^{140}Sb IT decay (41 μs) 2016Lo01

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 154, 1 (2018)	20-Nov-2018

Parent: ^{140}Sb: E=298.2+x; J^π=(6$^-$,7$^-$); $T_{1/2}$=41 μs *8*; %IT decay=100.0

^{140}Sb-%IT decay: 100% isomeric transition is assumed.

2016Lo01 is the first spectroscopic study of the ^{140}Sb nuclide.

Compiled for XUNDL compilation by B. Singh (McMaster).

2016Lo01: ^{140}Sb isomer populated in ^{9}Be(^{238}U,X) reaction with E(^{238}U)$^{86+}$=345 MeV/nucleon (target thickness=2.9 mm) with ^{140}Sb selected based on ΔE-tof-Bρ method using the BigRIPS and ZeroDegree spectrometers at RIBF-RIKEN. Selected ions implanted in WAS3ABi stopper, a stack of double-sided silicon detectors (DSSSDs). Measured Eγ, Iγ, γ(t), (implanted ions)γ-coin, isomer half-life using 4π EURICA array of 12 Ge cluster detectors and 18 $LaBr_3$(Ce) detectors. Detected $\approx$ 9300 well separated ^{140}Sb nuclei. Deduced levels, J, π, isomer, configuration, single-particle excitations. Comparison with shell-model, and mean-field calculations.

All data are from 2016Lo01 unless noted otherwise.

^{140}Sb Levels

E(level)†	J^π‡	$T_{1/2}$	Comments
0.0	(3$^-$,4$^-$)	173 ms *12*	J^π: adopted values, from β feedings to (2$^+$) and (4$^+$) of ^{140}Te daughter; (4$^-$) not excluded (2017Mo12). $T_{1/2}$: adopted values, from 2017Mo12 (γ(t)).
70.9 *8*	(4$^-$,5$^-$)		
298.2 *10*	(5$^-$,6$^-$)		
298.2+x	(6$^-$,7$^-$)	41 μs *8*	%IT=100 Possible configuration=$\pi g^{1}_{7/2}\otimes\nu f^{-1}_{7/2}$. E(level): x<30 keV (2016Lo01). $T_{1/2}$: from 70.9γ(t) and 227.3γ(t) (2016Lo01).

† From Eγ values.

‡ Assigned by 2016Lo01 (same as the adopted values) based on (3$^-$,4$^-$) for the ground state and model predictions for the higher states.

γ(^{140}Sb)

E$_\gamma$	I$_\gamma$	E$_i$(level)	J^π_i	E$_f$	J^π_f	Mult.†	α‡	Comments
x		298.2+x	(6$^-$,7$^-$)	298.2	(5$^-$,6$^-$)			E$_\gamma$: x<30 keV if E2, <1-2 keV if M1 (2016Lo01), based on consideration of transition rates in this mass region, and γ-energy detection threshold in this experiment.
70.9 *8*	103 *31*	70.9	(4$^-$,5$^-$)	0.0	(3$^-$,4$^-$)	(M1)	1.66 *6*	Mult.: pure E2 is ruled out by 2016Lo01 since with a total conversion coefficient of 5.61, its Iγ would be about five times smaller than that of the 227.3 transition. Note that even with M1 multipolarity of the 70.9 transition, its total intensity (I(γ+ce)) is about 2.7 times larger than that of the 227 transition whereas one would expect equal intensity if the decay scheme of the isomer is complete.
227.3 *5*	100	298.2	(5$^-$,6$^-$)	70.9	(4$^-$,5$^-$)	[M1,E2]	0.079 *15*	E$_\gamma$: this transition is unlikely to be the isomeric transition since the implied B(M1) or B(E2) would be too small to be consistent with expected transition rates from Weisskopf estimates.

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^{140}Sb IT decay (41 μs) 2016Lo01 (continued)

$\gamma(^{140}Sb)$ (continued)

† E1, E3 and M2 type of transitions between levels of opposite parities are not considered likely based on expected active spherical orbitals involved in the low-lying structure of ^{140}Sb.

‡ Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.