

# Rahul Gopalakrishnan

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## Work Experience

- ✦ **Software Engineer, SUIT Payload of Aditya-L1 Mission** Jun 2023 – Present  
Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune, India
  - Led the science and calibration observation planning during the SUIT payload verification phase.
  - Designed and implemented the SUIT data processing pipeline, handling 100 Gb of daily data and delivering science-ready products within 24 hours.
  - Developed the Quick Look Display (QLD) for real-time data quality assessment and the Sun Center Finder for ISRO's mission feedback, both deployed at ISRO.
  - Designed and implemented the SUIT internal database and query system for efficient data management along with the SUIT website with automated outreach product uploads.
  - Created the SUIT simulator to verify program sequences before execution.
  - Oversee daily operations at the SUIT Payload Operation Center, including observation planning, server maintenance, and data storage management.
- ✦ **AstroSat Support Executive, CZTI Payload of AstroSat Mission** Feb 2023 – May 2023  
Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune, India
  - Developed an automated Gamma Ray Burst (GRB) detection algorithm using the Sum Threshold method (Paper in preparation).
  - Conducted X-ray polarization analysis using CZTI data and maintained a comprehensive catalog.
- ✦ **Scientific Trainee, CZTI Payload of AstroSat mission** Feb 2022 – Feb 2023  
Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune, India
  - Developed a pipeline wrapper script to execute all processing modules based on user requirements.
  - Analyzed CZTI data and reported approximately 40 GRBs to the GCN Circulars Archive (View on ADS).
  - Investigated the detectability of GRBs with CZTI and presented findings at the AstroSat CZTI Workshop at IUCAA in September 2022.
  - Maintained the CZTI GRB catalog and updated it on the website (link).
  - Monitored instrument health, identified and disabled noisy pixels, and performed targeted GRB searches based on reports from other instruments.

## Research Experience

- 📖 **Masters Thesis - From Hydrodynamics to Astrophysics - A Numerical Study** May 2019 – April 2020  
Indian Institute of Science Education and Research (IISER), Bhopal  
Guide: Dr. Ritam Mallick, Associate Professor, IISER Bhopal, India  

Developed an exact numerical solver for Euler's equations and studied standard hydrodynamic problems such as the SOD shock tube and Sedov-blast problems by creating simulation codes. Applied these hydrodynamic techniques to model a toy supernova case, analyzing variations in physical properties.
- 📖 **Course Project - Simulating Oscillating Chemical Reaction** Jan 2019 – April 2019  
Indian Institute of Science Education and Research (IISER), Bhopal  
Guide: Dr. Nirmal Ganguly, Assistant Professor, IISER Bhopal  

Simulated the Belousov-Zhabotinsky (BZ) reaction, one of the most well-known oscillating chemical reactions, using numerical techniques such as the Runge-Kutta method and Newton-Raphson technique. Analyzed the conditions leading to periodicity and chaotic behavior in the reaction.
- 📖 **Reading Project - Introduction to Solid State Physics** May 2017 – July 2017  
Indian Institute of Science Education and Research (IISER), Bhopal  
Guide: Dr. Surajit Saha, Assistant Professor, IISER Bhopal  

Gained foundational knowledge in solid-state physics through laboratory work and literature review.

## Publications

### Journal Articles

- 1 Soumya Roy, Durgesh Tripathi, ... **Rahul Gopalakrishnan** ..., et al. "Near- and Mid-ultraviolet Observations of X-6.3 Flare on 2024 February 22 Recorded by the Solar Ultraviolet Imaging Telescope on board Aditya-L1". In: *The Astrophysical Journal Letters* 981.1 (Mar. 2025), p. L19. ISSN: 2041-8205, 2041-8213. [10.3847/2041-8213/adbobe](https://doi.org/10.3847/2041-8213/adbobe).

- 2 Soumya Roy, Durgesh Tripathi, ... **Rahul Gopalakrishnan** ..., et al. "X class flare on 31st december, 2023 observed by the Solar Ultraviolet Imaging Telescope". In: *The Astrophysical Journal Letter* (2025). Accepted.
- 3 Janmejy Sarkar, VN Nived, ... **Rahul Gopalakrishnan** ..., et al. "Test and Calibration of the Solar Ultraviolet Imaging Telescope (SUIT) on board Aditya-L1". In: (2025). <https://doi.org/10.48550/arXiv.2503.23476>.
- 4 Durgesh Tripathi, A. N. Ramaprakash, ... **Rahul Gopalakrishnan** ..., et al. "The Solar Ultraviolet Imaging Telescope on Board Aditya-L1". en. In: *Solar Physics* 300.3 (Mar. 2025), p. 30. ISSN: 1573-093X. [10.1007/s11207-025-02423-1](https://doi.org/10.1007/s11207-025-02423-1).
- 5 Divita Saraogi, J Venkata Aditya, ... **Rahul Gopalakrishnan** ..., et al. "Localization of gamma-ray bursts using AstroSat Mass Model". In: *Monthly Notices of the Royal Astronomical Society* 530.2 (Feb. 2024), pp. 1386–1393. ISSN: 0035-8711. [10.1093/mnras/stae435](https://doi.org/10.1093/mnras/stae435).



## In Preparation

- 1 **Rahul Gopalakrishnan**, Rushikesh Deogaonkar, Soumya Roy, et al. "Unraveling the Secrets of the lower Solar Atmosphere: One year of Operation of the Solar Ultraviolet Imaging Telescope (SUIT) on board Aditya-L1". In Prep. Feb. 2025.
- 2 **Rahul Gopalakrishnan**, Jitendra Joshi, Navaneeth P.K, et al. "Automated GRB detection using Sum-threshold Algorithm with CZTI". In Prep. Apr. 2025.
- 3 **Rahul Gopalakrishnan**, Nived V.N, Soumya Roy, et al. "Data Processing Pipeline of Solar Ultraviolet Imaging Telescope (SUIT) onboard Aditya-L1". In Prep. Mar. 2025.



## Conference Proceedings

- 1 **Rahul Gopalakrishnan**, Nived V. N, Durgesh Tripathi, et al. "Data processing pipeline of SUIT onboard Aditya-L1". In: *43rd Meeting of the Astronomical Society of India (ASI)*. Oral Presentation. Astronomical Society of India. NIT Rourkela, India, 2025.
- 2 **Rahul Gopalakrishnan**, Vipul Prasad, A.R Rao, et al. "Detectability of GRBs in CZT Imager of AstroSat". In: *Astrosat CZTI Workshop*. Oral Presentation. CZTI payload of AstroSat Mission. IUCAA Pune, India, 2022.
- 3 **Rahul Gopalakrishnan** and Ritam Mallick. "From Hydrodynamics to Astrophysics - A numerical Study". In: *In-House Physics Symposium*. Poster Presentation. IISER Bhopal, India, 2020.






## Workshops and Conferences

- Jan 6 – 10, 2025  **AI/ML Applications to Astronomy and Astrophysics**: Participation - Workshop for young researchers and faculty with a background in astronomy and astrophysics and an interest in the application of AI/ML techniques in Astronomy.
- Dec 5 – 7, 2019  **CompFlu-2019**: Participation - Meet for researchers in the interdisciplinary area of complex fluids and soft matter.

## Education



-  **BS-MS Dual Degree** Aug 2015 – Jul 2020  
 Indian Institute of Science Education and Research (IISER), Bhopal  
 CPI: 7.98/10  
**Relevant Courses**: Introduction to Astronomy and Astrophysics, Numerical Methods and Programming, Computational Fluid Dynamics, General Theory of Relativity, Quantum Field Theory, and Cosmology
-  **Higher Secondary Education** Jun 2013 – Mar 2015  
 ASMMHSS Alathur, Palakkad  
 Percentage: 97.08%

## Skills

-  **Languages** : Proficient in reading, writing, and speaking English, Hindi, and Malayalam, with strong speaking skills in Tamil.
-  **Programming** : Python (Astropy, SunPy, Matplotlib, NumPy, SciPy, etc.), C++, XML/XSL,  $\LaTeX$ , etc.
-  **Databases** : MySQL, SQLite
-  **Web Development** : HTML, CSS, JavaScript, Apache Web Server
-  **Operating Systems** : Linux

## Miscellaneous

### Achievements

- 2020  **DST Fellowship**: INSPIRE Fellowship for PhD
- 2015 – 2020  **INSPIRE Fellowship**: Awarded to the top 1% students in the year 2015

## References

### **Prof. Durgesh Tripathi**

Principal Investigator of SUIT/Aditya-L1

Senior Professor

Operation Director, SUIT Payload

IUCAA Pune, India,

Post Bag 4, Ganeshkhind, Pune, Maharashtra – 411007

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### **Prof. Gulab Chand Dewangan**

Senior Professor

IUCAA Pune, India,

Post Bag 4, Ganeshkhind, Pune, Maharashtra – 411007

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