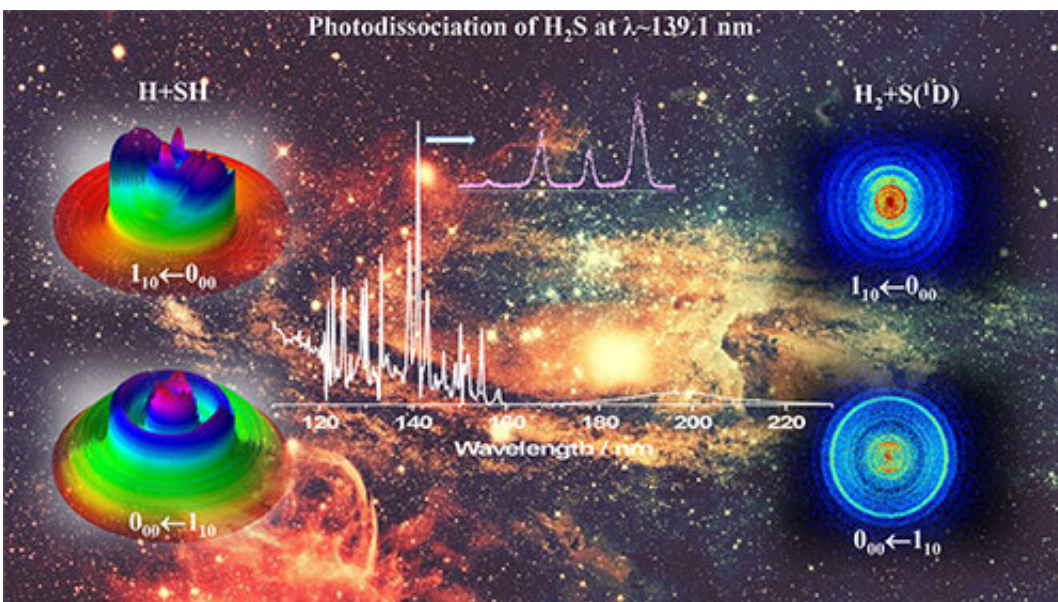


# Detailed photodissociation dynamics of hydrogen sulfide revealed

August 17 2021, by Li Yuan



Rotational and nuclear-spin level dependent multi-channel product measurement and photodissociation mechanisms of  $\text{H}_2\text{S}$ . Credit: ZHAO Yarui and YUAN Kaijun

Hydrogen sulfide ( $\text{H}_2\text{S}$ ) is one of the most important molecules in the solar nebula, and its photochemical process strongly relates to the production of the SH(X) radicals and sulfur atoms in the interstellar medium.

Previous studies found that the astronomical observation deduced SH(X) abundance ratio was lower than that predicted by the standard

astrochemical models in turbulent dissipation regions and shocks.

Recently, a group led by Prof. Yuan Kaijun from the Dalian Institute of Chemical Physics (DICP) of the Chinese Academy of Sciences (CAS), in collaboration with Prof. Mike Ashfold from the University of Bristol and Dr. Chris Hansen from the University of New South Wales, revealed strong rotational excitation dependence in the photodissociation dynamics of [hydrogen sulfide](#). This provides an alternative explanation for the observation of SH(X) radical dissipation in the interstellar medium and the source of sulfur atoms in comets.

This study was published in *Nature Communications* on July 22.

The researchers applied high-resolution translational energy spectroscopies to elucidate the detailed photodissociation mechanisms of H<sub>2</sub>S. They found that the photochemical process of H<sub>2</sub>S was far more complicated than the current theoretical predictions, and the findings might need to be added into the related astrochemical models.

"Our experiments provide one of the most complete experimental studies of molecular photofragmentation processes reported to date, affording initial parent quantum state and nuclear -spin dependent, and detailed investigation of competing product channels," said Prof. YUAN. "It reveals heterogeneous and homogeneous predissociation pathways following excitation to a Rydberg state of H<sub>2</sub>S."

"This work is a landmark in [photochemistry](#)," said one of the reviewers of the study.

**More information:** Yarui Zhao et al, Rotational and nuclear-spin level dependent photodissociation dynamics of H<sub>2</sub>S, *Nature Communications* (2021). [DOI: 10.1038/s41467-021-24782-6](https://doi.org/10.1038/s41467-021-24782-6)

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