Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh	NDS 157, 1 (2019)	15-Apr-2019

Q(β^-)=6884 *15*; S(n)=6057 *15*; S(p)=10537 *15*; Q(α)=−11558 *15* 2017Wa10
S(2n)=16186 *16*, S(2p)=26841 *15* (2017Wa10).
Theory references: consult the NSR database (www.nndc.bnl.gov/nsr/) for 20 references dealing with various aspects of nuclear structure.
A tentative 22-min isomeric activity in ^{50}Sc proposed by 1959Po64 was not confirmed in later studies.

^{50}Sc Levels

Cross Reference (XREF) Flags

A	^{50}Ca β^- decay (13.45 s)	D	^{48}Ca(α,d)
B	^{50}Sc IT decay (0.35 s)	E	^{48}Ca(^{16}O,^{14}N)
C	^{48}Ca(^{3}He,p)	F	^{50}Ti(t,^{3}He)

E(level)[†]	J$^\pi$[@]	T$_{1/2}$	XREF	Comments
0.0	5$^+$	102.5 s *5*	ABCDEF	%β^-=100 J$^\pi$: L(t,^{3}He)=4+6; allowed β^- feeding to 6$^+$ (log *ft*=5.4); L(^{3}He,p)=L(α,d)=4. T$_{1/2}$: from 1970Wa29 (1121γ decay curve, main uncertainty is systematic, as the statistical uncertainty is stated by authors only as 0.2 s). Others: 1.72 min *4* (1963Ka16), 1.80 min *20* (1959Po64), 1.74 min *4* (1955Mo71), 1963Ch03. Previous values are in agreement but much less precise as compared to that in 1970Wa29. Measured strong absorption radii=1.43 fm^2 *10* at 40.57 MeV/nucleon ^{50}Sc beam, 1.39 fm^2 *8* at 90 MeV/nucleon (1999Ai02), 1.07 fm^2 *7* at 62.2 MeV/nucleon (1997Li15).
256.895 *10*	2$^+$	0.35 s *4*	ABCD F	%IT=99.5 *5*; %β^-<1.0 (2017Ga25) J$^\pi$: spin=2 from (1519γ)(71γ)(θ) in β^- decay (2017Ga25); L(^{3}He,p)=2. T$_{1/2}$: from γ(t) in IT decay. Upper limit of %β^- estimated in 2017Ga25 in ^{50}Ca β^- decay study from examining γ-intensities in ^{50}Sc and ^{50}Ti. %IT,%β^-: others: Iβ(to ^{50}Ti 1554)<2.5% from ^{50}Ti 1554γ, <5% from $\beta\gamma$-coin (1984Al18).
328.447 *12*	3$^+$	<600 ps	A CDEF	XREF: C(338). J$^\pi$: spin=3 from (1519γ)(71γ)(θ) in β^- decay (2017Ga25); L(^{3}He,p)=2; and L(t,^{3}He)=2+4. T$_{1/2}$: from $\gamma\gamma$(t) in β^- decay (2017Ga25). Other: <10 ns from $\beta\gamma$(t) (1984Al18).
757 *6*	(4)$^+$		CDEF	J$^\pi$: L(^{3}He,p)=4; L(t,^{3}He)=4 is consistent with $\sigma(\theta)$ for J=4.
1847.772 *20*	1$^+$	<2 ns	A CDEF	J$^\pi$: L(α,d)=0 from 0$^+$; L(^{3}He,p)=0+2 from 0$^+$; allowed β^- feeding from 0$^+$ parent (log *ft*=4.1). T$_{1/2}$: from $\beta\gamma$(t) in β^- decay (2017Ga25) using generalized centroid difference method. Other: <10 ns from $\beta\gamma$(t) (1984Al18).
2225 *5*	2$^+$,3$^+$		CD F	J$^\pi$: L(^{3}He,p)=2; L(t,^{3}He)=2 or 2+4 is consistent with $\sigma(\theta)$, but not L=0+2 for J^π=1$^+$.
2326 *6*	(3)$^+$		CD F	J$^\pi$: L(^{3}He,p)=4; L(t,^{3}He)=2+4 is consistent with $\sigma(\theta)$ for J=3.
2527[‡] *10*	(1)		F	J$^\pi$: L(t,^{3}He)=1 or 0+2 consistent with $\sigma(\theta)$ for J=1.
2614[‡] *10*	(1$^+$)		F	J$^\pi$: L(t,^{3}He)=0+2 consistent with $\sigma(\theta)$ for J=1.
3028[‡] *15*			F	
3089 *5*	(0)$^+$		CD F	XREF: D(?)F(?). E(level),J$^\pi$: L(^{3}He,p)=0; possible anti-analog state.
3259[‡#] *6*	1$^+$,2$^+$,3$^+$		Cd F	J$^\pi$: L(^{3}He,p)=2.

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Adopted Levels, Gammas (continued)

^{50}Sc Levels (continued)

E(level)[†]	J$^{\pi}$[@]	XREF	Comments
3287[‡#] *5*	$1^+,2^+,3^+$	Cd F	J$^{\pi}$: L(^{3}He,p)=2.
3355[‡] *15*		d F	
3385[‡] *15*		Cd F	
3500[‡#] *20*		C F	
3556[‡#] *15*		F	
3611[‡#] *15*		C F	
3681 *5*	1^+	C F	XREF: F(?). J$^{\pi}$: L(^{3}He,p)=0+2.
3731? *10*		C	
3927 *13*	1^+	CD	J$^{\pi}$: L(^{3}He,p)=0+2.
3950 *20*		C	
4135 *20*	$1^+,2^+,3^+$	C	J$^{\pi}$: L(^{3}He,p)=2.
4232 *20*	$1^+,2^+,3^+$	Cd	J$^{\pi}$: L(^{3}He,p)=2.
4311 *13*	$1^+,2^+,3^+$	Cd	J$^{\pi}$: L(^{3}He,p)=2.
4456 *13*	$1^+,2^+,3^+$	CD	J$^{\pi}$: L(^{3}He,p)=2.
4530? *20*		C	
4590? *20*		C	
4638 *6*	1^+	C	J$^{\pi}$: L(^{3}He,p)=0+2.
4660 *20*		C	
4729? *20*		C	
4820 *20*	$1^+,2^+,3^+$	C	J$^{\pi}$: L(^{3}He,p)=2.
4876 *6*	1^+	C	J$^{\pi}$: L(^{3}He,p)=0+2.
4976 *6*	1^+	C	J$^{\pi}$: L(^{3}He,p)=0+2.
5072 *8*	$1^+,2^+,3^+$	C	J$^{\pi}$: L(^{3}He,p)=2.
5135 *20*		C	
5195 *20*		C	
5265 *20*		Cd	XREF: d(5320).
5338 *13*	$1^+,2^+,3^+$	Cd	XREF: d(5320). J$^{\pi}$: L(^{3}He,p)=2.
5430 *12*	$1^+,2^+,3^+$	C	J$^{\pi}$: L(^{3}He,p)=2.
5540 *20*		C	
5600 *13*	$1^+,2^+,3^+$	C	J$^{\pi}$: L(^{3}He,p)=2.
5699 *17*	$(0^+,1^+)$	C	J$^{\pi}$: L(^{3}He,p)=(0).
5810 *20*	(3^+)	C	J$^{\pi}$: L(^{3}He,p)=(2+4).
5853 *30*	$1^+,2^+,3^+$	C	J$^{\pi}$: L(^{3}He,p)=2.
6014 *30*	$3^+,4^+,5^+$	CD	J$^{\pi}$: L(^{3}He,p)=4.
6118 *30*	$1^+,2^+,3^+$	CD	J$^{\pi}$: L(^{3}He,p)=2.
6285 *30*	$1^+,2^+,3^+$	C	J$^{\pi}$: L(^{3}He,p)=2.
6447 *30*		C	
6618 *30*		C	
8.25×10^3 *3*		D	
11195 *20*	(0^+)	C	J$^{\pi}$: L(^{3}He,p)=(0); IAS of ^{50}Ca g.s.

† From (^{3}He,p), except for those states connected by gammas, as indicated in XREF, or the 3388 state where E(level) is from (t,^{3}He).

‡ Levels below 2330 keV in (t,^{3}He) were assigned by 1985Aj03 on the basis of the intensities and previously known levels. According to the authors, positive assignments of states to ^{50}Sc is difficult above the 2327 group, since ^{48}Ti was also present in the target material and some of these states could belong to ^{48}Sc.

Unresolved groups of states observed at 3250, 3300, 3475, 3556, and 3598 in (t,^{3}He).

@ From L-transfers in ^{48}Ca(^{3}He,p), ^{48}Ca(α,d) and ^{50}Ti(t,^{3}He), as well as comparison of experimental $\sigma(\theta)$ in (t,^{3}He) with coupled-channel Born approximation (CCBA) calculations. Exceptions are noted. In all the particle-transfer experiments, target J^{π}

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Adopted Levels, Gammas (continued)

^{50}Sc Levels (continued)

is 0^+ for the ground states, which imply J^π values as: 0^+,1^+ for L=1; 0^-,1^-,2^- for L=1; 1^+,2^+,3^+ for L=2; 3^+,4^+,5^+ for L=4; 5^+,6^+,7^+ for L=6; 1^+ for L=0+2; 3^+ for L=2+4; and 5^+ for L=4+6. No L=3 cases seem to have been reported in any of these experiments.

$\gamma(^{50}Sc)$

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.†	δ†	α‡	Comments
256.895	2^+	256.894 *10*	100	0.0	5^+	(M3)		0.0356	B(M3)(W.u.)=13.4 *16* Mult.: B(M3)(W.u.) exceeds somewhat RUL.
328.447	3^+	71.552 *5*	100	256.895	2^+	M1(+E2)	+0.015 *25*	0.0386 *17*	B(M1)(W.u.)>0.096 Mult.: from α(exp) deduced from intensity balance consideration and $\gamma\gamma(\theta)$ in β^- decay (2017Ga25). δ: from $\gamma\gamma(\theta)$ in β^- decay (2017Ga25). Other: <0.5 from α(exp).
		328	0.84 *9*	0.0	5^+	[E2]		0.00325	B(E2)(W.u.)>0.16
1847.772	1^+	1519.30 *2*	100.0 *13*	328.447	3^+	[E2]			B(E2)(W.u.)>0.002
		1590.85 *3*	60.7 *11*	256.895	2^+				

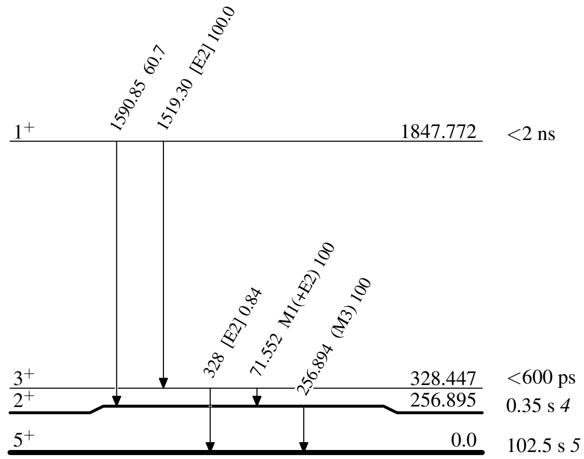
† From β^- decay, with Mult. and mixing ratios deduced from $\gamma\gamma(\theta)$ and RUL, unless otherwise noted.

‡ 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.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



$^{50}_{21}Sc_{29}$