^{116}Sb ε decay (15.8 min)   1994Ga14

	Type	Author	History Citation	Literature Cutoff Date
	Full Evaluation	Jean Blachot	NDS 111, 717 (2010)	1-Dec-2009

Parent: ^{116}Sb: E=0.0; J$^{\pi}$=3$^+$; T$_{1/2}$=15.8 min 8; Q(ε)=4707 5; %ε+%β^+ decay=100.0

Activity: ^{113}In(α,n), ^{116}Sn(p,n) (1994Ga14).

Measured: β (1955St73,1968Ki07), $\beta\gamma$ (1955St73), $\gamma\gamma$ (1955St73,1994Ga14), γ semi. (1972GeZF,1994Ga14). Others: 1954At34, 1961Fi05, 1968Bu18, 1974HeYW.

The level scheme is as given by 1994Ga14.

^{116}Sn Levels

E(level)	J$^{\pi}$	T$_{1/2}$	E(level)	J$^{\pi}$	E(level)	J$^{\pi}$
0.0	0$^+$	stable	2585.62 11	1$^+$	3371.11 24	3$^+$
1293.550 14	2$^+$		2649.93 20	2$^+$	3416.5 3	2$^+$
1756.66 4	0$^+$		2801.39 11	4$^+$	3513.7 5	(2$^+$)
2027.4 4	0$^+$		2843.61 8	2$^+$	3586.89 25	2$^+$
2112.24 6	2$^+$		2959.96 10	2$^+$	3593.49 14	3$^+$
2225.215 3	2$^+$		2995.64 21	3$^+$	3748.0 3	4
2266.17 8	3$^-$		3045.4 4	4$^+$	3903.37 10	2$^+$
2390.95 7	4$^+$		3088.35 21	2$^+$	4270 6	(2$^+$)
2529.11 9	4$^+$		3179.5 4	3$^+$		
2545.8 7	(0)$^+$		3227.6 5	(2)$^+$		

ε,β^+ radiations

E(decay)	E(level)	Iβ^+ ‡	Iε‡	Log ft	I(ε+β^+)‡	Comments
(804 5)	3903.37		0.0025 17	7.8 3	0.0025 17	εK=0.8545; εL=0.1156; εM+=0.02988
(959 5)	3748.0		0.026 6	6.96 11	0.026 6	εK=0.8558; εL=0.1146; εM+=0.02957
(1114 5)	3593.49		0.060 9	6.73 7	0.060 9	εK=0.8567; εL=0.1139; εM+=0.02936
(1120 5)	3586.89		0.092 21	6.55 11	0.092 21	εK=0.8568; εL=0.1139; εM+=0.02935
(1193 5)	3513.7		0.036 10	7.01 13	0.036 10	εK=0.8570; εL=0.1136; εM+=0.02926
(1291 5)	3416.5		0.070 18	6.79 12	0.070 18	εK=0.8568; εL=0.1132; εM+=0.02915
(1336 5)	3371.11	8.4×10^{-5} 21	0.049 12	6.98 11	0.049 12	av Eβ=148.6 22; εK=0.8562; εL=0.1130; εM+=0.02908
(1479 5)	3227.6	0.00043 10	0.056 12	7.01 10	0.056 12	av Eβ=211.1 22; εK=0.8515; εL=0.1119; εM+=0.02880
(1528 5)	3179.5	0.00032 11	0.028 10	7.34 16	0.028 10	av Eβ=232.0 22; εK=0.8485; εL=0.1114; εM+=0.02867
(1619 5)	3088.35	0.0032 4	0.150 19	6.66 6	0.153 19	av Eβ=271.5 22; εK=0.8405; εL=0.1101; εM+=0.02833
(1662 5)	3045.4	0.00057 4	0.0206 15	7.55 4	0.0212 15	av Eβ=290.2 22; εK=0.8354; εL=0.1094; εM+=0.02814
(1711 5)	2995.64	0.0015 4	0.041 10	7.28 11	0.042 10	av Eβ=311.9 22; εK=0.8285; εL=0.10839 11; εM+=0.02788 3
(1747 5)	2959.96	0.016 1	0.35 3	6.35 5	0.37 3	av Eβ=327.4 22; εK=0.8227 9; εL=0.10758 12; εM+=0.02766 4
(1863 5)	2843.61	0.105 10	1.41 13	5.81 5	1.52 14	av Eβ=378.1 22; εK=0.7995 12; εL=0.10435 16; εM+=0.02683 4
(1906 5)	2801.39	0.0080 11	0.091 12	7.02 7	0.099 13	av Eβ=396.6 22; εK=0.7894 13; εL=0.10297 18; εM+=0.02647 5
(2178 5)	2529.11	0.02 1	0.07 2	7.23 15	0.09 3	av Eβ=516.5 23; εK=0.7040 19; εL=0.09153 25; εM+=0.02352 7
(2316 5)	2390.95	0.058 7	0.18 2	6.89 6	0.24 3	av Eβ=577.9 23; εK=0.6506 20; εL=0.0845 3; εM+=0.02170 7
(2441 5)	2266.17	0.048 9	0.11 2	7.15 9	0.16 3	av Eβ=633.6 23; εK=0.5996 21; εL=0.0778 3; εM+=0.01997 7

^{116}Sb ε decay (15.8 min)   **1994Ga14** (continued)

ϵ,β^+ radiations (continued)

E(decay)	E(level)	Iβ^+ ‡	Iε‡	Log ft	I($\varepsilon+\beta^+$)‡	Comments
(2482 *5*)	2225.215	13 *1*	27 *2*	4.78 *4*	40 *3*	av Eβ=652.0 *23*; εK=0.5826 *21*; εL=0.0755 *3*; εM+=0.01940 *7*
						E(β^+)=1300 *80* (1968Ki07), 1500 (1955St73).
(2595 *5*)	2112.24	0.18 *2*	0.29 *3*	6.79 *6*	0.47 *5*	av Eβ=702.7 *23*; εK=0.5358 *21*; εL=0.0694 *3*; εM+=0.01782 *7*
(2950† *5*)	1756.66	0.061 *11*	0.053 *10*	7.64 *9*	0.114 *21*	av Eβ=863.7 *23*; εK=0.3994 *18*; εL=0.05162 *23*; εM+=0.01325 *6*
(3413 *5*)	1293.550	40 *3*	18 *2*	5.24 *5*	58 *5*	av Eβ=1076.1 *23*; εK=0.2651 *12*; εL=0.03418 *16*; εM+=0.00877 *4*

† E(β^+)=2290 *50* (scin,1968Ki07), 2270 *100* (mag spect,1961Fi05), 2300 *300* (absorption,1956At10); (2400β+)(1270γ)-coin (1955St73).

‡ Absolute intensity per 100 decays.

γ(^{116}Sn)

Iγ normalization: assuming no $\varepsilon+\beta^+$ feeding to g.s. and Iγ(1293+2112+2225+2843$^+$ 2959+3087+4270)=100.

Eγ†	Iγ†@	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Mult.	δ	α&	Comments
84.9 *5*	0.000016	2112.24	2$^+$	2027.4	0$^+$				Iγ: Iγ deduced from B(E2)/B(E2)(2112) as reported in 1981Jo03, not given by 1994Ga14.
113.1	<0.000016	2225.215	2$^+$	2112.24	2$^+$				Eγ: from 1979Ka01, not given by 1994Ga14.
138.2 *3*	0.020 *8*	2529.11	4$^+$	2390.95	4$^+$				
198.0	<0.0013	2225.215	2$^+$	2027.4	0$^+$				Eγ: from 1979Ka01, not given by 1994Ga14.
310.0‡ *3*	0.005 *2*	2959.96	2$^+$	2649.93	2$^+$				
355.63 *24*	0.023 *11*	2112.24	2$^+$	1756.66	0$^+$				
359.9 *7*	0.015 *11*	2585.62	1$^+$	2225.215	2$^+$				
374.37 *24*	0.046 *12*	2959.96	2$^+$	2585.62	1$^+$				
378.1‡ *6*	0.002 *1*	3179.5	3$^+$	2801.39	4$^+$				
416.86 *8*	0.09 *3*	2529.11	4$^+$	2112.24	2$^+$				
463.12 *4*	0.412 *13*	1756.66	0$^+$	1293.550	2$^+$				
466.6‡ *4*	0.005 *2*	2995.64	3$^+$	2529.11	4$^+$				
468.59 *6*	0.225 *11*	2225.215	2$^+$	1756.66	0$^+$				
^{x}567.9 *5*	0.016 *11*								
577.4‡ *2*	0.019 *10*	2843.61	2$^+$	2266.17	3$^-$				
604.7‡ *4*	0.007 *2*	2995.64	3$^+$	2390.95	4$^+$				
693.5 *6*	0.016 *8*	2959.96	2$^+$	2266.17	3$^-$				
733.8 *7*	0.033 *15*	2027.4	0$^+$	1293.550	2$^+$				
770.3‡ *4*	0.006 *2*	2995.64	3$^+$	2225.215	2$^+$				
788.5‡ *6*	0.006 *3*	3179.5	3$^+$	2390.95	4$^+$				
818.68 *7*	0.294 *16*	2112.24	2$^+$	1293.550	2$^+$	M1+E2	−1.8 *2*	0.00216 *2*	α=0.00216 *2*; α(K)=0.00186 *2*; α(L)=0.00023 δ: from $\gamma\gamma(\theta)$ in ^{116}In β^- decay (1974Ga05).
828.9‡ *2*	0.004 *1*	2585.62	1$^+$	1756.66	0$^+$				

$^{116}\text{Sb } \varepsilon$ decay (15.8 min)   1994Ga14 (continued)

$\gamma(^{116}\text{Sn})$ (continued)

E_γ[†]	I_γ[†@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	δ	α[&]	Comments
831.1 7	0.024 10	3416.5	2^+	2585.62	1^+				
931.84 5	29.3 8	2225.215	2^+	1293.550	2^+	M1+E2	$-1.9 +5-7$	0.00159 5	α=0.00159 5; α(K)=0.00137 4; α(L)=0.00017 δ: from $\gamma\gamma(\theta)$, 1979Ka01.
961.7[‡] 10	0.006 3	3227.6	$(2)^+$	2266.17	3^-				
972.60 8	0.260 19	2266.17	3^-	1293.550	2^+				
980.2[‡] 4	0.007 4	3371.11	3^+	2390.95	4^+				
1001.0 5	0.054 21	3586.89	2^+	2585.62	1^+				
1002.5[‡] 10	0.009 3	3227.6	$(2)^+$	2225.215	2^+				
1097.40 7	0.326 21	2390.95	4^+	1293.550	2^+				
1145.8[‡] 4	0.012 5	3371.11	3^+	2225.215	2^+				
1150.1 5	0.031 15	3416.5	2^+	2266.17	3^-				
1200.0[‡] 6	0.042 12	3227.6	$(2)^+$	2027.4	0^+				
1252.2 7	0.029 10	2545.8	$(0)^+$	1293.550	2^+				
1292.1[‡] 2	0.057 13	2585.62	1^+	1293.550	2^+				
1293.558 15	100.0 22	1293.550	2^+	0.0	0^+	E2		0.00075	α=0.00075; α(K)=0.00065
1331.9 4	0.025 10	3088.35	2^+	1756.66	0^+				
1356.34 25	0.040 9	2649.93	2^+	1293.550	2^+				
1368.21 19	0.058 9	3593.49	3^+	2225.215	2^+				
1474.8 3	0.047 9	3586.89	2^+	2112.24	2^+				
1481.3[‡] 2	<0.013	3593.49	3^+	2112.24	2^+				
1507.83 11	0.119 13	2801.39	4^+	1293.550	2^+				
1550.01 9	0.470 23	2843.61	2^+	1293.550	2^+				
1666.39 11	0.125 12	2959.96	2^+	1293.550	2^+				
1702.1 4	0.032 10	2995.64	3^+	1293.550	2^+				
1751.8 4	<0.025	3045.4	4^+	1293.550	2^+				E_γ: this γ and its placement is given in 1994Ga14 but not shown in the level scheme.
1794.5 3	0.049 11	3088.35	2^+	1293.550	2^+				
1885.9 6	0.025 11	3179.5	3^+	1293.550	2^+				
1934.3[‡] 10	0.009 3	3227.6	$(2)^+$	1293.550	2^+				
2077.6 4	0.039 11	3371.11	3^+	1293.550	2^+				
2112.27 10	0.382 24	2112.24	2^+	0.0	0^+				
2123.0 4	0.027 8	3416.5	2^+	1293.550	2^+				
2219.8 5	0.040 11	3513.7	(2^+)	1293.550	2^+				
2225.19 13	17.2 10	2225.215	2^+	0.0	0^+				
^{x}2300.2 5	0.016 9								
2454.4 3	0.031 6	3748.0	4	1293.550	2^+				
2585.70 25	0.038 7	2585.62	1^+	0.0	0^+				
2650.2 11	0.006 4	2649.93	2^+	0.0	0^+				
2843.71 15	1.30 10	2843.61	2^+	0.0	0^+				
2960.0 3	0.244 21	2959.96	2^+	0.0	0^+				
3088.6 4	0.107 11	3088.35	2^+	0.0	0^+				
3515.5 12	0.002 1	3513.7	(2^+)	0.0	0^+				
3586.3 8	0.007 2	3586.89	2^+	0.0	0^+				
3903.3 1	0.003 2	3903.37	2^+	0.0	0^+				
4270.[#a] 6	$\approx$0.0026	4270	(2^+)	0.0	0^+				

[†] From 1994Ga14.
[‡] Presence deduced from other measurements. See 1991Ra01.

$\gamma(^{116}$Sn) (continued)

[#] This γ is only given by 1968Ki07.

[@] For absolute intensity per 100 decays, multiply by 0.848 *60*.

[&] 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.

[a] Placement of transition in the level scheme is uncertain.

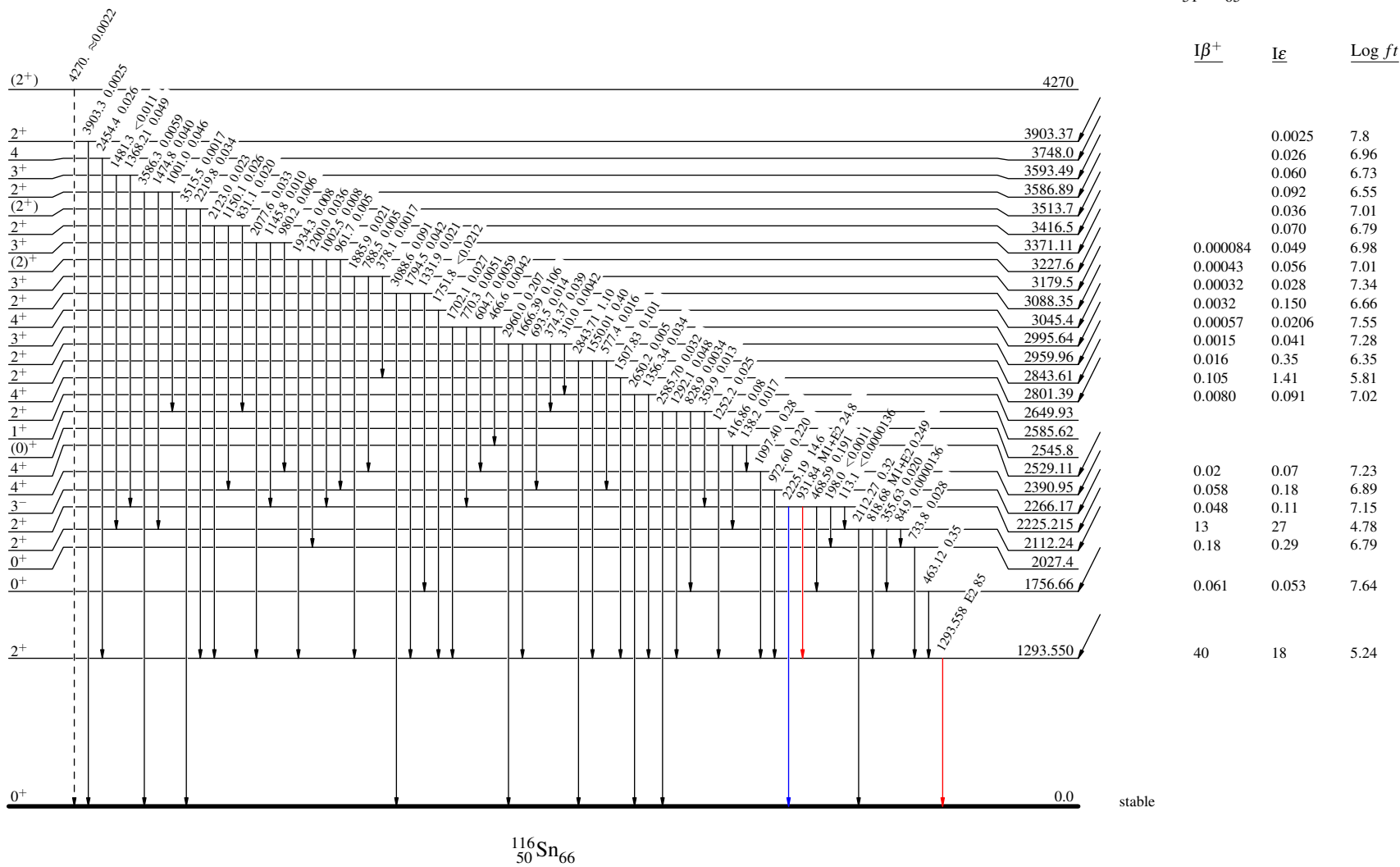[x] γ ray not placed in level scheme.

^{116}Sb ε decay (15.8 min)   1994Ga14

Decay Scheme

Intensities: I_γ per 100 parent decays

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)

3^+ 0.0   15.8 min 8

$\%\varepsilon + \%\beta^+ = 100$ $Q_\varepsilon = 4707\ 5$

$^{116}_{51}$Sb$_{65}$

	$I\beta^+$	$I\varepsilon$	Log ft
(2^+) 4270			
2^+ 3903.37		0.0025	7.8
4 3748.0		0.026	6.96
3^+ 3593.49		0.060	6.73
2^+ 3586.89		0.092	6.55
(2^+) 3513.7		0.036	7.01
2^+ 3416.5		0.070	6.79
3^+ 3371.11	0.000084	0.049	6.98
$(2)^+$ 3227.6	0.00043	0.056	7.01
3^+ 3179.5	0.00032	0.028	7.34
2^+ 3088.35	0.0032	0.150	6.66
4^+ 3045.4	0.00057	0.0206	7.55
3^+ 2995.64	0.0015	0.041	7.28
2^+ 2959.96	0.016	0.35	6.35
2^+ 2843.61	0.105	1.41	5.81
4^+ 2801.39	0.0080	0.091	7.02
2^+ 2649.93			
1^+ 2585.62			
$(0)^+$ 2545.8			
4^+ 2529.11	0.02	0.07	7.23
4^+ 2390.95	0.058	0.18	6.89
3^- 2266.17	0.048	0.11	7.15
2^+ 2225.215	13	27	4.78
2^+ 2112.24	0.18	0.29	6.79
0^+ 2027.4			
0^+ 1756.66	0.061	0.053	7.64
2^+ 1293.550	40	18	5.24
0^+ 0.0 stable			

$^{116}_{50}$Sn$_{66}$

Gamma transitions (energy, intensity):
4270. ≈0.0022; 3903.3 0.0025; 2454.4 0.026; 1481.3 <0.0011; 1368.21 0.049; 3586.3 0.0059; 1474.8 0.0040; 1001.0 0.046; 3515.5 0.0017; 2219.8 0.034; 2123.0 0.023; 1150.1 0.026; 831.1 0.020; 2077.6 0.033; 1145.8 0.010; 980.2 0.006; 1934.3 0.008; 1200.0 0.036; 1002.5 0.008; 961.7 0.005; 1885.9 0.021; 788.5 0.005; 378.1 0.0017; 3088.6 0.091; 1794.5 0.042; 1331.9 0.021; 1751.8 <0.0212; 1702.1 0.0027; 770.3 0.0051; 604.7 0.0059; 466.6 0.0042; 2960.0 0.207; 1666.39 0.106; 693.5 0.014; 374.37 0.039; 310.0 0.0042; 2843.71 1.10; 1550.01 0.40; 577.4 0.016; 1507.83 0.101; 2650.2 0.005; 1356.34 0.034; 2585.70 0.0032; 1292.1 0.048; 828.9 0.0034; 359.9 0.0013; 1252.2 0.025; 416.86 0.08; 138.2 0.017; 1097.40 0.28; 972.60 0.220; 2225.19 14.6; 931.84 M1+E2 24.8; 468.59 0.191; 198.0 <0.0011; 2112.27 0.32; 818.68 M1+E2 0.249; 355.63 0.020; 84.9 0.0000136; 733.8 0.028; 463.12 0.35; 1293.558 E2 85