

<sup>129</sup>Sn β<sup>-</sup> decay (2.23 min) 1995St28,1987StZO

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Janos Timar and Zoltan Elekes, Balraj Singh		NDS 121, 143 (2014)	31-May-2014

Parent: <sup>129</sup>Sn: E=0.0; J<sup>π</sup>=3/2<sup>+</sup>; T<sub>1/2</sub>=2.23 min 4; Q(β<sup>-</sup>)=4022 29; %β<sup>-</sup> decay=100.0

<sup>129</sup>Sn-Q(β<sup>-</sup>): From 2012Wa38.

<sup>129</sup>Sn-J<sup>π</sup>, T<sub>1/2</sub>: From Adopted Levels of <sup>129</sup>Sn.

1995St28, 1987StZO (thesis by the first author of 1995St28): <sup>235</sup>U(n,F) E=th, on-line mass separator; Ge detector, ce, γγ-coin, T<sub>1/2</sub>.

1982Hu09: <sup>235</sup>U(n,F) E=th, on-line mass separator; Ge detector, γγ-coin, T<sub>1/2</sub>. A total of 57 γ rays up to 1951 keV are reported in this study, but only 14 γ rays are common with those in 1987StZO and 1995St28. Only 17 γ rays were placed in a level scheme with 12 excited states. Following levels are not confirmed in 1987StZO: 1448.2, 1755.8, 2018.1, 2148.6 and 2463.8. Placements of several γ rays are different from those in 1987StZO and 1995St28.

Others: prior to work of 1982Hu09, only one γ ray at 645 was known.

1980De35: <sup>235</sup>U(n,F) E=th, on-line mass separator; Ge detector, scin γ, β, ce, γγ-, βγ-coin.

1974Fo06: <sup>235</sup>U(n,F) E=th, chem; pc β, Ge detector.

1972Iz01: <sup>235</sup>U(n,F) E=th, on-line mass separator; Ge detector, γγ-coin.

The decay scheme given here is from 1987StZO and 1995St28. Note that 1982Hu09 proposed a decay scheme with 12 levels, 7 of which are confirmed in 1987StZO.

<sup>129</sup>Sb Levels

Following levels proposed in 1982Hu09 are not confirmed in 1987StZO. The gamma rays assigned in 1982Hu09 either have been placed elsewhere or not seen in 1987StZO: 1448.2, 1755.8, 2018.1(?), 2148.6, 2463.8(?). These are omitted here.

E(level) <sup>†</sup>	J <sup>π</sup> <sup>‡</sup>	T <sub>1/2</sub> <sup>‡</sup>	Comments
0.0	7/2 <sup>+</sup>	4.366 h 26	
644.96 7	(5/2) <sup>+</sup>		
913.61 5	(3/2) <sup>+</sup>		
1161.41 5	(9/2) <sup>+</sup>		
1252.24 5	(3/2 <sup>+</sup> , 5/2, 7/2 <sup>-</sup> )		J <sup>π</sup> : 1995St28 (also 1987StZO) suggest 5/2 <sup>+</sup> .
1493.11 7	(1/2 <sup>+</sup> )		
1503.59 7	(5/2 <sup>+</sup> )		J <sup>π</sup> : 1995St28 (also 1987StZO) suggest 7/2 <sup>+</sup> .
1762.00 10	(1/2, 3/2, 5/2)		J <sup>π</sup> : 1995St28 suggest 3/2 <sup>+</sup> .
1841.95 8	(1/2, 3/2, 5/2)		1995St28 suggest 5/2 <sup>+</sup> .
1848.82 10	(5/2 <sup>+</sup> )		J <sup>π</sup> : 1995St28 (also 1987StZO) suggest 7/2 <sup>+</sup> .
1913.79 22	(1/2, 3/2, 5/2)		
2114.96 12	(1/2, 3/2, 5/2)		
2154.87 12	(1/2, 3/2, 5/2)		
2180.94 10	(1/2, 3/2, 5/2)		
2259.57 12	(1/2, 3/2, 5/2)		
2383.41 22	(1/2, 3/2, 5/2)		
2392.91 10	(1/2, 3/2, 5/2)		
2747.7 3	(1/2, 3/2, 5/2)		
2785.4 4	(1/2, 3/2, 5/2)		
2831.29 11	(1/2, 3/2, 5/2)		
3093.9 5	(1/2, 3/2, 5/2)		

<sup>†</sup> From least-squares fit to the E<sub>γ</sub> data with double the quoted uncertainty for 645γ, 862γ and 1470γ to get an acceptable fit with reduced χ<sup>2</sup>=2.9. Otherwise reduced χ<sup>2</sup>=6.9.

<sup>‡</sup> From Adopted Levels.

<sup>129</sup>Sn β<sup>-</sup> decay (2.23 min) **1995St28,1987StZO (continued)**

β<sup>-</sup> radiations

E(decay)	E(level)	Iβ <sup>-†‡</sup>	Log ft	Comments
(9.3×10 <sup>2</sup> 3)	3093.9	0.4 2	5.9 2	av Eβ=318 12
(1.19×10 <sup>3</sup> 3)	2831.29	0.607 20	6.10 5	av Eβ=426 13
(1.24×10 <sup>3</sup> 3)	2785.4	1.02 3	5.94 5	av Eβ=446 13
(1.27×10 <sup>3</sup> 3)	2747.7	1.5 7	5.8 2	av Eβ=462 13
(1.63×10 <sup>3</sup> 3)	2392.91	1.02 11	6.40 6	av Eβ=616 13
(1.64×10 <sup>3</sup> 3)	2383.41	0.97 9	6.43 6	av Eβ=621 13
(1.76×10 <sup>3</sup> 3)	2259.57	1.30 4	6.43 4	av Eβ=676 13
(1.84×10 <sup>3</sup> 3)	2180.94	4.00 9	6.01 3	av Eβ=711 13
(1.87×10 <sup>3</sup> 3)	2154.87	0.63 2	6.84 4	av Eβ=722 13
(1.91×10 <sup>3</sup> 3)	2114.96	3.55 7	6.13 3	av Eβ=740 13
(2.11×10 <sup>3</sup> 3)	1913.79	1.62 5	6.64 3	av Eβ=831 14
(2.17×10 <sup>3</sup> 3)	1848.82	0.67 5	7.08 4	av Eβ=861 14
(2.18×10 <sup>3</sup> 3)	1841.95	2.64 8	6.49 3	av Eβ=864 14
(2.26×10 <sup>3</sup> 3)	1762.00	1.72 6	6.74 3	av Eβ=901 14
(2.52×10 <sup>3</sup> 3)	1503.59	1.2 1	7.09 5	av Eβ=1020 14
(2.53×10 <sup>3</sup> 3)	1493.11	2.7 2	6.75 4	av Eβ=1024 14
(2.77×10 <sup>3</sup> 3)	1252.24	0.24 12	8.0 2	av Eβ=1136 14
(3.11×10 <sup>3</sup> 3)	913.61	3.2 2	7.05 4	av Eβ=1294 14
(3.38×10 <sup>3</sup> 3)	644.96	71 2	5.853 22	av Eβ=1420 14

† Deduced by evaluators from γ-ray intensity balance. Gamma-intensity balance for 1161 level gives non-physical β feeding of -0.56% 7.

‡ Absolute intensity per 100 decays.

γ(<sup>129</sup>Sb)

Iγ normalization: From summed I(γ+ce) to g.s.=100. No β<sup>-</sup> feeding to g.s. is expected.

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Gamma rays reported in 1982Hu09 but not confirmed in 1987StZO

E <sub>γ</sub>	I <sub>γ</sub>	Level	E <sub>γ</sub>	I <sub>γ</sub>	Level
66.4 3	5.0 10		455.2 5	0.4 2	
80.5 1	6.6 9		541.0 3	0.8 3	
82.2 2	2.3 5		567.4 4	0.6 2	2749.0?
139.8 1	2.3 2		569.6 2	1.1 3	2018.1?
182.2 1	0.7 1		598.2 2	1.1 3	
190.2 2	0.5 1		600.6 2	1.5 3	2749.0?
192.6 2	0.5 1		618.6 2	1.5 4	
198.1 1	2.2 2		803.0 2	2.1 6	1448.2
202.9 2	0.9 1		867.7 2	1.2 4	
256.6 2	0.5 1	2018.1?	897.7 4	0.8 3	
258.3 2	0.9 2		1110.7 2	4.0 10	1755.8
262.6 10			1406.6 3	1.2 4	
273.7 2	0.4 1	2115.4	1410.7 3	1.1 4	
284.8 3	0.5 1	2749.0?	1725.6 2	2.8 8	
296.0 1	2.1 3		1755.9 3	1.5 5	1755.8
336.0 1	1.7 2		1779.1 3	2.5 8	
368.3 2	0.5 1		1831.8 3	1.8 6	
372.3 3	0.6 2		1865.0 3	1.3 5	
374.1 4	0.4 2		1915.2 3	1.5 5	
385.9 3	0.7 2		1942.6 3	2.1 7	
416.9 2	1.0 3	2258.6	1951.0 4	1.2 5	
445.5 2	1.0 2	2463.8?			

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$E_\gamma$ †	$I_\gamma$ †@	$E_i$ (level)	$J_i^\pi$	$E_f$	$J_f^\pi$	Comments
251.7 4	0.59 2	1503.59	(5/2 <sup>+</sup> )	1252.24	(3/2 <sup>+</sup> , 5/2, 7/2 <sup>-</sup> )	
266.1 2	1.28 2	2114.96	(1/2, 3/2, 5/2)	1848.82	(5/2 <sup>+</sup> )	
332.2# 2	0.30# 2	2180.94	(1/2, 3/2, 5/2)	1848.82	(5/2 <sup>+</sup> )	
339.1 2	0.66 5	2180.94	(1/2, 3/2, 5/2)	1841.95	(1/2, 3/2, 5/2)	Additional information 13.
342.2 2	0.92 2	1503.59	(5/2 <sup>+</sup> )	1161.41	(9/2 <sup>+</sup> )	
349.0 2	0.69 2	1841.95	(1/2, 3/2, 5/2)	1493.11	(1/2 <sup>+</sup> )	Additional information 7.
353.1 2	0.44 2	2114.96	(1/2, 3/2, 5/2)	1762.00	(1/2, 3/2, 5/2)	
410.2 2	1.84 5	1913.79	(1/2, 3/2, 5/2)	1503.59	(5/2 <sup>+</sup> )	
579.30 8	2.4 1	1493.11	(1/2 <sup>+</sup> )	913.61	(3/2 <sup>+</sup> )	
645.19‡ 5	100.0 16	644.96	(5/2 <sup>+</sup> )	0.0	7/2 <sup>+</sup>	Additional information 1.
688.0 3	0.62 3	1848.82	(5/2 <sup>+</sup> )	1161.41	(9/2 <sup>+</sup> )	
848.27 6	2.44 5	1493.11	(1/2 <sup>+</sup> )	644.96	(5/2 <sup>+</sup> )	
858.2 2	1.70 3	1503.59	(5/2 <sup>+</sup> )	644.96	(5/2 <sup>+</sup> )	Additional information 4.
862.2‡ 1	0.64 2	2114.96	(1/2, 3/2, 5/2)	1252.24	(3/2 <sup>+</sup> , 5/2, 7/2 <sup>-</sup> )	Additional information 10.
890.3 2	1.1 1	2383.41	(1/2, 3/2, 5/2)	1493.11	(1/2 <sup>+</sup> )	
913.54 5	6.3 2	913.61	(3/2 <sup>+</sup> )	0.0	7/2 <sup>+</sup>	Additional information 2.
928.8 2	2.17 4	2180.94	(1/2, 3/2, 5/2)	1252.24	(3/2 <sup>+</sup> , 5/2, 7/2 <sup>-</sup> )	
1117.06 8	2.39 5	1762.00	(1/2, 3/2, 5/2)	644.96	(5/2 <sup>+</sup> )	Additional information 6.
1140.6 2	0.91 9	2392.91	(1/2, 3/2, 5/2)	1252.24	(3/2 <sup>+</sup> , 5/2, 7/2 <sup>-</sup> )	
1161.42 5	0.90 6	1161.41	(9/2 <sup>+</sup> )	0.0	7/2 <sup>+</sup>	
1196.98 5	2.97 5	1841.95	(1/2, 3/2, 5/2)	644.96	(5/2 <sup>+</sup> )	Additional information 8.
1203.8 1	1.72 3	1848.82	(5/2 <sup>+</sup> )	644.96	(5/2 <sup>+</sup> )	Additional information 9.
1252.21 5	4.58 9	1252.24	(3/2 <sup>+</sup> , 5/2, 7/2 <sup>-</sup> )	0.0	7/2 <sup>+</sup>	Additional information 3.
1281.8 4	1.16 3	2785.4	(1/2, 3/2, 5/2)	1503.59	(5/2 <sup>+</sup> )	
1327.69 8	0.69 2	2831.29	(1/2, 3/2, 5/2)	1503.59	(5/2 <sup>+</sup> )	
1470.4‡ 1	1.67 4	2114.96	(1/2, 3/2, 5/2)	644.96	(5/2 <sup>+</sup> )	Additional information 11.
1479.3 1	0.25 8	2392.91	(1/2, 3/2, 5/2)	913.61	(3/2 <sup>+</sup> )	
1503.63 8	1.90 5	1503.59	(5/2 <sup>+</sup> )	0.0	7/2 <sup>+</sup>	Additional information 5.
1509.9 1	0.72 2	2154.87	(1/2, 3/2, 5/2)	644.96	(5/2 <sup>+</sup> )	Additional information 12.
1535.9 1	1.45 3	2180.94	(1/2, 3/2, 5/2)	644.96	(5/2 <sup>+</sup> )	Additional information 14.
1614.6 1	1.48 4	2259.57	(1/2, 3/2, 5/2)	644.96	(5/2 <sup>+</sup> )	Additional information 15.
2102.7 3	1.7 8	2747.7	(1/2, 3/2, 5/2)	644.96	(5/2 <sup>+</sup> )	
2448.9 5	0.5 2	3093.9	(1/2, 3/2, 5/2)	644.96	(5/2 <sup>+</sup> )	

† From 1987StZO (thesis from first author of 1995St28). Detailed  $\gamma$ -ray data are also available from 1982Hu09, but a large number of  $\gamma$  rays in this work has not been confirmed by 1987StZO. Many of these  $\gamma$  rays probably belong to impurities.

‡ Double uncertainty assumed by evaluators for least-squares fit.

# From figure III-30 in 1987StZO; uncertainties assumed by the evaluators.

@ For absolute intensity per 100 decays, multiply by 0.880 13.

$^{129}\text{Sn} \beta^-$  decay (2.23 min) 1995St28,1987StZO

Decay Scheme

Intensities:  $I_\gamma$  per 100 parent decays

Legend

- $I_\gamma < 2\% \times I_\gamma^{\max}$
- $I_\gamma < 10\% \times I_\gamma^{\max}$
- $I_\gamma > 10\% \times I_\gamma^{\max}$

