^{147}Sm(α,2nγ) 1979RaZZ

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 185, 2 (2022)	23-Aug-2022

1979RaZZ: E=25.5 MeV alpha beam from Notre Dame FN-tandem. Measured Eγ, Iγ, $\gamma\gamma$-coin, excitation functions, $\gamma(\theta)$, E(ce), I(ce). Deduced levels, J^π, conversion coefficients, γ-ray multipolarities, and mixing ratios. ^{149}Gd also studied using ^{141}Pr(^{11}B,3nγ).

^{149}Gd Levels

E(level)[†]	J$^\pi$[‡]	Comments
0.0	$7/2^-$	
164.87 *16*	$5/2^-$	
352.5 *3*	$3/2^-$	
775.10 *15*	$11/2^-$	
795.74 *15*	$9/2^-$	
816.9 *11*	$3/2^-$	
873.10 *16*	$11/2^-$	J$^\pi$: $11/2^+$ in the Adopted Levels.
955.64 *20*	$13/2^+$	
1026.4? *3*	$3/2^-$	J$^\pi$: $3/2^+$ in the Adopted Levels.
1085.14 *25*	$(5/2,7/2,9/2)^-$	J$^\pi$: $(5/2^-,7/2)$ in the Adopted Levels.
1483.58 *19*	$15/2^-$	
1608.77 *17*	$13/2^-$	
1735.1?		Uncertain level not included in the Adopted Levels.
1739.43 *24*	$17/2^+$	
1750.9 *3*	$15/2^-$	J$^\pi$: $(15/2^+)$ in the Adopted Levels, however, the level is considered uncertain by evaluators as not confirmed in other studies.
1999.3 *3*	$15/2^+$	
2057.76 *20*	$17/2^-$	
2231.47 *21*	$17/2^-$	
2383.03 *22*	$19/2^-$	
2400.7 *3*	$21/2^+$	
2514.3 *4*	$19/2^-$	J$^\pi$: $(19/2^+)$ in the Adopted Levels, however, the level is considered uncertain by evaluators as not confirmed in other studies.
2523.77 *24*	$21/2^-$	
2856.4 *4*	$23/2^+$	J$^\pi$: $(21/2,23/2,25/2^+)$ in the Adopted Levels.
3133.7 *3*	$23/2^-$	
3227.3 *3*	$23/2^+$	
3293.7 *4*	$25/2^+$	
3386.7 *4*	$27/2^+$	

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

[‡] As given in 1979RaZZ, based on $\gamma(\theta)$ data and decay pattern. Many assignments are the same as in the Adopted Levels, except that these are placed in parentheses there as strong arguments seem lacking. When different, the assignments from the Adopted Levels are listed in comments.

$\gamma(^{149}Gd)$

A_2, A_4 and α(K)exp values are from 1979RaZZ.

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^{147}Sm(α,2nγ) 1979RaZZ (continued)

$\gamma(^{149}Gd)$ (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	Comments
78		873.10	11/2$^-$	795.74	9/2$^-$			
83		955.64	13/2$^+$	873.10	11/2$^-$			
98.0 *2*	25.8 *8*	873.10	11/2$^-$	775.10	11/2$^-$			A_2=+0.131 *17*; A_4=−0.253 *21* M1+E2 in 1979RaZZ; E1 in the Adopted Levels, Gammas dataset. δ(Q/D)=+1.1 *2* from $\gamma(\theta)$, in disagreement with adopted mult=E1.
159.4 *2*	1.48 *4*	3386.7	27/2$^+$	3227.3	23/2$^+$	Q		A_2=+0.20 *5*; A_4=−0.14 *6* E2 in 1979RaZZ.
164.9 *2*	13.4 *3*	164.87	5/2$^-$	0.0	7/2$^-$	D+Q	−0.12 *7*	A_2=+0.019 *7*; A_4=−0.019 *9* M1+E2 in 1979RaZZ; δ(Q/D) is in disagreement with 0.93 *2* from the value in the Adopted Gammas taken from L-subshell ratios in ^{149}Tb ε decay.
180.5 *2*	13.5 *3*	955.64	13/2$^+$	775.10	11/2$^-$	D(+Q)	+0.01 *2*	A_2=−0.240 *16*; A_4=−0.010 *17* E1 in 1979RaZZ.
187.6 *2*	0.72 *4*	352.5	3/2$^-$	164.87	5/2$^-$	D+Q	−1.5 *+15−28*	A_2=+0.23 *11*; A_4=+0.06 *12* δ: this value disagrees with adopted δ=+0.5 *+2−1* from ^{149}Tb ε. M1+E2 in 1979RaZZ.
289.4 *2*	2.13 *4*	1085.14	(5/2,7/2,9/2)$^-$	795.74	9/2$^-$	D		A_2=−0.07 *4*; A_4=+0.03 *4*
292.3 *2*	1.27 *3*	2523.77	21/2$^-$	2231.47	17/2$^-$	Q		A_2=+0.43 *5*; A_4=−0.09 *6* E2 in 1979RaZZ.
325.3 *2*	1.42 *5*	2383.03	19/2$^-$	2057.76	17/2$^-$	D+Q	−1.9 *+6−9*	A_2=−0.57 *8*; A_4=+0.09 *9*
390.5 *2*	1.59 *6*	1999.3	15/2$^+$	1608.77	13/2$^-$	E1		A_2=−0.13 *8*; A_4=−0.10 *10*; α(K)exp=0.0061 *35* Mult.: from α(K)exp=0.0061 *35*. δ(Q/D)=−0.02 *21* for ΔJ=1.
449.0 *2*	2.46 *6*	2057.76	17/2$^-$	1608.77	13/2$^-$			A_2=+0.06 *4*; A_4=+0.05 *5* E2 in 1979RaZZ.
455.7 *2*	3.10 *7*	2856.4	23/2$^+$	2400.7	21/2$^+$	D+Q	−1.3 *+10−13*	A_2=+0.32 *5*; A_4=−0.02 *5* M1+E2 in 1979RaZZ.
466.0 *2*	7.9 *1*	2523.77	21/2$^-$	2057.76	17/2$^-$	Q		A_2=+0.30 *2*; A_4=−0.08 *2* E2 in 1979RaZZ.
527.9 *2*	10.6 *2*	1483.58	15/2$^-$	955.64	13/2$^+$	E1		A_2=−0.234 *21*; A_4=−0.003 *21*; α(K)exp=0.0035 *5*
574.2 *2*	15.3 *2*	2057.76	17/2$^-$	1483.58	15/2$^-$	M1		A_2=−0.171 *11*; A_4=−0.004 *13*; α(K)exp=0.0177 *5*
622.7[#] *2*	3.5 *1*	2231.47	17/2$^-$	1608.77	13/2$^-$	D		A_2=−0.061 *54*; A_4=−0.02 *6* E2 in 1979RaZZ, but $\gamma(\theta)$ data inconsistent with ΔJ=2, Q.
630.9[#] *2*		795.74	9/2$^-$	164.87	5/2$^-$			E2 in 1979RaZZ.
643.6 *2*	4.27 *9*	2383.03	19/2$^-$	1739.43	17/2$^+$	E1		A_2=−0.19 *4*; A_4=−0.01 *5*; α(K)exp=0.0026 *7*
652[#]		816.9	3/2$^-$	164.87	5/2$^-$			M1+E2 in 1979RaZZ.
661.3 *2*	20.3 *2*	2400.7	21/2$^+$	1739.43	17/2$^+$	Q		A_2=+0.32 *10*; A_4=−0.064 *11* E2 in 1979RaZZ.
703.5 *2*	2.94 *7*	3227.3	23/2$^+$	2523.77	21/2$^-$	E1		A_2=−0.34 *5*; A_4=−0.03 *5*; α(K)exp=0.0014 *5*
708.5 *2*	25.5 *3*	1483.58	15/2$^-$	775.10	11/2$^-$	Q		A_2=+0.301 *9*; A_4=−0.063 *10* E2 in 1979RaZZ.
747.9 *2*	4.9 *1*	2231.47	17/2$^-$	1483.58	15/2$^-$	D		A_2=−0.25 *4*; A_4=+0.06 *5* δ(Q/D)=−4.0 *+9−23*. M1+E2 in 1979RaZZ.

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^{147}Sm(α,2nγ) 1979RaZZ (continued)

$\gamma(^{149}Gd)$ (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	Comments
750.7 *2*	1.85 *6*	3133.7	23/2$^-$	2383.03	19/2$^-$	Q		A_2=+0.37 *6*; A_4=−0.10 *7* E2 in 1979RaZZ.
763.4 *2*	3.08 *12*	2514.3	19/2$^-$	1750.9	15/2$^-$	(Q)		A_2=+0.39 *8*; A_4=−0.07 *9* E2 in 1979RaZZ.
775.1 *2*	100 *1*	775.10	11/2$^-$	0.0	7/2$^-$	Q		A_2=+0.253 *6*; A_4=−0.046 *7* E2 in 1979RaZZ.
783.8 *2*	38.9 *4*	1739.43	17/2$^+$	955.64	13/2$^+$	Q		A_2=+0.308 *6*; A_4=−0.063 *7*
795.7 *2*	66.2 *7*	795.74	9/2$^-$	0.0	7/2$^-$	D+Q	+0.19 *1*	A_2=+0.060 *5*; A_4=+0.020 *6* M1+E2 in 1979RaZZ.
813.0 *2*	8.4 *1*	1608.77	13/2$^-$	795.74	9/2$^-$	Q		A_2=+0.28 *3*; A_4=−0.07 *4* E2 in 1979RaZZ.
833.7 *2*	3.5 *1*	1608.77	13/2$^-$	775.10	11/2$^-$	D(+Q)	−2.1 *21*	A_2=−0.24 *6*; A_4=+0.055 *18* M1+E2 in 1979RaZZ.
861.5[@] *2*	4.8 *1*	1026.4?	3/2$^-$	164.87	5/2$^-$	D		A_2=−0.18 *4*; A_4=−0.02 *5* E1 in 1979RaZZ.
862[@]		1735.1?		873.10	11/2$^-$			
873.1 *2*	2.4 *1*	873.10	11/2$^-$	0.0	7/2$^-$	Q		A_2=+0.12 *6*; A_4=−0.14 *7* E2 in 1979RaZZ; (M2) in the Adopted dataset.
877.8 *2*	7.8 *1*	1750.9	15/2$^-$	873.10	11/2$^-$	Q		A_2=+0.202 *17*; A_4=−0.041 *20* E2 in 1979RaZZ.
893.0 *2*	3.2 *1*	3293.7	25/2$^+$	2400.7	21/2$^+$	Q		A_2=+0.40 *5*; A_4=−0.15 *6* E2 in 1979RaZZ.
899.4 *2*	2.3 *1*	2383.03	19/2$^-$	1483.58	15/2$^-$			A_2=−0.39 *6*; A_4=+0.12 *7* DJ=2, E2 in 1979RaZZ, but $\gamma(\theta)$ inconsistent with this assignment.

[†] From 1979RaZZ.
[‡] From $\gamma(\theta)$ in 1979RaZZ, unless otherwise noted. Mult=Q is most likely E2. For those with mult=(Q) from $\gamma(\theta)$, $\Delta J=0$ cannot be ruled out completely.
[#] Composite unresolved transition (1979RaZZ).
[@] Placement of transition in the level scheme is uncertain.

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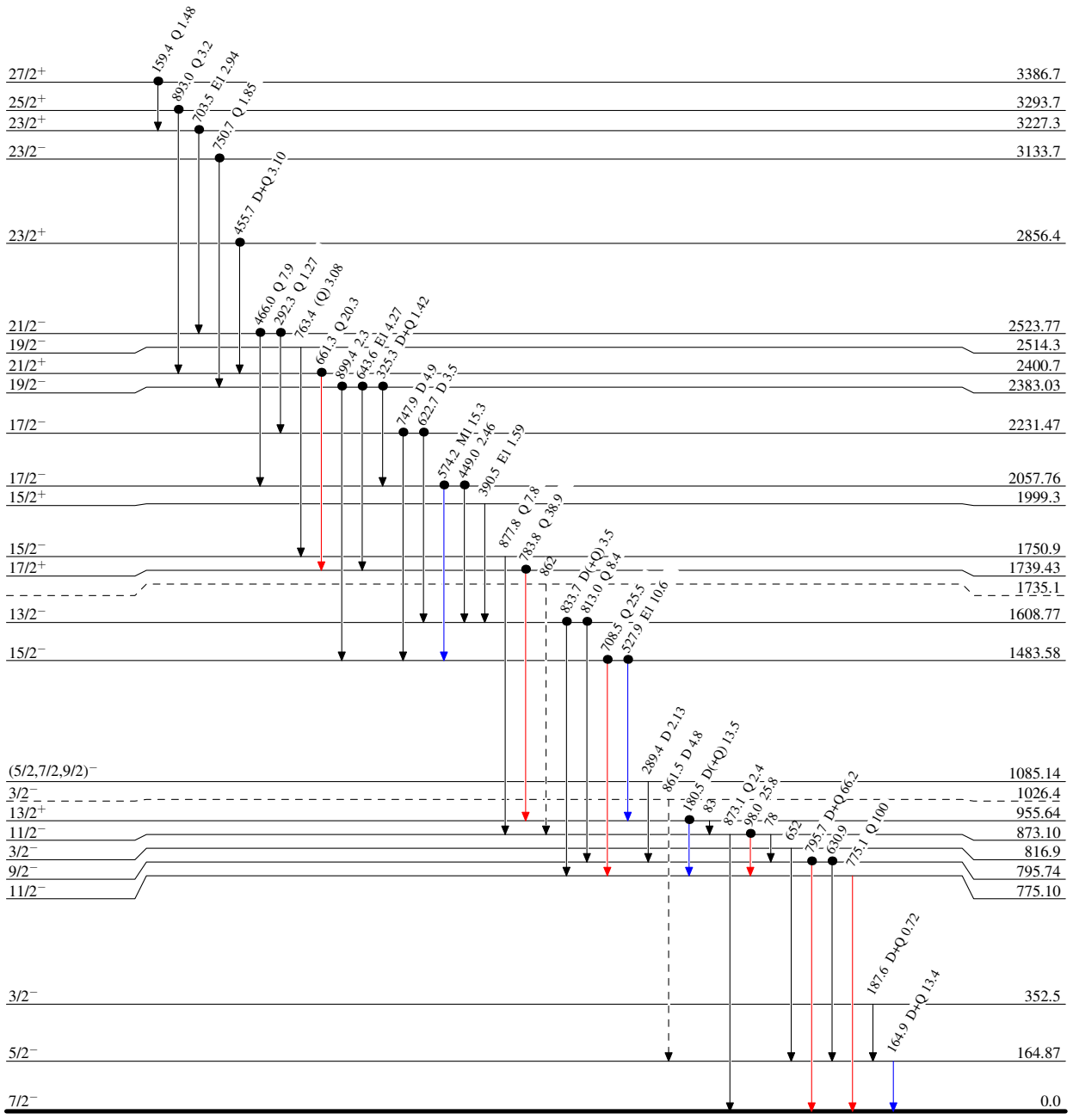
Level Scheme

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



$^{149}_{64}Gd_{85}$