

³²S(d,t) 2013Ir02,1977Tr02,1970Wh04

Type	Author	History	Citation	Literature Cutoff Date
Update	Jun Chen and Balraj Singh		ENSDF	23-Nov-2022

- 2013Ir02:** E(d)=24 MeV beam provided by MP tandem accelerator at MLL, Munich. Target=³²S ions implanted in 40 μg/cm² foil of 99.9% enriched ¹²C. Target thickness=11.7 μg/cm² 5. Tritons analyzed by Q3D magnetic spectrograph at Munich. Measured σ(θ) at 15°, 20°, 25°, 49°, 53.75°, 58.5°. Comparison with previous experimental data. Total of 16 proton-unbound levels reported above in the region of 6.3-7.1 MeV excitation, which is of astrophysical interest. Also **2012Ir01** conference paper.
- 2009Wr02:** E=25 MeV deuteron beam from Van de Graaff accelerator at Yale University. Enge magnetic spectrograph FWHM≈25 keV. Authors do not indicate which measurements are exclusively ³²S(d,t) and which are from ³¹P(³He,p). Two levels at 6837 and 6399 have been reported in this work and analyzed. The authors also observed these levels in (³He,t).
- 2022Ka18:** E(d)=23 MeV deuteron beam was produced from the Maier-Leibnitz-Laboratorium (MLL) tandem accelerator facility in Garching, Germany. Target was ≈120 μg/cm² natural ZnS on an ≈20 μg/cm² natural carbon backing. Outgoing tritons were momentum-analyzed using Q3D magnetic spectrograph (FWHM≈12-15 keV) and detected with the focal plane detector consisting of two gas proportional counters and a plastic scintillator. Measured σ(E_t) at θ_{lab}=55° and 45°. Deduced evidence for 6401 and 6648 levels in ³¹S. Calculated astrophysical reaction rate of ³⁰P(p,γ) and discussed its implications.
- 1977Tr02:** E=28 MeV deuterons from Princeton University AVF cyclotron. Cooled silicon detectors within a scattering chamber for ΔE-E measurements and angular distributions, FWHM=100 keV. CdS solid target. DWBA analysis.
- 1972Dz01:** E=17.7, 20.8, 23.0 MeV deuterons from Triangle Universities Cyclo-Van de Graaff accelerator. Scattering chamber with silicon ΔE-E telescopes for energy and angular distribution of tritons. Cs₂ gas target. DWBA analysis. FWHM=120 keV. Other: **1975DaYO:**(pol d,t), measured σ(θ), Ay(θ) unpublished thesis.
- 1970Wh04:** E=21.6 MeV deuterons from Yale Tandem Van de Graaff. Scattering chamber using ΔE-E telescopes for measurements of the triton energy and angular distribution (θ_{lab}=15°–75°). Enriched H₂S gas (95.0% ³²S) target. DWBA analysis. FWHM=90-100 keV.

³¹S Levels

2013Ir02 listed the following states in ³¹S as mirror states of levels in ³¹P: 5978,(9/2⁺) in ³¹S mirror of 6078, 9/2⁺ in ³¹P; 6138,(3/2,7/2)⁺ in ³¹S mirror of 6158,(1/2,3/2,5/2) in ³¹P; 6159,7/2⁺ in ³¹S mirror of 6233,(3/2,5/2,7/2)⁺ in ³¹P; 6259,1/2⁺ in ³¹S mirror of 6337,1/2⁺ in ³¹P; 6283,3/2⁺ in ³¹S mirror of 6381,3/2⁺ in ³¹P; and 6395,11/2⁺ in ³¹S mirror of 6453,11/2⁺ in ³¹P. Mirror assignments are from **2013Ir02**.

E(level) ^b	J ^π	L	C ² S ^a	Comments
0		0@	0.83	C ² S: other 0.87 (1970Wh04).
1250 [†] 10		2@	0.66	C ² S: other 0.55 (1970Wh04). Additional information 1.
2230 [†] 10		2@	1.94	C ² S: other 2.40 (1970Wh04). Additional information 2.
3280& 10		2&	0.44	
6327 [‡] #				E(level): mirror state of 6496, 3/2 ⁻ in ³¹ P.
6356 [‡] 2	5/2 ⁻			E(level): mirror state of 6594, 5/2 ⁻ in ³¹ P.
6377 [‡] #	9/2 ⁻			E(level): mirror state of 6502, 9/2 ⁻ in ³¹ P.
6394 [‡] 1	5/2 ⁺			E(level): mirror state of 6461, 5/2 ⁺ in ³¹ P. Other: 6398 6 in 2009Wr02 .
6402 [‡] 2	7/2 ⁽⁻⁾			E(level): mirror state of 6399, 7/2 ⁽⁻⁾ in ³¹ P. Evidence for this level at 6403 3 deduced also by 2022Ka18 .
6543 [‡] 2	3/2 ⁻			E(level): mirror state of 6610, 3/2 ⁻ in ³¹ P.
6584 [‡] 1	(5/2,7/2) ⁻			E(level): mirror state of 6842, (5/2) ⁻ in ³¹ P.
6636 [‡] #	9/2 ⁻			E(level): mirror state of 6796, 9/2 ⁻ in ³¹ P.
6648 4				E(level): from 2022Ka18 only.
6720 [‡] 1				

Continued on next page (footnotes at end of table)

 $^{32}\text{S}(\text{d,t})$ [2013Ir02](#), [1977Tr02](#), [1970Wh04](#) (continued) ^{31}S Levels (continued)

<u>E(level)^b</u>	<u>Comments</u>
6749 [‡] 2	
6834 ^{‡#}	E(level): 6837 7 in 2009Wr02 .
6869 [‡] 2	
6935 [‡] 2	
6958 [‡] 2	
6971 [‡] 2	
7034 ^{‡#}	

[†] From [1977Tr02](#).

[‡] Level from [2013Ir02](#).

[#] Known energy in literature used for calibration by [2013Ir02](#).

[@] From [1970Wh04](#), [1972Dz01](#) and [1977Tr02](#).

[&] From [1977Tr02](#).

^a From [1977Tr02](#), C²S formalism.

^b [Additional information 3](#).