^{122}Sn(^{7}Li,α2nγ) 2009Wa02

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 174, 1 (2021)	15-Apr-2021

Data for decays of the isomers populated in this reaction (2009Wa02, 2007Ju06) are also presented in ^{123}Sb IT decay.

2009Wa02: E=54 MeV ^{7}Li beam was produced from the 14UD Pelletron at the Australian National University. Target was 3.5 mg/cm^2 enriched ^{122}Sn. γ rays were detected with the CAESAR array of six Ge detectors with BGO anti-Compton shields and two LEPS detectors; conversion electrons were detected with a cooled Si(Li) detector. Measured Eγ, Iγ, E(ce), I(ce), $\gamma\gamma$-coin, $\gamma\gamma(\theta)$, γ(t), $\gamma\gamma$(t). Deduced levels, J, π, isomer $T_{1/2}$, conversion coefficients, γ-ray multipolarities, mixing ratios, branching ratios, transition strengths. Comparisons with theoretical calculations. Systematics of neighboring Sb isotopes. 2009Wa02 also performed a second experiment on ^{123}Sb isomers using Yb,Lu,W,Os(^{136}Xe,X) with E=6.0-6.2 MeV/nucleon at ANL. See more details in ^{123}Sb IT decay.

1985Pi02: E=27 MeV ^{7}Li beam was produced from the Stony Brook FN tandem accelerator. Target was ≈10 mg/cm^2 isotopically enriched ^{122}Sn. γ rays were detected with coaxial Ge(Li) detectors. Measured Eγ, $\gamma\gamma$-coin, $\gamma(\theta)$. Deduced levels.

Additional information 1.

2007Ju06: E=35 MeV beam was provided by 14UD Pelletron accelerator at the Australian National University. Target was 3.5 mg/cm^2 ^{122}Sn. γ rays were detected with CAESAR Ge detector array and three Compton-suppressed Ge detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, γ(t) using pulsed beam. Deduced half-life of 2614 level.

^{123}Sb Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	Comments
0.0	7/2$^+$		
160.20 *21*	5/2$^+$		
1030.20 *21*	9/2$^+$		
1088.52 *21*	11/2$^+$		
1260.31 *20*	9/2$^+$		
1337.41 *24*	9/2$^+$		
1655.91 *18*	11/2$^-$		
1773.4 *11*	(11/2)		E(level),J$^\pi$: level proposed in 1985Pi02 only.
2037.49 *23*	15/2$^-$	37.3 ns *8*	$T_{1/2}$: from $\gamma\gamma$(t) (2009Wa02).
2044.1 *3*	15/2$^+$		
2237.8 *3*	(19/2$^-$)	214 ns *3*	$T_{1/2}$: from $\gamma\gamma$(t) (2009Wa02).
2338.3 *3*	(15/2$^+$)		
2385.4 *3*	(17/2,19/2)$^-$		
2485.9 *3*	19/2$^+$	0.7 ns *2*	$T_{1/2}$: from centroid-shift analysis (2009Wa02).
2613.4 *4*	23/2$^+$	65 μs *1*	$T_{1/2}$: from summed double gated time spectra for 127-442-956-1089 cascade (2009Wa02). Other: 66 μs *4* from 2007Ju06 (pulsed beam timing).

[†] From a least-squares fit to γ-ray energies, assuming ΔEγ=0.3 keV, except for 436γ where 1 keV is assumed in the fitting.

[‡] Proposed by 2009Wa02 based on $\gamma\gamma(\theta)$, γ-decay pattern, analog states in ^{121}Sb, and known assignments for low-lying states, unless otherwise noted. When considered in Adopted Levels, these assignments are placed inside parenthesis by the evaluator if there is no firm evidence from other studies.

γ(^{123}Sb)

E$_i$(level)	J$_i^\pi$	E$_\gamma$[‡]	E$_f$	J$_f^\pi$	Mult.[#]
160.20	5/2$^+$	160.2	0.0	7/2$^+$	
1030.20	9/2$^+$	1030.2	0.0	7/2$^+$	
1088.52	11/2$^+$	1088.5	0.0	7/2$^+$	Q
1260.31	9/2$^+$	1100.1	160.20	5/2$^+$	
		1260.3	0.0	7/2$^+$	
1337.41	9/2$^+$	1177.2	160.20	5/2$^+$	

Continued on next page (footnotes at end of table)

^{122}Sn(^{7}Li,α2nγ) 2009Wa02 (continued)

$\gamma(^{123}Sb)$ (continued)

E_i(level)	J_i^π	E_γ[‡]	I_γ[‡]	E_f	J_f^π	Mult.[#]	α[†]	Comments
1337.41	9/2$^+$	1337.4		0.0	7/2$^+$	D		Mult.: from 1985Pi02 based on $\gamma(\theta)$, A_2=−0.31 *20*.
1655.91	11/2$^-$	395.6		1260.31	9/2$^+$			
		567.4		1088.52	11/2$^+$			
		625.7		1030.20	9/2$^+$	D		Mult.: E2 in 2009Wa02 could be a misprint and it should be E1 instead from their proposed level scheme.
		1655.9		0.0	7/2$^+$	[M2]	1.25×10^{-3}	
1773.4	(11/2)	436		1337.41	9/2$^+$	(D)		E_γ: from 1985Pi02 only, seen in coincidence with 1177γ. Mult.: from 1985Pi02 based on $\gamma(\theta)$.
2037.49	15/2$^-$	381.6	95.9 *24*	1655.91	11/2$^-$	E2	0.01727	E_γ: other: 381.7 (2007Ju06). Mult.: (382γ)(626γ)(θ): A_2=−0.045 *7*, A_4=−0.003 *10* gives δ(O/Q)=−0.07 *2* in 2009Wa02; but M2 and M3 ruled out by RUL.
		949.0	1.5 *4*	1088.52	11/2$^+$	[M2]	0.00475	
		1007.3	2.5 *4*	1030.20	9/2$^+$	[E3]	0.00281	
2044.1	15/2$^+$	955.6		1088.52	11/2$^+$	Q		
2237.8	(19/2$^-$)	200.4	100	2037.49	15/2$^-$	[E2]	0.1435	E_γ: other: 201.0 (2007Ju06).
2338.3	(15/2$^+$)	1249.7		1088.52	11/2$^+$			
2385.4	(17/2,19/2)$^-$	147.5		2237.8	(19/2$^-$)	D		Mult.: M1 or E1 from α(exp)=0.2 *2* (2009Wa02).
		347.9		2037.49	15/2$^-$			
2485.9	19/2$^+$	100.4	1.4 *1*	2385.4	(17/2,19/2)$^-$	E1	0.187	E_γ: from figure 1 of 2009Wa02, 100.5 in table II. Mult.: from α(exp)=0.1 *2* in 2009Wa02.
		147.6	1.6 *2*	2338.3	(15/2$^+$)	[E2]	0.416	
		441.7	97 *3*	2044.1	15/2$^+$	E2	0.01111	E_γ: other: 441.9 (2007Ju06). Mult.: Q from $\gamma\gamma(\theta)$; M2 ruled out by RUL.
2613.4	23/2$^+$	127.4	97.4 *11*	2485.9	19/2$^+$	(E2)	0.699	E_γ: other: 127.6 (2007Ju06). Mult.: δ(O/Q)=+0.01 *6* from (127γ)(442γ)(θ)+(127γ)(956γ)(θ)+(127γ)(1089γ)(θ): A_2=+0.106 *25*, A_4=+0.006 *36* (2009Wa02); M3 ruled out by RUL; E2 preferred since M2 would require a large B(M2).
		375.7	2.6 *6*	2237.8	(19/2$^-$)	[M2]	0.0671	

[†] Additional information 2.
[‡] From 2009Wa02.
[#] From analysis of $\gamma\gamma(\theta)$ in 2009Wa02, unless otherwise noted. The evaluator has replaced E2 from 2009Wa02 with Q and E1 with D, since magnetic or electric nature of a transition cannot be determined based on $\gamma\gamma(\theta)$. Assignments in square brackets are assumed by 2009Wa02, without any experimental evidence.

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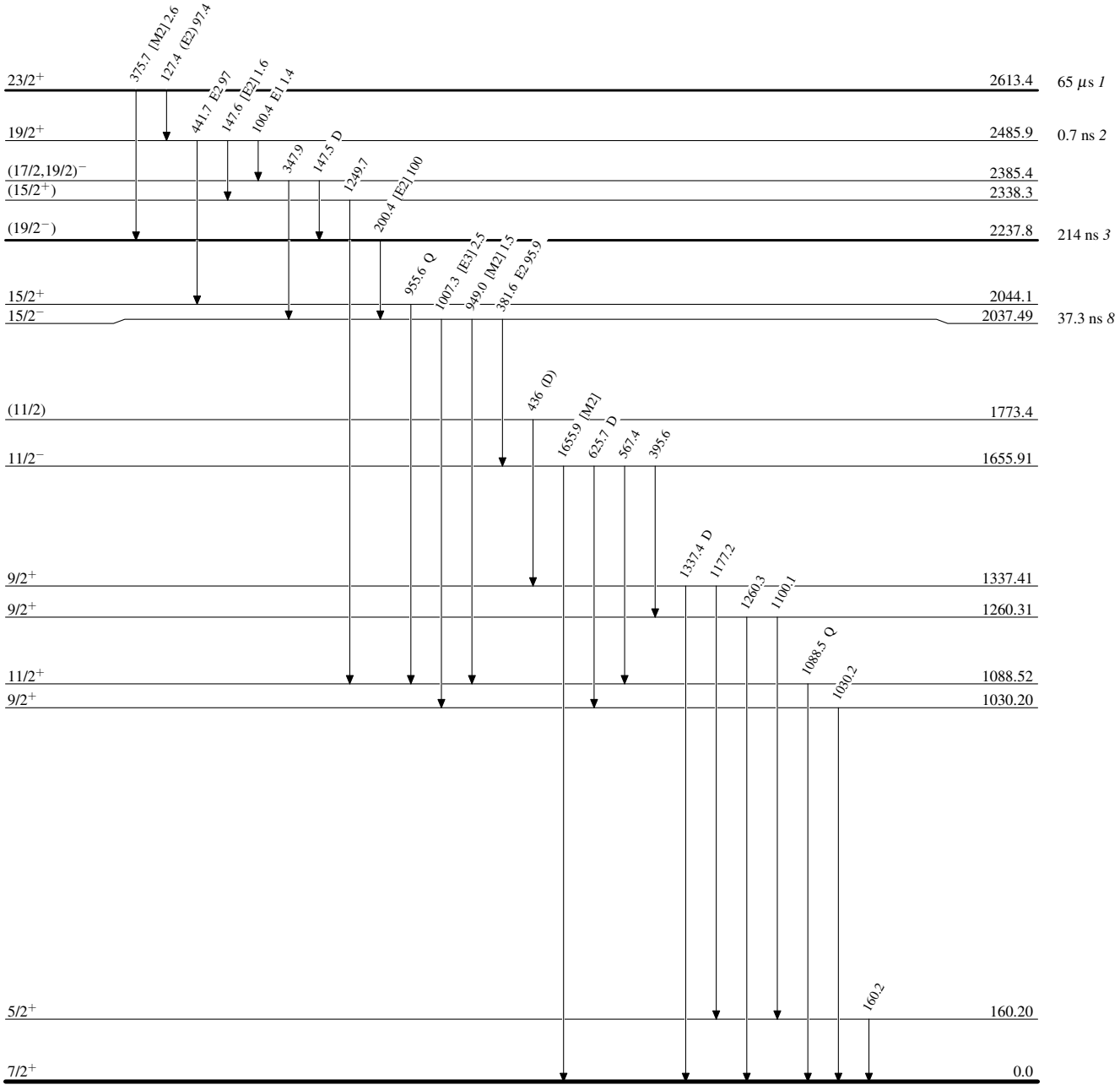
Level Scheme

Intensities: % photon branching from each level



$^{123}_{51}Sb_{72}$