ANUMANCHI AGASTYA SAI RAM LIKHIT

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EDUCATION

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

- • Galaxy Evolution & Stellar Populations • Observational Cosmology • N-body & MHD Simulations
- • High-Redshift Universe • Radio Astronomy and Instrumentation • ML & AI in astrophysics

RESEARCH EXPERIENCE

Study of Interstellar Medium Filaments Detection Algorithms and Application on the Galactic Plane TeraHertz Surveys Aug 2025 - Present
Project Associate | Supervisor: Prof. Samyaday Choudhury   Ahmadabad 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 [1] 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-ℓ primordial CMB B-mode power spectra from simulated observations.
- Demonstrated reliable recovery of key low-ℓ 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 [2] 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 Agrawal   IISER Bhopal

- Reviewed modern applications of computer vision and deep learning in astronomy in the Big Data era, focusing on classification, representation learning, and generative modelling.
- Implemented a sector-based deep-learning pipeline [3] 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.

RESEARCH SOFTWARE & PROJECTS

- **SPAN (SPectral ANalyzer for SDSS-like FITS Files):** Python-based FITS spectrum analysis tool for stellar spectra from SDSS-like surveys, providing visualization, smoothing, automated absorption/emission line detection, atomic-line matching, and PDF report generation.   GitHub

- **Ashu Viksha (beta):** Developing and deploying an early-stage research literature discovery tool integrating arXiv, with keyword-based search, reference prediction, user libraries, and personalized reading collections; incorporating NLP-based methods for literature organization.   Demo

PUBLICATIONS

[1] **Anumanchi Agastya Sai Ram Likhit** and R. Saha, "A generative reconstruction of low-ℓ cmb b-mode signal using reverse diffusion in deep learning," in *arXiv Pre-Print*, 2025. [Online]. 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. [Online]. 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. [Online]. Available: `https://openreview.net/forum?id=HzEefCle2c`.

POSTERS & ORAL PRESENTATIONS

[1] **A Search for Primordial Gravitational Waves Using Score-based Stochastic Differential Equations** (Oral).
Department of Physics In-House Symposium, IISER Bhopal, 2025.   Presentation Link

[2] **Identifying Potential Habitats Beyond Earth: A Multilayered Statistical Analysis of NASA Confirmed Exoplanets** (Poster).
42nd Meeting of the Astronomical Society of India (ASI 2024).   Abstract Link

[3] **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

[4] **Innovative Remote Web Tool for SKA Test LPDA Array at Gauribidanur Radio Observatory** (Poster).
4th Annual Meet of Modern Engineering Trends in Astronomy (META 2023).   Poster Link

ACHIEVEMENTS

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

OUTREACH & LEADERSHIP

- 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

- 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

Astrophysics & Cosmology: Astropy, Healpy, CAMB, Astroquery, SciPy, DS9, TOPCAT, Aladin, ESASky; JWST Data Reduction Pipeline; CST.
Programming: Python, C/C++, MATLAB, Bash.
Machine Learning: PyTorch, TensorFlow, scikit-learn, JAX*; diffusion models, CNNs.
Computing & Tools: Linux, HPC/SLURM, Git, LaTeX.   * *Elementary proficiency*