^{147}Sm(^{24}Mg,4nγ) 1985Ge05

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 191,1 (2023)	22-Aug-2023

Data reported in 1985Ge05 are from combined results of ^{147}Sm(^{24}Mg,4nγ) and ^{142}Nd(^{28}Si,3nγ) measurements.

1985Ge05: E(^{24}Mg)=128 MeV from the ANU 14UD Pelletron accelerator. Target consists of two self-supporting foils of 1.3 mg/cm^2 Sm. Measured γ-ray excitation functions, Eγ, Iγ at angles ±45° and ±135°, $\gamma\gamma$-coin, γ(x ray)-coin using four HPGe detectors, two of which were Compton-suppressed. ^{142}Nd(^{28}Si,3nγ), E(^{28}Si)=140 MeV, chopped beam. Pb-backed Nd foil targets. Measured $\gamma(\theta)$ at six angles between 0° and 90°, using a Compton-suppressed Ge detector. Deduced levels, J, π, band structures. Comparison with cranked-shell-model (CSM) calculations.

Other: 1996Sc50.

^{167}W Levels

E(level)†	J$^\pi$‡	Comments
0+x#	13/2$^+$	E(level): x=127.1 *17* in the Adopted Levels.
224.7+x# *2*	17/2$^+$	
630.0+x# *3*	21/2$^+$	
1168.9+x# *4*	25/2$^+$	
1655.5+x@ *5*	23/2$^{(-)}$	
1805.6+x# *4*	29/2$^+$	
1978.1+x@ *4*	27/2$^{(-)}$	From γ-ray branching ratios, 1985Ge05 deduced B(E1)(809.1γ, E1)/B(E2)(322.8γ, E2)=8.3×10^{-7} b^{-1} *8* (from $\gamma\gamma$-coin data), and >5.8×10^{-7} b^{-1} *7* (from singles data).
2300.2+x& *7*	(29/2$^-$)	
2352.3+x@ *5*	31/2$^{(-)}$	From γ-ray branching ratios, 1985Ge05 deduced B(E1)(546.6γ, E1)/B(E2)(374.3γ, E2)=14×10^{-7} b^{-1} *2* (from singles data).
2502.1+x# *5*	33/2$^+$	
2694.0+x& *7*	(33/2$^-$)	
2810.0+x@ *5*	35/2$^{(-)}$	
3185.3+x& *7*	(37/2$^-$)	
3204.2+x# *5*	37/2$^+$	
3382.2+x@ *5*	39/2$^{(-)}$	
3779.7+x& *9*	(41/2$^-$)	
3856.5+x# *6*	41/2$^+$	
4070.1+x@ *7*	43/2$^{(-)}$	
4473.8+x& *10*	(45/2$^-$)	
4499.7+x# *8*	45/2$^+$	
4856.1+x@ *9*	47/2$^{(-)}$	
5183.0+x# *9*	(49/2$^+$)	
5256.7+x& *11*	(49/2$^-$)	
5925.2+x# *11*	(53/2$^+$)	
6854.2+x# *12*	(57/2$^+$)	
7959.4+x# *13*	(61/2$^+$)	

† From a least-squares fit to Eγ data, however, most levels in the level scheme decay by single transitions. Add 125.9 keV to each level energy to correspond to level energies in the Adopted Levels.

‡ 1985Ge05 assumed J^π=13/2$^+$ for the bandhead (0.0+x level) of the strongly populated yrast band, consistent with known structure in ^{169}W and ^{171}W. They assigned π=− to the main sideband (bandhead at 1655.5+x), because its structure fitted into

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^{147}Sm(^{24}Mg,4nγ) 1985Ge05 (continued)

^{167}W Levels (continued)

the systematics of the odd-parity sidebands in heavier tungsten nuclei. Favored spin sequence of this band corresponds to the odd−spin sequence in similar bands in even tungsten nuclei. The second sideband, with bandhead at 2300.2+x, is tentatively connected to the first, and assumed to be the "unfavored" sequence, corresponding to the even-spin sequence in the even tungsten nuclei. Other J^π assignments followed from γ-ray multipolarities, inferred from $\gamma(\theta)$ data.

[#] Band(A): $\nu 3/2[651]i_{13/2}$,α=+1/2. Proposed configuration at the first backbend near $\hbar\omega\approx 0.32$= $\nu 3/2[651]i_{13/2}\otimes(\nu 3/2[651]i_{13/2}\otimes\nu 5/2[642]i_{13/2})$; at the second backbend near $\hbar\omega\approx 0.42$, configuration= $\nu 3/2[651]i_{13/2}\otimes\pi 9/2[514]^2h_{11/2}$; at the third backbend near $\hbar\omega\approx 0.49$, configuration=$\nu 3/2[651]i_{13/2}\otimes\pi 1/2[660]^2i_{13/2}$ (1985Ge05). Tentative parity assignments for levels above the 4500, $45/2^+$ level are listed only in Table 2 of 1985Ge05, not in authors' Fig. 4.

[@] Band(B): Tentative band based on $23/2^{(-)}$,α=−1/2. Side band as a possible favored sequence, with assumed negative parity, based on a similar character of a band in ^{166}W. Proposed configurations= $\nu 3/2[651]i_{13/2}\otimes(\pi 9/2[514]h_{11/2}\otimes\pi 5/2[402]d_{5/2})$ or $\nu 3/2[651]i_{13/2}\otimes(\nu 3/2[651]i_{13/2}\otimes\nu 3/2[521]h_{9/2})$ (1985Ge05).

[&] Band(b): Tentative band based on $(25/2^-)$,α=+1/2. Side band as a possible unfavored(?) sequence, with assumed negative parity, based on a similar character of a band in ^{166}W. Tentative J^π assignments for this band are given only in Table 2 of 1985Ge05, not in authors' level-scheme Fig. 4.

$\gamma(^{167}W)$

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Comments
[x]136.2 *5*							
224.7 *2*	89 *2*	224.7+x	$17/2^+$	0+x	$13/2^+$	Q	A_2=+0.15 *2*; A_4=−0.06 *2*
322.1[ab] *5*	9[a] *2*	2300.2+x	$(29/2^-)$	1978.1+x	$27/2^{(-)}$	D+Q	A_2=−0.4 *2*; A_4=+0.5 *2* A_2 and A_4 are likely for a doublet.
322.8[a] *5*	7[a] *3*	1978.1+x	$27/2^{(-)}$	1655.5+x	$23/2^{(-)}$		
[x]337.3[@] *5*	8[&] *3*						
374.3 *2*	20 *1*	2352.3+x	$31/2^{(-)}$	1978.1+x	$27/2^{(-)}$	(Q)	A_2=+0.22 *5*; A_4=−0.05 *5*
393.8 *2*	17 *1*	2694.0+x	$(33/2^-)$	2300.2+x	$(29/2^-)$	(Q)	A_2=+0.11 *5*
405.3 *2*	100	630.0+x	$21/2^+$	224.7+x	$17/2^+$	(Q)	A_2=+0.17 *2*; A_4=−0.02 *2*
457.7 *2*	25 *2*	2810.0+x	$35/2^{(-)}$	2352.3+x	$31/2^{(-)}$	(Q)	A_2=+0.18 *6*
491.3 *2*	15 *9*	3185.3+x	$(37/2^-)$	2694.0+x	$(33/2^-)$	(Q)	A_2=+0.17 *6*
538.9 *2*	78 *2*	1168.9+x	$25/2^+$	630.0+x	$21/2^+$	Q	A_2=+0.16 *4*; A_4=−0.04 *3*
546.6 *5*	9 *1*	2352.3+x	$31/2^{(-)}$	1805.6+x	$29/2^+$	D	A_2=−0.3 *1*
572.2 *2*	22 *2*	3382.2+x	$39/2^{(-)}$	2810.0+x	$35/2^{(-)}$	(Q)	A_2=+0.14 *7*
594.4[@] *5*	12[&] *3*	3779.7+x	$(41/2^-)$	3185.3+x	$(37/2^-)$	(Q)	A_2=+0.16 *9*
636.7[@] *2*	46[&] *3*	1805.6+x	$29/2^+$	1168.9+x	$25/2^+$	(Q)	A_2=+0.14 *7*
643.2 *5*	14 *7*	4499.7+x	$45/2^+$	3856.5+x	$41/2^+$	(Q)	A_2=+0.27 *7*; A_4=−0.08
652.3 *2*	15 *2*	3856.5+x	$41/2^+$	3204.2+x	$37/2^+$	Q	A_2=+0.3 *2*; A_4=−0.2 *1*
683.3 *5*	6 *1*	5183.0+x	$(49/2^+)$	4499.7+x	$45/2^+$		
687.9[@] *5*	12[&] *4*	4070.1+x	$43/2^{(-)}$	3382.2+x	$39/2^{(-)}$		
694.1 *5*	11 *2*	4473.8+x	$(45/2^-)$	3779.7+x	$(41/2^-)$	(Q)	A_2=+0.3 *2*
696.4 *2*	39 *1*	2502.1+x	$33/2^+$	1805.6+x	$29/2^+$	(Q)	A_2=+0.15 *5*; A_4=−0.03 *6*
702.1[@] *2*	24[&] *3*	3204.2+x	$37/2^+$	2502.1+x	$33/2^+$	(Q)	A_2=+0.10 *6*
742.2 *5*	3 *1*	5925.2+x	$(53/2^+)$	5183.0+x	$(49/2^+)$	(Q)	A_2=+0.3 *2*
782.9[@] *5*		5256.7+x	$(49/2^-)$	4473.8+x	$(45/2^-)$		
786.0[@] *5*	9[&] *3*	4856.1+x	$47/2^{(-)}$	4070.1+x	$43/2^{(-)}$	(Q)	A_2=+0.2 *1*
809.1 *2*	26 *2*	1978.1+x	$27/2^{(-)}$	1168.9+x	$25/2^+$	D	A_2=−0.13 *7*
929.0 *5*	4 *2*	6854.2+x	$(57/2^+)$	5925.2+x	$(53/2^+)$		
1025.7 *5*	4 *1*	1655.5+x	$23/2^{(-)}$	630.0+x	$21/2^+$	D	A_2=−0.4 *2*
1105.2[b] *5*	2 *1*	7959.4+x	$(61/2^+)$	6854.2+x	$(57/2^+)$		

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^{147}Sm(^{24}Mg,4nγ) 1985Ge05 (continued)

$\gamma(^{167}W)$ (continued)

† $\Delta E\gamma$=0.2 keV assigned by evaluators for strong peaks I$\gamma \geq 15$, and $\Delta E\gamma$=0.5 keV for weaker peaks, based on a general comment by 1985Ge05.
‡ From ^{147}Sm(^{24}Mg,4nγ), E(^{24}Mg)=128 MeV, relative to Iγ=100 for 405.3γ.
# Inferred by evaluators from $\gamma(\theta)$ data in 1985Ge05.
@ Contaminated in singles spectrum.
& Deduced from $\gamma\gamma$-coincidence data.
a 322.1γ and 322.8γ form an unresolved doublet, intensity obtained from $\gamma\gamma$-coin data.
b Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

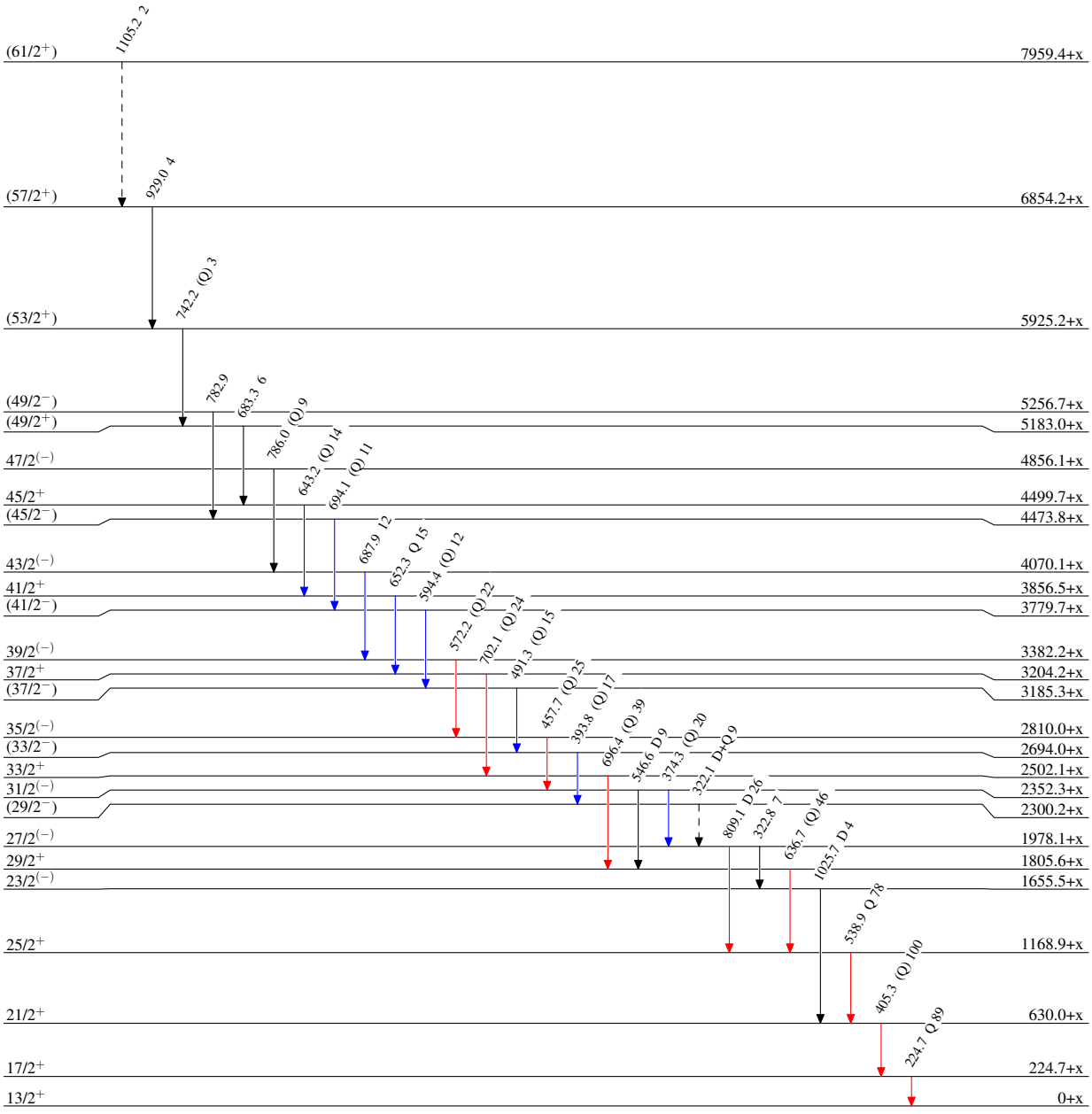
^{147}Sm(^{24}Mg,4nγ) 1985Ge05

Level Scheme

Intensities: Relative I_γ

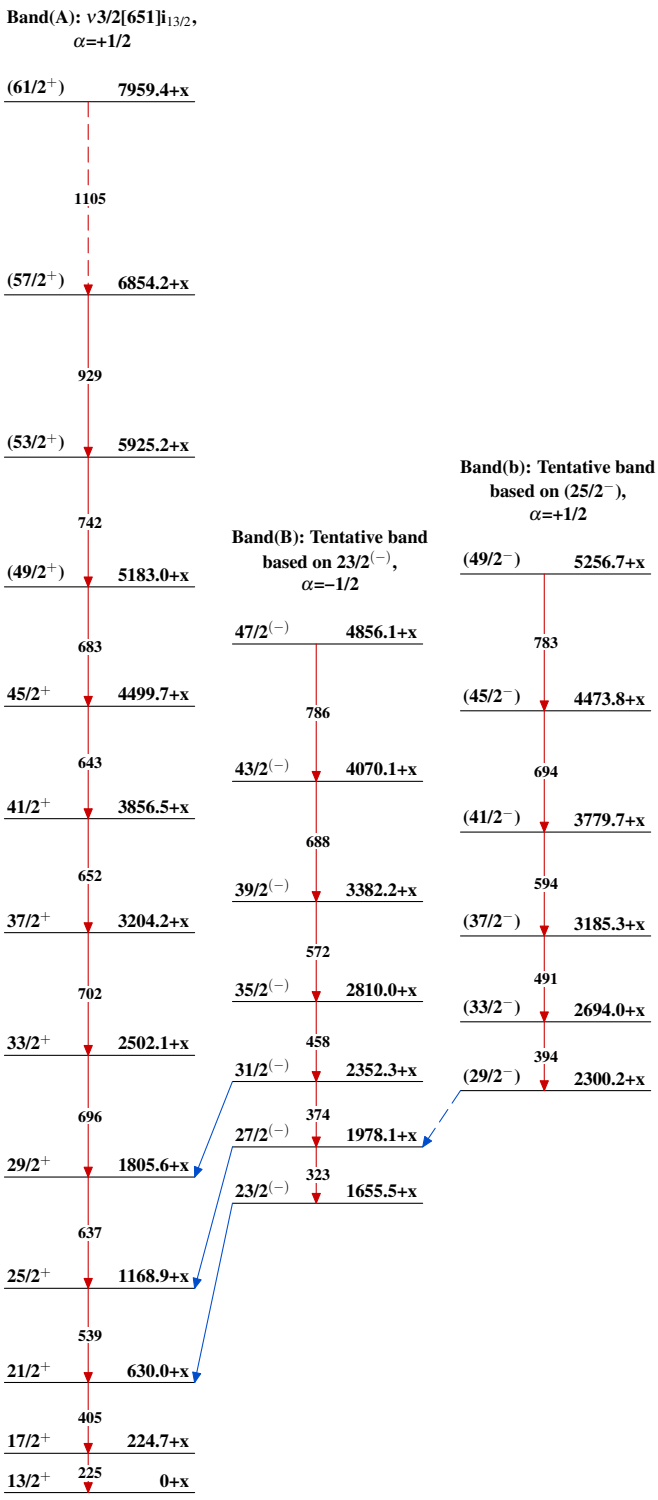
Legend

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



$^{167}_{74}W_{93}$

^{147}Sm(^{24}Mg,4nγ) 1985Ge05



$^{167}_{74}W_{93}$