^{123}Sn β^- decay (40.06 min) 1977Ti03,2006Kr04,1974Ra03

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

Parent: ^{123}Sn: E=24.6 *4*; $J^\pi=3/2^+$; $T_{1/2}$=40.06 min *2*; Q(β^-)=1408.2 *24*; %β^- decay=100.0

^{123}Sn-E,J^π,$T_{1/2}$: From Adopted Levels of ^{123}Sn.

^{123}Sn-Q(β^-): From 2021Wa16.

1977Ti03: ^{123m}Sn activity was produced by irradiation of 97.8% enriched ^{122}Sn with thermal neutrons and 96% enriched ^{124}Sn with fast neutrons at Saha Institute of Nuclear Physics. X and γ rays were detected with Ge(Li) detectors and conversion electrons were detected with a six-gap β-ray spectrometer. Measured Eγ, Iγ, E(X ray), I(X ray), E(ce), I(ce). Deduced levels, J, π, β-decay branching ratios, log *ft*, conversion coefficients, γ-ray multipolarities. Comparisons with available data.

2006Kr04: ^{123m}Sn activity was produced in thermal neutron capture on ^{122}Sn with neutrons from the Oregon State TRIGA reactor (OSTR). γ rays were detected with a HPGe detector. Measured Eγ, Iγ. Deduced levels, β-decay branching ratios.

1974Ra03: ^{123m}Sn activity was produced by irradiation of 95% enriched ^{122}Sn with thermal neutrons at ORNL. γ rays were detected with a 50-cm^3 Ge(Li) detector. Measured Eγ, Iγ. Deduced levels, J, π, β-decay branching ratios, log *ft*. Comparisons with available data.

1968Ba04: ^{123m}Sn activity was produced by irradiation of 92.3% enriched ^{122}Sn with thermal neutrons from the MIT reactor. γ rays were detected with a 1.2 cm^3 Ge(Li) detector. Measured Eγ, Iγ. Deduced levels, J, π, β-decay branching ratios, log *ft*.

1968Je02: ^{123m}Sn activity was produced by irradiation of enriched ^{122}Sn with neutrons from the I.E.A de Sao Paulo reactor. γ rays were detected with a NaI(Tl) and a Ge(Li) detector. Measured Eγ, Iγ. Deduced levels, J, π, β-decay branching ratio, log *ft*.

Others:

1949Du15: measured ce-β-coin, ce(t). Deduced parent $T_{1/2}$.

1949Le05: measured β(t). Deduced parent $T_{1/2}$.

1963Sc12: measured ce-γ(t). Deduced $T_{1/2}$ of 160 level.

1968Er03: measured γ(t). Deduced parent $T_{1/2}$.

1969PrZY: measured Eγ, Iγ. Also report data on ^{124}Sn(p,2nγ).

1970OsZZ: parent $T_{1/2}$.

1970Si21: measured $\beta\gamma$(t). Deduced $T_{1/2}$ of 160 level.

1973Be18: measured $\gamma\gamma$(t). Deduced $T_{1/2}$ of 160 level.

1990Ab06: measured γ(t). Deduced parent $T_{1/2}$.

^{123}Sb Levels

E(level)†	J^π‡	$T_{1/2}$‡	Comments
0.0	$7/2^+$	stable	
160.33 *3*	$5/2^+$	0.61 ns *4*	$T_{1/2}$: adopted value is weighted average of 0.60 ns *8* (1970Si21), 0.64 ns *5* (1963Sc12), 0.57 ns *7* (1969Sh12), 0.60 ns *4* (1973Be18) and 0.62 ns *21* (1964Sh23).
542.06 *5*	$(3/2)^+$	5.3 ps *+12−10*	
712.56 *21*	$1/2^+$		

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

‡ From Adopted Levels.

β^- radiations

E(decay)	E(level)	Iβ^-†‡	Log *ft*	Comments
(720.2 *25*)	712.56	0.011 *3*	8.3 *1*	av Eβ=235.50 *94*
(890.7 *24*)	542.06	0.055 *5*	7.93 *4*	av Eβ=302.57 *98*
(1272.5 *24*)	160.33	99.9 *3*	5.248 *4*	av Eβ=461.1 *11*

† From γ+ce intensity balance at each level.

‡ Absolute intensity per 100 decays.

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$\gamma(^{123}Sb)$

Iγ normalization: From ΣI(γ+ce to g.s.)=100.

E_γ	I_γ[#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	α[†]	Comments
160.34 *3*	100	160.33	$5/2^+$	0.0	$7/2^+$	M1+E2	0.078 *10*	0.1668	B(M1)(W.u.)=0.0075 *5*; B(E2)(W.u.)=1.25 *+36−31* %Iγ=85.69 *18* α(K)=0.1439 *21*; α(L)=0.0185 *3*; α(M)=0.00365 *6* α(N)=0.000705 *10*; α(O)=6.94×10^{-5} *10* E_γ: weighted average of 160.35 *3* (2006Kr04), 160.0 *3* (1977Ti03), 160.33 *5* (1974Ra03), 159.7 *5* (1968Ba04), and 160.6 *6* (1968Je02). Other: 153 *5* from E(ce) (1949Du15). Mult.,δ: α(K)exp=0.15 *1* and K/L=7.6 *6* (1977Ti03) gives δ(E2/M1)=0.21 *+14−21*, using BrIccMixing.
170.15 *38*	0.004 *3*	712.56	$1/2^+$	542.06	$(3/2)^+$				%Iγ=0.003 *3* E_γ: weighted average of 171.22 *38* (2006Kr04) and 170.9 *7* (1977Ti03). I_γ: weighted average of 0.003 *3* (2006Kr04) and 0.008 *5* (1977Ti03).
381.75 *5*	0.047 *3*	542.06	$(3/2)^+$	160.33	$5/2^+$	M1(+E2)			%Iγ=0.040 *3* E_γ: weighted average of 381.77 *5* (2006Kr04), 381.1 *4* (1977Ti03), 381.7 *4* (1974Ra03), 381.3 *7* (1968Je02), and 381 *1* (1968Ba04). I_γ: weighted average of 0.050 *3* (2006Kr04), 0.049 *5* (1977Ti03), 0.05 *1* (1974Ra03), and 0.040 *4* (1968Ba04). Other: 0.027 *3*) (1968Je02) is discrepant.
541.95 *10*	0.021 *3*	542.06	$(3/2)^+$	0.0	$7/2^+$				%Iγ=0.018 *3* E_γ: weighted average of 541.95 *10* (2006Kr04), 541.4 *4* (1977Ti03), 542.2 *4* (1974Ra03), 542.2 *9* (1968Je02), and 542 *1* (1968Ba04). I_γ: weighted average of 0.028 *5* (2006Kr04), 0.021 *3* (1977Ti03), 0.030 *6* (1974Ra03), 0.016 *3* (1968Je02), and 0.020 *4* (1968Ba04).
552.37 *24*	0.009 *2*	712.56	$1/2^+$	160.33	$5/2^+$				%Iγ=0.0077 *18* E_γ: weighted average of 552.29

Continued on next page (footnotes at end of table)

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

E_γ	E_i(level)	Comments
		24 (2006Kr04), 552.8 *4* (1977Ti03), 552.2 *4* (1974Ra03), and 552 *1* (1968Ba04). I_γ: weighted average of 0.010 *3* (2006Kr04), 0.010 *3* (1977Ti03), 0.014 *3* (1974Ra03), and 0.007 *2* (1968Ba04).

† Additional information 1.
‡ From Adopted Gammas. Values and arguments from this study are given in comments.
# For absolute intensity per 100 decays, multiply by 0.8569 *18*.

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Decay Scheme

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