

ADAM ZACHARIA ANIL

adamzachariaanil20@iisertvm.ac.in | adamanil@mit.edu | adamzacharia.com
Indian Institute of Science Education and Research, Thiruvananthapuram

RESEARCH INTERESTS

Multi-messenger Astrophysics, Gravitational-Wave Astronomy, Scientific Machine Learning (SciML), Autonomous AI Agents, Large Language Models (LLMs), Radio Interferometry, AI-Based Sensing Control, Computational Astrophysics

RESEARCH EXPERIENCE

Quasar | Project

2025

NRAO X CosmicAI

Remote

- Under the guidance of Dr Adele L. Plunkett, NRAO
- Developing an autonomous agent in collaboration with **CosmicAI** that leverages Large Language Models (LLMs), designed to allow researchers to query NRAO archives using natural language. The agent parses these prompts to autonomously retrieve data and execute subsequent analysis routines without manual coding.

Artemis Lab | Internship

2025

Observatoire de la Côte d'Azur

France

- Under the guidance of Dr Eleonora Polini, Artemis Lab
- **Principal Investigator** - Dr Frédéric Cleva, Artemis Lab
- My research focuses on classification and ranking of coherent stray lights sources in VIRGO optical benches.

MIT LIGO | Master Thesis

2025

MIT Kavli Institute for Astrophysics and Space Research

USA

- Under the guidance of Dr Nikhil Mukund, MIT
- **Principal Investigator** - Dr Lisa Barsotti, Senior Research Scientist, MIT
- My research focuses on developing techniques to maintain the optimal performance of optical systems over extended periods using AI.

MIT LIGO | Internship

2024

MIT Kavli Institute for Astrophysics and Space Research

USA

- Under the guidance of Dr Nikhil Mukund, MIT
- **Principal Investigator** - Dr Peter Fritschel, Associate Director for LIGO-MIT
- AI based sensing and control for Advanced LIGO and LLM based Optical simulations

Daksha | Minor project

2024

IISER Thiruvananthapuram X IIT-B

India

- With Dr Shabnam Iyyani, IISER Thiruvananthapuram
- **Principal Investigator** - Dr Shabnam Iyyani, IISER Thiruvananthapuram
- The ongoing project is aimed at replicating and assessing Daksha's ability to Search for thermal emissions in Gamma-Ray Burst (GRB) data from Daksha.

SEDMv2 | Internship

2023

University of Minnesota X Caltech

USA

- With Dr Michael Coughlin (Project Scientist SEDMv2), University of Minnesota
- **Principal Investigator** - Shrinivas R. (Shri) Kulkarni, Caltech
- Aid in the automated reduction / fitting pipelines which have the significant potential for being expanded to rapidly and photometrically identify specific types of transients, e.g., rare transients like kilonovae.

Correlation Function Analysis | Internship

2023

HSF-India

India

- With Dr Brij Kishor Jashal (Project Scientist) and Dr Archana Radhakrishnan, TIFR
- **Principal Investigator** - David Lange, Princeton University
- This project is to develop a generic software layer on top of the existing frameworks that can perform the fits and solve the system of equations to get multiple form factors from three-point correlation functions in lattice QCD.

EDUCATION

- IISER Thiruvananthapuram, Kerala** — Integrated MS 2020 – Present
- Major: Physics, Minor: Data Science
- TKM Centenary Public School, Kerala** — Higher Secondary (Grade 12) 2020
- Percentage: 93
 - Subjects: Physics, Chemistry, Mathematics
- TKM Centenary Public School, Kerala** — Secondary (Grade 10) 2018
- GPA: 10

ACHIEVEMENTS

- **Young Innovators Program** Among the 14 students selected by the Kerala Government for Young Innovators Program
- Secured **Indian Knowledge Systems (IKS) grant** from the Central Government of India, facilitating advanced research in the domain of indigenous knowledge and its integration with contemporary practices to foster cultural preservation and sustainable development

PROJECTS, WORKSHOPS, TALKS AND POSTER PRESENTATION

Talk - OpticsGPT (MIT LIGO Lab)

- Talk on generating optical simulation codes using Large Language Models

Poster Presentation- OpticsGPT (NSF AI Institute for Artificial Intelligence and Fundamental Interactions)

- Presented a poster on OpticsGPT, an AI tool capable of generating optical simulation codes from images and description

Project - Stellar Classification

- Three person group project as part of coursework
- Classified stars into Dwarf and Giant Using ML.
- Used Machine Learning Classification (unsupervised and supervised), Dimensionality reduction and many other data analysis techniques on the dataset

ZTF Summer School - Caltech

- Organised by Caltech at University of Minnesota
- hands-on sessions and interactive classes, gaining practical experience in data analysis.
- Specific training in machine learning application for astronomical data

LIGO Gravitational-wave Open Data Workshop

- Interactive sessions and assignments on Gravitational wave data analysis

WORK AND VOLUNTEER EXPERIENCE

PSI(t) | *President* | 2022-2023

- Official Physics club of IISER Thiruvananthapuram
- Provided strategic leadership for the Physics Club, overseeing the planning and execution of guest lectures, workshops, study groups, and outreach programs
- Served as the main liaison between the club, university administration, and external organizations, ensuring effective representation and communication

ABLED | *Team Leader* | 2022-2024

- An APP to help differently abled. Spearheaded the project ABLED in collaboration with non profit organization Helping Hands to help the daily life of differently abled
- First Runner Up - Green Ideathon

iGEM | *Designer* | 2020-2021

- Was part of the outreach team for iGEM IISER TVM and worked as a designer for the outreach materials

COMPUTER SKILLS

Programming Python(NumPy, Astropy, SciPy, Pandas,) | C | Interferometer simulation - Finesse, OSCAR
Designing Adobe InDesign | Adobe Illustrator | Adobe Photoshop

OTHER INTERESTS

Digital Art | Music | Football | Computer Hardware | Photography

REFERENCES

1. Dr. Shabnam Iyyani

Assistant Professor
School of Physics
IISER, Kerala, India
Email: shabnam@iisertvm.ac.in

2. Dr. Adele L. Plunkett

Scientist
ALMA Science Center
NRAO, Virginia, United States
Email: aplunket@nrao.edu

3. Dr. Lisa Barsotti

Senior Research Scientist
MIT Kavli – LIGO Laboratory
MIT, Massachusetts, United States
Email: lisabar@ligo.mit.edu