

Adopted Levels, Gammas

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	M. S. Basunia, A. Chakraborty		NDS 197,1 (2024)	31-May-2024

$Q(\beta^-)=-18734.24$; $S(n)=19036.13$; $S(p)=4395.44$; $Q(\alpha)=-9343.1723$ [2021Wa16](#)
 $S(2n)=3.428E4.16$, $S(2p)=7144.4021$, $Q(\epsilon p)=546.8621$ ([2021Wa16](#)).

Other reactions:

$^1\text{H}(^{30}\text{S},^{30}\text{S})$, $E=53$ MeV/u: [2000BI25](#),[2001Kh17](#) and [2001BI17](#) (same group): measured recoil proton spectra, deduced $\sigma(E,\theta)$.

$^1\text{H}(^{31}\text{S},^{30}\text{S})$, $E=71$ MeV/u: [2008Ga07](#) and [2007Ga46](#) (same group): measured E_γ , particle- γ coincidence, reported 1192 γ , 2210 γ and 3402 γ .

$^{32}\text{S}(\gamma,2n)$, $E_\gamma=15-62$ MeV; measured bremsstrahlung yields; deduced $\sigma(E_\gamma)$ – ([1970An21](#)).

$^1\text{H}(^{33}\text{Cl},\alpha_0)$, $E=208.1, 229.1, 250.6$ MeV; measured E_α, I_α , particle spectra, $^{30}\text{S}-\alpha$ coincidence; deduced cross sections. ^{33}Cl was produced from $^2\text{H}(^{32}\text{S},^{33}\text{Cl})$, $E=320$ MeV primary reaction ([2011De28](#)).

[2012Zh06](#): Production cross sections ~ 10 mb and ~ 80 mb were measured in fragmentation of $^9\text{Be}(^{40}\text{Ar},X)$ and $^{181}\text{Ta}(^{40}\text{Ar},X)$, $E=57$ MeV/nucleon, respectively.

^{30}S Levels

Cross Reference (XREF) Flags

A	^{31}Ar ϵp decay (15.0 ms)	D	$^{29}\text{Si}(\text{pol } p, \pi^-)$
B	$^{28}\text{Si}(^3\text{He}, n), (^{12}\text{C}, ^{10}\text{Be})$	E	Coulomb excitation
C	$^{28}\text{Si}(^3\text{He}, n\gamma)$	F	$^{32}\text{S}(p, t)$

E(level) [†]	J ^π	T _{1/2} ^b	XREF	Comments
0	0 ⁺	1.1798 s 6	ABCDEF	$\% \epsilon + \% \beta^+ = 100$ J^π : L=0 in (p,t). $T_{1/2}$: weighted average of 1.1783 s 48 (1980Wi13 – method not mentioned), 1.22 s 3 (1971Mo27 – 678 $\gamma(t)$), 1.18 s 4 (1967Ba36 – $\beta(t)$), 1.181 s 13 (1974ScZL – method not mentioned), 1.1759 s 17 (2011So11 – $\beta(t)$ using a 4 π plastic scintillator), 1.17992 s 34 (2018Ia01 – $\beta(t)$ using a 4 π proportional gas counter), 1.35 s 10 (1961Ro30 – 511 $\gamma(t)$), 1.5 s 1 (1960Jo10), 1.4 s 1 (1963Fr10 – $\beta(t)$).
2210.15 [‡]	2 ⁺	169 fs 23	ABCDEF	J^π : L=2 in (p,t). $T_{1/2}$: unweighted average of 70 fs 35 (1973Ku15), 121 fs 35 (1970Bi08) 215 fs 52 (1972Ca22) and 176 fs 15 (1982Al22 – $\tau=254$ fs 23), 246 fs 26 (2017Pe14 – $\tau=355$ fs 37 – DSAM), all from ($^3\text{He}, n\gamma$) – DSAM, and 153 fs 13 (Coul. Ex.). Weighted average is 167 fs 16 $\chi^2=3.4 > \chi^2_{\text{crit}}=2.2$.
3404.3 [‡]	2 ⁺	121 fs 15	ABCD F	XREF: D(3490). J^π : L=2 in (p,t).
3667.4 [‡]	(0 ⁺)	>1 ps	A C	J^π : from isotropic $\gamma(\theta)$ (2012Lo14 – ($^3\text{He}, n\gamma$)). $J^\pi=(2^+), (0^+)$ in 1972Gr39 ($^3\text{He}, n$) and proposed configuration: $\nu(d_{3/2})^{+2}$.
3676.7 [‡]	(1 ⁺)	97 fs 55	ABC F	XREF: B(3700). J^π : angular distribution consistent with 1 ⁺ , does not agree with 0 ⁺ in (p,t). 1 from $n\gamma(\theta)$ (1973Ku15 – ($^3\text{He}, n\gamma$)).
4687.7 3	(3 ⁺)		A C F	XREF: F(4704). J^π : from triton(θ) measurements and mirror analogue of ^{30}Si (2013Se08 – (p,t)). 1 or 3 from $\gamma(\theta)$ and 3 ⁺ from mirror analogue of ^{30}Si (2012Lo14 – ($^3\text{He}, n\gamma$)).
4808.9 4	(2 ⁺)		A C F	J^π : from triton(θ) and mirror analogue of ^{30}Si (2013Se08 – (p,t)) and from comparison of the location of 2 ₃ ⁺ state with the prediction by isobaric multiple mass equation (IMME) (2010Se07 – (p,t)).

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Adopted Levels, Gammas (continued) ^{30}S Levels (continued)

E(level) [†]	J^π	$T_{1/2}$ ^b	L	XREF	Comments
5132.1 [‡] 3	(4 ⁺)	38 fs 14		A C F	J^π : from triton(θ) (2013Se08 – (p,t)). Other: 3 ⁻ based on analogue state to 5487.49 in ^{30}Si (1988Kr11).
5168 6	(4 ⁺)		4+0	F	J^π : L=4+0 for doublet in (p,t).
5218.8 [#] 3	(3 ⁺)			ABC F	XREF: B(5200)F(5226). E(level): from ^{31}Ar β^+ p decay.
5226 3	(0 ⁺)			B F	J^π : from pp(θ) data (2014Ko17). XREF: B(5200). E(level): from (p,t). Other: 5200 44 ($^3\text{He,n}$).
5318 4	(3 ⁻)			B F	J^π : L=4+0 for doublet in (p,t). XREF: B(5288).
5390 [#] 2	(2 ⁺)			AB F	J^π : L=3 ($^3\text{He,n}$) and the predicted location of the 3 ⁻ state (p,t). XREF: B(5400).
5848.1 5	(4 ⁺)			A C F	E(level): weighted average of 5389 2 from ^{31}Ar ϵ p decay and 5396 4 from (p,t). Other: 5400 43 from ($^3\text{He,n}$). J^π : from prediction and L=3,(2) in (p,t). J^π : L=2,3,4 are also possible, $J^\pi=(1,2^+,4^+)$ in 2013Se08 ((p,t) and ($^3\text{He,n}\gamma$)) and 4 ⁺ in 2012A123 ((p,t) and ($^3\text{He,n}$)). Other: (1 ⁻) in 2007Ba69 (p,t) from their L=1 – from measurements of triton(θ) ($\approx 20^\circ$ to 60°).
5947 2	4,5 ^c			AB D F	XREF: B(5912). E(level): weighted average of 5945 3 from ^{31}Ar ϵ p decay, 5950 10 from (pol p, π^-), and 5947 2 from (p,t).
6065 3	1 ⁻			AB F	XREF: B(6117). E(level): weighted average of 6064 3 from ^{31}Ar ϵ p decay and 6071 11 from (p,t). J^π : L=1 in ($^3\text{He,n}$).
6202 ^{&} 3				AB F	XREF: B(6240).
6280.1 12				A	
6338.8 14				A F	E(level): weighted average of 6338.6 14 from ^{31}Ar ϵ p decay and 6341 5 from (p,t).
6415 40	0 ⁺			B F	XREF: B(6393). J^π : assigned in 1982Yo02 ($^3\text{He,n}$), based on a flat n-p correlation pattern.
6541 4				AB F	XREF: B(6584)F(6512.1). E(level): 6512.1 in (p,t) appears to be a different level. In Table II (2012A123) ($J^\pi=(1^-)$), authors list with that of the ^{31}Ar ϵ p decay. Without any details – evaluators list as the same level.
6643 3				Ab	XREF: A(?).
6700				B	E(level): from stronger population in ($^{12}\text{C},^{10}\text{Be}$) (1988Kr11). Analogue state of ^{30}Si at 7043.17 ($J^\pi=5^-$).
6766 3	2 ⁺		2	AB F	XREF: B(6730). E(level): weighted average of 6762 4 from ^{31}Ar ϵ p decay and 6768 3 from (p,t). Other: 6730 44 from ($^3\text{He,n}$). J^π : L=2 in (p,t).
6810				B	
6855 4				AB F	XREF: B(6838)F(6861).
6927 4	(1 ⁻) ^d			AB F	XREF: B(6919)F(6901.5). J^π : other: (3,4) from n-p(θ) measurements in 1982Yo02 (($^3\text{He,n}$)).
7068 10	0 ⁺ ^d			A F	E(level): unweighted average of 7078 7 from ^{31}Ar ϵ p decay and 7058.9 25 from (p,t).
7123 10	(1,2) ^e			AB	XREF: B(7133).
7204 17	(3 ⁻) ^d			AB F	XREF: A(7237?). E(level): unweighted average of 7237 5 from ^{31}Ar ϵ p decay, 7180 41 from ($^3\text{He,n}$), and 7194.9 18 from (p,t).

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Adopted Levels, Gammas (continued) ^{30}S Levels (continued)

E(level) [†]	J ^π	XREF	Comments
7319.6 7	(2 ⁺) ^d	AB	XREF: B(7294).
7352 8	(2 ⁺) ^d	AB F	XREF: B(7330)F(7310.6).
7485 4	(4 ⁺) ^d	AB D F	XREF: B(7420)D(7460)F(7446.5).
7598 4		A	
7693 4		A	
7924 5		AB F	XREF: B(7910)F(7899.0).
8082.8 23		B F	XREF: B(8060).
8300		B	E(level): from stronger population in ($^{12}\text{C}, ^{10}\text{Be}$) (1988Kr11). Analogue state of ^{30}Si at 8930 ($J^\pi=(6^+)$). Configuration: $\nu((f_{7/2})^{+2})_{6+}$ (1988Kr11 – quoted from literature).
8482.3 15			F
8680 44		B	
8875.0 82			F
9080.6 45			F
9130 10	4,5 ^c	D	
9220 41		B	
9276.3 42			F
9391.4 65	(0 ⁺ , 1 ⁻ , 2 ⁺) ^d		F
9486.0 74			F
9701 6		B F	XREF: B(9670).
9785.1 44			F
9874.2 91	(0 ⁺ , 1 ⁻ , 2 ⁺) ^d		F
9900	(6 ⁺)	B	E(level), J ^π : from ($^{12}\text{C}, ^{10}\text{Be}$) (1988Kr11). Spin and parity from $\sigma(\theta)$ and DWBA analysis. Analogue state of ^{30}Si at 10670 ($J^\pi=6^+$).
10009 ^a 21		B F	
10070 [@] 6	4,5 ^c	D F	
10122.6 15			F
10274.7 19			F
10443.1 46			F
10500 43		B F	XREF: F(10443.1).
10650 43		B	
10755.1 30			F
10814.9 [@] 28		B F	XREF: B(10830)F(10814.9).
11015.4 [@] 8		B F	
11200 32		B	
11300 32		B	
11399.7 [@] 22		B F	
11490 6		B F	E(level): weighted average of 11450 24 from ($^3\text{He}, n$) and 11490.4 33 from (p,t).
11546.2 [@] 20		B F	XREF: F(11546.2).
11609.1 [@] 25		B F	XREF: F(11609.1).
11683 6		B F	XREF: F(11681.7). E(level): weighted average of 11710 20 from ($^3\text{He}, n$) and 11681.7 40 from (p,t).
11770 19		B	
11852 [@] 4		B F	XREF: F(11852.3).
12039.2 23			F

[†] From a least-squares fit to E_γ , when available. 3676 γ was not considered and $\Delta E_\gamma(1283.4)=1$ keV was assumed. Otherwise from particle reaction datasets.

[‡] From $^{28}\text{Si}(^3\text{He}, n\gamma)$.

[#] From $^{31}\text{Ar} \beta^+ p$ decay.

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Adopted Levels, Gammas (continued) ^{30}S Levels (continued)

@ From (p,t).

& From ^{31}Ar ϵp decay.

^a From $^{28}\text{Si}(^3\text{He},\text{n}),(^{12}\text{C},^{10}\text{Be})$.

^b From $(^3\text{He},\text{n}\gamma)$, except otherwise noted.

^c From 1987Ca05. The possible spin values resulting from the stretched two-particle one-hole configuration $[(d_{3/2})^{+2}(d_{5/2})^1]_{9/2}$ coupled to the $1/2^+$ target.

^d From 2012Al23, (p,t) and $(^3\text{He},\text{n})$, mostly from comparison of mirror states of ^{30}Si .

^e From n-p(θ) measurements in $(^3\text{He},\text{n})$ (1982Yo02).

 $\gamma(^{30}\text{S})$

Additional information 1.

$E_i(\text{level})$	J_i^π	E_γ^\dagger	I_γ^\dagger	E_f	J_f^π	Mult. [‡]	δ^\ddagger	$\alpha^\#$	Comments
2210.15	2 ⁺	2210.1 2	100	0	0 ⁺	E2		4.26×10 ⁻⁴ 6	$\alpha(\text{K})=8.50\times 10^{-6}$ 12; $\alpha(\text{L})=6.55\times 10^{-7}$ 9; $\alpha(\text{M})=5.53\times 10^{-8}$ 8 $\alpha(\text{IPF})=0.000417$ 6 B(E2)(W.u.)=11.5 +19-14
3404.3	2 ⁺	1193.6 7	100 4	2210.15	2 ⁺	M1+E2	+0.16	3.01×10 ⁻⁵ 4	$\alpha(\text{K})=2.253\times 10^{-5}$ 32; $\alpha(\text{L})=1.738\times 10^{-6}$ 24; $\alpha(\text{M})=1.466\times 10^{-7}$ 21 $\alpha(\text{IPF})=5.69\times 10^{-6}$ 10 B(M1)(W.u.)=0.084 +13-10; B(E2)(W.u.)=7.0 +33-25 E _γ : weighted average of 1194.2 11 from ^{31}Ar ϵp decay and 1193.4 7 from $(^3\text{He},\text{n}\gamma)$.
		3402.6 13	25 4	0	0 ⁺	E2		9.56×10 ⁻⁴ 13	$\alpha(\text{K})=4.21\times 10^{-6}$ 6; $\alpha(\text{L})=3.24\times 10^{-7}$ 5; $\alpha(\text{M})=2.74\times 10^{-8}$ 4 $\alpha(\text{IPF})=0.000952$ 13 B(E2)(W.u.)=0.37 +8-6
3667.4	(0 ⁺)	1457.2 7	100	2210.15	2 ⁺	Q			
3676.7	(1 ⁺)	1466.5 4	68 3	2210.15	2 ⁺	(M1+E2)	-0.09 3	7.16×10 ⁻⁵ 10	$\alpha(\text{K})=1.550\times 10^{-5}$ 22; $\alpha(\text{L})=1.195\times 10^{-6}$ 17; $\alpha(\text{M})=1.008\times 10^{-7}$ 14 $\alpha(\text{IPF})=5.48\times 10^{-5}$ 8 B(M1)(W.u.)=0.029 +31-11; B(E2)(W.u.)=0.5 +8-3
		3676	100 32	0	0 ⁺	M1		9.21×10 ⁻⁴ 13	$\alpha(\text{K})=3.62\times 10^{-6}$ 5; $\alpha(\text{L})=2.78\times 10^{-7}$ 4; $\alpha(\text{M})=2.349\times 10^{-8}$ 33 $\alpha(\text{IPF})=0.000917$ 13 B(M1)(W.u.)=0.0027 +26-11 Mult.: from level scheme, D in $(^3\text{He},\text{n}\gamma)$.
4687.7	(3 ⁺)	1283.4	17.6 7	3404.3	2 ⁺				
		2477.4 2	100.0 14	2210.15	2 ⁺	D+Q	+0.73 9	4.89×10 ⁻⁴ 9	
4808.9	(2 ⁺)	1404.5 2	100 3	3404.3	2 ⁺				
		2598.8 4	100 3	2210.15	2 ⁺				

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Adopted Levels, Gammas (continued) $\gamma(^{30}\text{S})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ^\dagger	I_γ^\dagger	E_f	J_f^π	Mult. [‡]	$\alpha^\#$	Comments
5132.1	(4 ⁺)	2921.8 2	100	2210.15	2 ⁺	(E2)	7.56×10^{-4} 11	$\alpha(\text{K})=5.34 \times 10^{-6}$ 7; $\alpha(\text{L})=4.11 \times 10^{-7}$ 6; $\alpha(\text{M})=3.47 \times 10^{-8}$ 5 $\alpha(\text{IPF})=0.000750$ 11 B(E2)(W.u.)=13 +7-4
5218.8	(3 ⁺)	1814.4 3	25 15	3404.3	2 ⁺			
		3008.5 2	100.0 18	2210.15	2 ⁺			
5848.1	(4 ⁺)	3637.7 4	100	2210.15	2 ⁺	Q		

[†] From ($^3\text{He},n\gamma$).

[‡] From ($^3\text{He},n\gamma$), based on γ -ray angular correlations. Electric/magnetic character assigned based on RUL, if available.

[#] [Additional information 2](#).

Adopted Levels, GammasLevel Scheme

Intensities: Relative photon branching from each level

