^{32}S(d,p),(pol d,p) 1958En51,1975Li09,1976Bo18

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh	NDS 112, 1393 (2011)	31-Mar-2011

1958En51: E_d=6.006 and 6.542 MeV deuteron produced from the MIT-ONR electro-static generator. Targets: prepared by evaporating natural sulfur onto Formvar films. Detectors: a high-resolution, broad-range magnetic spectrograph for measuring proton energies. Measured $\sigma(E_p,\theta)$,Q-value (6413 *6*). Deduced levels.

1975Li09: E_d=12 MeV. Target: 100μg/cm^2 natural PbS prepared by evaporation onto thin carbon foils. Detector: a single high-resolution lithium-drifted silicon detector. Total resolution FWHM=14 keV. Measured $\sigma(E_p,\theta)$. Deduced levels, J^π, L, spectroscopic factors.

1976Bo18: E_d=12 MeV deuteron beam produced from the 6 MV EN Tandem Van de Graaff of the Max-Planck-Institut Heidelberg. Target: a self-supporting CdS foil of about 100 μg/cm^2. Protons recorded in Buechner type magnetic spectrograph with Ilford L4(50 μm) emulsions, FWHM=23 keV. Measured $\sigma(E_p,\theta)$. Deduced levels, J^π,L with the method of the cross-section ratio of (d,p) to the total neutron cross-section.

Others:

1949Da16: E_d=3.22 MeV deuteron produced from the Yale University cyclotron. Targets: H_2S gas. Proton energies determined by absorption method. Measured $\sigma(E_p)$, p-γ coin. Deduced levels, Q-value.

1966Sc09: E_d=9 and 12 MeV deuteron produced from the Argonne tandem accelerator. Targets: PbS. Detectors: Si surface barrier detectors. Measured $\sigma(E_p,\theta)$. Deduced J^π, L for 0, 0.84, 2.31, 2.94 and 3.22 MeV levels.

1966Sa07: E_d=1.5-2.5 MeV. Measured $\sigma(E_p,E_d,\theta)$.

1967Mo04: E_d=2.541 MeV deuteron produced from the MIT-ONR tandem accelerator. Target: prepared by evaporating CdS (natural sulfur) of about 90 μg/cm^2 onto a glass slide. Detectors: an array of 16 Au-Si surface barrier detectors. Total resolution FWHM=30 keV. Measured $\sigma(E_p,\theta)$. Deduced levels.

1970Bo36: E_d=12.3 MeV deuteron produced from the 120 cm cyclotron of the Institute of Nuclear Physics in Krakow. Target: prepared by evaporating natural sulphur (95.06% ^{32}S, 1.28 mg/cm^2) on a thin gold backing. Protons analyzed by means of a broad range magnetic spectrograph and recorded in nuclear emulsions. Total resolution FWHM=250 keV. Measured $\sigma(E_p,\theta)$. Deduced levels,J^π,L,spectroscopic factors from the DWBA analysis of the data.

1971Me12: E_d=18 MeV deuteron produced from the Yale MP tandem Van de accelerator. Target: H_2S gas of natural isotopic composition. Detectors: a ΔE-E telescope of silicon surface-barrier detectors (1500 and 2000 μm thick). Total resolution FWHM=60 keV. Measured $\sigma(E_p,\theta)$. Deduced levels, J^π, L, spectroscopic factors.

1973Or04: E_d=2.8 and 3.1 MeV. Measured $\sigma(E_p,\theta)$. Deduced levels, L, spectroscopic factors from the DWBA analysis of the data.

1974Bo34: E_d=12 MeV. 100 μg/cm^2 CdS target. Measured $\sigma(E_p)$. Deduced L.

1977Ba84: E_d=1.0-5.0 MeV on Ag_2S evaporated on thin Ag backings. Measured $\sigma(E_p)$.

1990Pi05: E_d=12.3 MeV deuteron on Sulphur target. Protons analyzed by a multi-angle magnetic spectrograph and recorded by 700 mm nuclear emulsion plates. Measured $\sigma(E_p,\theta)$. Deduced levels of 3220 and 5710 keV from measured Q-values. Deduced levels mainly for other nuclei.

1998He19: E_d=1.0-2.7 MeV. Targets: a thin CdS and a thick ZnS. Measured $\sigma(E_p,E_d)$.

2008La07: E_d=1.975-2.600 MeV. Targets: TiS_2 evaporated onto a carbon foil. Detector: a Si surface barrier detector. Measured $\sigma(E_p,E_d)$.

Others: 1951St19 (Q=6422 *11*), 1972Eg03.

Polarized deuteron beam.

1971Eg01: polarized deuteron beam on sulfur target. Measured vector analyzing power. Deduced J^π for the ground state.

1980An36: E_d=1.8-3.0 MeV polarized beam on natural sulphur. Two pairs of silicon drifted solid-state detectors. Measured vector analyzing power <iT_{11}>.

Others: 1941Smith: Phys Rev 59, 942; 1951St19; 1953-Holt: Phys Rev 89, 665 and Proc Phys Soc (London) A66, 258; 1953Black: Phys Rev 90, 381A; 1960Ma48, 1958Te13; 1958Ch39; 1960Ma32.

^{32}S(d,p),(pol d,p) 1958En51,1975Li09,1976Bo18 (continued)

^{33}S Levels

$J^{\pi}=0^{+}$ for ^{32}S target.

E(level)[†]	J^{π}[a]	L[a]	C^2S[e]	Comments
0	3/2+	2	0.87	J^{π},L: From 1966Sc09,1970Bo36,1971Me12 and 1971Eg01. C^2S: average of 0.93 in 1971Me12 and 0.81 in 1970Bo36.
839 *5*	1/2+	0	0.56	E(level): weighted average from 1949Da16, 1958En51 and 1967Mo04. J^{π}: from 1970Bo36 and 1971Me12. L: from 1966Sc09, 1971Me12,1973Or04 and 1970Bo36. C^2S: average of 0.32 in 1971Me12 and 0.80 in 1970Bo36.
1965 *6*	5/2+[b]	2[b]	≤0.002[b]	E(level): weighted average from 1949Da16, 1958En51 and 1967Mo04. J^{π}: also from 1970Bo36. L: from 1970Bo36.
2170 *50*				E(level): from 1949Da16.
2314[#] *6*	3/2+[b]	2[b]	0.066[b]	J^{π},L: also from 1966Sc09,1970Bo36. C^2S: from 1971Me12.
2869[@] *6*	3/2+,5/2+[b]	2[b]	0.10,0.05[b]	L: also from 1970Bo36. C^2S: from 1971Me12.
2936[#] *6*	7/2−	3	0.53	J^{π}: from 1970Bo36 and 1971Me12. L: from 1966Sc09, 1970Bo36 and 1971Me12. C^2S: average of 0.57 in 1971Me12 and 0.49 in 1970Bo36.
2971[#] *6*				
3220.5 *2*	3/2−	1	0.87	E(level): from 1990Pi05. J^{π}: from 1970Bo36 and 1971Me12. L: from 1966Sc09,1970Bo36,1971Me12 and 1973Or04. C^2S: average of 0.48 in 1971Me12 and 1.26 in 1970Bo36.
3833[@] *6*				
3935 *6*				
4049 *6*				
4095 *6*				
4145[@] *6*				
4211 *6*	3/2−[b]	1[b]	0.075[b]	L: also from 1973Or04.
4377 *6*				
4425[@] *6*				
4732[@] *6*				E(level): 4732 and 4747 cannot be resolved in 1973Or04. L: see comment for 4747 level.
4747 *6*		(0)		E(level): 4732 and 4747 cannot be resolved in 1973Or04. L: from 1973Or04 for unresolved 4732+4747 peaks. The J^{π} assignments for 4732 and 4747 levels suggest L=0 belongs to only the 4747 level.
4869 *6*				
4919 *6*	1/2−,3/2−[b]	1[b]	0.044[b]	L: also from 1973Or04. C^2S: for $J^{\pi}=1/2^{-}$ (1971Me12).
4941 *6*	5/2−,7/2−[b]	3[b]	0.07,0.036[b]	C^2S: from 1971Me12.
5176[@] *6*				
5210 *6*				
5272 *6*				
5287 *6*				
5340 *6*				
5351 *6*				
5399 *6*				
5479 *6*		0		L: from 1973Or04.
5597 *6*		(0)		E(level): 5597,5613 and 5622 are unresolved in 1973Or04.

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^{32}S(d,p),(pol d,p) 1958En51,1975Li09,1976Bo18 (continued)

^{33}S Levels (continued)

E(level)[†]	J^{π}[a]	L[a]	C^2S[e]	Comments
				L: from 1973Or04.
5613 *6*		(0)		E(level): 5597,5613 and 5622 are unresolved in 1973Or04. L: from 1973Or04.
5622[@] *6*		(0)		E(level): 5597,5613 and 5622 are unresolved in 1973Or04. L: from 1973Or04.
5710.1 *2*	1/2−[b]	1[b]	0.53[b]	E(level): from 1990Pi05. L: also from 1973Or04.
5864 *6*				
5888 *6*	3/2−[b]	1[b]	0.11[b]	L: also from 1973Or04.
5915 *6*				
5982 *6*				
6067 *6*				
6079? *6*				
6101 *6*				
6131 *6*				
6234 *6*				
6261 *6*				
6310[@] *6*				
6326 *6*				
6360 *6*				
6372 *6*				
6416 *6*		(1)		E(level): 6416 and 6427 can not be resolved in 1973Or04. L: from 1973Or04.
6427 *6*	1/2−,3/2−[b]	1[b]	0.18,0.08[b]	L: also from 1973Or04. E(level): 6416 and 6427 can not be resolved in 1973Or04. C^2S: from 1971Me12.
6487 *6*		(0)		L: from 1973Or04.
6513 *6*				
6526 *6*				
6559 *6*				
6616 *6*		(0)		L: from 1973Or04.
6676 *6*				
6690 *6*	5/2−,7/2−[b]	3[b]	0.18,0.09[b]	E(level): weighted average from 1958En51 and 1971Me12. C^2S: from 1971Me12.
6710 *6*				
6720 *6*				
6788 *6*				
6892 *6*				
6903 *6*				
6965 *6*				
6999 *6*				
7017 *6*				
7037 *6*				
7133 *6*				
7164 *6*				
7183 *6*				
7190 *6*	3/2−[b]	1[b]	0.046[b]	
7254 *6*				
7330 *6*				
7335? *6*				
7353 *6*				
7359 *6*				
7369 *6*				
7401 *6*				
7413 *6*				

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^{32}S(d,p),(pol d,p) 1958En51,1975Li09,1976Bo18 (continued)

^{33}S Levels (continued)

E(level)[†]	J^{π}[a]	L[a]	C^2S[e]	Comments
7452 *6*	1/2⁻,3/2⁻[b]	1[b]	0.26,0.12[b]	C^2S: from 1971Me12.
7460 *6*				
7475 *6*				
7482 *6*				
7503 *6*				
7560? *6*				
7579? *6*				
7589? *6*				
7595? *6*				
7601? *6*				
7615 *6*	5/2⁻,7/2⁻[b]	3[b]	0.053,0.027[b]	E(level): weighted average from 1958En51 and 1971Me12. C^2S: from 1971Me12.
7629 *6*				
7658 *6*				
7693 *6*				
7711 *6*				
7749 *6*				
7766 *6*				
7779 *6*				
7797 *6*				
7828 *6*				
7840 *6*				
7862 *6*				
7892 *6*				
7906 *6*				
7983 *6*				
7991 *6*				
8015 *6*				
8584[‡] *10*	7/2⁻[c]	3	0.012[c]	
8644[‡] *10*	3/2⁺[c]	2	0.021[c]	
8670[‡] *10*	1/2⁻[c]	1	0.007[c]	
8687[d] *10*		2[d]		
8729[‡] *10*	7/2⁻[c]	3	0.031[c]	
8750[&] *3*	1/2⁺	0		J^{π},L: from 1975Li09 and 1976Bo18. Γ=20 keV *3*, from the analysis in 1968Bo18 of the neutron resonance data in 1950Ba88.
8837[‡&] *2*	1/2⁻[c]	1	0.005[c]	J^{π}: 1975Li09 also gives J^{π}=7/2⁻ (L=3). L: also from 1976Bo18. 1975Li09 also gives L=3. C^2S: 0.002 for J^{π}=7/2⁻ (1975Li09).
8873[‡] *10*	7/2⁻[c]	3	0.034[c]	
8908[d] *2*		1[d]		
8924[d] *2*		1[d]		
8939[‡] *10*	7/2⁻[c]	3	0.007[c]	
8942				E(level): from 1976Bo18.
8975[‡] *10*	7/2⁻[c]	3	0.003[c]	
9008[&d] *3*	1/2⁺[d]	0[d]		Γ=13 keV *3*, from the analysis in 1968Bo18 of the neutron resonance data in 1950Ba88.
9035[‡] *10*	3/2⁺[c]	2	0.0034[c]	
9115[‡] *10*	[c]		[c]	
9138[‡] *10*	3/2⁺[c]	2	0.027[c]	
9175[‡] *10*	[c]		[c]	

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^{32}S(d,p),(pol d,p) 1958En51,1975Li09,1976Bo18 (continued)

^{33}S Levels (continued)

E(level)[†]	J^{π}[a]	L[a]	C^2S[e]	Comments
9209[&d] *2*	3/2+[d]	2[d]	0.011	C^2S: from 1975Li09.
9245[‡] *10*	7/2−[c]	3	0.006[c]	
9280[‡] *10*	7/2−[c]	3	0.007[c]	
9316[&d] *3*	1/2+[d]	0[d]		
9346[‡&d] *3*	7/2−[cd]	3[d]	0.004[c]	L: 1976Bo18 gives L=1.
9361[d] *2*		1[d]		
9399[‡&d] *3*	3/2+[cd]	2[d]	0.021[c]	
9432[d] *3*		2[d]		
9460[‡] *10*	1/2−[c]	1	[c]	E(level),J^{π},L: from 1975Li09.
9537[d] *5*		1[d]		
9562[d] *5*		2[d]		
9605[d] *5*		0[d]		Γ=10 keV *4*, from the analysis in 1968Bo18 of the neutron resonance data in 1950Ba88.
9664[d] *5*		1[d]		Γ=11 keV *4*, from the analysis in 1968Bo18 of the neutron resonance data in 1950Ba88.

[†] From 1958En51, unless otherwise noted.
[‡] From 1975Li09, unless otherwise noted.
[#] Weighted average from 1958En51 and 1967Mo04.
[@] Weighted average from 1949Da16 and 1958En51.
[&] Weighted average from 1975Li09 and 1976Bo18.
[a] From the comparison of the DWBA prediction of the angular distribution with the experimental data.
[b] From 1971Me12, unless otherwise noted.
[c] From 1975Li09, unless otherwise noted.
[d] From the analysis in 1968Bo18 of the neutron resonance data in 1950Ba88.
[e] Spectroscopic factor C^2S: $NgC^2S=\sigma(\theta)_{exp}/\sigma(\theta)_{DWBA}$, where N is the normalization factor and $g=(2J_f+1)/(2J_i+1)$. N=1.58 (1971Me12), N=1.5 (1970Bo36). When two values are given, first corresponds to L-1/2 and the second to L+1/2 transfer.