^{32}S(d,n) 1998TeZV,1972El03,1988Eg03

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh	NDS 199,1 (2025)	30-Sep-2024

Target J^π(^{32}S g.s.)=0$^+$.

1998TeZV: E=25 MeV deuteron beam was produced from the AVF cyclotron at the Cyclotron and Radioisotope Center, Tohoku university. Target was 2.2 mg/cm^2 natural sulfur sandwiched between two natural platinum foils. Neutrons were detected with a liquid scintillator. Measured time-of-flight spectra, σ(E$_n$,θ). Deduced levels, J, π, L-transfers, spectroscopic factors from DWBA analysis. No details of $\sigma(\theta)$ data are given in the lab report and thus L-transfer values extracted from $\sigma(\theta)$ are considered tentative by the evaluators.

1972El03: E=4.7 and 5.5 MeV deuteron beams were produced from the Van de Graaff accelerator at the University of Alberta. Target was silver sulfide prepared using natural sulfur. Measured time-of-flight, σ(E$_n$,θ) with $\theta_{c.m.}$=0° to 130°. Deduced levels, J, π, L-transfers and spectroscopic factors from data analysis with DWBA and Hauser-Feshbach theories. Comparisons with available data. Report 7 levels up to 2851.

1988Eg03: E=8.0, 8.3 and 8.6 MeV deuteron beams were produced from the Ohio University Accelerator Laboratory (OUAL). Target was 128 μg/cm^2 cadmium sulfide evaporated onto a thin gold backing. Neutrons were detected with an array of seven identical NE213 liquid scintillators (FWHM=108 keV for 7 MeV neutrons). Measured neutron time-of-flight spectra, σ(E$_n$,θ) with $\theta_{c.m.}$=0° to 160°. Deduced levels, J, π, L-transfers, spectroscopic factors from DWBA and Hauser-Feshbach analysis of measured $\sigma(\theta)$ for g.s., 810, 2690 and 2850 levels.

1967Mu12: E=5 MeV deuteron beam was produced from the Oxford University Tandem Accelerator. Target was gas of H_2S in a gas cell corresponding to a 2.3 mg/cm^2 natural sulphur. Neutrons were detected with a NE213 liquid scintillator. Measured σ(E$_n$,θ), $\theta_{c.m.}$=0° to 160°. Deduced levels, J, π, L-transfers, relative spectroscopic factors from DWBA analysis for g.s., 810 and 2110 levels.

1960Ma21: E=4 MeV deuteron beam was produced at Aldermaston. Target was prepared by vacuum evaporation of natural Sb_2S_3 and CdS (98.7% ^{32}S) for one run. Neutrons were detected with a time-of-flight spectrometer. Measured neutron time-of-flight spectra. Deduced levels. Comparisons with available data. Report g.s., 880, 2110, 2530 and 2820 levels.

1953Mi10: E=8.1 MeV deuteron beam was produced from the Liverpool University 37-inch cyclotron. Target was a thin layer (0.5 to 4 mg/cm^2) of the sulphur deposited on thick gold backing discs. Neutrons were detected with photographic plates. Measured σ(E$_n$,θ), $\theta_{c.m.}$=−5° to 60°. Deduced levels, J, L-transfers for the levels of g.s., 760, 2840 and 4220 keV.

Others:

2004Ma98: measured magnetic moment of ^{33}Cl μ=0.7549(3)μ_N by β-NMR method.

1977Az01: measured half-life of ^{33}Cl g.s. produced from ^{32}S(d,n).

Additional information 1.

^{33}Cl Levels

Spectroscopic factor is defined by N×g×C^{2}S=$\sigma(\theta)_{exp}/\sigma(\theta)_{DWBA}$, where N is the normalization factor and g=(2J$_f$+1)/(2J$_i$+1) (1966Ba54); N=1.58 (1988Eg03).

E(level)†	J$^\pi$‡	L†	C^{2}S†	Comments
0	3/2$^+$	2	0.715	L: from 1972El03, 1988Eg03, 1998TeZV. C^{2}S: others: 0.59 (1988Eg03), 0.87 (1972El03).
812# *4*	1/2$^+$	0	0.37	E(level): others: 880 *70* (1960Ma32), 760 *70* (1953Mi10), 810 (1967Mu12), 820 (1998TeZV). L: from 1972El03, 1988Eg03, 1998TeZV. C^{2}S: other: 0.17 (1988Eg03,1972El03).
1993# *6*				
2100? *60*		2		E(level): from 1960Ma21. Other: 2110 (1967Mu12). L: from 1967Mu12. This level is not seen in 1972El03, 1998TeZV and other studies and considered questionable by the evaluators. It may correspond to the 1993 level.
2351# *5*	3/2$^+$	2	0.065	E(level): other: 2360 (1998TeZV).

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^{32}S(d,n) 1998TeZV,1972El03,1988Eg03 (continued)

^{33}Cl Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	L[†]	C^{2}S[†]	Comments
				L: from 1972El03, 1998TeZV. C^{2}S: also from 1972El03.
2530? *60*				E(level): from 1960Ma21. Other: 2500 (1967Mu12). This level is not seen in 1972El03, 1998TeZV and other studies and considered questionable by the evaluators. It may correspond to the 2351 level.
2688[#] *4*	7/2$^-$	3	0.416	E(level): other: 2690 (1988Eg03,1998TeZV). L: from 1988Eg03 and also favored by γ(q) in 1972El03. C^{2}S: others: 0.92 (1988Eg03), 0.50 (1972El03).
2851[#] *4*	3/2$^-$	1	0.563	E(level): others: 2840 *60* (1953Mi10), 2820 *60* (1960Ma21), 2850 (1967Mu12), 2860 (1998TeZV). C^{2}S: others: 1.2 (1988Eg03), 0.55 (1972El03).
4130	3/2$^-$	1	0.133	E(level): other: 4220 *80* (1953Mi10). L: from 1953Mi10, 1998TeZV.
4550	1/2$^-$	(1)	0.22	
4790	7/2$^-$	(3)	0.051	
5090	1/2$^-$	(1)	0.22	
5270	5/2$^-$	(3)	0.032	
5660	3/2$^-$	(1)	0.083	
5890	5/2$^-$	(3)	0.028	
6290	7/2$^-$	(3)	0.058	
6440	3/2$^-$	(1)	0.038	
6660	5/2$^-$,7/2$^-$	(3)	0.077,0.045	
6840	3/2$^+$,5/2$^+$	(2)	0.055,0.032	
6970	5/2$^-$	(3)	0.047	
7330	(9/2$^+$,7/2$^-$)	(4,3)	0.022,0.019	
7490	3/2$^-$	(1)	0.11	
7720	5/2$^-$,7/2$^-$	(3)	0.023,0.014	
7930	5/2$^-$,7/2$^-$	(3)	0.033,0.019	
8110	5/2$^-$,7/2$^-$	(3)	0.018,0.011	
8290	5/2$^-$,7/2$^-$	(3)	0.050,0.050	
8490	5/2$^-$,7/2$^-$	(3)	0.050,0.029	
8860	5/2$^-$,7/2$^-$	(3)	0.070,0.040	
9560	5/2$^-$,7/2$^-$	(3)	0.045,0.025	
9780	5/2$^-$,7/2$^-$	(3)	0.045,0.025	

[†] From 1998TeZV, unless otherwise noted. L-transfers and C^{2}S are from DWBA analysis of measured $\sigma(\theta)$. L-transfers from 1998TeZV are considered as tentative and placed inside parentheses by the evaluators where 1998TeZV is the only source, considering that no $\sigma(\theta)$ data are given in 1998TeZV. Values of C^{2}S are for corresponding J^{π} assignments.

[‡] As listed in 1998TeZV for the purpose of extracting C^{2}S in the DWBA analysis.

[#] From 1972El03.