

Sonith L. S.

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Research Interests

Observational stellar astrophysics; symbiotic stars, interacting binaries, and accreting white dwarfs; accretion, mass transfer, and outburst physics; novae and stellar transients; time-domain and multi-wavelength astronomy; optical spectroscopy and photometry; time-series and light-curve analysis; spectral energy distribution modelling; astronomical surveys, machine learning for stellar variability classification, and developing data reduction pipelines.

Education

2018–
Present **PhD in Astrophysics**, *Indian Institute of Astrophysics*, Bangalore.

Thesis: A Study of Symbiotic Stars

Advisor: Prof. Umanath S. Kamath

Thesis defence awaiting

2013–2017 **Integrated MSc (BSc–MSc Physics)**, *Pondicherry University*, Puducherry.

Skills and Technical Expertise

Spectroscopy: Time-resolved spectroscopy; IRAF, PyRAF, Specutils, and Python-based reduction pipelines; flux and equivalent width measurements; emission-line diagnostics and spectral analysis using Astropy.

Photometry & Time-Series: PSF photometry, light curve analysis, time-series analysis; periodicity estimation using Lomb–Scargle periodograms, phase dispersion minimisation, and related methods; variability studies of transient sources using Astropy and Photutils.

Programming & Research Tools: Python (Astropy, NumPy, Pandas, Matplotlib, Astroquery); IDL, SQL; Git, L^AT_EX; machine learning libraries including Scikit-learn, TensorFlow/PyTorch, and SciPy for statistical modelling.

Observations: Spectroscopic observations with HCT and photometric observations with GIT; planning and coordinating Target-of-Opportunity observations; 60+ nights of observing experience with HCT.

Data Analysis: Spectral energy distribution, emission line diagnostics, multi-wavelength data analysis, continuum modelling (cool giant, pseudo-photosphere, and nebular emission), statistical analysis of time-domain datasets, feature extraction, and light-curve classification.

Research Contributions: Long-term spectroscopic monitoring of symbiotic outbursts across orbital phases; characterisation of hot and cool-type outburst behaviour in YY Her, CM Aql and TCP J18224935-2408280; development of semi-automated pipelines for spectroscopic reduction; multi-wavelength analysis combining optical and X-ray observations.

Software Tools Developed

HFOSC Spectroscopic Pipeline: Developed a semi-automated pipeline for HFOSC spectroscopic calibration, extraction, and analysis. Used in five published papers ([GitHub](#)).

Gaia Curves: Tools for working with Gaia light curves.

Astrotools: Toolkit for time-series analysis, spectroscopic analysis, and emission-line diagnostics (private repository).

Telescope Time Awarded as PI

- 2020–2024 **Optical and near infrared spectroscopy of symbiotic stars.**
HIMALAYAN CHANDRA TELESCOPE (HCT), REGULAR PROPOSALS
- 2020–2024 **Observations of novae and symbiotic stars in outburst.**
HCT, TARGET-OF-OPPORTUNITY PROPOSALS
- 2022–2023 **Follow up observations of Z-And type outburst in symbiotic stars.**
GROWTH-INDIA TELESCOPE (GIT)
- Cycle A13 **X-ray Observation of Symbiotic Stars.**
ASTROSAT
Allocated observing time: 45 ks.

Publications

First- and Second-author Refereed Publications

- 2026 **Sonith, L. S.** & Kamath, U. S., CM Aql: Follow-up observations of a cool-type classical symbiotic outburst *The Astrophysical Journal* (under review).
- 2026 Swastik, C., Bestha, M., **Sonith, L. S.**, et al., [A Quiet Host in an Active Planet-Forming Disk: Optical Spectroscopy of WISPIT 2](#) *Astronomy & Astrophysics*, 712, L13 (Letter).
- 2026 Rawat, N. S., **Sonith, L. S.**, Kamath, U. S., et al., [Optical observations of the fast nova V1674 Herculis](#) *Monthly Notices of the Royal Astronomical Society*, 547, stag361.
- 2025 **Sonith, L. S.** & Kamath, U. S., [The 2021 Hot-type Symbiotic Outburst of YY Herculis: An Optical Follow-up Study](#) *The Astrophysical Journal*, 991, 229.
- 2023 **Sonith, L. S.** & Kamath, U. S., [TCP J18224935-2408280: A symbiotic star identified during outburst](#) *Monthly Notices of the Royal Astronomical Society*, 526, 6381.

Co-author Refereed Publications

- 2024 Basu, J., Pavana, M., Anupama, G. C., et al. (**Sonith, L. S.**), [Multiwavelength Observations of Multiple Eruptions of the Recurrent Nova M31N 2008-12a](#) *The Astrophysical Journal*, 966, 44.
- 2024 Nayana, A. J., Anupama, G. C., Roy, N., et al. (**Sonith, L. S.**), [Shock-driven synchrotron radio emission from the 2021 outburst of RS Ophiuchi](#) *Monthly Notices of the Royal Astronomical Society*, 528, 5528.
- 2024 Bhargava, Y., Dewangan, G. C., Anupama, G. C., et al. (**Sonith, L. S.**), [Soft X-ray and FUV observations of Nova Her 2021 \(V1674 Her\) with AstroSat](#) *Monthly Notices of the Royal Astronomical Society*, 528, 28.

In Preparation

- 2026 **Sonith, L. S.**, et al., Optical follow-up study of the 2021 outburst of the recurrent nova RS Ophiuchi Manuscript in preparation.

Conference Proceedings

- 2024 Bhargava, Y., Dewangan, G. C., Anupama, G. C., et al. (**Sonith, L. S.**), [Fast and Furious: Nova Her 2021 caught by AstroSat from UV to X-rays](#) *45th COSPAR Scientific Assembly*.
- 2024 Basu, J., Pavana, M., Anupama, G. C., et al. (**Sonith, L. S.**), [M31 nova survey using GIT and UVIT with focus on recurrent nova M31N 2008-12a](#) *42nd Astronomical Society of India Meeting*.
- 2022 Bhargava, Y., Dewangan, G. C., Singh, K. P., et al. (**Sonith, L. S.**), [Investigating periodicity in supersoft source Nova Her 2021 using AstroSat and GIT](#) *44th COSPAR Scientific Assembly*.

Astronomer's Telegrams

- 2022 Nayana, A. J., Anupama, G. C., Banerjee, D., et al. (**Sonith, L. S.**), [uGMRT observations of recurrent nova U Sco](#) *The Astronomer's Telegram*, 15449.
- 2022 Nayana, A. J., Anupama, G. C., Banerjee, D., et al. (**Sonith, L. S.**), [uGMRT detection of Galactic nova V1405 Cas](#) *The Astronomer's Telegram*, 15383.

- 2021 **Sonith, L. S.**, Basu, J., Anupama, G. C., et al., [Optical spectroscopy of the 2021 outburst of recurrent nova M31N 2008-12a](#) *The Astronomer's Telegram*, 15045.
- 2021 Nayana, A. J., Anupama, G. C., Banerjee, D., et al. (**Sonith, L. S.**), [uGMRT observations of the 2021 outburst of RS Ophiuchi](#) *The Astronomer's Telegram*, 14899.
- 2020 Pavana, M., Anupama, G. C., Sujith, D. S., et al. (**Sonith, L. S.**), [Optical spectroscopy of the 2020 outburst of recurrent nova M31N 2008-12a](#) *The Astronomer's Telegram*, 14140.

Conference Presentations

Contributed Talks

- 2025 31st Young Scientists' Conference on Astronomy and Space Physics (YSC 31), Kyiv, Ukraine (online), Contributed talk: **Optical follow-up study of YY Herculis outburst.**
- 2024 Indian Institute of Astrophysics In-House Science Symposium, Bengaluru, India, Contributed talk: **Optical follow-up study of YY Herculis outburst.**
- 2023 National Conference on Recent Trends in the Study of Compact Objects (RETCO-V), Kodaikanal, India, Contributed talk: **An optical follow-up study of the classical symbiotic outburst of TCP J18224935-2408280.**
- 2022 Transient Sky with Gaia Workshop, University of Coimbra, Portugal, Contributed talk: **Follow-up study of TCP J18224935-2408280: a symbiotic star identified during the outburst.**

Poster Presentations

- 2023 41st Annual Meeting of the Astronomical Society of India (ASI 2023), IIT Indore, India, Poster presentation: **Optical spectroscopic view on the classical symbiotic outburst of CM Aql.**
- 2023 Indian Institute of Astrophysics Foundation Day Symposium, Bengaluru, India, Poster presentation: **Optical Follow-up Study of TCP J18224935-2408280: A Symbiotic Star Identified During Outburst.**
- 2022 40th Annual Meeting of the Astronomical Society of India (ASI 2022), IIT Roorkee, India, Poster presentation: **Understanding the nature of TCP J18224935-2408280: a symbiotic star identified during outburst.**

Teaching & Organisation

- 2026 [Code/Astro 2026](#) Local Hub, Raman Research Institute, Bengaluru, India, **Teaching Assistant, Local Organiser, and Liaison**; coordinated participant communication, local logistics, and on-site workshop activities (22–27 June 2026).

Schools & Workshops

- 2021 **School on Stellar Spectroscopy and Astrophysical Parameterisation from Gaia to Large Spectroscopic Surveys**, *INAF, Italy (21–23 September 2021)*.
- 2021 **ZTF Summer School on Variable Stars**, *Zwicky Transient Facility (16–20 August 2021)*.
- 2021 **Code/Astro: Astronomy Software Development Workshop**, *Caltech and IPAC (June 2021)*.

Outreach and Public Engagement

Conducted astronomy outreach in rural schools around Bangalore, engaging students from different backgrounds through lectures and basic physics demonstrations. Participated in public science events (National Science Day, solar and lunar eclipses) and delivered astronomy talks in Malayalam for school and college students.

Media Coverage

- 2023 [TCP J1822 is a symbiotic star, observations find](#), *Phys.org*, 11 December 2023.