

# ANUMANCHI AGASTYA SAI RAM LIKHIT

🌐 astropi-b.github.io — 🎓 Google Scholar — 📞 (+91) 7569758818 — ✉ astropi.2003@gmail.com

## EDUCATION

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**Indian Institute of Science Education and Research, Bhopal, India.**

Jun 2025

BS-MS in Physics (major) and Data Science and Engineering (minor)

MS (final year) CGPA: 9.80 / 10.0 — Overall CGPA: 8.03 / 10.0

*Master's thesis: Score-Based Reconstruction of Primordial Gravitational Waves from CMB B-Mode Polarization.*

**Sri Chaitanya Junior College, Vijayawada, India.**

Apr 2020

Mathematics, Physics, Chemistry, English and Sanskrit

GPA: 9.79/10.0

## RESEARCH INTERESTS

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- Galaxy Formation & Evolution
- Observational Cosmology
- N-body & Hydrodynamical Simulations
- High-Redshift Universe
- Radio Astronomy and Instrumentation
- ML & AI in Astrophysics

## RESEARCH EXPERIENCE

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**Simulations and Observational studies of Dwarf Galaxies**

Jan 2026 - Present

*Research Project* | *Supervisor: Prof. Samyaday Choudhury*

Ahmedabad University

- Analyzing dwarf and low-mass galaxies in IllustrisTNG-50 to study their gas content, star-formation activity, morphology, and feedback-related properties.
- Developing a simulation-analysis and mock-observation pipeline using SKIRT9 radiative-transfer outputs and UV-IR post-processing to connect simulated galaxy properties with observables from facilities such as AstroSat UVIT and JWST.

**Study of Interstellar Medium Filament Detection Algorithms and Application on the Galactic Plane Terahertz Surveys**

Aug 2025 - Present

*Project Associate* | *Supervisor: Prof. Samyaday Choudhury* Ahmedabad University & SAC-ISRO

- Analyzing filamentary structures in the interstellar medium using multi-wavelength dust observations to study density morphology and their connection to star-formation processes.
- Conducting a comparative study of filament detection algorithms and developing a quantitative methodology to evaluate the reliability and quality of predicted filament structures.

**Score Based Reconstruction of Primordial Gravitational Waves from CMB B-Mode Polarization**

Mar 2024 – Apr 2025

*Master's Project* | *Supervisor: Dr. Rajib Saha*

IISER Bhopal

- Simulated CMB datasets incorporating primordial B-modes, weak gravitational lensing, ECHO mission-level instrumental noise, and multiple complex polarization foreground combinations.
- Developed a score-based VE-SDE framework to reconstruct low- $\ell$  primordial CMB B-mode power spectra from simulated observations.
- Demonstrated reliable recovery of key low- $\ell$  B-mode spectral features down to  $r \sim 10^{-3}$ , showing the feasibility of score-based inference for next-generation CMB experiments.

**Commissioning and Data Analysis for the SKA-Low LPDA Radio Interferometric Beamforming Testbed at Gauribidanur Radio Observatory**

May 2023 - Aug 2023

*Visiting Student (VSP)* | *Supervisor: Dr. Prabu Thiagaraj*

Raman Research Institute

- Simulated the 100–350 MHz LPDA antennas and phased-array geometry in CST, characterizing beam patterns and broadband response for SKA-Low beamforming design.

- Commissioned the LPDA interferometric array at Gauribidanur by testing front-end electronics, verifying system stability, and performing observations of solar and Galactic plane transits.
- Built end-to-end pipelines for observations, interferometric analysis, and RFI mitigation, integrated into the remotely accessible GLOT web tool.

**Computer Vision and Deep Learning for Astronomy & Astrophysics** Jan 2024 - Jul 2024  
*Course Project (Extended Research Work)* | Supervisor: Dr. Akshay Agarawal IISER Bhopal

- Implemented a sector-based deep-learning pipeline for optimized star-galaxy classification using SDSS-DR18, achieving state-of-the-art performance through sky segmentation and a dedicated CNN architecture.
- Explored diffusion models and latent-space representations to generate realistic galaxy images with controllable physical properties, and to understand morphological and redshift-driven variations.

## PUBLICATIONS

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- [1] **Anumanchi Agastya Sai Ram Likhit** and R. Saha, “A generative reconstruction of low- $\ell$  CMB B-mode signal using reverse diffusion in deep learning,” *arXiv preprint*, 2025. Available: <https://arxiv.org/abs/2512.22683>
- [2] **Likhit, Anumanchi Agastya Sai Ram**, K. Naveen, B. A. Pandian, R. Abhishek, and T. Prabu, “Innovative web tool for remote data acquisition and analysis: Customized for SKA low frequency beamforming test bed LPDA array at Gauribidanur Radio Observatory,” *Journal of Astrophysics and Astronomy*, vol. 46, no. 1, p. 26, 2025. Available: <https://doi.org/10.1007/s12036-025-10052-0>
- [3] **Anumanchi Agastya Sai Ram Likhit**, D. Tripathi, and A. Agarwal, “A novel sector-based algorithm for an optimized star-galaxy classification,” in *The Second Tiny Papers Track at ICLR 2024*, 2024. Available: <https://openreview.net/forum?id=HzEefCle2c>

## POSTERS & ORAL PRESENTATIONS

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- [1] **Score-Based Diffusion for Low- $\ell$  Primordial CMB B-Mode Reconstruction.** (Flash Oral – accepted; to be presented remotely)  
*3rd International Conference on Machine Learning for Astrophysics (ML4ASTRO3), University of Malta, 31 Aug – 4 Sep 2026.*
- [2] **Developing a Quantitative Framework for Interstellar Medium Filament Analysis.** (Poster & Flash Talk)  
*Ahmedabad Astrophysics Meet II, Ahmedabad University, Feb 2026.* [Poster Link](#)
- [3] **A Search for Primordial Gravitational Waves Using Score-based Stochastic Differential Equations.** (Oral)  
*Department of Physics In-House Symposium, IISER Bhopal, 2025.* [Presentation Link](#)
- [4] **Two-Element Broadband LPDA Radio Interferometry: Exploring the SKA Low-Frequency Band.** (Poster)  
*42nd Meeting of the Astronomical Society of India (ASI 2024).* [Abstract Link](#)
- [5] **Innovative Remote Web Tool for SKA Test LPDA Array at Gauribidanur Radio Observatory.** (Poster & Flash Talk)  
*4th Annual Meet of Modern Engineering Trends in Astronomy (META 2023).* [Poster Link](#)

## ACHIEVEMENTS

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- Selected for a Flash Oral contribution at the 3rd International Conference on Machine Learning for Astrophysics (ML4ASTRO3), University of Malta. *Sep 2026*

- Best Poster Award, 4th Annual Meet of Modern Engineering Trends in Astronomy *Dec 2023*

## OUTREACH & LEADERSHIP

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- Conducted an astronomy outreach program for ~230 students at PM Shri School JNV Khatlall, Gujarat, including basic night-sky introduction, hands-on activities, and telescope observations; organized under ICARD (IUCAA) and Ahmedabad University in collaboration with Project Orion. *Feb 2026*
- Organized the Astronomy Outreach Event “From Ancient Myths to Modern Missions in Astronomy” at Ahmedabad University, conducted under IUCAA Centre for Astronomy Research and Development (ICARD) in collaboration with Project Orion (Invincible NGO). *Oct 2025*

## WORKSHOPS & TRAINING

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- Selected Participant, *Tackling the Big Data Universe: Signal Processing and Imaging using the MeerKAT Telescope*, Rajagiri School of Engineering and Technology (RSET), Kochi. *2026*
- L-Galaxies Workshop, MPA, Berlin (remote) *2025*
- AI/ML Applications to Astronomy & Astrophysics, IUCAA (remote) *2025*
- Sagan Summer Workshop, NASA NExSci (remote) *2024*
- Astrophysics Summer School, IIA Bangalore (remote) *2022*

## SKILLS

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**Astrophysics & Cosmology:** Astropy, Healpy, CAMB, Astroquery, SciPy, DS9, TOPCAT, Aladin, ESASky; JWST Data Reduction Pipeline; CST, GIZMO\*

**Programming:** Python, C/C++, MATLAB, Bash.

**Machine Learning:** PyTorch, TensorFlow, scikit-learn, JAX\*; diffusion models, CNNs.

**Computing & Tools:** Linux, HPC/SLURM, Git, L<sup>A</sup>T<sub>E</sub>X. *\* Elementary proficiency*