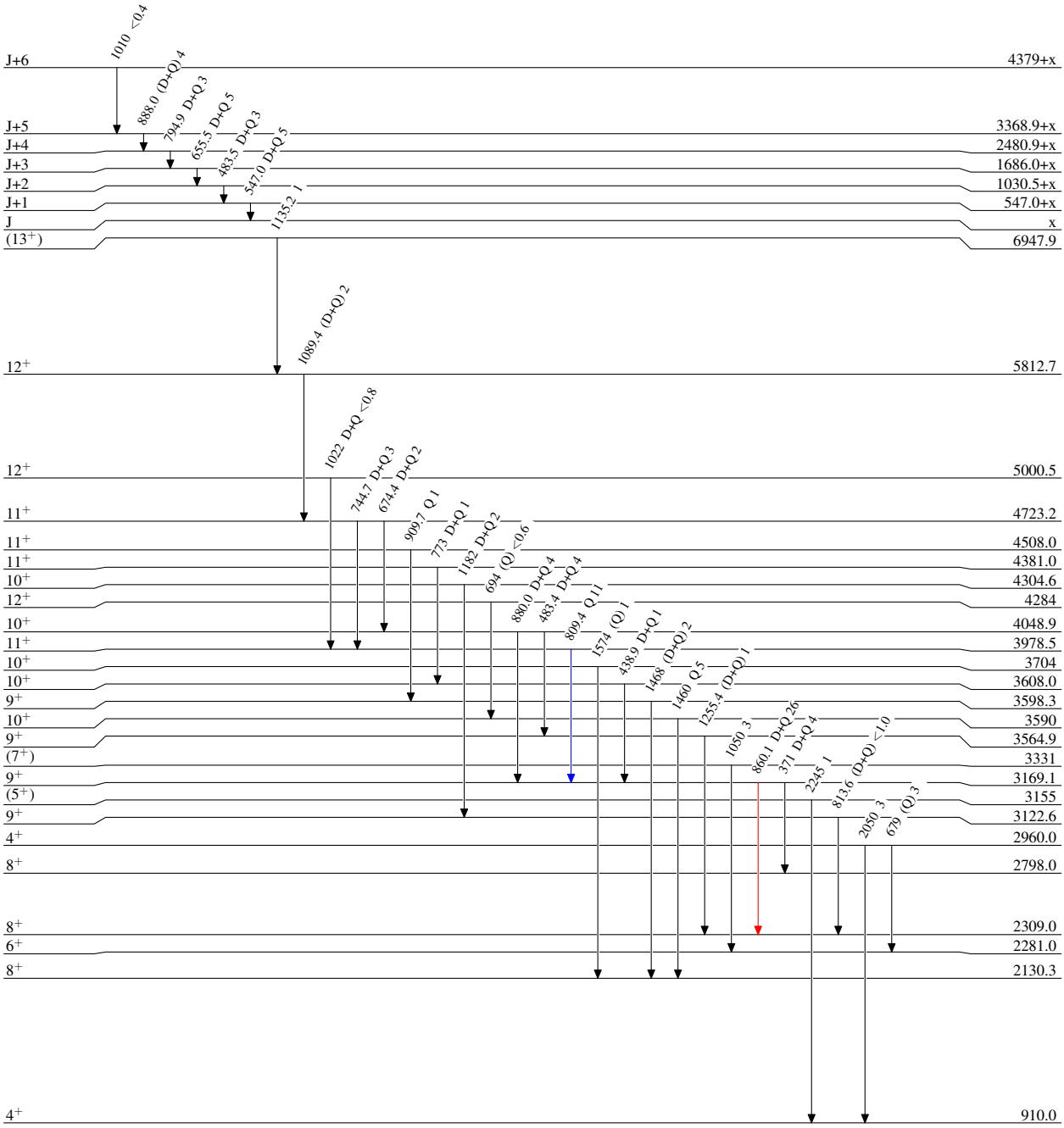
Intensities: Relative I_γ

Legend

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

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

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



$^{62}_{27}Co_{35}$

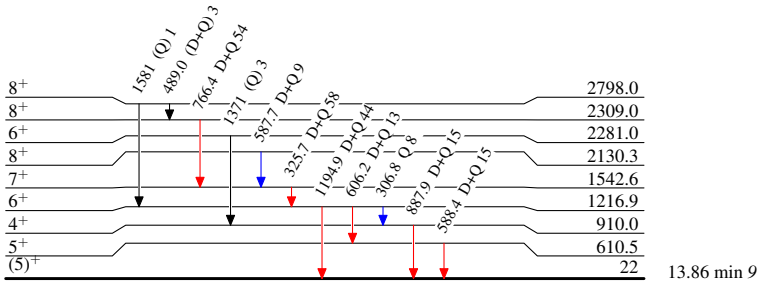
^{26}Mg(^{48}Ca,3np2$\alpha\gamma$) 2022Se03

Level Scheme (continued)

Intensities: Relative I_γ

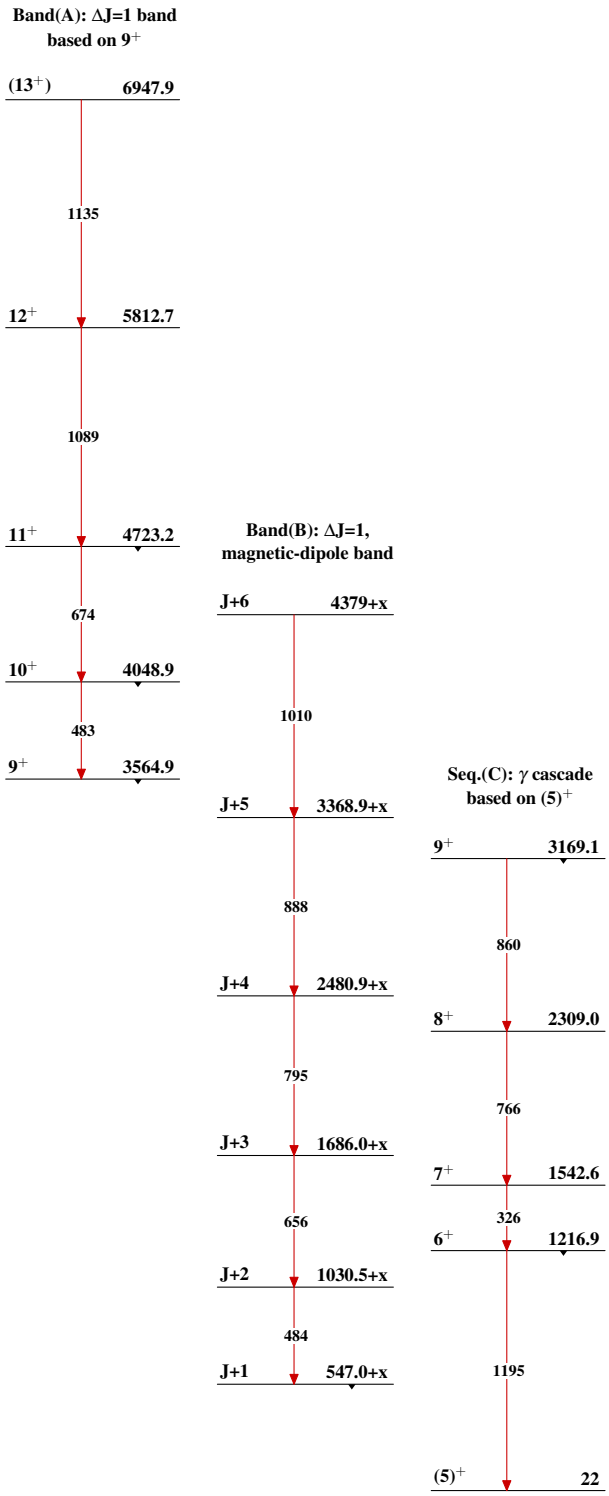
Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)



$^{62}_{27}Co_{35}$

^{26}Mg(^{48}Ca,3np2$\alpha\gamma$) 2022Se03



$^{62}_{27}Co_{35}$