Adopted Levels, Gammas

History

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

Q(β^-)=4710 *6*; S(n)=5211 *7*; S(p)=1.468×10^4 *4*; Q(α)=−11207 *15* 2012Wa38
Note: Current evaluation has used the following Q record 4674 11 *5247* 24 *14710* 40-11220 *80* 2003Au03.
Q(β^-)=4698 *11* (2004Fo06).
Charge radii and moments measurements: 2002Le30, 2004Le13, 2005Le34.
Mass measurements: 2002BoZX, 2005Si34.

^{131}Sn Levels

Cross Reference (XREF) Flags

A ^{131}In β^- decay (0.28 s) D ^{132}In β^-n decay
B ^{131}In β^- decay (0.35 s) E ^{248}Cm SF decay
C ^{131}In β^- decay (0.32 s)

E(level)	J$^\pi$[†]	T$_{1/2}$[‡]	XREF	Comments
0.0	(3/2$^+$)[@]	56.0[#] s *5*	AB	%β^-=100 μ=+0.747 *4* (2004Le13,2005Le34) Q=−0.04 *8* (2004Le13) T$_{1/2}$: other: 39 s *2* (1977Sc14; 798γ(t)). Mean square charge radius: Δ<r^2>(^{131}Sn−^{120}Sn)=+0.52 fm^2 *7*; charge radius r=4.708 fm *7* (2005Le34). μ,Q: hyperfine structure using LASER spectroscopy.
0.0+x	(11/2$^-$)[@]	58.4[#] s *5*	A C E	%β^-≈100; %IT=? μ=−1.276 *5* (2004Le13,2005Le34) Q=+0.02 *20* (2004Le13,2005Le34) From the β spectrum x=69 *14*; or x=65.1 *3* from the level scheme (2004Fo06). E(level): level energy held fixed in least-squares adjustment. Mean square charge radius: Δ<r^2>(^{131}Sn−^{120}Sn)=+0.55 fm^2 *7*; charge radius r=4.711 fm *7* (2005Le34). μ,Q: hyperfine structure using LASER spectroscopy. T$_{1/2}$: others: 50 s *2* (1977Sc14; 305, 450, 1226γ(t)) and 61 s *1* (1981Hu09; 304, 450, 798, 1226γ(t)).
331.73 *10*	(1/2$^+$)		B	J$^\pi$: γ to (3/2$^+$); β feeding from (1/2$^-$); probable (νs$_{1/2}$)$^{-1}$ state.
1654.53 *8*	(5/2$^+$)		AB	J$^\pi$: γ to (3/2$^+$); β feeding from (1/2$^-$); probable (νd$_{5/2}$)$^{-1}$ state.
2434.13 *7*	(7/2$^+$)		A	J$^\pi$: possible allowed β transition from (9/2$^+$); γ to (3/2$^+$); probable (νg$_{7/2}$)$^{-1}$ state.
3909.6 *6*	(1/2,3/2)		A	
3989.93 *19*	(7/2$^+$)		A	J$^\pi$: γ to (3/2$^+$); possible β feeding from (9/2$^+$).
4102.01+x[&] *18*	(15/2$^-$)		E	
4220.1+x[b] *8*	(13/2$^+$)		E	
4247.1+x[b] *8*	(15/2$^+$)		E	
4262.2 *7*			A	
4273.22+x[b] *18*	(17/2$^+$)	<0.2 ns	C E	
4352.7 *7*			A	
4404.8 *4*			A	
4423.1+x[a] *6*	(15/2$^+$)		E	
4429.6 *5*	(1/2,3/2)		B	
4446.41+x[&] *18*	(19/2$^-$)	<0.2 ns	C E	J$^\pi$: (E1) γ to (17/2$^+$).
4487.08 *20*	(7/2$^+$)		A	J$^\pi$: γ to (3/2$^+$); possible β feeding from (9/2$^+$).

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Adopted Levels, Gammas (continued)

^{131}Sn Levels (continued)

E(level)	J^{π}[†]	$T_{1/2}$[‡]	XREF	Comments
4510.6+x[&] *8*	(17/2$^-$)		E	
4557.85+x[a] *21*	(19/2$^+$)	<2 ns	C E	J^{π}: (M1,E2) γ to (17/2$^+$).
4575.8 *5*	1/2,3/2		B	
4576.1+x[a] *6*	(17/2$^+$)		E	
4604.91+x[&] *21*	(23/2$^-$)	300 ns *20*	C E	J^{π}: E2 γ to (19/2$^-$).
4705.6+x? *4*			C	
4743.4+x[&] *11*	(21/2$^-$)		E	
4768.6+x? *13*			E	
4770.7? *5*			A	
4989.9+x[a] *11*	(21/2$^+$)		E	
5111.9 *7*			A	
5215.7 *5*			A	
6653.61+x *24*	(19/2$^+$,21/2$^+$)		C	J^{π}: log *ft*=4.5 from (21/2$^+$); γ's to (17/2$^+$) and (19/2$^+$). Analogy of β^- decay with $(\pi\ g_{9/2})^{-1}\rightarrow(\nu\ g_{7/2})^{-1}$ in odd-In isotopes suggests this level as a member of the $\nu(g_{7/2}g_{7/2}^{-1}h_{11/2}^{-1})$ multiplet with $J^{\pi}=19/2^+$.

[†] Above the g.s. and the isomer state as proposed by 1984Fo19, 1984Fo03 and 2001Bh04, based on shell model considerations and partly on β- decay systematics (2004Fo06).

[‡] From $\gamma\gamma$(t) ^{131}In 0.32 s 21/2$^-$ β^- decay, except as noted.

[#] From 1986StZZ; γ(t). Discrepancy in $T_{1/2}$ from 798γ(t) between 1977Sc14 and 1981Hu09 is unresolved. Others (isomers unresolved): 65 s 6 (1974Fo06), 51.5 s *4* and 58.1 s *6* (1974Gr29), and 62.9 s *25* (1972Iz01). See 1978Iz03, 1976Au03, and 1974Gr29 for additional references.

[@] From systematics of $d_{3/2}$ and $h_{11/2}$ hole states in odd-A Sn nuclides near A=132. Hyperfine interactions measurements and experimental multipole moments (2002Le30,2004Le13) are consistent with 3/2+and 11/2$^-$ assignments.

[&] Band(A): $\nu(f_{7/2}h_{11/2}^{-1})$ multiplet (2001Bh04).

[a] Band(B): $\nu(f_{7/2}h_{11/2}^{-1}d_{3/2}^{-1})$ multiplet (2001Bh04).

[b] Band(C): $\nu h_{11/2}^{-1}\otimes$(3$^-$ octupole) multiplet (2001Bh04).

Adopted Levels, Gammas (continued)

$\gamma(^{131}Sn)$

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	α[&]	Comments
331.73	(1/2$^+$)	331.72 *10*	100	0.0	(3/2$^+$)	[M1,E2]	0.0239 *18*	E_γ,I_γ: from 0.35 s ^{131}In β^- decay.
1654.53	(5/2$^+$)	1654.55 *10*	100	0.0	(3/2$^+$)			
2434.13	(7/2$^+$)	779.64 *10*	1.9 *3*	1654.53	(5/2$^+$)	[M1]	0.00276	B(M1)(W.u.)≈0.002 (1984Fo03) B(M1)↓: from Iγ's and calculated B(E2)(2434γ). In order of magnitude this is consistent with *l*-forbidden M1 transition rates around ^{208}Pb (1984Fo03).
		2434.08 *7*	100	0.0	(3/2$^+$)			
3909.6	(1/2,3/2)	3577.8 *6*	100	331.73	(1/2$^+$)			
3989.93	(7/2$^+$)	1555.6 *5*	3.7 *9*	2434.13	(7/2$^+$)			
		3989.9[‡] *2*	100	0.0	(3/2$^+$)			
4102.01+x	(15/2$^-$)	4102	100	0.0+x	(11/2$^-$)			
4220.1+x	(13/2$^+$)	4220	100	0.0+x	(11/2$^-$)			
4247.1+x	(15/2$^+$)	4247	100	0.0+x	(11/2$^-$)			
4262.2		4262.1[@] *7*	100	0.0	(3/2$^+$)			
4273.22+x	(17/2$^+$)	171.1 *3*	1.5 *4*	4102.01+x	(15/2$^-$)			
		4273.20[‡] *20*	100[‡]	0.0+x	(11/2$^-$)			
4352.7		4352.6[@] *7*	100	0.0	(3/2$^+$)			
4404.8		2750.0 *5*	64 *20*	1654.53	(5/2$^+$)			
		4404.9 *4*	100	0.0	(3/2$^+$)			
4423.1+x	(15/2$^+$)	150	64	4273.22+x	(17/2$^+$)			
		203	100	4220.1+x	(13/2$^+$)			
		321	64	4102.01+x	(15/2$^-$)			
		4423	64	0.0+x	(11/2$^-$)	[M2]	1.13×10^{-3}	
4429.6	(1/2,3/2)	4097.6 *10*	67 *30*	331.73	(1/2$^+$)			
		4429.6 *5*	100	0.0	(3/2$^+$)			
4446.41+x	(19/2$^-$)	173.185[‡] *23*	100[‡]	4273.22+x	(17/2$^+$)	(E1)	0.0384	B(E1)(W.u.)>0.00020
		344.40[#] *3*	15 *2*	4102.01+x	(15/2$^-$)			
		4446.0[#] *5*	8 *2*	0.0+x	(11/2$^-$)	[E4]	1.67×10^{-4}	B(E4)(W.u.)>68
4487.08	(7/2$^+$)	4487.00[@] *20*	100	0.0	(3/2$^+$)			
4510.6+x	(17/2$^-$)	63[a]		4446.41+x	(19/2$^-$)			
		238	32	4273.22+x	(17/2$^+$)			
		408	100	4102.01+x	(15/2$^-$)			
4557.85+x	(19/2$^+$)	284.67[‡] *10*	100[‡]	4273.22+x	(17/2$^+$)	(M1,E2)	0.037 *5*	
4575.8	1/2,3/2	4242.5 *12*	40 *20*	331.73	(1/2$^+$)			
		4576.0 *5*	100	0.0	(3/2$^+$)			
4576.1+x	(17/2$^+$)	303	50	4273.22+x	(17/2$^+$)			
		329	100	4247.1+x	(15/2$^+$)			
		474	50	4102.01+x	(15/2$^-$)			

$^{131}_{50}Sn_{81}$-3

Adopted Levels, Gammas (continued)

γ(^{131}Sn) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	α[&]	Comments
4576.1+x	(17/2$^+$)	4576	50	0.0+x	(11/2$^-$)	[E3]	1.18×10^{-3}	
4604.91+x	(23/2$^-$)	158.50[‡] *10*	100[‡]	4446.41+x	(19/2$^-$)	E2	0.313	B(E2)(W.u.)=0.363 *25*
4705.6+x?		259.2 *3*	100	4446.41+x	(19/2$^-$)			
4743.4+x	(21/2$^-$)	297	100	4446.41+x	(19/2$^-$)			
4768.6+x?		258	100	4510.6+x	(17/2$^-$)			
4770.7?		4770.6[@a] *5*	100	0.0	(3/2$^+$)			
4989.9+x	(21/2$^+$)	432	100	4557.85+x	(19/2$^+$)			
5111.9		2677.7 *7*	100 *2*	2434.13	(7/2$^+$)			
5215.7		5215.6[@] *5*	100 *4*	0.0	(3/2$^+$)			
6653.61+x	(19/2$^+$,21/2$^+$)	2095.9[‡] *2*	100[‡] *20*	4557.85+x	(19/2$^+$)			
		2380.2[‡] *2*	66[‡] *17*	4273.22+x	(17/2$^+$)			

[†] From ^{131}In 9/2$^+$ 0.28 s β^- decay, except as noted.
[‡] From ^{131}In 21/2$^-$ 0.32 s β^- decay.
[#] From ^{248}Cm SF decay only.
[@] May belong to the decay of 0.35 s 1/2$^-$ ^{131}In isomer.
[&] 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.

$^{131}_{50}Sn_{81}$-4

Adopted Levels, Gammas

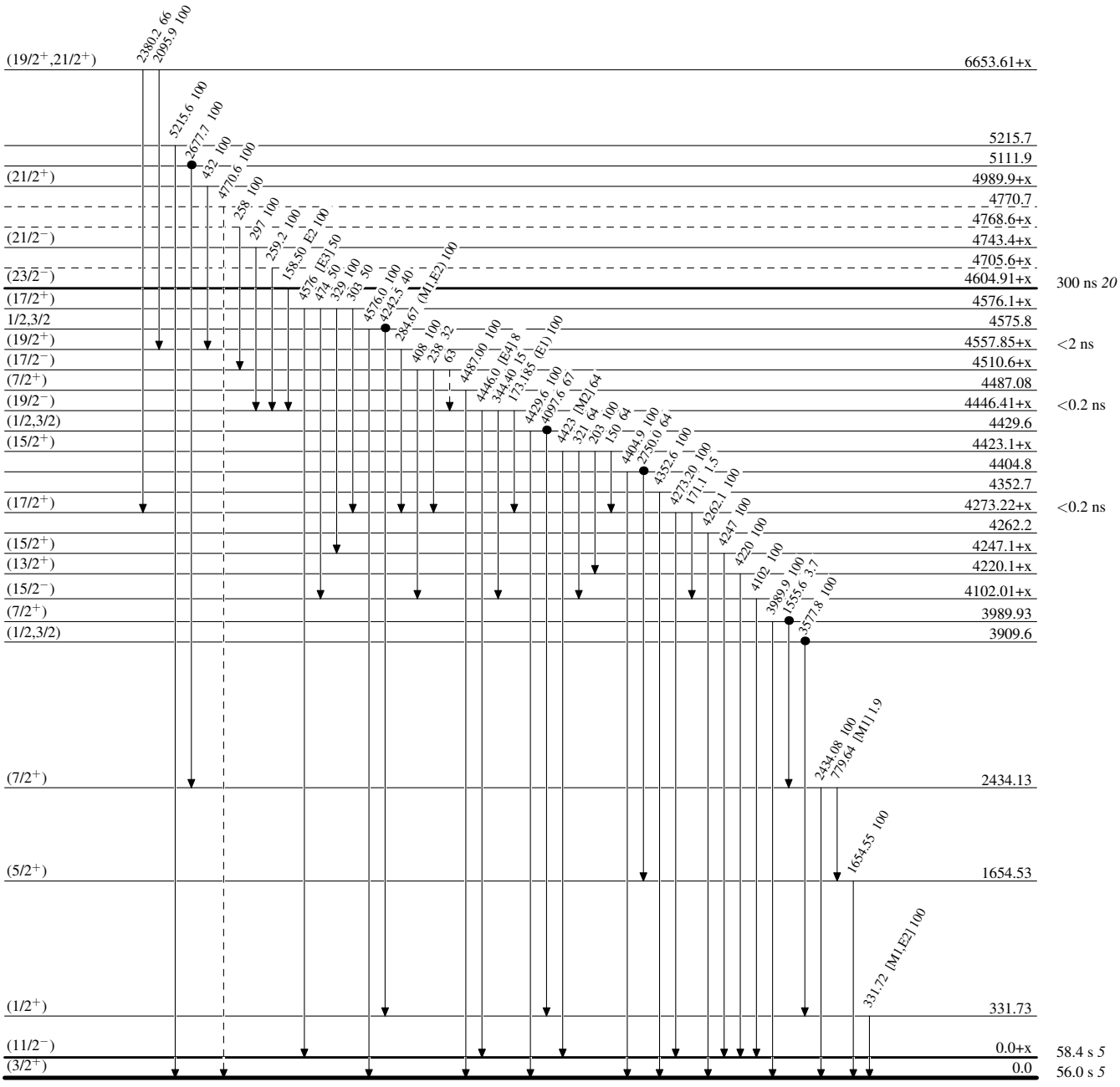
Legend

Level Scheme

Intensities: Relative photon branching from each level

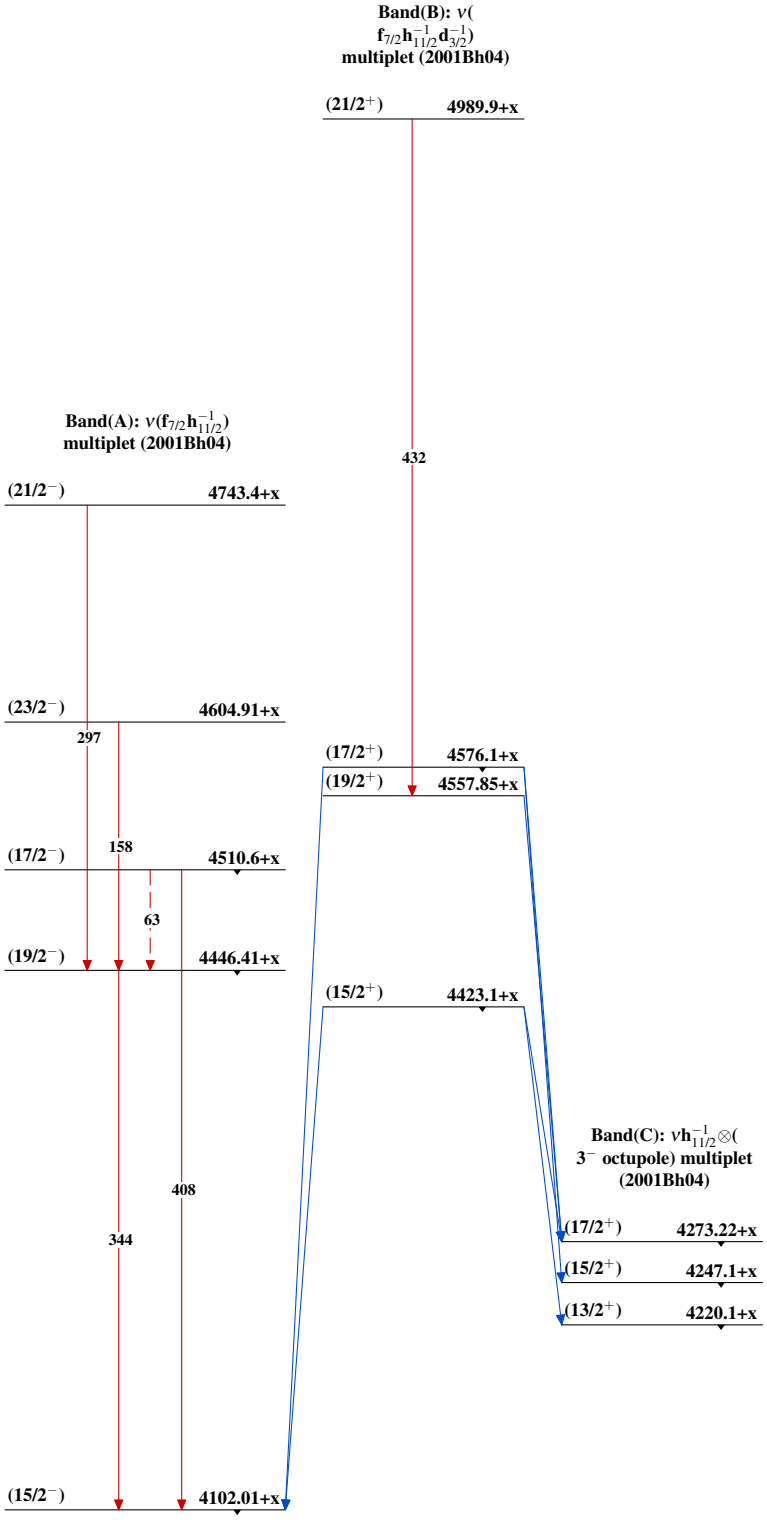
γ Decay (Uncertain)

Coincidence



$^{131}_{50}Sn_{81}$

Adopted Levels, Gammas



$^{131}_{50}Sn_{81}$