Anumanchi Agastya Sai Ram Likhit

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Research Interests

Observational Cosmology, Radio Astronomy, Early Galaxy Formation and Evolution, Astronomical Instrumentation, Deep Learning and Exoplanets

Education

Majors: Physics
Minor: Data Science

Degree/Certificate	Institute/Board	CGPA(/10)	Year
BS-MS Physics	IISER Bhopal	7.81	2025
XII	Intermediate Education Andhra Pradesh	9.79	2020
x	Secondary Education Andhra Pradesh	9.8	2018

Honours and Awards

- **Best Poster Award** 4th Annual Meet of Modern Engineering Trends in Astronomy (META-2023) 2023.11

Publications

A Novel Sector-Based Algorithm for an Optimized Star-Galaxy Classification 2024.04
ICLR 2024 *https://doi.org/10.48550/arXiv.2404.01049*

An Innovative Web Tool for Remote Data Acquisition and Analysis : Customized for SKA Test LPDA Setup at Gauribidanur Radio Observatory. 2024.06
Journal of Astronomy & **Astrophysics (JoAA) 2025** *Accepted (Pre Print: arXiv.2501.13090)*

Poster & Oral Presentations

A Search for Primordial Gravitational Waves Using Score-based Stochastic Differential Equations (Oral) 2025.03

- Department of Physics In House Symposium, IISER Bhopal

Identifying Potential Habitats Beyond Earth: A Multilayered Statistical Analysis of NASA Confirmed Exoplanets. (Poster) (https://ui.adsabs.harvard.edu/abs/2024asi..confP.211S) 2024.02

- The 42nd meeting of the Astronomical Society of India (ASI - 2024)

Two Element Broadband Log-Periodic Dipole Antenna Radio Interferometry: Exploring the SKA Low Frequency Band (Poster) (https://ui.adsabs.harvard.edu/abs/2024asi..confP..01D) 2024.02

- The 42nd meeting of the Astronomical Society of India (ASI - 2024)

Innovative Remote Web Tool for SKA Test LPDA Array at Gauribidanur Radio Observatory. (Poster) (https://doi.org/10.13140/RG.2.2.22933.13283) 2023.11

- 4th Annual Meet of Modern Engineering Trends in Astronomy (META-2023)

Research Experience

Masters Project IISER Bhopal 2024.03 ~ present
Probing Primordial Gravitational Waves Using Score based SDE's on CMB B Mode

- Conducting cosmological simulations for the Cosmic Microwave Background (CMB) polarization using CAMB, Healpy, and PySM, incorporating realistic instrument systematics.
- Developing advanced score-based stochastic differential equations (SDEs) to reconstruct and denoise primordial B-mode polarization maps, aiming to detect signals from primordial gravitational waves.

SKAO Science Data Challange 3b SKAO 2024.06 ~ present
21 cm Cosmology

- Infering the reionization properties of the Universe from power spectra of the hydrogen-21cm signal from the Epoch of Reionisation corresponding to different redshift ranges, provided by SKA-Low simulations.
- Investigating and applying advanced statistical and machine learning techniques, leveraging high-performance computing (CESGA), to infer key reionisation parameters and properties.

Research Intern IISER Bhopal 2024.04 ~ present

Solving Data-Intensive Astronomical and Cosmological Problems

- Developed an optimized star-galaxy classification algorithm tailored for large-scale astronomical datasets.
- Developing Generative Models for realistic Galaxy Image Simulations with specific physical properties such as morphology and redshift.

Course Project - Cosmology IISER Bhopal 2024.08 ~ 2024.11

Exploring CMB Polarization: Theory, Simulations, and Observational Challenges.

- Investigated the theory, E and B modes, and the role of polarization in understanding primordial gravitational waves and large-scale structures.
- Simulated and analyzed CMB polarization power spectra to study scalar and tensor perturbations.

Visiting Student Raman Research Institute 2023.05 ~ 2023.12

Radio Astronomy Observations, Instrumentation and Data Analysis

- Designed and simulated an Array of Log Periodic Dipole Antennas in Computer Simulation Technology Software.
- Established setup of an antenna array at Gauribidanur Radio Observatory as part of the Square Kilometre Array (SKA) tests.
- Developed a custom data analysis pipeline for Radio Astronomy observations and Engineered a comprehensive user friendly web interface for the LPDA Array, streamlining remote observations, data downloading, and processing.

For more details on my Experiences listed above and other Experiences, please visit this page on my website.

Technical Skills

- **Programming**: C, MATLAB*, Python, LaTeX, CASA*, Git , Mathematica, SQL*, Linux, CST Microwave Studio, HPC.
- **English**: TOFEL iBT(94)

Relevant Coursework

- Introduction to Astronomy and Astrophysics
- Cosmology I & II
- Mathematical Methods I & II
- General Theory of Relativity
- Computer Vision
- Machine Learning
- Data Science in Practice
- Numerical Methods in Programming

Workshops and Summer Schools

- AI/ML Applications to Astronomy and Astrophysics at Inter-University Centre for Astronomy and Astrophysics (IUCAA). - 2025
- 2024 Sagan Summer Workshop at NASA Exoplanet Science Institute –Participated in hands-on sessions, expert talks, and collaborative discussions on exoplanet science. - 2024
- Astrophysics Summer School at Indian Institute of Astrophysics (IIA), Bangalore –Explored advanced topics in Astrophysics and Cosmology. - 2022

Affiliations

1. Contributing member of Validation of Transiting Exoplanets using Statistical Tools (VaTEST) (Profile)
2. Member of Computational Team of IISER Bhopal Astronomy Research Group (IBARG) (Profile)
3. Subject Matter Expert of Advanced Physics Chegg (Chegg India Pvt. Ltd.)(Profile)

Referees

- **Dr. Rajib Saha**
  Assistant Professor, Indian Institute of Science Education and Research Bhopal
  Email: rajib@iiserb.ac.in
- **Prabu T**
  Research Scientist, Raman Research Institute
  Email: prabu@rri.res.in