

¹²¹Sb(n,γ) E=res **1970Bh01,1971Lo26**

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	T. Tamura	NDS 108,455 (2007)	30-Sep-2006

$J^\pi(^{121}\text{Sb})=5/2^+$, $S(n)=6806.38$ 15 (2003Au03).

Primary γ rays from neutron resonances are compiled: E(level)'s, E_γ 's and Γ_γ 's for each levels are included.

1970Bh01: ¹²¹Sb(n,γ), E=thermal and resonance, natural Sb target, chopper; measured E_γ , I_γ , n-γ(t), deduced mult., J^π , and partial widths Γ_γ of transitions from resonance states; observed resonances: E(n)=6.24 eV, 15.4 eV and 29.7 eV.

1971Lo26: ¹²¹Sb(n,γ), natural Sb target, photoneutron source, time-of-flight, E=resonance; measured E_γ , I_γ ; deduced $J=\pi$, mult., partial widths Γ_γ of transitions from resonance states; observed resonances: E(n)=6.24 eV, 15.4 eV, 29.7 eV, 53.5 eV, 64.5 eV, 73.8 eV, 90 eV, 111 eV, 127 eV, 132 eV, 144 eV and 150 eV; semi γ : others: **1969In03**.

¹²²Sb Levels

Resonance energies, J^π and reference sources for levels and γ 's

E(n) (eV)	J^π	References
6.24	3 ⁺	1970Bh01 , 1971Lo26
15.4	2 ⁺	1970Bh01 , 1971Lo26
29.7	3 ⁺	1970Bh01 , 1971Lo26
53.5	2 ⁺	1971Lo26
64.5	3 ⁺	1971Lo26
73.8	2 ⁺	1971Lo26
90	(3) ⁺	1971Lo26
111	2 ⁺	1971Lo26
127	3 ⁺	1971Lo26
132	3 ⁺	1971Lo26
144	2 ⁺	1971Lo26
150	3 ⁺	1971Lo26

E(level) [†]	$J^\pi a$	E(level) [†]	$J^\pi a$	E(level) [†]	$J^\pi a$
0.0	2 ⁻	1003.7 20		1381.6 [#] 20	+
61.6 [‡] 4	3 ⁺	1005.5 [‡] 3		1497.2 20	
78.1 [‡] 3	(3) ⁻	1018.4 [‡] 3		1500.4 20	
193.0 [‡] 5	(4) ⁻	1031.0 [‡] 3	+	1527.1 20	
209.7 [‡] 5	(4) ⁺	1043.4 [‡] 7	+	1547.5 20	
282.7 [‡] 3	(3) ⁻	1118.3 20	(2 ⁻ ,3 ⁻)	1561.3 20	
311.3 [‡] 3	(4) ⁻	1121.0 [‡] 4		1571.0 20	
397.0 [‡] 4	(2,3) ⁺	1128.9 [‡] 4		1588.8 20	
410.1 20		1159.3 [‡] 4	3 ⁺ ,4 ⁺	1603.5 20	
474 [‡] 2	3 ⁺ ,4 ⁺	1177.7 [‡] 6	+	1651.6 20	
631.8 [‡] 3	(1 ⁻ ,2 ⁻ ,3 ⁻)	1186.8 [‡] 3		1676.6 [#] 20	
642.6 [‡] 3	(3,4)	1189.7 20		1759.6 [#] 20	
790.7 20		1205.6 [‡] 3		1779.6 20	
796.7 [‡] 3	(2 ⁻ ,3 ⁻)	1232.8 20		1786.8 20	
810.9 20		1245.8 20	+	1808.3 20	
825.4 [‡] 5	(2 ⁻ ,3 ⁻)	1250.9 20	(1 ⁻ ,2 ⁻ ,3 ⁻)	1816.3 20	
920.6 [‡] 3	(2 ⁻ ,3 ⁻)	1258.5 20		1835.4 20	
935.5 [‡] 6		1273.9 20		1879.0 20	
968.7 [‡] 15		1301.0 20	(2 ⁻ ,3 ⁻ ,4 ⁻)	1945.0 20	

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¹²¹Sb(n,γ) E=res **1970Bh01,1971Lo26 (continued)**

¹²²Sb Levels (continued)

<u>E(level)[†]</u>	<u>E(level)[†]</u>	<u>E(level)[†]</u>	<u>J^π^a</u>	<u>E(level)[†]</u>	<u>J^π^a</u>
1961.1 20	2185.4 20	S(n)+0.00624 [@]	3 ⁺ &	S(n)+0.111 [@]	2 ⁺ &
2018.0 20	2205.0 20	S(n)+0.0154 [@]	2 ⁺ &	S(n)+0.127 [@]	3 ⁺ &
2029.5 20	2246.0 20	S(n)+0.0297 [@]	3 ⁺ &	S(n)+0.132 [@]	3 ⁺ &
2078.9 20	2347.3 20	S(n)+0.0535 [@]	2 ⁺ &	S(n)+0.144 [@]	2 ⁺ &
2121.3 20	2436.6 20	S(n)+0.0645 [@]	3 ⁺ &	S(n)+0.150 [@]	3 ⁺ &
2150.7 20	2464.1 20	S(n)+0.0738 [@]	2 ⁺ &		
2157.1 20	2475.3 20	≈S(n)+0.090 [@]	(3) ⁺ &		

[†] Difference between S(n)=(6806.38 keV) and primary E_γ: ΔE=2.0 keV, unless noted otherwise.

[‡] Rounded values from Adopted Levels.

From 1971Lo26.

@ Neutron resonance state: tof (1971Lo26) or chopper (1970Bh01).

& From spin-dependence of observed population ratio of 121.5-keV level (J=(1)⁺) and 193-keV level (J=(4)⁻) from each resonance: I_γ(121.5)/I_γ(114.9)≈2.5 (spin-2 res.), ≈1.0 (spin-3 res.); π=+ for s-neutron capture (1970Bh01,1971Lo26).

^a From Adopted Levels, unless noted otherwise.

γ(¹²²Sb)

γ ray energies and partial widths (meV) from ¹²¹Sb(n,γ) resonances (1970Bh01,1971Lo26).

<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_γ[†]</u>	<u>I_γ[‡]</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.^{&}</u>
S(n)+0.00624	3 ⁺	4331.1 20	0.42 9	2475.3		
		4369.8 20	0.30 8	2436.6		
		4459.1 20	0.35 8	2347.3		
		4621.0 20	0.21 7	2185.4		
		4649.3 20	0.40 8	2157.1		
		4685.1 20	0.62 6	2121.3		
		4727.5 20	0.13 2	2078.9		
		4776.9 20	0.36 4	2029.5		
		4788.4 20	0.33 4	2018.0		
		4845.3 20	0.15 6	1961.1		
		4861.4 20	0.40 9	1945.0		
		4927.4 20	0.38 6	1879.0		
		4971.0 20	0.48 10	1835.4		
		4998.1 20	0.47 6	1808.3		
		5130 [#] 5	0.21 [@] 4	1676.6		
		5154.8 20	0.40 6	1651.6		
		5202.9 20	0.18 6	1603.5		
		5217.6 20	0.20 6	1588.8		
		5309.2 20	0.13 5	1497.2		
		5425 [#] 5	0.12 [@] 2	1381.6 ⁺		
		5560.6 20	0.83 6	1245.8 ⁺		
		5616.7 20	0.25 5	1189.7		
		5626.6 20	0.12 4	1177.7 ⁺		
		5645.8 20	0.28 3	1159.3 3 ⁺ ,4 ⁺		
		5675.0 20	0.26 3	1128.9		
		5688.1 20	0.19 2	1118.3 (2 ⁻ ,3 ⁻) (E1)		
		5763 [#] 5	0.07 [@] 1	1043.4 ⁺		
		5774.1 20	0.31 4	1031.0 ⁺		

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¹²¹Sb(n,γ) E=res **1970Bh01,1971Lo26** (continued)

γ(¹²²Sb) (continued)

<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_γ[†]</u>	<u>I_γ[‡]</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.&</u>	<u>Comments</u>		
S(n)+0.00624	3 ⁺	5786.2 20	0.64 5	1018.4					
		5799.6 20	0.53 4	1005.5					
		5883.9 20	1.91 8	920.6 (2 ⁻ ,3 ⁻)	(E1)				
		5979.2 20	0.12 3	825.4 (2 ⁻ ,3 ⁻)	(E1)				
		6007.9 20	0.44 4	796.7 (2 ⁻ ,3 ⁻)	(E1)				
		6161.9 20	0.16 3	642.6 (3,4)	(M1)				
		6396.3 20	0.20 4	410.1					
		6408.8 20	0.05 20	397.0 (2,3) ⁺	(M1)				
		6522.9 20	2.05 10	282.7 (3) ⁻	(E1)				
		6597.5 20	0.13 2	209.7 (4) ⁺					
		6613.0 20	0.32 3	193.0 (4) ⁻					
		6744.8 20	0.24 3	61.6 3 ⁺	(M1)				
		S(n)+0.0154	2 ⁺	4331.1 20	0.38 11	2475.3			
				4342.3 20	0.28 10	2464.1			
4560.4 20	0.24 4			2246.0					
4601.4 20	0.47 8			2205.0					
4655.7 20	0.32 8			2150.7					
5019.6 20	0.57 9			1786.8					
5047 [#] 5	0.17 [@] 3			1759.6					
5202.9 20	0.58 10			1603.5					
5245.1 20	0.49 3			1561.3					
5258.9 20	0.21 2			1547.5					
5306.0 20	0.18 4			1500.4					
5532.5 20	0.25 8			1273.9					
5555.5 20	1.13 5			1250.9 (1 ⁻ ,2 ⁻ ,3 ⁻)	(E1)				
5573.6 20	0.38 7			1232.8					
5598.6 20	0.23 5			1205.6					
5619.6 20	0.18 4			1186.8					
5683.0 20	0.43 6			1121.0					
5774.1 20	0.35 7			1031.0 ⁺					
5840 [#] 5	0.14 [@] 2			968.7					
5868.8 20	0.25 3			935.5					
5883.9 20	1.28 6			920.6 (2 ⁻ ,3 ⁻)	(E1)				
5979.2 20	0.23 5			825.4 (2 ⁻ ,3 ⁻)	(E1)				
6007.9 20	1.22 7			796.7 (2 ⁻ ,3 ⁻)	(E1)				
6173.5 20	0.89 5			631.8 (1 ⁻ ,2 ⁻ ,3 ⁻)	(E1)				
6408.8 20	0.18 7	397.0 (2,3) ⁺	(M1)						
6522.9 20	0.46 6	282.7 (3) ⁻	(E1)						
6728.2 20	2.58 11	78.1 (3) ⁻	(E1)						
S(n)+0.0297	3 ⁺	6806.4 20	1.37 7	0.0 2 ⁻	E1				
		4845.3 20	0.24 11	1961.1					
		4990.1 20	0.70 17	1816.3					
		5019.6 20	0.62 19	1786.8					
		5202.9 20	0.79 12	1603.5					
		5217.6 20	0.40 9	1588.8					
		5235.4 20	0.51 1	1571.0					
		5245.1 20	0.21 9	1561.3					
		5279.3 20	0.43 8	1527.1					
		5505.4 20	1.46 14	1301.0 (2 ⁻ ,3 ⁻ ,4 ⁻)	(E1)				
		5547.9 20	0.20 5	1258.5					
		5560.6 20	0.23 5	1245.8 ⁺					
		5616.7 20	0.24 6	1189.7					
		5675.0 20	0.50 9	1128.9					
		5688.1 20	0.09 [@] 2	1118.3 (2 ⁻ ,3 ⁻)	(E1)		I _γ : for 5688γ (1971Lo26), 5688γ corresponds to either 5688.1γ or 5683.0γ in 1970Bh01.		
		5786.2 20	0.72 9	1018.4					
		5802.7 20	0.16 5	1003.7					

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¹²¹Sb(n,γ) E=res **1970Bh01,1971Lo26** (continued)

γ(¹²²Sb) (continued)

<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_γ[†]</u>	<u>I_γ[‡]</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.&</u>	<u>Comments</u>		
S(n)+0.0297	3 ⁺	5995.5 20	0.23 10	810.9					
		6007.9 20	0.14 @ 2	796.7 (2 ⁻ ,3 ⁻)	(E1)				
		6015.7 20	0.27 13	790.7					
		6161.9 20	0.68 6	642.6 (3,4)	(M1)				
		6332# 2	0.07 @ 1	474 3 ⁺ ,4 ⁺					
		6493.1 20	0.38 14	311.3 (4) ⁻					
		6522.9 20	0.22 7	282.7 (3) ⁻	(E1)				
		6613.0 20	0.28 4	193.0 (4) ⁻	(E1)				
		6728.2 20	0.75 7	78.1 (3) ⁻	(E1)				
S(n)+0.0535	2 ⁺	6806.4 20	0.13 5	0.0 2 ⁻	E1				
		5130# 5	0.40 @ 8	1676.6					
		5154.8 20	0.59 @ 12	1651.6		I _γ : for 5160γ (1971Lo26).			
		5217.6 20	0.31 @ 6	1588.8		I _γ : for 5222γ (1971Lo26).			
		5258.9 20	0.50 @ 10	1547.5		I _γ : for 5260γ (1971Lo26).			
		5532.5 20	0.55 @ 11	1273.9		I _γ : for 5536γ (1971Lo26).			
		5547.9 20	0.43 @ 8	1258.5		I _γ : for 5550γ (1971Lo26).			
		6173.5 20	1.30 @ 26	631.8 (1 ⁻ ,2 ⁻ ,3 ⁻)	(E1)	I _γ : for 6176γ (1971Lo26).			
		6728.2 20	0.23 @ 5	78.1 (3) ⁻	(E1)	I _γ : for 6729γ (1971Lo26).			
		6744.8 20	0.26 @ 3	61.6 3 ⁺	(M1)	I _γ : for 6746γ (1971Lo26).			
		6806.4 20	0.66 @ 13	0.0 2 ⁻	E1				
		S(n)+0.0645	3 ⁺	5019.6 2	0.55 @ 11	1786.8			I _γ : for 5027γ (1971Lo26).
5047# 5	0.66 @ 13			1759.6					
5154.8 20	0.47 @ 10			1651.6					
5505.4 20	0.71 @ 14			1301.0 (2 ⁻ ,3 ⁻ ,4 ⁻)	(E1)	I _γ : for 5510γ (1971Lo26).			
5619.6 20	0.47 @ 10			1186.8		I _γ : for 5621γ (1971Lo26), 5621γ corresponds to either 5616.7γ or 5619.6γ in 1970Bh01.			
5979.2 20	0.69 @ 14			825.4 (2 ⁻ ,3 ⁻)	(E1)	I _γ : for 5982γ (1971Lo26).			
6161.9 20	0.59 @ 12			642.6 (3,4)	(M1)	I _γ : for 6161γ (1971Lo26).			
6522.9 20	0.57 @ 12			282.7 (3) ⁻	(E1)	I _γ : for 6523γ (1971Lo26).			
S(n)+0.0738	2 ⁺			5786.2 20	0.31 @ 6	1018.4			I _γ : for 5789γ (1971Lo26).
				6007.9 20	0.26 @ 5	796.7 (2 ⁻ ,3 ⁻)	(E1)	I _γ : for 6011γ (1971Lo26).	
		6173.5 20	2.4 @ 5	631.8 (1 ⁻ ,2 ⁻ ,3 ⁻)	(E1)				
		6522.9 20	0.45 @ 9	282.7 (3) ⁻	(E1)				
		6744.8 20	0.31 @ 6	61.6 3 ⁺	(M1)				
≈S(n)+0.090	(3) ⁺	5555.5 20	0.90 @ 18	1250.9 (1 ⁻ ,2 ⁻ ,3 ⁻)	(E1)		I _γ : for 5561γ (1971Lo26).		
		5573.6 20	0.31 @ 6	1232.8			I _γ : for 5578γ (1971Lo26).		
		5688.1 20	0.52 @ 10	1118.3 (2 ⁻ ,3 ⁻)	(E1)				
		5786.2 20	0.47 @ 10	1018.4					
		5883.9 20	0.38 @ 8	920.6 (2 ⁻ ,3 ⁻)	(E1)		I _γ : for 5886γ (1971Lo26).		
		6173.5 20	0.52 @ 10	631.8 (1 ⁻ ,2 ⁻ ,3 ⁻)	(E1)				
		6493.1 20	2.3 @ 5	311.3 (4) ⁻			I _γ : for 6497γ (1971Lo26).		
S(n)+0.111	2 ⁺	5688.1 20	0.71 @ 15	1118.3 (2 ⁻ ,3 ⁻)	(E1)				
		5979.2 20	1.18 @ 20	825.4 (2 ⁻ ,3 ⁻)	(E1)				
		6007.9 20	0.62 @ 12	796.7 (2 ⁻ ,3 ⁻)	(E1)				
		6744.8 20	0.62 @ 12	61.6 3 ⁺	(M1)				
S(n)+0.127	3 ⁺	5532.5 20	0.59 @ 12	1273.9					

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¹²¹Sb(n,γ) E=res **1970Bh01,1971Lo26 (continued)**

γ(¹²²Sb) (continued)

<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_γ[†]</u>	<u>I_γ[‡]</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.&</u>	<u>Comments</u>
S(n)+0.127	3 ⁺	5688.1 20	0.17 [@] 3	1118.3 (2 ⁻ ,3 ⁻)		(E1)	
		5802.7 20	0.17 [@] 3	1003.7			I _γ : for 5803γ (1971Lo26).
		5883.9 20	0.78 [@] 16	920.6 (2 ⁻ ,3 ⁻)		(E1)	
		6613.0 20	0.88 [@] 18	193.0 (4) ⁻			I _γ : for 6612γ (1971Lo26).
		6728.2 20	0.83 [@] 17	78.1 (3) ⁻		(E1)	
S(n)+0.132	3 ⁺	5688.1 20	0.31 [@] 6	1118.3 (2 ⁻ ,3 ⁻)		(E1)	
		5802.7 20	0.17 [@] 3	1003.7			
		6332 [#] 2	1.07 [@] 20	474 3 ⁺ ,4 ⁺			
		6522.9 20	0.17 [@] 3	282.7 (3) ⁻		(E1)	
S(n)+0.144	2 ⁺	6613.0 20	0.90 [@] 18	193.0 (4) ⁻			
		5245.1 20	0.47 [@] 10	1561.3			I _γ : for 5250γ (1971Lo26).
		5979.2 20	3.0 [@] 6	825.4 (2 ⁻ ,3 ⁻)		(E1)	
		6173.5 20	1.61 [@] 30	631.8 (1 ⁻ ,2 ⁻ ,3 ⁻)		(E1)	
		6522.9 20	2.3 [@] 5	282.7 (3) ⁻		(E1)	
S(n)+0.150	3 ⁺	6806.4 20	1.9 [@] 4	0.0 2 ⁻		E1	
		4998.1 20	0.50 [@] 10	1808.3			
		5573.6 20	0.74 [@] 15	1232.8			
		5619.6 20	0.17 [@] 3	1186.8			
		5688.1 20	0.17 [@] 3	1118.3 (2 ⁻ ,3 ⁻)		(E1)	
		5802.7 20	0.50 [@] 10	1003.7			
		6493.1 20	0.57 [@] 11	311.3 (4) ⁻			
6728.2 20	1.01 [@] 20	78.1 (3) ⁻		(E1)			
6806.4 20	1.3 [@] 3	0.0 2 ⁻		E1			

[†] From 1970Bh01, unless noted otherwise. Evaluator notes that E_γ's in 1971Lo26 systematically deviate from the values in 1970Bh01: +7 keV (4657 keV to 5210 keV), +4 keV (5222 keV to 5550 keV).

[‡] Given as Γ_γ (meV) (partial γ width) from 1970Bh01, unless noted otherwise; Upper limit of Γ_γ for undetected γ's (1970Bh01) are omitted (evaluator).

[#] From 1971Lo26.

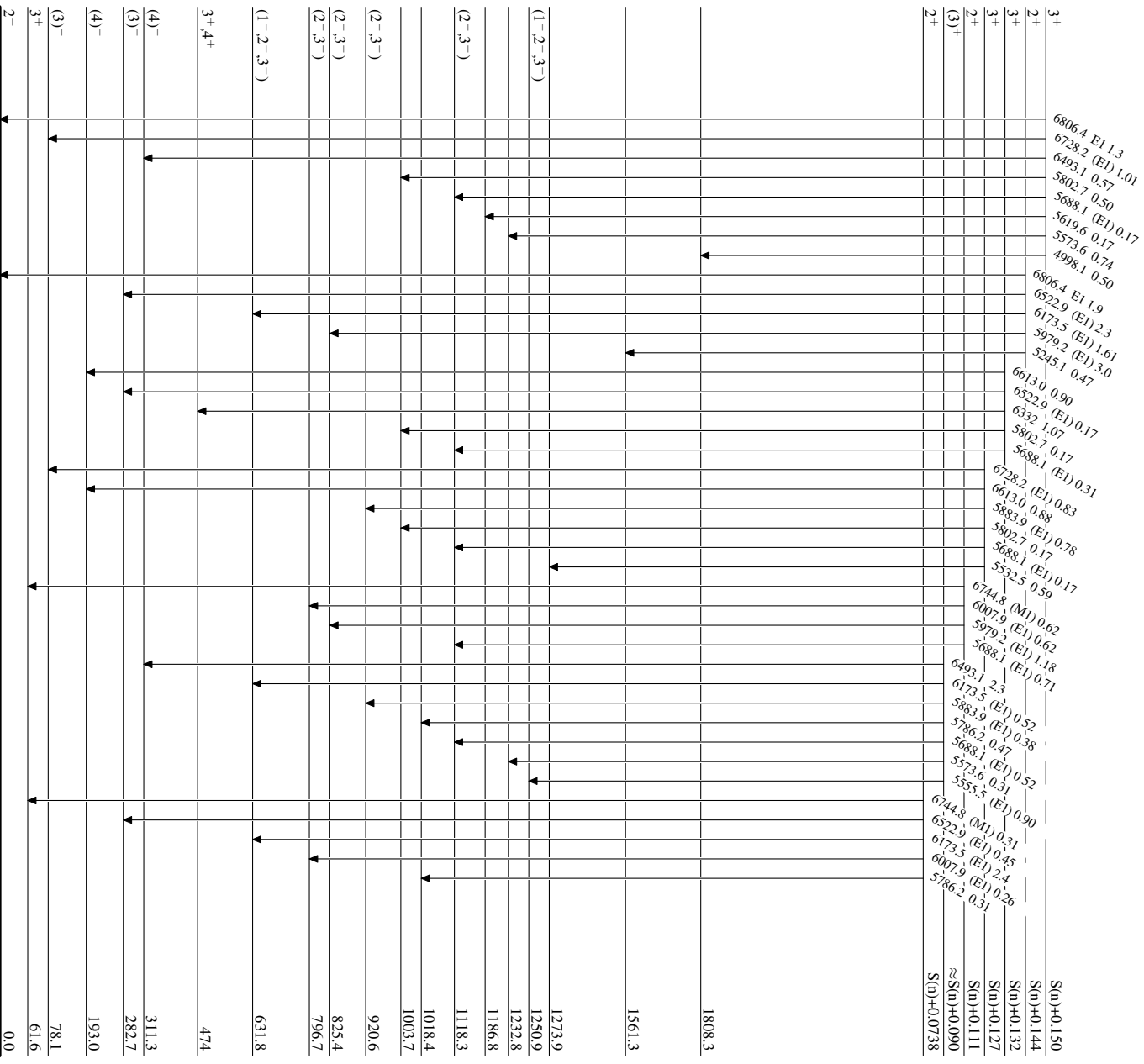
[@] From 1971Lo26. The value is multiplied by 2.37 of 1971Lo26 because 1971Lo26 values are smaller (average of strong γ's) than the corresponding values in 1970Bh01. Uncertainty estimate ≈20% (evaluator).

[&] From 1970Bh01, 1971Lo26; 1970Bh01: E1/M1 assignment is based on comparison of partial Γ_γ with a single-particle estimate (1.18 photons/100 neutron captures for 6523γ); E1 (strong) group and M1 (weak) group; 1971Lo26: a similar comparison of Γ_γ. E1/M1 distinction seems to become less clearer as approaching low-energy region. Assignments are taken for E_γ>5.5 MeV and originating from more than two resonances (evaluator).

¹²¹Sb(n,γ) E=res 1970Bh01,1971Lo26

Level Scheme

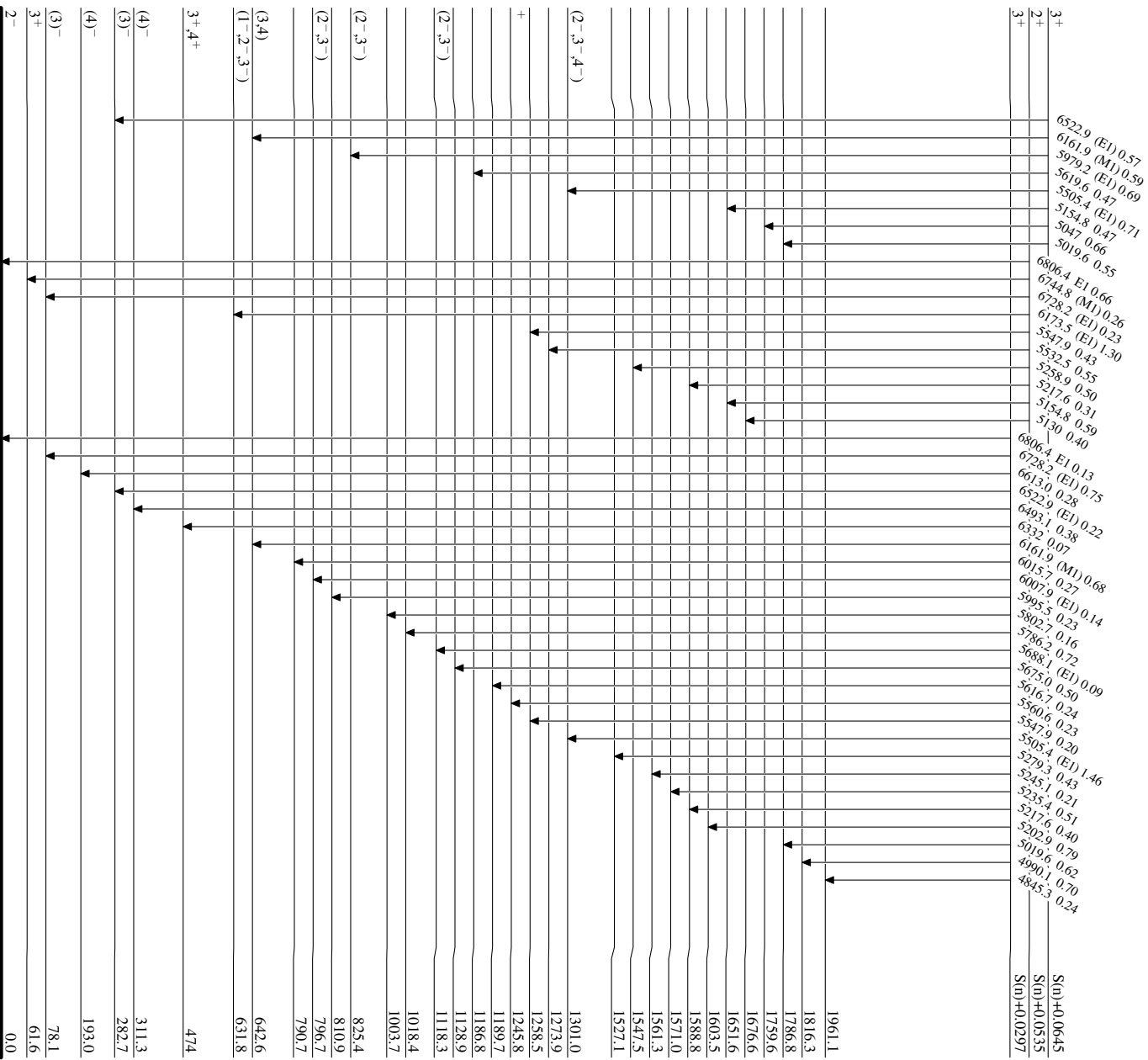
Intensities: I_γ (meV)



¹²¹Sb(n,γ) E=res 1970BH01,1971L026

Level Scheme (continued)

Intensities: I_γ (meV)

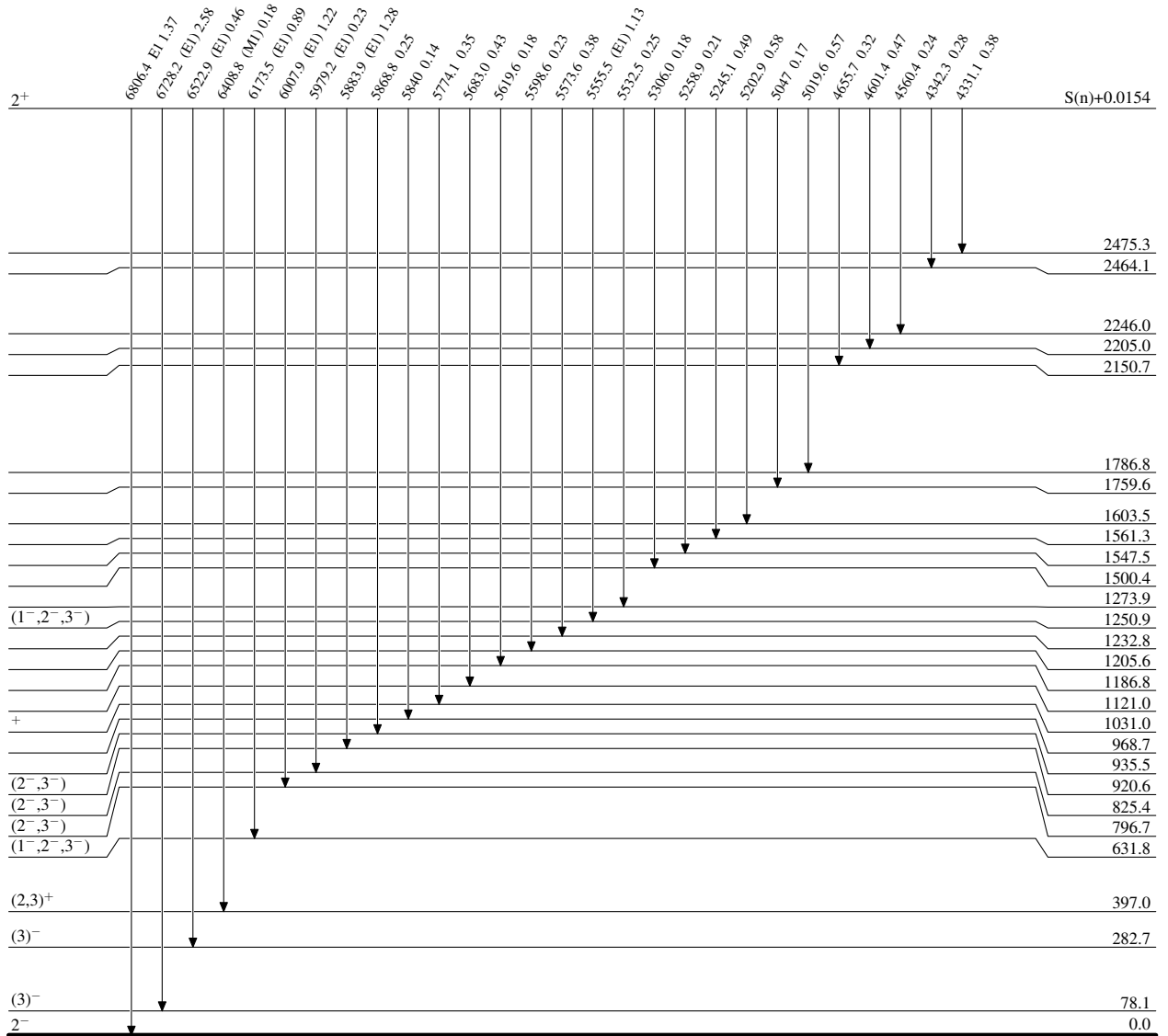


¹²²Sb₇₁

¹²¹Sb(n,γ) E=res 1970Bh01,1971Lo26

Level Scheme (continued)

Intensities: Γ_γ (meV)

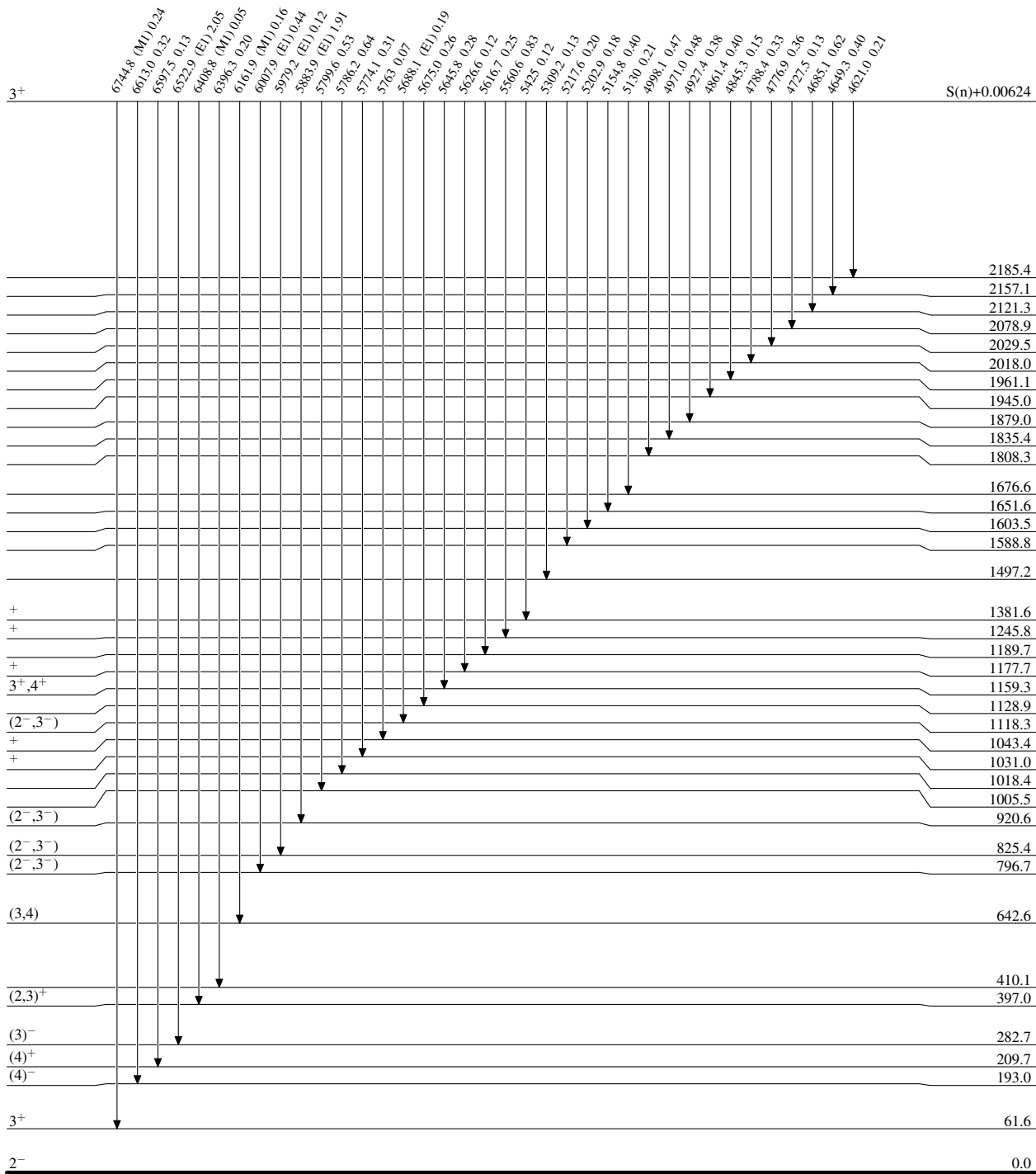


¹²²Sb₇₁

$^{121}\text{Sb}(n,\gamma)$ E=res 1970Bh01,1971Lo26

Level Scheme (continued)

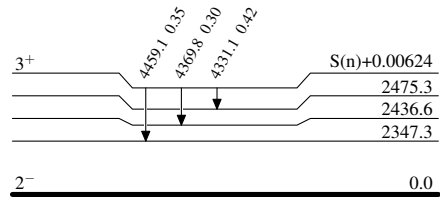
Intensities: Γ_γ (meV)



$^{122}_{51}\text{Sb}_{71}$

$^{121}\text{Sb}(n,\gamma) \text{E=res}$ 1970Bh01,1971Lo26

Level Scheme (continued)

Intensities: Γ_γ (meV) $^{122}_{51}\text{Sb}_{71}$