^{34}S(d,p) 2024Ku24,1971Va18,1969Mo12

$J^{\pi}=0^+$ for ^{34}S g.s.

2024Ku24: An 8-MeV/nucleon deuteron beam was produced from the 9-MV Super-FN tandem Van de Graaff accelerator at FSU. The target was carbon-backed sulfur enriched in ^{34}S. Protons were spatially dispersed by the Super-Enge Split-Pole Spectrograph and detected using a position-sensitive ionization chamber (ΔE) and a plastic scintillator (E) at the focal plane with FWHM≈45 keV. An additional ^{34}S(d,pγ)^{35}S measurement using the $CeBr_3$ Array (CeBrA) demonstrator provides information on some overlapping peaks produced from the ^{32}S contaminants in the target. Measured $\theta(E_p,\theta)$. Deduced 23 levels, single-neutron spectroscopic factors and strengths from finite-range PTOLEMY-DWBA analysis.

1971Va18: A 10-MeV deuteron beam was produced from the Utrecht 6-MV tandem accelerator. Targets were a 100 $\mu g/cm^2$ PbS on carbon plus formvar foils and a 5 $\mu g/cm^2$ pure ^{34}S embedded in aluminum foil. Protons were detected using one 15-mm long and seven 30-mm long, 0.6-mm thick position-sensitive detectors (PSD) in the focal plane of the Utrecht split-pole magnetic spectrograph. Measured $\theta(E_p,\theta)$. Deduced 17 levels, L, J, π, spectroscopic factors from DWUCK-DWBA analysis for the ground state and seven excited states of ^{35}S.

1969Mo12: A 6.495-MeV deuteron beam was produced from the ONR-CIT tandem accelerator. The target was an enriched target of 450 *25*-$\mu g/cm^2$ CdS (85% ^{34}S) evaporated onto a 301 *15*-$\mu g/cm^2$ gold foil and a natural target of 289 *30*-$\mu g/cm^2$ Sb^2S^3 evaporated onto a 289 *30*-$\mu g/cm^2$ gold foil. Protons were detected using an array of 16 Au-Si surface barrier detectors with FWHM=30 keV. Measured $\theta(E_p,\theta)$. Deduced 37 levels.

1984Pi03: A 12.3-MeV deuteron beam was produced from a cyclotron. The target was CdS (61.9% in ^{36}S, 37.7% in ^{34}S), 100 $\mu g/cm^2$ on a 20 $\mu g/cm^2$ carbon backing. Protons were analyzed by a multi-angle magnetic spectrograph and detected using a 700-mm long nuclear emulsion plates Ilford L4. Measured $\sigma(E_p,\theta)$. Deduced 13 levels, L, J, π, and spectroscopic factors from DWUCK-DWBA analysis for six excited states of ^{35}S.

1979So01: A 3.55-MeV deuteron beam was produced from a Van de Graaff electrostatic generator. The target was 18−$\mu g/cm^2$ GeS (80% ^{36}S, 20% ^{34}S) on a 25−$\mu g/cm^2$ carbon backing. Protons were analyzed by a magnetic spectrograph and recorded by a spark chamber with FWHM=10-15 keV. Measured $\sigma(E_p,\theta)$. Deduced levels.

1971Ko33: A 6.6-MeV deuteron beam was produced from a cyclotron. Targets were GeS films of 70-80 $\mu g/cm^2$ (98% enrichment in ^{34}S) evaporated onto a 20 $\mu g/cm^2$ carbon substrate. Protons were detected using an 800−μ-thick Si(Li). Measured $\sigma(E_p,\theta)$. Deduced levels, J, π, L and spectroscopic factors from distorted-wave analysis for the ground state and five excited states of ^{35}S.

1971Me12: An 18-MeV deuteron beam was produced from the Yale MP tandem Van de Graaff accelerator. The target was H^2S gas of natural isotopic composition (95.06% ^{32}S, 4.18% ^{34}S). Protons were detected using a ΔE-E telescope of silicon surface-barrier detectors. Measured $\sigma(E_p,\theta)$. Deduced levels, J, π, L and spectroscopic factors local, zero-range JULIE-DWBA analysis of $\sigma(E_p,\theta)$ for the ground state and two excited states of ^{35}S.

1966Sc09: 9- and 12-MeV deuteron beams were produced from the Argonne tandem accelerator. The target was PbS. Protons were detected using silicon surface barrier detectors. Measured $\sigma(E_p,\theta)$ for the ground state and one excited state of ^{35}S.

1958En51: 6.006- and 6.542-MeV deuteron beams were produced from the MIT-ONR electrostatic generator. Targets were Sb^2S^3 of natural isotopic constitution (4.2% ^{34}S). Energies of charged reaction products emitted from the target at angles of 50, 90, and 130° were measured by a broad-range magnetic spectrograph and nuclear emulsions. Measured $\sigma(E_p,\theta)$. Deduced 5 levels.

Other measurements: 1976We29: ^{34}S(d,p)^{35}S angular distributions for the ground state and the first excited state of ^{35}S. 1973Co25: ^{34}S(d,p)^{35}S excitation functions for the two lowest excited states of ^{35}S.

Theoretical calculations: 1977Os07, 1974Os02.

^{35}S Levels

C^2S from 2024Ku24. The normalization was determined from the L=3 strengths summed up through E_x=5.1 MeV and divided by the expected $1f_{7/2}$ vacancy, i.e., $\Sigma G_{+L=3}/(2j+1)$, where j=7/2. This is equivalent to $\Sigma C^2S_{L=3}=1$ up to 5.1 MeV. For C^2S given under comments, $C^2S=\sigma(\theta)_{exp}/\sigma(\theta)_{DWBA}/N/(2J_f+1)\times(2J_i+1)$, where the normalization factor N=1.53. The C^2S from 1971Me12 based on N=1.58 has been renormalized by evaluators using N=1.53.

E(level)	J^{π}&	L[a]	C^2S[a]	Comments
0	$3/2^+$	2	0.54 *12*	L: 2 also from 1971Va18, 1971Ko33, and 1971Me12. C^2S: 0.43 *11* (1971Va18), 0.33 (1971Ko33), and 0.48 (1971Me12).
1571.92# *19*	$1/2^+$	0	0.14 *7*	L: 0 also from 1971Va18, 1971Ko33, and 1984Pi03. C^2S: 0.17 *4* (1971Va18), 0.25 (1971Ko33), and 0.154 (1984Pi03).

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^{34}S(d,p) 2024Ku24,1971Va18,1969Mo12 (continued)

^{35}S Levels (continued)

E(level)	J^π[&]	L[a]	C^2S[a]	Comments
1991.08[#] *16*	$7/2^-$	3	0.87 *9*	C^2S: 0.68 *17* (1971Va18), 0.38 *8* (1971Ko33), 0.65 *10* (1971Me12), and 0.841 *12* (1984Pi03).
2347.59[#] *15*	$3/2^-$	1	0.62 *7*	E(level): others: 2347 *8* (1969Mo12) and 2336 *10* (1971Va18). L: 1 also from 1971Va18 and 1984Pi03. C^2S: 0.52 *13* (1971Va18), 0.52 (1971Me12), 0.33 (1971Ko33), and 0.505 (1984Pi03).
2724 *8*	$5/2^+$	2	0.02 *1*	E(level): weighted average of 2722 *8* (1969Mo12) and 2726 *8* (1971Va18). L: other: (2,3) from 1971Va18.
2941 *10*	$3/2^+$	2	<0.02	E(level): weighted average of 2943 *10* (1969Mo12) and 2939 *10* (1971Va18).
3420 *8*	$5/2^+$	2	0.02 *1*	E(level): weighted average of 3422 *8* (1969Mo12) and 3415 *12* (1971Va18).
3569 *14*				E(level): unweighted average of 3583 *8* (1969Mo12) and 3555 *9* (1971Va18).
3596[†] *8*				E(level): other: 3595 *9* (1971Va18).
3675[‡] *10*	$(1/2^-,3/2^-)$	(1)		J^π: assigned from L=(1) and also adopted in the Adopted Levels. L: from 1971Va18. C^2S: $<2.5\times10^{-3}$ for $J^\pi=1/2^-$ and $<1.25\times10^{-3}$ for $J^\pi=3/2^-$ (1971Va18).
3801.90[#] *30*	$3/2^-$	1	0.07 *4*	E(level): others: 3804 *8* (1969Mo12) and 3795 *10* (1971Va18). L: 1 also from 1971Va18. C^2S: 0.09 *3* (1971Va18).
3885[†] *10*				E(level): other: 3866? *10* (1971Va18).
3907[‡] *10*				
4025 *10*				E(level): weighted average of 4025 *10* (1969Mo12) and 4025 *10* (1971Va18).
4109 *10*				E(level): weighted average of 4112 *10* (1969Mo12) and 4105 *10* (1971Va18).
4189.87[#] *26*	$1/2^-$	1	0.17 *2*	E(level): others: 4190 *8* (1969Mo12) and 4196 *12* (1971Va18). C^2S: 0.12 *3* (1971Va18).
4305 *8*				E(level): weighted average of 4302 *8* (1969Mo12) and 4312 *12* (1971Va18).
4481[†] *8*	$3/2^+,7/2^-$	2,3	0.07,0.05	E(level): other: 4477 doublet (2024Ku24). L: 2,3 doublet (2024Ku24). C^2S: 0.07 *2* for L=2 component and 0.05 *2* for L=3 component (2024Ku24).
4575[†] *8*				
4837[†] *8*				
4903.28[#] *16*	$1/2^-$	1	0.78 *8*	E(level): other: 4903 *8* (1969Mo12). L: 1 also from 1984Pi03. C^2S: 0.776 (1984Pi03).
4963.12[#] *16*	$3/2^-$	1	0.32 *3*	E(level): other: 4965 *8* (1969Mo12). L: 1 also from 1984Pi03. C^2S: 0.218 (1984Pi03).
5058[†] *8*	$7/2^-$	3	0.08 *1*	
5126[†] *11*				
5342[†] *8*				
5475?[†] *10*				
5542?[†] *8*				
5740[@] *20*	$(5/2,7/2)^-$	3	0.03 *1*	J^π: assigned from L=3 and also adopted in the Adopted Levels. 2024Ku24 assigns $(5/2^-)$ and states that the J^π assignment is purely speculative.
5890[@] *20*	$(3/2,5/2)^+$	2	0.11 *2*	J^π: assigned from L=2 and also adopted in the Adopted Levels. 2024Ku24 assigns $(3/2^+)$ and states that the J^π assignment is purely speculative.
5980[†] *10*				
6078.6[#] *13*	$1/2^-,3/2^-$	1		E(level): other: 6080 *8* (1969Mo12). J^π: assigned from L=1 and also adopted in the Adopted Levels. L: from 1984Pi03. C^2S=0.086 for $J^\pi=1/2^-$ and 0.042 for $J^\pi=3/2^-$.

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^{34}S(d,p) 2024Ku24,1971Va18,1969Mo12 (continued)

^{35}S Levels (continued)

E(level)	L[a]	Comments
6292[†] *8*		
6334[†] *8*		
6344[†] *8*		
6446[†] *8*		
6496[†] *8*		
6537.7[#] *14*		
6545.1[#] *13*		E(level): other: 6543 *8* (1969Mo12).
6584[†] *10*		
6635.2[#] *13*	(2,3)	E(level): others: 6634 *8* (1969Mo12) and 6625 *30* (2024Ku24).
6677[†] *8*		
6891.3[#] *14*	(1,3)	E(level): others: 6892 *10* (1969Mo12) and 6915 *30* (2024Ku24).
7021 *10*	(2,3)	E(level): weighted average of 7022 *10* (1969Mo12) and 7005 *35* (2024Ku24).
7150[@] *35*	(0,3)	
7205[@] *35*	(1,2)	
7482.7[#] *13*	(1,2)	E(level): other: 7495 *40* (2024Ku24).
7570[@] *40*	(2,3)	
7640[@] *40*	(2,3)	

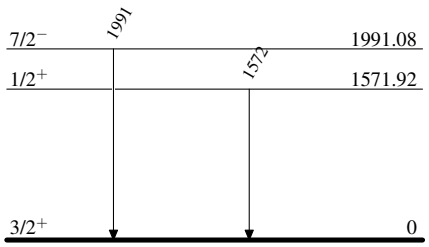
[†] From 1969Mo12.
[‡] From 1971Va18.
[#] From 1984Pi03.
[@] From 2024Ku24.
[&] From the Adopted Levels for extracting C^2S, unless otherwise noted.
[a] From DWBA analysis of the measured $\sigma(\theta)$ in 2024Ku24, unless otherwise noted.

$\gamma(^{35}S)$

E_γ	E_i(level)	J_i^π	E_f	J_f^π	Comments
1572	1571.92	$1/2^+$	0	$3/2^+$	E_γ: from 2024Ku24.
1991	1991.08	$7/2^-$	0	$3/2^+$	E_γ: from 2024Ku24.

^{34}S(d,p) 2024Ku24,1971Va18,1969Mo12

Level Scheme



$^{35}_{16}S_{19}$