^{9}Be(^{36}S,^{35}Sγ) 2015MuZY,2021JoZZ

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Lijie Sun and Jun Chen	NDS 211,1 (2026)	30-Sep-2025

$J^{\pi}=0^{+}$ for ^{36}S ground state.

2015MuZY: a secondary beam of ^{36}S was produced via the projectile fragmentation of a 140-MeV/nucleon ^{48}Ca primary beam impinging on a 846-mg/cm^2 ^{9}Be target at the coupled cyclotron facility at NSCL, MSU. The ^{36}S nuclei were selected using the A1900 separator with an intensity of 8.1×10^5 pps and a purity of 89.7%. The excited states of ^{35}S were populated by the one-neutron knockout reaction from the ^{36}S beam at 88 MeV/nucleon (midtarget energy) on a 100-mg/cm^2 ^{9}Be secondary target located at the reaction target position of the S800 spectrometer. The projectile-like residues were identified from their energy loss measured by an ionization chamber located at the focal plane of the S800 spectrometer and from their ToF measured between two scintillators situated at the object position and at the focal plane of the S800 spectrometer. Prompt γ rays from the deexcitation of the ^{35}S residues were detected by seven modules of the GRETINA Ge array. Measured Eγ, Iγ, (^{35}S)γ-coin, $\gamma\gamma$-coin, the inclusive knockout cross section for producing ^{35}S from ^{36}S, the fractional populations and parallel momentum distributions of 11 populated states in ^{35}S residues. Deduced levels, J, π, L-transfers, partial knockout cross sections and spectroscopic factors. Calculated single-particle cross sections (σ_{sp}) for neutron removal and parallel momentum distributions using the eikonal model.

2021JoZZ: a more careful reanalysis of 2015MuZY data.

^{35}S Levels

b_f values under comments are population fraction in the knock-out reaction, σ_f^{sp} values are for calculated single-particle cross sections, and R_s values are quenching factors from a systematics study in 2014To14. The partial cross sections to each level can be deduced from $b_f\times\sigma_{inc}^{exp}$.

The inclusive cross section σ_{inc}^{exp} for producing ^{35}S from ^{36}S is measured to be 63.7 mb *6* (2015MuZY) and 67 mb *4* (2021JoZZ).

E(level)†	L‡	C^{2}S#	Comments
0	2	3.33 *76*	C^{2}S: 3.2 *7* (2015MuZY). b_f=44.5% *37* (2021JoZZ), b_f=43.3% *47*, σ_f^{sp}=13.1 mb, R_s=0.66 *13* (2015MuZY).
1572 *1*	0	1.26 *25*	C^{2}S: 1.1 *3* (2015MuZY). b_f=19.9% *8* (2021JoZZ), b_f=18.6% *31*, σ_f^{sp}=16.1 mb, R_s=0.64 *13* (2015MuZY).
1990	3	<0.2	C^{2}S: from 2015MuZY. C^{2}S=0.11 *20* (2021JoZZ). b_f=1.41% *10* (2021JoZZ), b_f<2.9%, σ_f^{sp}=12.7 mb, R_s=0.69 *14* (2015MuZY).
2348 *1*	1	0.34 *1*	C^{2}S: 0.4 *1* (2015MuZY). b_f=4.33% *8* (2021JoZZ), b_f=5.3% *13*, σ_f^{sp}=13.1 mb, R_s=0.70 *14* (2015MuZY).
2717 *2*	2	0.56 *12*	C^{2}S: 0.6 *2* (2015MuZY). b_f=6.14% *7* (2021JoZZ), b_f=6.4% *16*, σ_f^{sp}=11.4 mb, R_s=0.62 *12* (2015MuZY).
2939 *2*	(2)	0.31 *6*	L: 2015MuZY reports L=0. C^{2}S: 0.4 *2* (2015MuZY). b_f=3.99% *3* (2021JoZZ), b_f=5.7% *16*, σ_f^{sp}=13.5 mb, R_s=0.61 *12* (2015MuZY).
3421 *2*	2	0.49 *11*	C^{2}S: 0.5 *1* (2015MuZY). b_f=5.08% *5* (2021JoZZ), b_f=5.1% *10*, σ_f^{sp}=11.0 mb, R_s=0.61 *12* (2015MuZY).
3595 *5*	(2)	0.21 *6*	C^{2}S: 0.3 *1* (2015MuZY). b_f=2.13% *5* (2021JoZZ), b_f=3.0% *7*, σ_f^{sp}=11.0 mb, R_s=0.60 *12* (2015MuZY).
3818 *5*	(3)	0.25 *7*	C^{2}S: 0.3 *1* (2015MuZY). b_f=0.49% *4* (2021JoZZ), b_f=4.0% *9*, σ_f^{sp}=11.8 mb, R_s=0.72 *14* (2015MuZY).
3890 *4*	(0)	0.29 *9*	C^{2}S: 0.15 *4* (2015MuZY). b_f=3.09% *6* (2021JoZZ), b_f=2.3% *5*, σ_f^{sp}=13.5 mb, R_s=0.72 *14* (2015MuZY). L: inconsistent with $J^{\pi}=(5/2^{+})$ in the Adopted Levels.
4025 *4*	(2)	0.34 *9*	C^{2}S: 0.6 *1* (2015MuZY). b_f=3.98% *5* (2021JoZZ), b_f=6.4% *10*, σ_f^{sp}=12.1 mb, R_s=0.60 *12* (2015MuZY).
4948 *5*			

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^{9}Be(^{36}S,^{35}Sγ) 2015MuZY,2021JoZZ (continued)

^{35}S Levels (continued)

E(level)†
5349 *8*
5775 *4*

† From 2021JoZZ based on measured Eγ.
‡ From 2021JoZZ. L-transfers are deduced by comparing the measured and eikonal-calculated parallel momentum distributions of residuals. Parentheses around L values are added by evaluators due to poor fits.
# From 2021JoZZ, unless otherwise noted. The spectroscopic factor $C^2S=b_f\sigma^{exp}_{inc}/R_s\sigma^{sp}_f$, where b_f is the population fraction, σ^{exp}_{inc} is the measured total inclusive cross section, R_s is the quenching factor from a systematics study 2014To14, and σ^{sp}_f is the eikonal model calculated single-particle cross section.

γ(^{35}S)

E$_\gamma$†	E$_i$(level)	E$_f$	E$_\gamma$†	E$_i$(level)	E$_f$	E$_\gamma$†	E$_i$(level)	E$_f$	E$_\gamma$†	E$_i$(level)	E$_f$
778	2348	1572	1830	3818	1990	2717	2717	0	4948	4948	0
1309	4025	2717	1990‡	1990	0	2939	2939	0	5349	5349	0
1542	3890	2348	2036	4025	1990	3421	3421	0	5775	5775	0
1572	1572	0	2348	2348	0	3595	3595	0			

† From 2021JoZZ level scheme. γ-ray energy uncertainties are not given.
‡ Placement of transition in the level scheme is uncertain.

Legend

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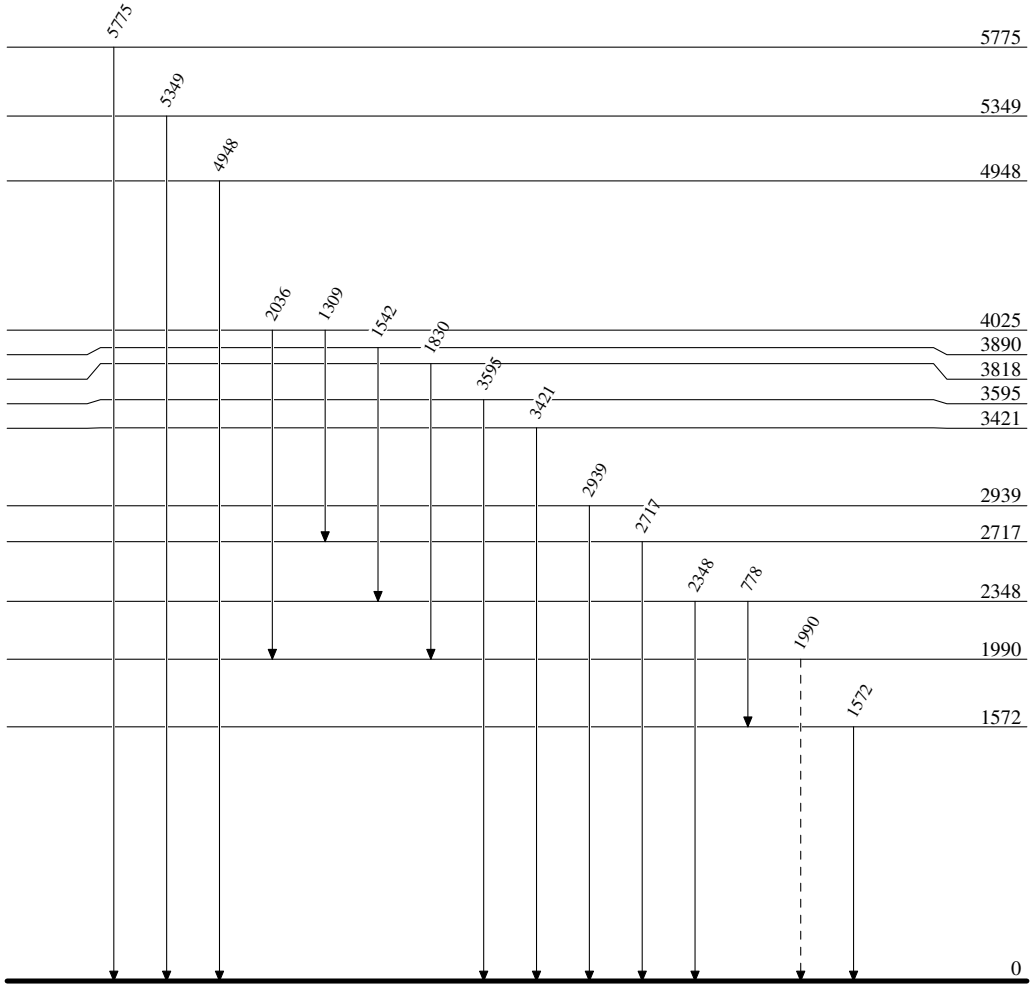
Level Scheme

γ Decay (Uncertain)



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