^{34}S(p,p),(p,p′γ):resonances 1967Ko19,1977Ou01,1981Bi05

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen, John Cameron and Balraj Singh	NDS 112,2715 (2011)	20-Oct-2011

1967Ko19: ^{34}S(p,p′γ), E=2.78-3.08 MeV proton beam produced from the 4 MeV electrostatic accelerator of the Physical-Technical Institute of the Ukrainian SSR Academy of Sciences, in energy step of 1 keV. Enriched thin ^{34}S target. A 70 by 60 mm NaI(Tl) crystal for detecting the 2.13 MeV γ-ray of ^{34}S decay, resolution of 11.5% for the 0.622 MeV ^{137}Cs line. Measured $\sigma(E_p,\theta)$ from yields of the 2.13 MeV γ-ray, pγ(θ) of the 2.13 MeV γ-ray. Deduced resonance energies, J^π, relative resonance intensities.

1977Ou01: ^{34}S(p,p), E=1.45-2.82 MeV proton beam of 3-5 μA produced from the TUNL 3-MV Van de Graaff accelerator in energy steps of 100 eV for on-resonance and 400 eV for off-resonance, overall FWHM=350-450 eV. CdS target (enriched 90% ^{34}S) evaporated onto 5-10 μg/cm^2 carbon backings. Surface barrier detectors for protons at 90°, 105°, 135° and 160°. Measured $\sigma(E_p,\theta)$. Deduced resonance energies, J^π, Γ_p from R-Matrix analysis.

1981Bi05: ^{34}S(p,p), E=1.4-2.8 MeV 50-80 nA proton beam produced from the Groningen 5 MV Van de Graaff accelerator. Targets of 4 and 1 μg/cm^2 Sb_2S_3 (90% in ^{34}S) evaporated onto 10 μg/cm^2 carbon backings. Three silicon surface barrier detectors for detecting protons at 88°, 124° and 174°. Measured $\sigma(E_p,\theta)$. Deduced resonance energies, J^π, Γ_p. Also measured (p,γ).

1971BrXT: ^{34}S(p,p). Measured $\sigma(E_p)$. Deduced resonance energies, J^π, widths.

1974Bi16: ^{34}S(p,p), E=1.2-2.1 MeV protons produced from the Helsinki University 2.5 MV van de Graaff accelerator. Targets prepared from natural sulphur (4.22% ^{34}S) with ^{34}S ions embedded into carbon foils. Four silicon surface barrier detectors for detecting protons. Measured $\sigma(E_p,\theta)$. Deduced resonance energies, J^π, widths from analysis of the resonances.

Others: 1978Ce02, 1980Fa07, 1983Ch50, 1988Za04.

^{35}Cl Levels

A_2 and A_4 from pγ(θ) of the 2.13 MeV γ-ray from ^{34}S (1967Ko19).
R.I.: resonance intensity relative to 1 for E_p=2799 resonance (1967Ko19).

E(level)†‡	J^π[a]	Γ_p‡	E_p(lab)(keV)‡	Comments
7195#	1/2$^-$#		848	Γ=27 eV *8* (1971BrXT).
7274#	1/2$^-$#		929	Γ=14 eV *4* (1971BrXT).
7550@	7/2$^-$@	0.0072@ keV *15*	1214	Γ=11.0 eV *15*, Γ_γ=3.8 eV *15* (1974Bi16).
7686&	3/2$^-$&		1354	446 eV *15* for J^π=3/2$^-$ (1981Bi05).
7706&	3/2$^+$,5/2$^+$&		1375	Γ_p=4 eV *1* for J^π=5/2$^+$, 17 eV *3* for J^π=3/2$^+$ (1981Bi05).
7795.8 *5*	(1/2)$^-$	0.031 keV *10*	1467.3 *5*	
7837.3 *5*	3/2$^-$	3.73 keV *38*	1510.0 *5*	Γ=3.8 keV *2*, Γ_p=3.8 keV *2* (1974Bi16).
7880.0 *5*	3/2$^+$,5/2$^+$	0.008 keV *4*	1554.0 *5*	
8004.4 *5*	3/2$^+$,5/2$^+$	0.011 keV *5*	1682.1 *5*	Γ_p=21 keV*3* for J^π=5/2$^+$, 24 eV *3* for J^π=3/2$^+$ (1981Bi05).
8034.3 *5*	1/2$^-$,3/2$^-$	0.026 keV *7*	1712.9 *5*	
8038.2 *5*	1/2$^+$	0.30 keV *2*	1716.9 *5*	
8148.3 *5*	1/2$^-$	2.66 keV *27*	1830.2 *5*	
8149.5 *5*	3/2$^-$	0.56 keV *6*	1831.5 *5*	
8209.4 *5*	(5/2)$^+$	0.033 keV *10*	1893.2 *5*	Γ=100 eV *20*, Γ_p=120 eV *20* (1974Bi16).
8210.6 *5*	1/2$^+$	0.094 keV *15*	1894.4 *5*	Γ_p=39 eV *5* for J^π=5/2$^+$, 44 eV *6* for J^π=3/2$^+$, 120 eV *11* for J^π=1/2$^+$ (1981Bi05). Γ=270 eV *50*, Γ_p=270 eV *50* (1974Bi16).
8216@	5/2$^+$@	0.014@ keV *3*	1900	Γ=14 eV *4*, Γ_γ=0.78 eV (1974Bi16).
8243.4 *5*	3/2$^-$	0.140 keV *15*	1928.2 *5*	
8270.5 *5*	3/2$^+$,5/2$^+$	0.005 keV *3*	1956.1 *5*	
8278.8 *5*	3/2$^+$,5/2$^+$	0.006 keV *3*	1964.6 *5*	
8289.6 *5*	(1/2)$^-$	0.04 keV *1*	1975.7 *5*	Γ_p=49 eV *11* for J^π=3/2$^-$, 48 eV *6* for J^π=1/2$^-$ (1981Bi05).
8300.2 *5*	3/2$^-$	0.073 keV *15*	1986.7 *5*	
8383.3 *5*	3/2$^+$,5/2$^+$	0.023 keV *7*	2072.2 *5*	Γ=30 eV *7*, Γ_p=28 eV *6*, Γ_γ=2.4 eV (1974Bi16). J^π: 5/2$^+$ in 1974Bi16.

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^{34}S(p,p),(p,p′γ):resonances 1967Ko19,1977Ou01,1981Bi05 (continued)

^{35}Cl Levels (continued)

E(level)[†‡]	Jπ[a]	Γ_p[‡]	E_p(lab)(keV)[‡]	Comments
8404.4 *5*	$5/2^-,7/2^-$	0.002 keV *1*	2093.9 *5*	
8405.6 *5*	$(5/2^-,7/2^-)$	0.001 keV *1*	2095.2 *5*	
8409.0 *5*	$1/2^-$	0.125 keV *15*	2098.7 *5*	
8417.6 *5*	$1/2^+$	0.026 keV *7*	2107.5 *5*	
8435.4 *5*	$(3/2)^+$	0.090 keV *15*	2125.9 *5*	
8486.2 *5*	$3/2^+,5/2^+$	0.012 keV *5*	2178.2 *5*	
8487.7 *5*	$3/2^-$	0.150 keV *15*	2179.7 *5*	
8515.3 *5*	$1/2^-$	0.150 keV *15*	2208.1 *5*	
8573.3 *5*	$(5/2)^+$	0.08 keV *1*	2267.9 *5*	
8581.9 *5*	$1/2^+$	0.75 keV *8*	2276.7 *5*	
8592.3 *5*	$3/2^+,5/2^+$	0.003 keV *2*	2287.4 *5*	
8615.8 *5*	$5/2^+$	0.175 keV *20*	2311.6 *5*	
8620.2 *5*	$3/2^+,5/2^+$	0.002 keV *1*	2316.2 *5*	
8632.5 *5*	$(3/2,5/2^+)$	0.001 keV *1*	2328.8 *5*	
8643.3 *5*	$3/2^+,5/2^+$	0.003 keV *2*	2339.9 *5*	
8687.1 *5*	$5/2^-,7/2^-$	0.001 keV *1*	2385.0 *5*	
8689.2 *5*	$1/2^+$	0.20 keV *2*	2387.2 *5*	
8690.6 *5*	$1/2^-$	6.44 keV *65*	2388.6 *5*	
8697.7 *5*	$3/2^-$	0.8 keV *1*	2396.0 *5*	
8749.7 *5*	$3/2^-$	0.30 keV *3*	2449.5 *5*	
8774.7 *5*	$1/2^-$	0.571 keV *60*	2475.2 *5*	
8781.0 *5*	$3/2^-$	0.214 keV *25*	2481.7 *5*	
8788.2 *5*	$(3/2^+,5/2^+)$	0.001 keV *1*	2489.1 *5*	
8799.0 *5*	$(3/2^+,5/2^+)$	0.001 keV *1*	2500.3 *5*	
8824.8 *5*	$1/2^+$	1.70 keV *17*	2526.8 *5*	
8828.7 *5*	$1/2^-$	12.2 keV *12*	2530.8 *5*	
8829.8 *5*	$1/2^+$	0.080 keV *15*	2532.0 *5*	
8839.3 *5*	$5/2^-,7/2^-$	0.001 keV *1*	2541.7 *5*	Γ_p=4 eV *1* for $J^\pi=7/2^-$, 2 eV *1* for $J^\pi=5/2^-$ (1981Bi05).
8857.8 *5*	$3/2^+,5/2^+$	0.010 keV *5*	2560.8 *5*	
8869.8 *5*	$3/2^+,5/2^+$	0.027 keV *10*	2573.2 *5*	
8908.7 *5*	$3/2^+,5/2^+$	0.002 keV *1*	2613.2 *5*	
8955.4 *5*	$(3/2)^+$	0.075 keV *15*	2661.3 *5*	
8959.4 *5*	$(1/2^-,3/2^-)$	0.04 keV *1*	2665.4 *5*	
8983.3 *5*	$5/2^-,7/2^-$	0.003 keV *2*	2690.0 *5*	
8985.3 *5*	$3/2^+,5/2^+$	0.025 keV *10*	2692.1 *5*	
8997.9 *5*	$5/2^-,7/2^-$	0.002 keV *1*	2705.1 *5*	
9020.6 *5*	$3/2^-$	3.50 keV *35*	2728.4 *5*	
9031.3 *5*	$(5/2)^+$	0.04 keV *1*	2739.4 *5*	
9039.8 *5*	$1/2^-$	0.292 keV *30*	2748.2 *5*	
9048.1 *5*	$5/2^-,7/2^-$	0.001 keV *1*	2756.7 *5*	
9050.1 *5*	$(5/2)^+$	0.095 keV *15*	2758.8 *5*	
9083.5 *5*	$(5/2)^+$	0.057 keV *10*	2793.2 *5*	Γ_p=59 eV *7* for $J^\pi=5/2^+$, 67 eV *8* for $J^\pi=3/2^+$ (1981Bi05).
9089 *4*			2799 *4*	R.I.=1.
9100.7 *5*	$3/2^-$	0.20 keV *2*	2810.9 *5*	
9108 *4*			2818 *4*	R.I.=0.18.
9114 *4*			2825 *4*	R.I.=0.34.
9120 *4*			2831 *4*	R.I.=0.31.
9127 *4*			2838 *4*	R.I.=0.16.
9136 *4*			2847 *4*	R.I.=0.34.
9147 *4*			2859 *4*	R.I.=0.27.
9159 *4*			2871 *4*	R.I.=0.29.
9168 *4*	$(3/2^-)$		2880 *4*	R.I.=3.70. A_2=+0.19 *133*, A_4=+0.017 *1480* (1967Ko19).
9185 *4*			2898 *4*	R.I.=0.11.
9196 *4*			2909 *4*	
9207 *4*	$9/2^+$		2920 *4*	R.I.=1.70.

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^{34}S(p,p),(p,p′γ):resonances 1967Ko19,1977Ou01,1981Bi05 (continued)

^{35}Cl Levels (continued)

E(level)[†‡]	Jπ[a]	E_p(lab)(keV)[‡]	Comments
			A_2=+0.09 *18*, A_4=+0.37 *12* (1967Ko19).
9222 *4*		2936 *4*	R.I.=0.25.
9227 *4*	5/2−	2941 *4*	R.I.=0.59.
			A_2=+0.59 *28*, A_4=+0.29 *32* (1967Ko19).
9241 *4*	7/2+	2955 *4*	R.I.=2.32.
			A_2=+0.24 *40*, A_4=+0.27 *53* (1967Ko19).
9255 *4*		2970 *4*	R.I.=0.45.
9271 *4*		2986 *4*	R.I.=0.34.
9276 *4*		2991 *4*	R.I.=0.32.
9284 *4*	5/2−	3000 *4*	R.I.=3.86.
			A_2=+0.72 *28*, A_4=−0.17 *29* (1967Ko19).
9294 *4*		3010 *4*	R.I.=0.68.
			R.I.=0.68.
9299 *4*		3015 *4*	R.I.=0.45.
9325 *4*	5/2+	3042 *4*	R.I.=1.81.
			A_2=+0.81 *28*, A_4=−0.48 *35* (1967Ko19).
9336 *4*	7/2+	3053 *4*	R.I.=1.00.
			A_2=+0.17 *29*, A_4=+0.34 *40* (1967Ko19).
9345 *4*		3062 *4*	R.I.=0.50.
9349 *4*		3067 *4*	R.I.=0.50.
9355 *4*		3073 *4*	R.I.=2.23.

† From $E_x=E_{cm}$+Sp where S(p)=6370.82 *5* (2011AuZZ) and E_{cm} deduced from E_p(lab).
‡ From 1977Ou01, unless otherwise noted; values from 1967Ko19 after E_x=9101 keV.
# From 1971BrXT.
@ From 1974Bi16.
& From 1981Bi05.
a From comparison of experimental differential cross sections with theoretical predictions by R-Matrix calculations (1977Ou01) for levels E_x=9101 keV and from pγ(θ) (1967Ko19) for levels after that.