^{144}Sm(^{16}O,5nγ) 2016Li41

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

E(^{16}O)=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. Specific reaction channels selection done with the so called chessboard comprising 24 CsI scintillators. Semiempirical shell-model (SESM) calculations. Coexistence of prolate-oblate shapes predicted by adiabatic and configuration-fixed constrained triaxial covariant density functional theory (CDFT) calculations with point-coupling energy density functional (PC-PK1). Also performed potential energy surfaces calculations and systematics of N=85 even-Z isotones, N=87 even-Z isotones, N=84 even-even isotones, and N=86 even-even isotones comparisons respectively.

^{155}Yb Levels

E(level)†	J$^\pi$‡	T$_{1/2}$	Comments
0.0#	(7/2$^-$)	1.793 s *19*	J$^\pi$,T$_{1/2}$: from the adopted values. configuration: (νf$_{7/2}$)$_{7/2^-}$, oblate, β=0.15, $\gamma\approx$60°.
168.7@ *3*	(9/2$^-$)		configuration: (νh$_{9/2}$)$_{9/2^-}$, prolate, β=0.14, $\gamma\approx$0°.
666.00# *19*	(11/2$^-$)		
839.4& *3*	(13/2$^+$)		configuration: (νi$_{13/2}$)$_{13/2^+}$, oblate, β=0.16, $\gamma\approx$60°.
983.8@ *4*	(13/2$^-$)		
1178.5# *3*	(15/2$^-$)		
1527.5& *3*	(17/2$^+$)		
1592.8@ *4*	(17/2$^-$)		
1912.8@ *5*	(21/2$^-$)		
2033.7& *5*	(21/2$^+$)		
2494.4& *6*	(25/2$^+$)		
2526.6 *6*	(23/2$^-$)		
2768.8@ *6*	(25/2$^-$)		
3520.3@ *8*	(29/2$^-$)		
3740.8@ *9*	(33/2$^-$)		
4183.4 *11*	(35/2$^-$)		
4549.6 *12*	(37/2$^-$)		

† From least-squares fit to Eγ's.

‡ Values assigned by 2016Li41 based on measured multipolarities, systematics and theoretical calculations.

Band(A): Based on (νf$_{7/2}$)$_{7/2^-}$. Levels (7/2$^-$), (11/2$^-$), (15/2$^-$) proposed to arise from the coupling of the νf$_{7/2}$ orbital to the 0$^+$, 2$^+$, 4$^+$ couplings of the two νf$_{7/2}$ orbitals (2016Li41).

@ Band(B): Based on (νh$_{9/2}$)$_{9/2^-}$. Levels (9/2$^-$), (13/2$^-$), (17/2$^-$), (21/2$^-$) proposed to arise from the coupling of the νh$_{9/2}$ orbital to the 0$^+$, 2$^+$, 4$^+$, 6$^+$ couplings of the two νf$_{7/2}$ orbitals (2016Li41).

& Band(C): Based on (νi$_{13/2}$)$_{13/2^+}$. Levels (13/2$^+$), (17/2$^+$), (21/2$^+$), (25/2$^+$) proposed to arise from the coupling of the νi$_{13/2}$ orbital to the 0$^+$, 2$^+$, 4$^+$, 6$^+$ couplings of the two νf$_{7/2}$ orbitals (2016Li41).

$^{144}Sm(^{16}O,5n\gamma)$ 2016Li41 (continued)

$\gamma(^{155}Yb)$

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [@]	Comments
168.7 *4*	37.7 *6*	168.7	(9/2⁻)	0.0	(7/2⁻)	(M1+E2)	ADO=0.97 *2*.
173.4 *2*	98.2[#] *54*	839.4	(13/2⁺)	666.00	(11/2⁻)	D(+Q)	ADO=0.75 *1*.
220.5 *5*	32.5 *6*	3740.8	(33/2⁻)	3520.3	(29/2⁻)	E2	ADO=1.29 *2*.
242.2 *5*	16.6 *3*	2768.8	(25/2⁻)	2526.6	(23/2⁻)	(M1+E2)	ADO=0.95 *2*.
317.8 *5*		983.8	(13/2⁻)	666.00	(11/2⁻)		
320.0 *3*	70.3 *6*	1912.8	(21/2⁻)	1592.8	(17/2⁻)	E2	ADO=1.38 *2*.
349.0 *3*	71.5[#] *25*	1527.5	(17/2⁺)	1178.5	(15/2⁻)	D(+Q)	ADO=0.86 *2*.
366.2 *5*	15.9 *2*	4549.6	(37/2⁻)	4183.4	(35/2⁻)	D	ADO=0.79 *1*.
414.3 *5*		1592.8	(17/2⁻)	1178.5	(15/2⁻)		
442.6 *5*	20.8 *4*	4183.4	(35/2⁻)	3740.8	(33/2⁻)	(M1+E2)	ADO=0.68 *2*.
460.7 *3*	68.3[#] *28*	2494.4	(25/2⁺)	2033.7	(21/2⁺)	E2	ADO=1.36 *7*.
506.2 *3*	70.0[#] *10*	2033.7	(21/2⁺)	1527.5	(17/2⁺)		ADO=1.07 *3*. Mult.: based on ADO ratio this should be D+Q; 2016Li41 adopt Q as in band transition.
512.5 *3*	75.4[#] *26*	1178.5	(15/2⁻)	666.00	(11/2⁻)		
609.0 *2*	80.2 *14*	1592.8	(17/2⁻)	983.8	(13/2⁻)	E2	ADO=1.29 *3*.
613.8 *5*	18.3 *7*	2526.6	(23/2⁻)	1912.8	(21/2⁻)	(M1+E2)	ADO=0.67 *2*.
666.0 *2*	178.8[#] *54*	666.00	(11/2⁻)	0.0	(7/2⁻)	E2	ADO=1.28 *3*.
688.1 *2*	100[#]	1527.5	(17/2⁺)	839.4	(13/2⁺)	E2	ADO=1.24 *7*.
751.5 *5*	35.2 *7*	3520.3	(29/2⁻)	2768.8	(25/2⁻)	E2	ADO=1.30 *3*.
815.1 *2*	100	983.8	(13/2⁻)	168.7	(9/2⁻)	E2	ADO=1.35 *3*.
856.0 *4*	46.3 *5*	2768.8	(25/2⁻)	1912.8	(21/2⁻)		ADO=1.01 *2*. Mult.: based on ADO ratio this should be D+Q; 2016Li41 adopt Q as in band transition.

[†] Based on comment of 2016Li41 that uncertainties are between 0.2 and 0.5 keV the evaluator assigned unc to each γ transition based on their relative intensities divided into four groups covering the interval in between 16%−100% starting with 0.5 keV for the lowest intesity group up to 0.2 keV for the highest one ending to 100%, here including the 179% higher relative intensity. No difference was made in between the two groups based on the two different normalizations (see the comment below).

[‡] 2016Li41 give two scales of normalization γ-ray intensities: normalized to 100% for 815.1γ unless noted otherwise.

[#] Normalized to 100% for 688.1γ.

[@] From mesured experimental ratio $R_{ADO}=I_\gamma(135°)\backslash I_\gamma(90°)$ with typical values 1.2 for stretched quadrupole and 0.8 for stretched pure dipole transitions respectively. For the particular population and decay mechanism of this study 2016Li41 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).

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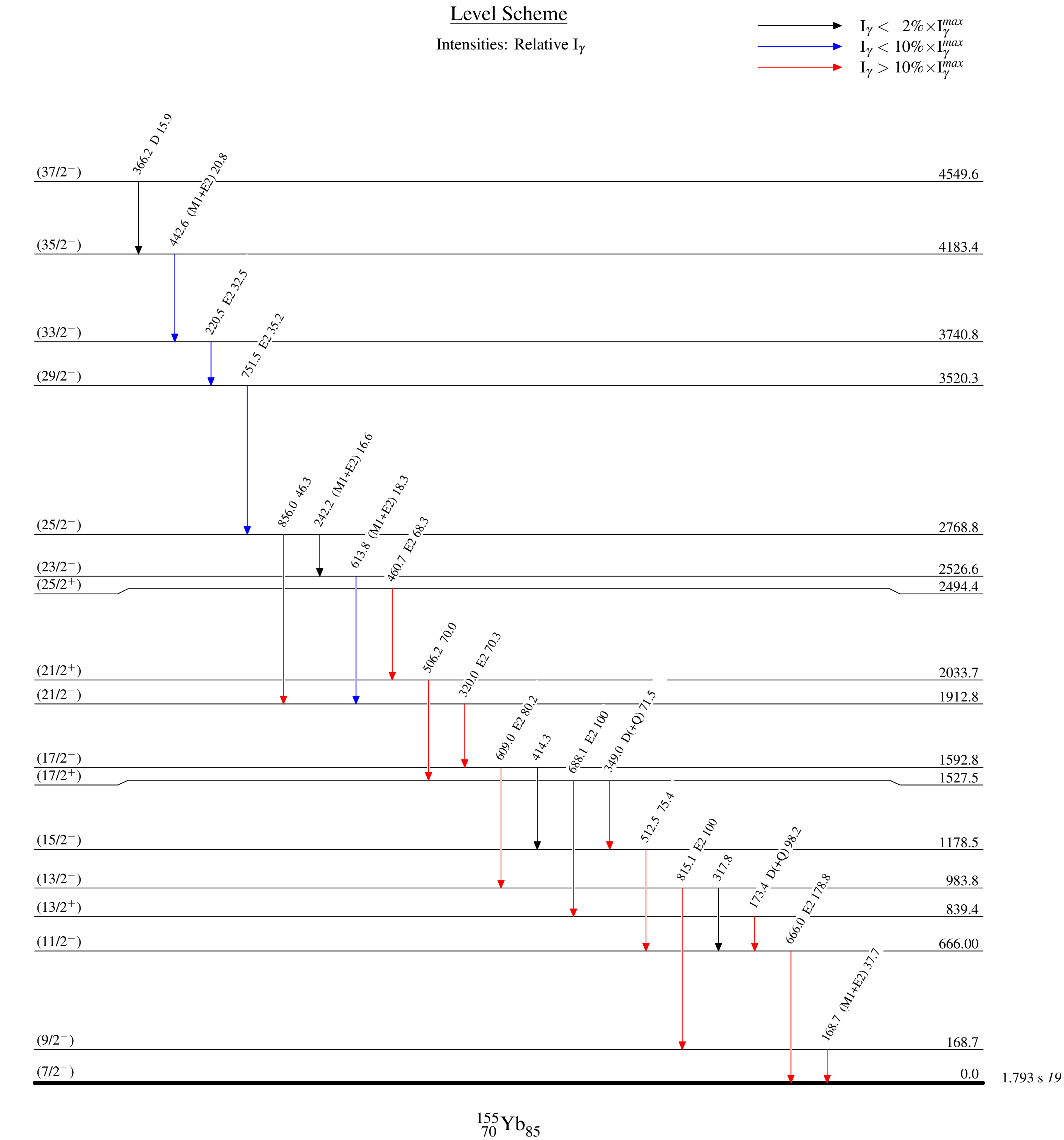

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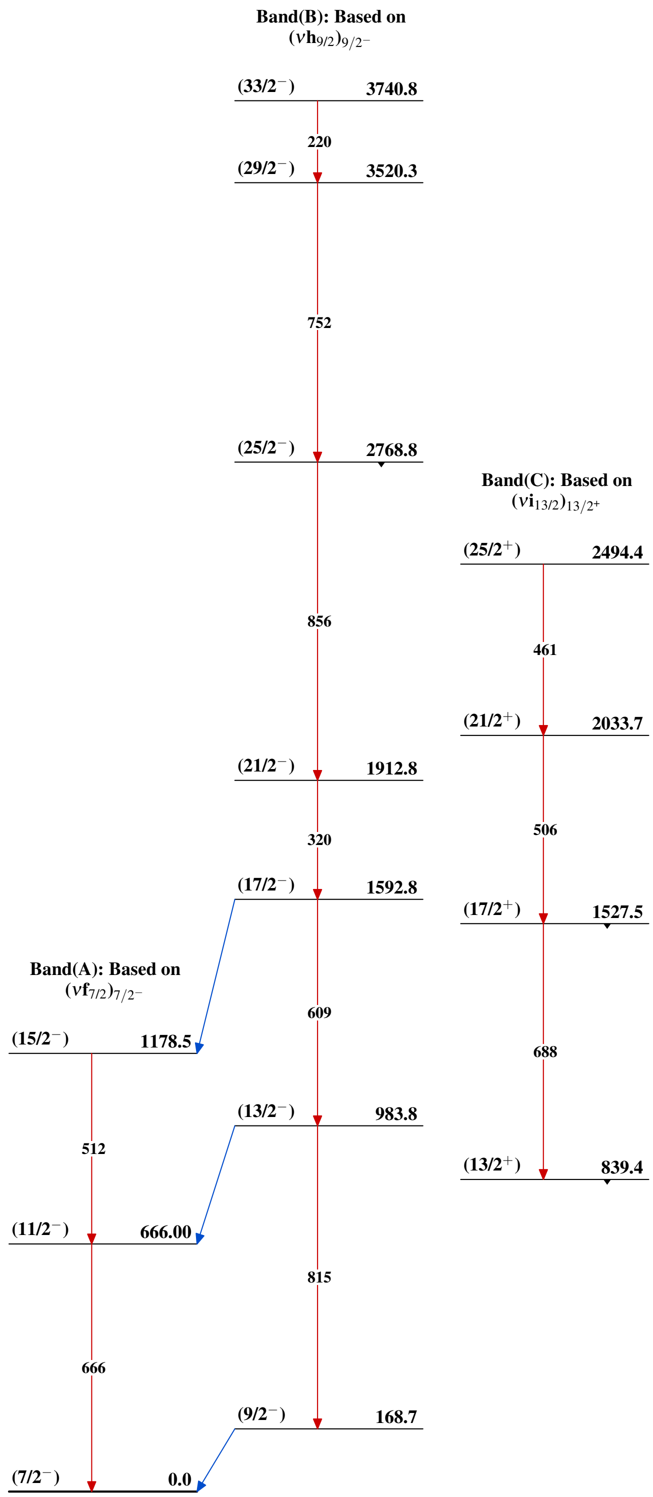

$^{155}_{70}Yb_{85}$