

Adopted Levels, Gammas

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Yu. Khazov, I. Mitropolsky, A. Rodionov		NDS 107,2715 (2006)	17-Jul-2006

$Q(\beta^-)=3229.1$ 21; $S(n)=7767$ 15; $S(p)=9138$ 3; $Q(\alpha)=-7509$ 22 [2012Wa38](#)

Note: Current evaluation has used the following Q record 3221 21 7768 27 9138 23 -7430 40 [2003Au03](#).

 ^{131}Sb Levels

Possible existence of a high-spin 16.7-min isomer in ^{131}Sb was proposed by [1988Go19](#) on the basis of observation of 434 γ and 657 γ . In a subsequent erratum, the authors retracted this claim because the same two γ rays had earlier been assigned to ^{129}Sb isomer by [1982Hu09](#), although, [1987St23](#) did not report these two γ rays from the decay of ^{129}Sb isomer. The origin of the two γ rays seen by [1988Go19](#) remains uncertain.

Cross Reference (XREF) Flags

A $^{131}\text{Sn} \beta^-$ decay (56.0 s+58.4 s)

B $^{241}\text{Pu}(n,\text{F}\gamma)$ E=thermal

E(level)	J^π	$T_{1/2}$	XREF	Comments
0.0	(7/2 ⁺)	23.03 min 4	A	$\% \beta^- = 100$ J^π : 3/2, 5/2, 7/2 from $\log ft = 6.0$ 2 to 5/2 ⁻ . (5/2, 7/2, 9/2, 11/2) from $\log ft = 5.9$ 1 to (7/2 ⁺ , 9/2 ⁺). (7/2 ⁺) from syst of odd-mass Sb isotopes. $\mu = 2.89$ 1 (1997St06). $T_{1/2}$: from 1967Ha27 . Others: 19.4 min 23 (1966St25) and 25.5 min 20 (1964Co30). Single-particle state ($\pi g_{7/2}$) (1981ScZL). J^π : from syst of odd-mass Sb isotopes and odd-even nuclei with N=82 (1977Sc14). Single-particle state ($\pi d_{5/2}$) (1981ScZL).
798.494 19	(5/2 ⁺)		A	
1141.67# 14	(3/2 ⁺)		A	
1202.61# 14	(5/2 ⁺)		A	
1226.04# 3	(11/2 ⁺)		AB	J^π : M2 γ from (15/2 ⁻); γ to (7/2 ⁺).
1229.28# 5	(9/2 ⁺)		A	J^π : E3 γ from (15/2 ⁻); γ 's to (5/2 ⁺) and (7/2 ⁺).
1481.15# 3	(7/2 ⁺)		A	
1676.06@ 6	(15/2 ⁻)	91 μs 4	AB	J^π : from analogy to ^{127}Sb and syst of 5 ⁻ and 7 ⁻ states in even Sn isotopes (1977Sc14). $T_{1/2}$: weighted average of 88 μs 5 (1987Bo19), 95 μs 6 (1982Pr01). Others: 80 μs 3 (1969Wa29) and 50 μs 8 (1977Sc14); 65 μs 5 (2000Ge18).
1687.2 9	(19/2 ⁻)	4.3 μs 8	B	J^π : from the analogy with ^{129}Sb states and decay pattern (2000Ge18). Configuration= $\pi g_{7/2} \nu (h_{11/2}^{-1} d_{3/2}^{-1})$ (2000Ge18). $T_{1/2}$: from 2000Ge18 , $\gamma\text{c}(t)$ and c-c(t).
1725.9@ 9	(17/2 ⁻)		AB	
1730.6@ 3	(13/2 ⁻)		A	
1758.2 11			A	
1786.9			A	
1812.93@ 13	(11/2 ⁻)		A	
1861.9 10			A	
1867.0 11			A	
1871.90 12	(5/2, 7/2, 9/2)		A	
1889.5 7			A	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{131}Sb Levels (continued)				
E(level)	J^π [†]	$T_{1/2}$	XREF	Comments
1916.49 9	(15/2 ⁻)		A	J^π : 1981ScZT considered 15/2 less probable than 11/2,13/2.
1918.7 7			A	
1931.08 8	(7/2,9/2,11/2) [‡]		A	J^π =(9/2 ⁺) from systematics of low-spin parity states in odd-mass Sb isotopes (1988StZQ).
1980.39 7	(13/2 ⁻)		A	J^π : 13/2 ⁻ ,15/2 ⁻ proposed by 1988StZQ (no details given). Probably not 15/2 ⁻ from $\beta\gamma$ coin (evaluators).
1997.5 10			A	
2004.07 25			A	
2018.7 10			A	
2021.4 8			A	
2036.64 13			A	
2043.45 8			A	
2069.2 10	(19/2 ⁺)		B	J^π : from shell-model calculations: E1 transition to 17/2 ⁻ and transition to 19/2 ⁻ (2000Ge18).
2086.2 4	(11/2,13/2) [‡]	1.1 μs 2	A	J^π : from lack of β -feeding in ^{131}Sn 3/2 ⁺ isomer decay (see 1995St28).
2165.6 15	(23/2 ⁺)		B	J^π : from shell-model calculations; the only E2 transition to 19/2 ⁺ . $T_{1/2}$: from 2000Ge18 , $\gamma\text{c(t)}$ and c-c(t) .
2274.62 20			A	
2392.11 18	(1/2 ⁺)		A	J^π : from syst of odd-mass Sb isotopes (1981ScZT).
2453.70? 20			A	
2561.14 24			A	
2663.57 14			A	
2861.2 5			A	
2865.47 10	(11/2,13/2,15/2) [‡]		A	
2916.3 4			A	
2938.1 6			A	
2953.56 17			A	
2978.01 12	(3/2,5/2,7/2)		A	
2984.35 18			A	
3060.9 5			A	
3074.51 23			A	
3121.33 19			A	
3258.58 18			A	
3268.61 14	(5/2,7/2,9/2)		A	
3308.45 14			A	
3367.5 3			A	
3411.91 20	(9/2)		A	
3539.1 10			A	
3568.7 10			A	

[†] All spin and parity assignments are based on shell-model ^{131}Sn decay (56.0 s+58.4 s) data set for additional suggested assignments.

[‡] From γ -deexcitation pattern assuming mult.=D,Q.

Band(A): Configuration=(^{130}Sn 2⁺) $\otimes$ ($\pi, g_{7/2}$).

@ Band(B): Configuration=(^{130}Sn 7⁻) $\otimes$ ($\pi, g_{7/2}$).

Adopted Levels, Gammas (continued)

$\gamma(^{131}\text{Sb})$

$E_i(\text{level})$	J_i^π	E_γ	$I_\gamma^\ddagger$	E_f	J_f^π	Mult.	$\alpha^\#$	$I_{(\gamma+ce)}^\ddagger$	Comments
798.494	(5/2 ⁺)	798.50 2	100	0.0	(7/2 ⁺)				
1141.67	(3/2 ⁺)	1141.6& 2	100&	0.0	(7/2 ⁺)				
1202.61	(5/2 ⁺)	404.5	2.5	798.494	(5/2 ⁺)				
		1202.6& 2	100&	0.0	(7/2 ⁺)				
1226.04	(11/2 ⁺)	1226.03 3	100	0.0	(7/2 ⁺)				E _γ : 1226.4 (2000Ge18).
1229.28	(9/2 ⁺)	430.6 6	3.3 17	798.494	(5/2 ⁺)	[E2]	0.01198		
		1229.23 6	100 12	0.0	(7/2 ⁺)				
1481.15	(7/2 ⁺)	251.70 10	38 7	1229.28	(9/2 ⁺)	[M1,E2]	0.058 9		
		682.660 22	26 8	798.494	(5/2 ⁺)				
		1481.12 8	100 4	0.0	(7/2 ⁺)				
1676.06	(15/2 ⁻)	447.4	3.2	1229.28	(9/2 ⁺)	E3	0.0321		B(E3)(W.u.)=0.106 12
		450.03 5	100 11	1226.04	(11/2 ⁺)	M2	0.0387		B(M2)(W.u.)=0.00065 11
		1676.0 ^a	2.8	0.0	(7/2 ⁺)	[M4]	0.00343		B(M4)(W.u.)=33 4
1687.2	(19/2 ⁻)	11.2		1676.06	(15/2 ⁻)				B(E2)(W.u.)=0.99 18 (2000Ge18)
									E _γ : γ, ce not observed; transition was introduced (2000Ge18) on the basis of γ1226.4 time measurements.
1725.9	(17/2 ⁻)	49.83	100	1676.06	(15/2 ⁻)	[M1,E2]	12 8		
1730.6	(13/2 ⁻)	54.35	100	1676.06	(15/2 ⁻)	[M1,E2]	9 6		
		504.6 3	78 25	1226.04	(11/2 ⁺)				
1758.2		82.29 ^{@a} 6	100 [@]	1676.06	(15/2 ⁻)				
1786.9		583.9 ^a	100	1202.61	(5/2 ⁺)				
1812.93	(11/2 ⁻)	82.29 ^{@a} 6	404 [@] 61	1730.6	(13/2 ⁻)	[M1,E2]	2.2 11		
		331.7 6	15 8	1481.15	(7/2 ⁺)	[M2]	0.0993		
		583.5 2	100 19	1229.28	(9/2 ⁺)				
1861.9		185.83	100	1676.06	(15/2 ⁻)				
1867.0		108.8 3	100 70	1758.2					
		190.73 ^{@a} 13	8.0×10 ² [@] 10	1676.06	(15/2 ⁻)				
1871.90	(5/2,7/2,9/2)	643.0	5.8	1229.28	(9/2 ⁺)				
		669.0	5.8	1202.61	(5/2 ⁺)				
		1073.36 12	100 17	798.494	(5/2 ⁺)				
		1872.6 5	15 5	0.0	(7/2 ⁺)				
1889.5		660.2		1229.28	(9/2 ⁺)			4.2	
		663.4		1226.04	(11/2 ⁺)			100	
1916.49	(15/2 ⁻)	186.2	14.6	1730.6	(13/2 ⁻)				
		190.73 ^{@a} 13	123 [@] 16	1725.9	(17/2 ⁻)				
		240.43 7	100 16	1676.06	(15/2 ⁻)				
1918.7		437.9	100	1481.15	(7/2 ⁺)				
1931.08	(7/2,9/2,11/2)	118.06 15	30 8	1812.93	(11/2 ⁻)				
		701.1	20	1229.28	(9/2 ⁺)				

Adopted Levels, Gammas (continued)

$\gamma(^{131}\text{Sb})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ	$I_\gamma^\dagger$	E_f	J_f^π	Mult.	$\alpha^\#$	$I_{(\gamma+ce)}^\ddagger$	Comments
1931.08	(7/2,9/2,11/2)	1931.05 8	100 22	0.0	(7/2 ⁺)				
1980.39	(13/2 ⁻)	63.82	1	1916.49	(15/2 ⁻)				
		304.33 3	100 13	1676.06	(15/2 ⁻)				
1997.5		184.6		1812.93	(11/2 ⁻)				
2004.07		801.63 26	100 22	1202.61	(5/2 ⁺)				
		1204.9 ^a	9	798.494	(5/2 ⁺)				
		2003.4 5	86 22	0.0	(7/2 ⁺)				
2018.7		102.20	100	1916.49	(15/2 ⁻)				
2021.4		104.68		1916.49	(15/2 ⁻)			74	
		208.462 ^{@a} 9	@	1812.93	(11/2 ⁻)			36	
		291.00		1730.6	(13/2 ⁻)			100	
2036.64		223.711 10	100	1812.93	(11/2 ⁻)				
2043.45		62.9 2	20 7	1980.39	(13/2 ⁻)				
		285.0 ^a 2	40 12	1758.2					
		367.40 5	100 15	1676.06	(15/2 ⁻)				
2069.2	(19/2 ⁺)	343.2	100	1725.9	(17/2 ⁻)	(E1)	0.00635		
		382.0	50	1687.2	(19/2 ⁻)				
2086.2	(11/2,13/2)	155.9 6	100 36	1931.08	(7/2,9/2,11/2)				
		410.25 ^{@a} 20	364 [@] 72	1676.06	(15/2 ⁻)				
2165.6	(23/2 ⁺)	96.4		2069.2	(19/2 ⁺)	E2	1.88		B(E2)(W.u.)=0.54 11
2274.62		793.5 2	88 29	1481.15	(7/2 ⁺)				
		1071.9 ^{†a}		1202.61	(5/2 ⁺)				
		1475.80	38	798.494	(5/2 ⁺)				
		2274.22	100	0.0	(7/2 ⁺)				
2392.11	(1/2 ⁺)	388.1 [†]		2004.07					
		520.3		1871.90	(5/2,7/2,9/2)				
		911.0		1481.15	(7/2 ⁺)				
		1189.0 [†]		1202.61	(5/2 ⁺)				
		1250.7 7	41 17	1141.67	(3/2 ⁺)				
		1593.6 2	100 24	798.494	(5/2 ⁺)				
		2392.2		0.0	(7/2 ⁺)				
2453.70?		410.25 ^{@a} 20	100 [@]	2043.45					
2561.14		1419.6	10	1141.67	(3/2 ⁺)				
		1762.60 25	100	798.494	(5/2 ⁺)				
		2561.6	10	0.0	(7/2 ⁺)				
2663.57		904.6 ^a 7	24 8	1758.2					
		1182.4 2	100 24	1481.15	(7/2 ⁺)				
		2663.21	69	0.0	(7/2 ⁺)				
2861.2		774.70 ^a 16	100	2086.2	(11/2,13/2)				
2865.47	(11/2,13/2,15/2)	885.08 7	100 14	1980.39	(13/2 ⁻)				

Adopted Levels, Gammas (continued)

$\gamma(^{131}\text{Sb})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ	$I_\gamma^{\pm}$	E_f	J_f^π	Comments
2865.47	(11/2,13/2,15/2)	1188.70	21	1676.06	(15/2 ⁻)	
		1639.7 5	18 5	1226.04	(11/2 ⁺)	
2916.3		999.8 3	100	1916.49	(15/2 ⁻)	
2938.1		546.3	40	2392.11	(1/2 ⁺)	
		1065.9	23	1871.90	(5/2,7/2,9/2)	
		1736.6 ^{†a}		1202.61	(5/2 ⁺)	
		2139.54	100	798.494	(5/2 ⁺)	
2953.56		1022.1 2	100 25	1931.08	(7/2,9/2,11/2)	
		1724.90 26	68 18	1229.28	(9/2 ⁺)	E_γ : poor fit: level-energy difference=1724.28 17.
2978.01	(3/2,5/2,7/2)	314.45 13	58 13	2663.57		
		703.5 ^{†a}		2274.62		
		1059.7	35	1918.7		
		1496.4 3	46 7	1481.15	(7/2 ⁺)	
		1775.60 18	81 17	1202.61	(5/2 ⁺)	
		1836.31 16	75 19	1141.67	(3/2 ⁺)	
		2179.59	100	798.494	(5/2 ⁺)	
		2977.7 4	25 7	0.0	(7/2 ⁺)	
2984.35		320.75 12	100 18	2663.57		
		898.5 4	41 15	2086.2	(11/2,13/2)	
		2186.4 ^{@a} 2	118 [@] 30	798.494	(5/2 ⁺)	
3060.9		1918.85 50	100	1141.67	(3/2 ⁺)	
		2264	50	798.494	(5/2 ⁺)	
3074.51		1202.6 ^{&} 2	100 ^{&}	1871.90	(5/2,7/2,9/2)	
3121.33		260.15 40	40 20	2861.2		
		1141.2 ^{&} 2	100 ^{&} 20	1980.39	(13/2 ⁻)	
		1894.25 40	88 20	1226.04	(11/2 ⁺)	E_γ : poor fit: level-energy difference=1894.30 19.
3258.58		1391.61 [@]	41 [@]	1867.0		
		2029.30 17	100 19	1229.28	(9/2 ⁺)	
		2032.0	37	1226.04	(11/2 ⁺)	
3268.61	(5/2,7/2,9/2)	208.462 ^{@a} 9	32 [@] 12	3060.9		
		1787.47 18	100 19	1481.15	(7/2 ⁺)	
		2039.25 25	95 23	1229.28	(9/2 ⁺)	
		2470.5 4	75 19	798.494	(5/2 ⁺)	
		3267.5 7	75 19	0.0	(7/2 ⁺)	
3308.45		1328.03 18	70 13	1980.39	(13/2 ⁻)	
		1391.61 [@]	47 [@]	1916.49	(15/2 ⁻)	
		2082.45 20	100 26	1226.04	(11/2 ⁺)	
3367.5		383.2 3	76 18	2984.35		
		2568.93	41	798.494	(5/2 ⁺)	
		3367.0 8	100 24	0.0	(7/2 ⁺)	

Adopted Levels, Gammas (continued)

$\gamma(^{131}\text{Sb})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ	$I_\gamma^\ddagger$	E_f	J_f^π	Comments
3411.91	(9/2)	1736.5 7	29 15	1676.06	(15/2 ⁻)	
		2186.4 @a 2	118 @ 30	1226.04	(11/2 ⁺)	
		2208.95 20	100 30	1202.61	(5/2 ⁺)	
		2614.4 4	76 24	798.494	(5/2 ⁺)	E_γ : poor fit: level-energy difference=2613.42 20.
		3412.3 9	29 10	0.0	(7/2 ⁺)	
3539.1		3539.0	100	0.0	(7/2 ⁺)	
3568.7		3568.6	100	0.0	(7/2 ⁺)	

[†] Placement from 1995St28.

[‡] Branching ratios from each level.

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.

@ Multiply placed with undivided intensity.

& Multiply placed with intensity suitably divided.

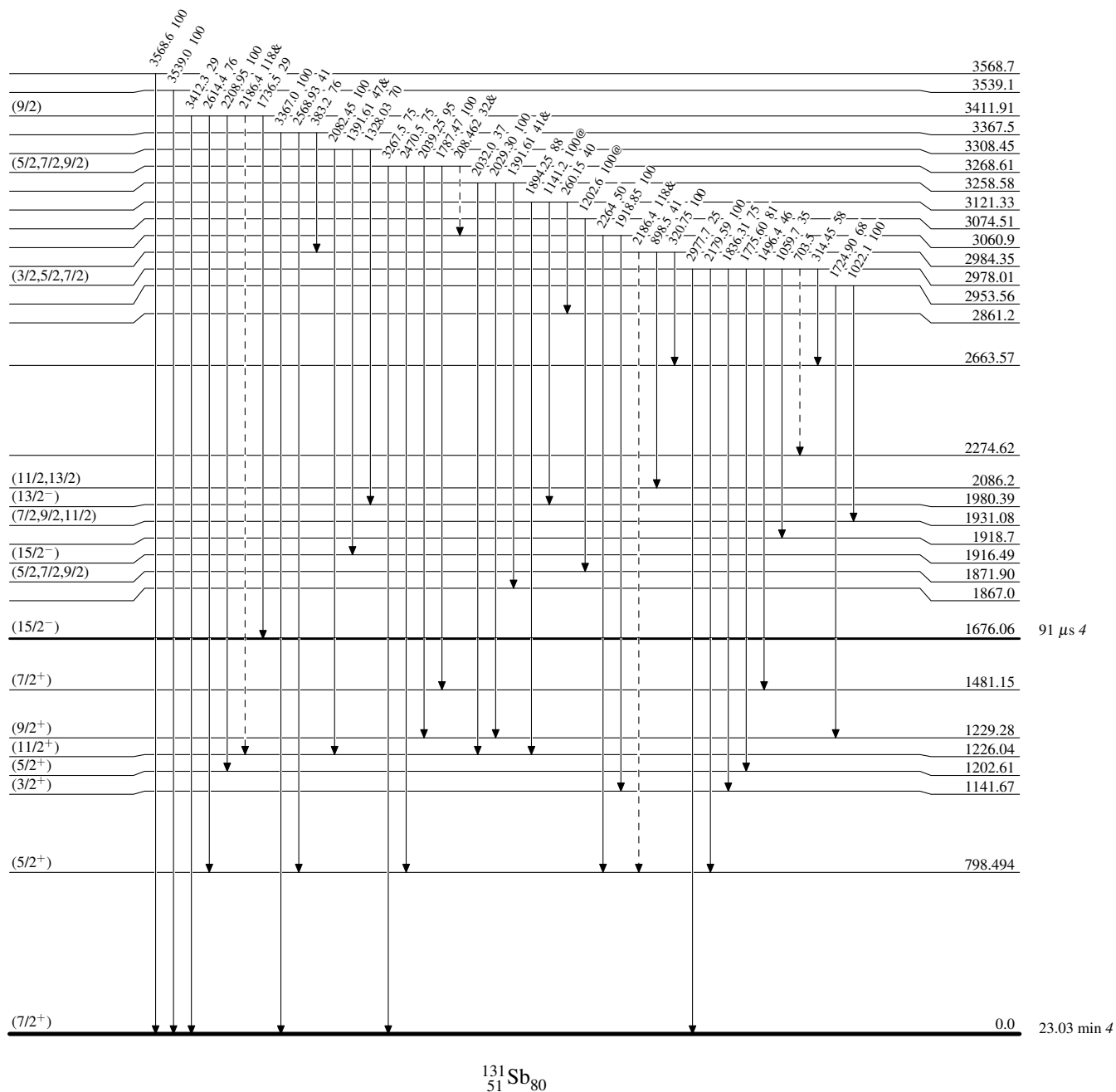
^a Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Level Scheme

Legend

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

-----► γ Decay (Uncertain)

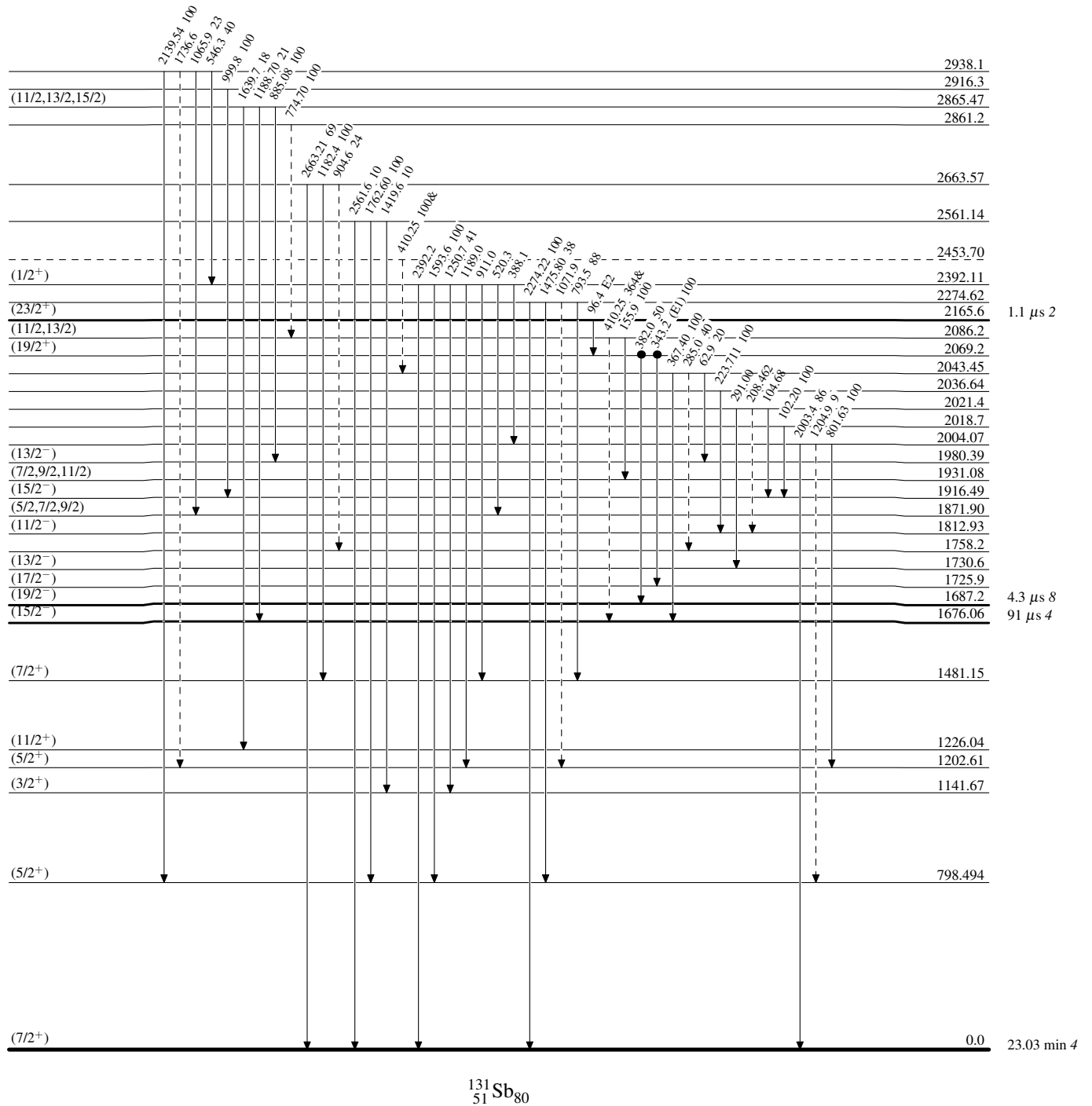
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level
 & Multiply placed: undivided intensity given
 @ Multiply placed: intensity suitably divided

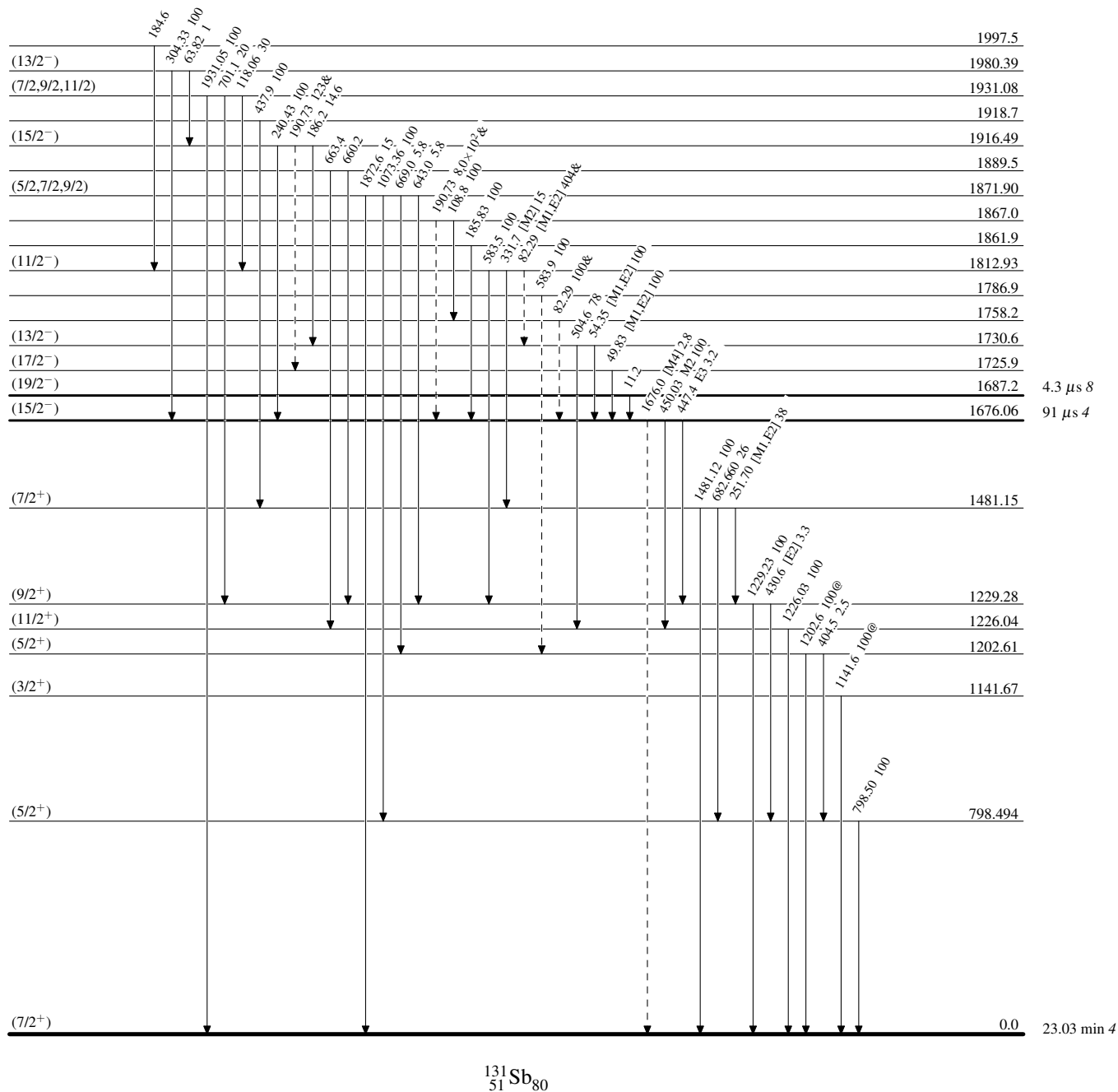
-----► γ Decay (Uncertain)
 ● Coincidence



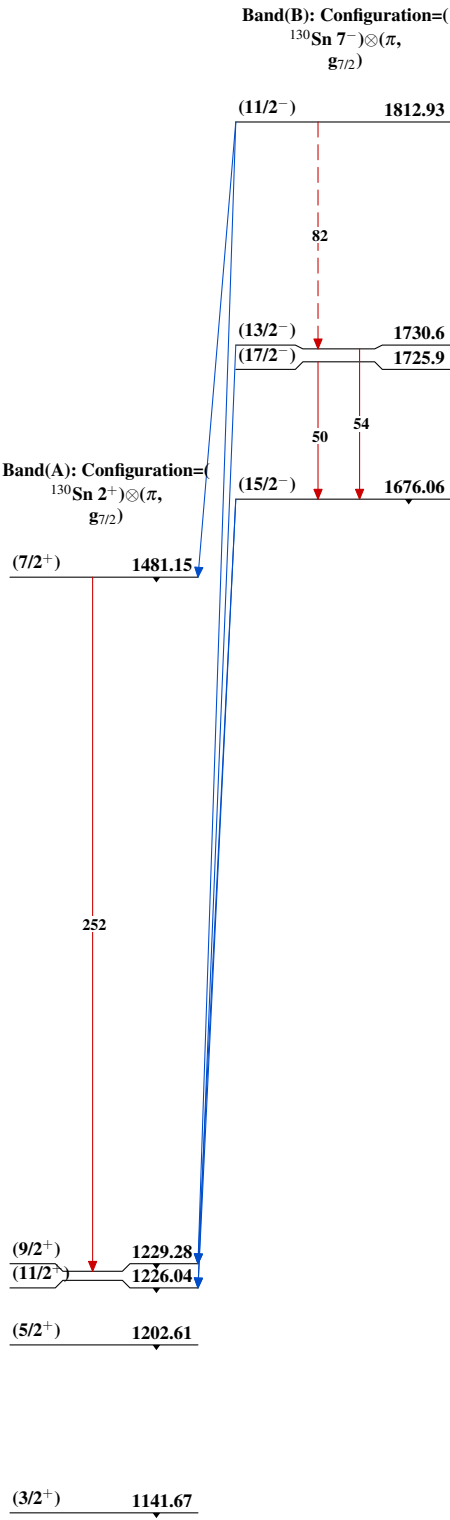
Adopted Levels, Gammas**Level Scheme (continued)**

Legend

Intensities: Relative photon branching from each level
 & Multiply placed: undivided intensity given
 @ Multiply placed: intensity suitably divided

-----► γ Decay (Uncertain)

Adopted Levels, Gammas



$^{131}_{51}\text{Sb}_{80}$