^{144}Sm(^{16}O,p4nγ) 2018Li19

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 160, 1 (2019)	21-Oct-2019

2018Li19: E=118 MeV beam provided by Separated Sector Cyclotron (SSC) at iThemba LABS, South Africa on 2.89 mg/cm^2 target (on 13.13 mg/cm^2 Pb backing). Used γ multidetector array AFRODITE (8 Compton-supressed clover detectors). Energy and efficiency calibrations performed with standard ^{133}Ba and ^{152}Eu sources. Measured symmetrized $\gamma\gamma$ and $\gamma\gamma\gamma$ coin and asymmetric Angular Distribution from Oriented states (ADO) $\gamma\gamma$ coin matrices. Theoretical interpretation based on potential energy surfaces calculations and on systematics of odd Tm isotopes and N=84,86 isotones.

^{155}Tm Levels

States 11/2$^-$ to 27/2$^-$ of α=−1/2 g.s. band are interpreted as being of soft quasivibrational character followed by quasirotational character above 27/2$^-$ state. Energy anomaly of yrast states: first 25/2$^-$ state of seniority 5 is lower in energy than 27/2$^-$ state of seniority 3.

E(level)[†]	J$^\pi$[‡]	Comments
0.0[#]	11/2$^-$	configuration: $\pi h_{11/2}$.
535.6[#] *3*	15/2$^-$	
1132.1[#] *5*	19/2$^-$	
1380.2[@] *5*	(17/2$^-$)	
1752.0[#] *5*	23/2$^-$	
2038.9[@] *6*	(21/2$^-$)	
2133.7 *7*	(25/2$^-$)	configuration: $\pi h^3_{11/2}\nu f_{7/2}h_{9/2}$.
2312.1[#] *6*	27/2$^-$	configuration: $\pi h_{11/2}\otimes\nu f_{7/2}h_{9/2}$ fully aligned.
2718.6[@] *6*	(25/2$^-$)	
3030.8[#] *8*	31/2$^-$	
3769.2[#] *9*	35/2$^-$	
4529.8[#] *11*	39/2$^-$	
5248.0[#] *12*	43/2$^-$	
6074.0[#] *13*	(47/2$^-$)	

[†] From least-squares fit to Eγ's.
[‡] As deduced by 2018Li19 based on measured multipolarities and theoretical arguments. All parity values are negative.
[#] Band(A): Based on $\pi h_{11/2}$, α=−1/2.
[@] Band(B): Based on $\pi h_{11/2}$, α=+1/2.

γ(^{155}Tm)

E$_\gamma$[†]	I$_\gamma$	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[‡]	Comments
178.4 *5*	12.6 *9*	2312.1	27/2$^-$	2133.7	(25/2$^-$)	(M1+E2)	ADO=0.99 *17*.
381.7 *5*	18.2 *9*	2133.7	(25/2$^-$)	1752.0	23/2$^-$	(M1+E2)	ADO=0.93 *10*.
535.6 *3*	100.0	535.6	15/2$^-$	0.0	11/2$^-$	E2	ADO=1.15 *6*.
560.1 *3*	49.5 *19*	2312.1	27/2$^-$	1752.0	23/2$^-$	E2	ADO=1.21 *9*.
[x]581.1							
596.5 *3*	89.8 *29*	1132.1	19/2$^-$	535.6	15/2$^-$	E2	ADO=1.13 *7*.
619.9 *3*	77.6 *27*	1752.0	23/2$^-$	1132.1	19/2$^-$	E2	ADO=1.18 *7*.
[x]635.5							
[x]648.9							

Continued on next page (footnotes at end of table)

^{144}Sm(^{16}O,p4nγ) 2018Li19 (continued)

γ(^{155}Tm) (continued)

E_γ[†]	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
658.7 *5*	6.2 *6*	2038.9	(21/2$^-$)	1380.2	(17/2$^-$)	E2	ADO=1.18 *11*.
679.7 *5*	8.2 *7*	2718.6	(25/2$^-$)	2038.9	(21/2$^-$)	E2	ADO=1.35 *14*.
718.2 *5*	≈3	5248.0	43/2$^-$	4529.8	39/2$^-$	E2	ADO=1.21 *13*.
718.7 *5*	≈11	3030.8	31/2$^-$	2312.1	27/2$^-$	E2	ADO=1.22 *12*.
738.4 *5*	10.1 *5*	3769.2	35/2$^-$	3030.8	31/2$^-$	E2	ADO=1.19 *13*.
760.6 *5*	5.5 *4*	4529.8	39/2$^-$	3769.2	35/2$^-$	E2	ADO=1.16 *15*.
826.0 *5*	<2	6074.0	(47/2$^-$)	5248.0	43/2$^-$		
[x]841.6							
844.6 *5*	6.3 *4*	1380.2	(17/2$^-$)	535.6	15/2$^-$	(M1+E2)	ADO=0.98 *10*.
906.8 *5*	2.4 *2*	2038.9	(21/2$^-$)	1132.1	19/2$^-$	(M1+E2)	ADO=0.99 *14*.
966.6 *5*	2.1 *2*	2718.6	(25/2$^-$)	1752.0	23/2$^-$	D(+Q)	ADO=0.82 *9*.

[†] Values given 2018Li19 are without unc, which were adopted by evaluator.

[‡] From mesured experimental ratio $R_{ADO}=I_\gamma(135°)\backslash I_\gamma(90°)$ with typical values 1.2 for stretched quadrupol and 0.8 for stretched pure dipole transitions respectively. For the particular population and decay mechanism of this study 2018Li19 adopted E2 for stretched Q (M2 is unlikely) and (M1+E2) for mixed D+Q transitions (E1+M2 is less likely) while for the relatively pure dipole transtions one can rather adopt D(+Q).

[x] γ ray not placed in level scheme.

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Level Scheme

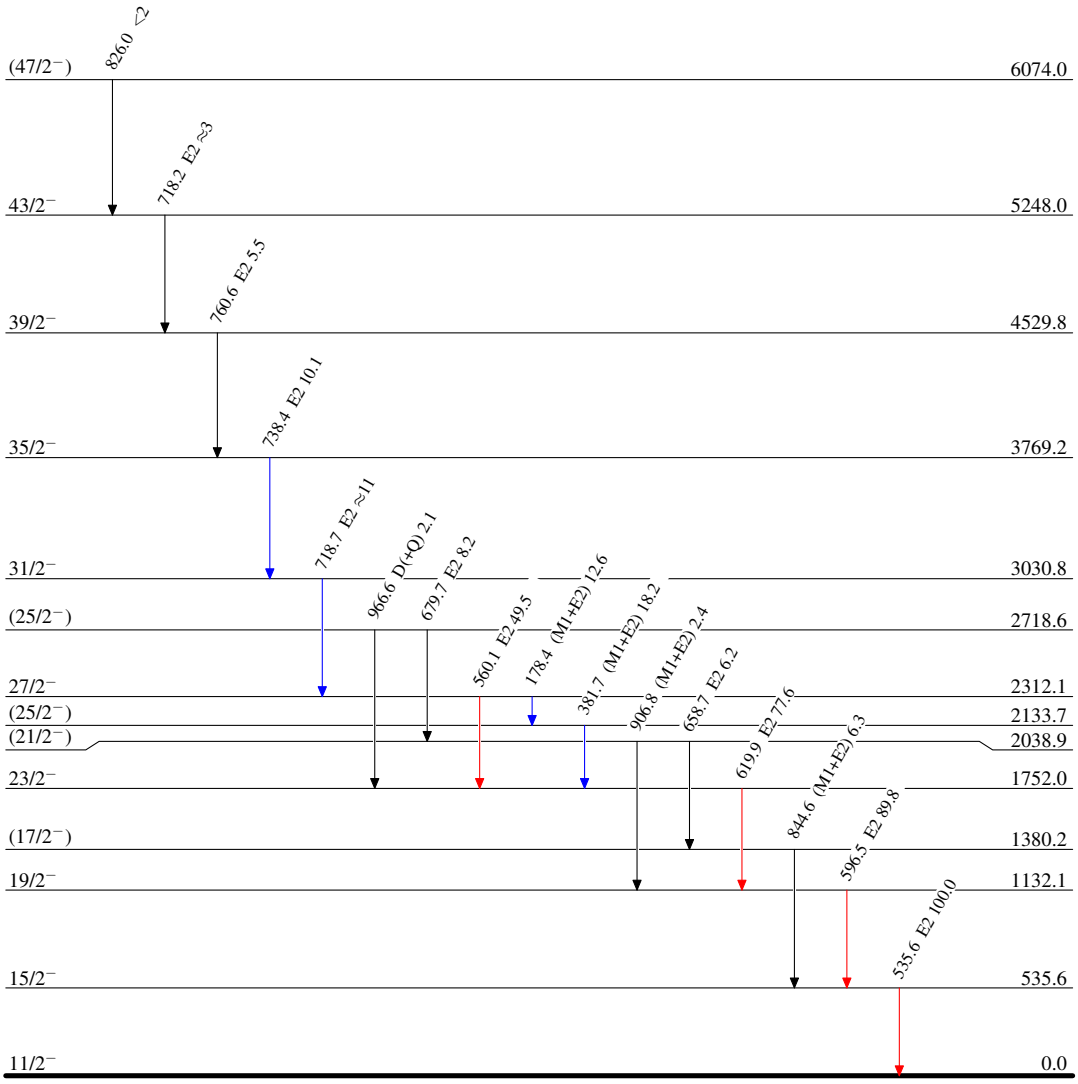
Intensities: Relative I_γ

Legend

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

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

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



$^{155}_{69}Tm_{86}$

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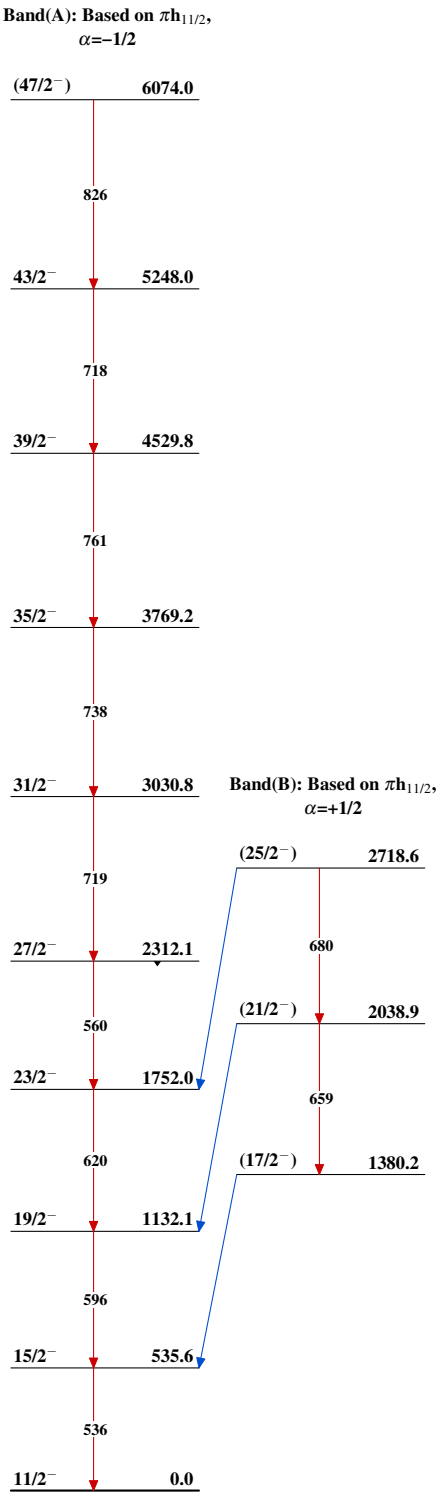

$^{155}_{69}Tm_{86}$