

^{132}Sn β^- decay (39.7 s) 1989St06,1995Ma02

Type	History		Literature Cutoff Date
	Author	Citation	
Full Evaluation	Balraj Singh	ENSDF	28-Feb-2018

Parent: ^{132}Sn : $E=0.0$; $J^\pi=0^+$; $T_{1/2}=39.7$ s 8; $Q(\beta^-)=3089$ 3; $\% \beta^-$ decay=100.0

^{132}Sn - $T_{1/2}$: From ^{132}Sn Adopted Levels.

^{132}Sn - $Q(\beta^-)$: From 2017Wa10.

1989St06: measured E_γ , I_γ , $\gamma\gamma$, $\gamma\gamma(t)$.

1995Ma02 (also 1995Ma49): measured ce , $\gamma\gamma(\theta)$ for nine cascades, level lifetimes by $\beta\gamma(t)$ and $\beta\gamma\gamma(t)$.

1972Ke20 (also 1973Ke23): measured $T_{1/2}$, E_γ , I_γ , $\gamma\gamma$, ce , β , $\beta\gamma(t)$.

Others:

1979Bo26: measured energies of three γ rays with a curved-crystal spectrometer.

$T_{1/2}$ (^{132}Sn isotope): 1975Ba36, 1974Gr29, 1972Nu04, 1972Na10, 1972Iz01 (also 1978Iz03), 1970Li14, 1966St25, 1963Gr13.

β spectra: 1977Al09.

1972CIZN, 1974CIZX: measured (fragment)(fragment)(γ)(t), $\gamma\gamma(t)$ to deduce isomers from ^{242}Cf SF decay. The authors observed 91 γ and 163 γ in coin forming a cascade from a 102-ns isomer.

Theoretical calculations of $T_{1/2}$ and $\log ft$ for ^{132}Sn decay: 2015Su10, 2013Mi02.

 ^{132}Sb Levels

E(level) [†]	J^π [‡]	$T_{1/2}$ [#]	Comments
0.0 ^a	(4) ⁺	2.79 min 7	J^π : 3 ⁺ is not completely ruled out as discussed by 1995Ma02.
0+x? ^{&}	(8) ⁻	4.10 min 5	E(level): x=150-250 keV (1989St06). Other: 200 30 (2017Au03). Possible feeding from 254 level.
85.55 ^a 6	(3) ⁺	15.62 ns 13	J^π : 2 if J(^{132}Sb g.s.)=3. $T_{1/2}$: other: 14.8 ns 18 (1972Ke20).
162.80 ^a 20	(5 ⁺) [@]		
254.5 ^{&} 3	(6 ⁻) [@]	102 ns 4	J^π : 4 ⁻ is possible but less likely. $T_{1/2}$: from study of isomers in fission products (1974CIZX). Other: 150 ns 70 (1989St06). It is possible that this level also feeds the 4.10-min, (8 ⁻) isomer.
389.2 ^{&} 4	(4 ⁻) [@]		E(level): reverse ordering of 94-135 cascade is also possible giving a level at 348.4, instead of that at 389.2.
426.07 ^a 6	(2) ⁺	15.8 ps 17	J^π : 3 ⁻ is possible but less likely. J^π : 3 if J(^{132}Sb g.s.)=3. $T_{1/2}$: other: ≤ 2 ns (1972Ke20).
483.1 ^{&} 4	(3 ⁻) [@]		J^π : 2 ⁻ is possible but less likely.
529.10 5	(3 ⁺)	≤ 13 ps	J^π : 2 if J(^{132}Sb g.s.)=3. Possible configuration= $\pi g_{7/2} \otimes v s_{1/2}^{-1}$.
1078.31 ^b 6	(2) ⁺	2.6 ps 14	J^π : 1 if J(^{132}Sb g.s.)=3. $T_{1/2}$: other: ≤ 2 ns (1972Ke20).
1325.15 ^b 6	1 ⁺	≤ 37 ps	$T_{1/2}$: other: ≤ 0.8 ns (1972Ke20).
2268.26 19	1 ⁺	≤ 60 ps	Possible configuration= $\pi g_{7/2} \otimes v d_{5/2}^{-1}$.

[†] From least-squares fit to E_γ data.

[‡] From Adopted Levels. The assignments are essentially suggested by 1989St06 on the basis of 1⁺ for 1325 and 2268 levels (from $\log ft$ values); (4)⁺ for ^{132}Sb g.s.; multipolarity of transitions; and $\gamma\gamma(\theta)$ data from 1995Ma02. Other J^π choices are possible if $J^\pi(^{132}\text{Sb}$ g.s.)=3⁺. Comparison with shell-model calculations is also used in assigning J^π values.

[#] From $\beta\gamma(t)$ (1995Ma02), unless otherwise indicated.

[@] Preferred choice (1989St06). Less likely choice is given under comments.

[&] Possible member of configuration= $\pi g_{7/2} \otimes v h_{11/2}^{-1}$.

^a Possible member of configuration= $\pi g_{7/2} \otimes v d_{3/2}^{-1}$.

^b Possible member of configuration= $\pi d_{5/2} \otimes v d_{3/2}^{-1}$.

¹³²Sn β⁻ decay (39.7 s) **1989St06,1995Ma02** (continued)

β⁻ radiations

E(decay)	E(level)	Iβ ^{-†}	Log ft	Comments
(821 3)	2268.26	0.88 7	4.82 4	av Eβ=275.9 16
(1764 3)	1325.15	99 4	4.02 2	av Eβ=677.5 18
				E(decay): other: 1760 40 from 1977A109.
(2606‡ 3)	483.1	<0.19	>7.4	av Eβ=1061.3 19
				Iβ ⁻ : upper limit as 93.9γ is in coincidence with 246.87γ.

† Absolute intensity per 100 decays.

‡ Existence of this branch is questionable.

γ(¹³²Sb)

I_γ normalization: From I(γ+ce)(γ rays to g.s.)=100.

γγ(θ) were measured by 1995Ma02 for the following cascades, but the values of A₂ and A₄ coefficients were not quoted: 340-86; 549-529; 993-86; 247-549; 247-652; 247-993; 247-1078; 899-340; 1240-86. Results were interpreted for J^π and δ values assuming J^π(¹³²Sb g.s.)=4⁺ and 3⁺.

E _γ [†]	I _γ ^{†a}	E _i (level)	J _i ^π	E _f	J _f ^π	Mult.#	δ [@]	α ^b	Comments
85.58 8	98.0 20	85.55	(3) ⁺	0.0	(4) ⁺	M1+E2	-0.095 14	0.981 15	α(K)=0.841 13; α(L)=0.1130 25; α(M)=0.0225 5 α(N)=0.00431 10; α(O)=0.000418 8 E _γ : 85.428 4 (1979Bo26). α(K)exp=0.83 8, α(L)exp=0.13 3 (1972Ke20).
91.7 2	0.17 3	254.5	(6 ⁻)	162.80	(5 ⁺)	(E1)&		0.241	α(K)=0.208 4; α(L)=0.0268 5; α(M)=0.00526 8 α(N)=0.000995 16; α(O)=9.19×10 ⁻⁵ 14
93.9 2	0.20 2	483.1	(3 ⁻)	389.2?	(4 ⁻)	(M1)&		0.740	α(K)=0.638 10; α(L)=0.0822 13; α(M)=0.01628 25 α(N)=0.00314 5; α(O)=0.000309 5
134.7 2	0.24 3	389.2?	(4 ⁻)	254.5	(6 ⁻)	(E2)&		0.574	α(K)=0.440 7; α(L)=0.1075 17; α(M)=0.0220 4 α(N)=0.00405 7; α(O)=0.000319 5
162.8 2	0.15 7	162.80	(5 ⁺)	0.0	(4) ⁺	(M1)&		0.1591	α(K)=0.1374 20; α(L)=0.0175 3; α(M)=0.00346 5 α(N)=0.000668 10; α(O)=6.60×10 ⁻⁵ 10
246.87 5	86 4	1325.15	1 ⁺	1078.31	(2) ⁺	M1+E2	-0.14 6	0.0523 9	α(K)=0.0452 7; α(L)=0.00574 12; α(M)=0.001135 24 α(N)=0.000219 5; α(O)=2.16×10 ⁻⁵ 4 E _γ : 246.736 15 (1979Bo26). α(K)exp=0.046 9 (1972Ke20), 0.050 5 (1995Ma02).
340.53 5	100	426.07	(2) ⁺	85.55	(3) ⁺	M1,E2		0.0236 11	α(K)=0.0201 7; α(L)=0.0028 4; α(M)=0.00055 8 α(N)=0.000106 13; α(O)=1.00×10 ⁻⁵ 8 E _γ : 340.48 3 (1979Bo26). -0.20≤δ≤0.

Continued on next page (footnotes at end of table)

¹³²Sn β⁻ decay (39.7 s) **1989St06,1995Ma02 (continued)**

γ(¹³²Sb) (continued)

<u>E_γ[†]</u>	<u>I_γ^{†a}</u>	<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.#</u>	<u>δ[@]</u>	<u>α^b</u>	<u>Comments</u>
426.1 ^c	≤1	426.07	(2) ⁺	0.0	(4) ⁺				α(K)exp=0.021 4 (1972Ke20), 0.018 2 (1995Ma02). E _γ : from 1995Ma02 only.
443.5 2	0.46 4	529.10	(3) ⁺	85.55	(3) ⁺				
529.09 6	4.3 4	529.10	(3) ⁺	0.0	(4) ⁺	D(+Q)	-0.23 23		
549.23 7	4.7 4	1078.31	(2) ⁺	529.10	(3) ⁺	D(+Q)	-0.07 21		
652.31 6	5.5 4	1078.31	(2) ⁺	426.07	(2) ⁺	(M1+E2)	-0.7 6	0.0043 3	α(K)=0.00372 23; α(L)=0.000463 19; α(M)=9.1×10 ⁻⁵ 4 α(N)=1.76×10 ⁻⁵ 8; α(O)=1.74×10 ⁻⁶ 10
^x 710 [‡]									
795.7 2	0.63 4	1325.15	1 ⁺	529.10	(3) ⁺				
^x 816 [‡]									
^x 870 [‡]									
899.04 5	91 5	1325.15	1 ⁺	426.07	(2) ⁺	M1+E2	-0.22 10	0.00213 4	α(K)=0.00186 4; α(L)=0.000224 4; α(M)=4.42×10 ⁻⁵ 7 α(N)=8.54×10 ⁻⁶ 14; α(O)=8.52×10 ⁻⁷ 15
992.66 8	75 4	1078.31	(2) ⁺	85.55	(3) ⁺	M1+E2	-0.49 8	0.00165 3	α(K)=0.00144 3; α(L)=0.000174 3; α(M)=3.43×10 ⁻⁵ 6 α(N)=6.63×10 ⁻⁶ 12; α(O)=6.60×10 ⁻⁷ 12
1078.3 1	5.1 3	1078.31	(2) ⁺	0.0	(4) ⁺				δ(O/Q)=0.
1239.63 5	19.8 10	1325.15	1 ⁺	85.55	(3) ⁺				δ(O/Q)=0.
1739.10 25	0.29 6	2268.26	1 ⁺	529.10	(3) ⁺				
1842.22 25	1.5 1	2268.26	1 ⁺	426.07	(2) ⁺				

[†] From 1989St06.

[‡] Tentative γ in coincidence with gate on 246.87γ (1989St06).

[#] From ce data (1995Ma02,1972Ke20). In 1995Ma02, γ and ce spectra were measured simultaneously. In 1972Ke20, ce data were normalized to 527, M4 transition in ¹³⁵Xe. The assignments given in parentheses are based on significant δ(Q/D) ratios which from RUL are most likely M1+E2 rather than E1+M2.

[@] From γγ(θ) (1995Ma02), based on J^π=4⁺ for ¹³²Sb g.s.

[&] From intensity balance (1989St06) in 94-135-92-163 cascade. The ordering of the 94-135 may be reversed without affecting the multipolarity assignment.

^a For absolute intensity per 100 decays, multiply by 0.490 12.

^b 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.

^c Placement of transition in the level scheme is uncertain.

^x γ ray not placed in level scheme.

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