^{123}Sb IT decay (214 ns) 2009Wa02,2008Jo03

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

Parent: ^{123}Sb: E=2238.6 *5*; J$^{\pi}$=(19/2^{-}); $T_{1/2}$=214 ns *3*; %IT decay=100.0

^{123}Sb-J$^{\pi}$,$T_{1/2}$: From Adopted Levels. Adopted $T_{1/2}$ is from γ(t) in 2008Jo03.

2009Wa02: ^{123}Sb isomers were produced in two experiments: ^{122}Sn(^{7}Li,α2nγ) E=54 MeV ^{7}Li beam from the 14UD Pelletron at the Australian National University on a target of 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). The second experiment Yb,Lu,W,Os(^{136}Xe,X) with E=6.0-6.2 MeV/nucleon ^{136}Xe beam from ATLAS facility at Argonne. γ rays were detected with the GAMMASPHERE array of 100 Compton-suppressed Ge detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin. 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.

2008Jo03: ^{123}Sb isomers were produced by ^{27}Al(^{178}Hf,X) with E=1150 MeV beam provided by ATLAS facility at Argonne on a ^{27}Al frame supporting a ^{208}Pb target for other experiments. γ rays were detected with the GAMMASPHERE array of 101 Compton-suppressed HPGe detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma(\theta)$, γ(t), $\gamma\gamma$(t). Deduced levels, J, π, isomer halflives, γ-ray multipolarities, mixing ratios. Pulsed beam with short pulses of ≈0.5 ns width and separated by 82.5 ns.

^{123}Sb Levels

E(level)†	J$^{\pi}$‡	$T_{1/2}$#	Comments
0.0	7/2^{+}		
160.0 *4*	5/2^{+}		
1030.2 *3*	9/2^{+}		
1088.58 *23*	11/2^{+}	0.52 ps *+5−4*	
1260.6 *4*	(9/2^{+})		
1656.14 *22*	11/2^{-}		
2037.6 *3*	(15/2)$^{-}$	37.3 ns *8*	$T_{1/2}$: from $\gamma\gamma$(t) (2009Wa02). Other: 37 ns *4* from $\gamma\gamma$(t) in 2008Jo03.
2238.6 *5*	(19/2^{-})	214 ns *3*	$T_{1/2}$: from $\gamma\gamma$(t) (2009Wa02). Other: 190 ns *30* from γ(t) in 2008Jo03.

† From a least-squares fit to γ-ray energies, assuming ΔEγ=0.3 keV where not given.

‡ From Adopted Levels. The same assignments are proposed by 2008Jo03 and/or 2009Wa02 based on $\gamma\gamma(\theta)$, γ-ray intensity balance, analog states in ^{121}Sb, and known assignments for low-lying states, except that these assignments are placed inside parenthesis by the evaluator if there is no firm evidence from other studies.

From Adopted Levels. Values from this study are indicated in comments.

$\gamma(^{123}$Sb)

Iγ normalization: From ΣI(γ+ce to g.s.)=100. I(γ+ce) intensity is not balanced at some levels, probably due to unobserved transitions. The decay scheme is thus considered incomplete by the evaluator and the normalization factor is taken as estimated.

E_γ ‡	I_γ ‡&	E_i(level)	J_i^π	E_f	J_f^π	Mult.@	δ@	α†	Comments
160.3 *5*	25 *3*	160.0	5/2$^+$	0.0	7/2$^+$	M1+E2	0.078 *10*	0.167 *3*	α(K)=0.1440 *24*; α(L)=0.0185 *3*; α(M)=0.00366 *7* α(N)=0.000705 *12*; α(O)=6.94$\times10^{-5}$ *12* E_γ: other: 160.3 (2009Wa02).
201.0 *4*	104 *18*	2238.6	(19/2$^-$)	2037.6	(15/2)$^-$	[E2]		0.1420 *23*	α(K)=0.1152 *18*; α(L)=0.0216 *4*; α(M)=0.00436 *7* α(N)=0.000813 *13*; α(O)=6.86$\times10^{-5}$ *11* B(E2)(W.u.)=0.1943 *34* E_γ: others: 200.4 (2009Wa02), 201.0 (2007Ju06).
381.7 *4*	114 *15*	2037.6	(15/2)$^-$	1656.14	11/2$^-$	E2		0.01725	B(E2)(W.u.)=0.0486 *12* α(K)=0.01460 *21*; α(L)=0.00214 *3*; α(M)=0.000427 *7* α(N)=8.10$\times10^{-5}$ *12*; α(O)=7.43$\times10^{-6}$ *11* E_γ: others: 381.6 (2009Wa02), 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.
396.0 *5*	29 *3*	1656.14	11/2$^-$	1260.6	(9/2$^+$)				E_γ: other: 395.6 (2009Wa02).
567.7 *4*	14 *3*	1656.14	11/2$^-$	1088.58	11/2$^+$				E_γ: other: 567.4 (2009Wa02).
626.1 *4*	94 *7*	1656.14	11/2$^-$	1030.2	9/2$^+$	(E1)		1.51$\times10^{-3}$	α(K)=0.001314 *19*; α(L)=0.0001575 *23*; α(M)=3.09$\times10^{-5}$ *5* α(N)=5.96$\times10^{-6}$ *9*; α(O)=5.88$\times10^{-7}$ *9* E_γ: other: 625.7 (2009Wa02). Mult.: D from $\gamma\gamma(\theta)$ in 2009Wa02. Additional information 1.
949.0#	1.8 *5*	2037.6	(15/2)$^-$	1088.58	11/2$^+$	[M2]		0.00475	B(M2)(W.u.)=6.5$\times10^{-4}$ *+22−19* α(K)=0.00410 *6*; α(L)=0.000518 *8*; α(M)=0.0001026 *15* α(N)=1.98$\times10^{-5}$ *3*; α(O)=1.97$\times10^{-6}$ *3* I_γ: from I(381.7γ)=114 *15* (2008Jo03) and I(949.0γ/381.6γ)=1.5 *4*/95.9 *24* (2009Wa02).
1007.3#	3.0 *6*	2037.6	(15/2)$^-$	1030.2	9/2$^+$	[E3]		0.00281	α(K)=0.00241 *4*; α(L)=0.000326 *5*; α(M)=6.48$\times10^{-5}$ *9* α(N)=1.241$\times10^{-5}$ *18*; α(O)=1.191$\times10^{-6}$ *17* I_γ: from I(381.7γ)=114 *15* (2008Jo03) and I(1007.3γ/381.6γ)=2.5 *4*/95.9 *24* (2009Wa02).
1030.3 *4*	100 *8*	1030.2	9/2$^+$	0.0	7/2$^+$	M1+E2	−0.54 *5*	1.51$\times10^{-3}$ *2*	α(K)=0.001316 *21*; α(L)=0.0001591 *25*; α(M)=3.13$\times10^{-5}$ *5* α(N)=6.05$\times10^{-6}$ *10*; α(O)=6.03$\times10^{-7}$ *10* E_γ: other: 1030.2 (2009Wa02).
1088.6 *3*	14 *3*	1088.58	11/2$^+$	0.0	7/2$^+$	E2		1.13$\times10^{-3}$	B(E2)(W.u.)=19.6 *11*

$^{123}_{51}$Sb$_{72}$-2

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

E_γ [‡]	I_γ [‡&]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [@]	α [†]	Comments
								α(K)=0.000984 *14*; α(L)=0.0001212 *17*; α(M)=2.39×10^{-5} *4* α(N)=4.60×10^{-6} *7*; α(O)=4.53×10^{-7} *7* E_γ: other: 1088.5 (2009Wa02). I_γ: estimated by the evaluator from intensity balance. Mult.: Q from $\gamma\gamma(\theta)$ in 2009Wa02.
1100.9 *5*	18 *4*	1260.6	$(9/2^+)$	160.0	$5/2^+$			E_γ: other: 1100.1 (2009Wa02).
1260.9 *7*	7 *2*	1260.6	$(9/2^+)$	0.0	$7/2^+$			E_γ: other: 1260.3 (2009Wa02).
1655.9 [#]		1656.14	$11/2^-$	0.0	$7/2^+$	[M2]	1.25×10^{-3}	α(K)=0.001036 *15*; α(L)=0.0001262 *18*; α(M)=2.49×10^{-5} *4* α(N)=4.81×10^{-6} *7*; α(O)=4.81×10^{-7} *7*; α(IPF)=5.73×10^{-5} *8*

[†] Additional information 2.
[‡] From 2008Jo03, unless otherwise noted. Intensities are relative within the band from 2008Jo03.
[#] From 2009Wa02.
[@] From Adopted Gammas. Assignments and arguments from this study are given in comments, where available.
[&] For absolute intensity per 100 decays, multiply by ≈0.7.

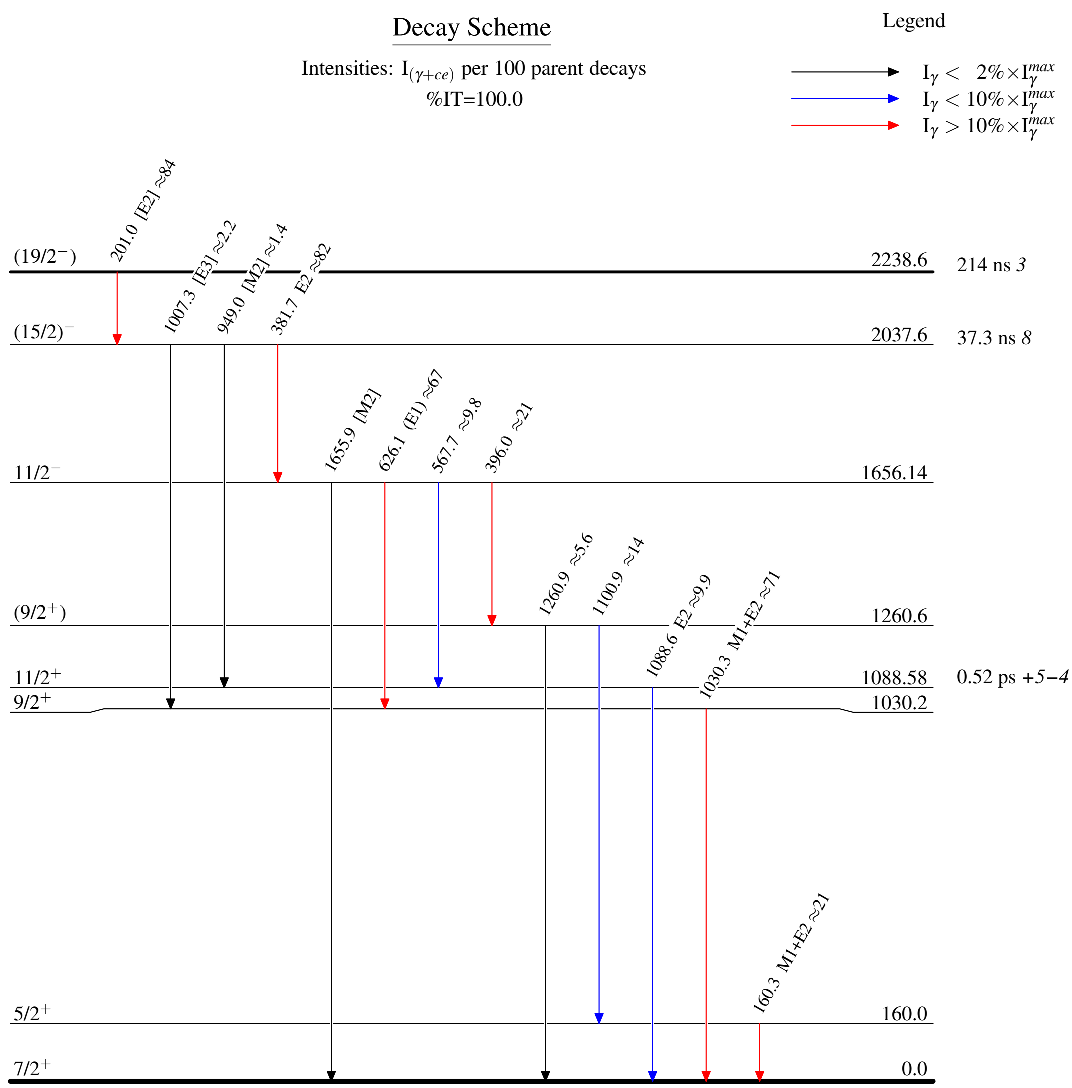
$^{123}_{51}Sb_{72}$-3

^{123}Sb IT decay (214 ns) 2009Wa02,2008Jo03

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays

%IT=100.0



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