

# AKSHITA MITTAL

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Indian Institute of Science Education and Research, Thiruvananthapuram  
Fifth Year BS-MS Student

## RESEARCH INTERESTS

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Gravitational-wave astrophysics, computational astrophysics, Bayesian statistics, machine learning, general relativity, cosmology, particle physics

## RESEARCH EXPERIENCE

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### Masters Project

Aug 2023 – Present

*IISER Thiruvananthapuram*

*India*

- With Dr Soumen Basak and Kallol Dey, IISER Thiruvananthapuram
- Exploration of the impact of eccentricity on parameter estimation for binary sources detectable by LISA

### Machine Learning Project

May 2023 – Present

*Kyoto University*

*Japan*

- With Prof. Takahiro Tanaka, Kyoto University and Dr Takahiro Yamamoto, Nagoya University
- Use of excess power method and CNN for an all-sky search of continuous gravitational waves for DECIGO

### Data Science Minor

Jan 2023 – Apr 2023

*IISER Thiruvananthapuram X IUCAA*

*India*

- With Dr Apratim Ganguly and Kanchan Soni, IUCAA and Dr Shabnam Iyyani, IISER Thiruvananthapuram
- Predictive GW analysis to explore underlying population distribution of compact binary parameters in deci-hertz band (Project Report)

### Remote Internship

July 2022 – Sept 2022

*Max Planck Institute for Gravitational Physics - Hannover*

*Germany*

- With Prof. Frank Ohme and Dr Krishnendu Nair, Max Planck Institute for Gravitational Physics, Hannover
- Analysis of effect of mass and distance on SNR of inspiralling binaries and on the mass of the graviton

### Remote Internship

Apr 2021 – June 2021

*Inter-University Centre for Astronomy and Astrophysics - Pune*

*India*

- With Prof. Sanjit Mitra and Kanchan Soni, Inter-University Centre for Astronomy and Astrophysics, Pune
- Literature survey for the use of GW higher-order modes in post-merger data analysis

### Remote Internship

July 2020 – Sept 2020

*Thapar Institute of Engineering and Technology - Patiala*

*India*

- With Dr Mamta Gulati, School of Mathematics, Thapar Institute of Engineering and Technology, Patiala
- In-depth study of *Fundamental Astronomy* by Hannu Karttunen and *Astrophysics for Physicists* by Arnab Rai Choudhari

## EDUCATION

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**IISER Thiruvananthapuram, Kerala** | Integrated MS

2019 – Present

- CGPA: 8.48

**West Point School, Kotkapura, Punjab** | Higher Secondary (Grade 12)

2018

- Percentage: 93.2
- Subjects: Physics, Chemistry, Mathematics

**Dasmesh Public School, Kotkapura, Punjab** | Secondary (Grade 10)

2016

- GPA: 10

## ACHIEVEMENTS

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- Awarded the **DAAD WISE** fellowship for the year 2022
- Gold Honor in the **International Astronomy and Astrophysics Competition 2020** (IAAC 2020)
- Winner of national-level physics research competition **Researchathon 2020** organised by the National Institute of Technology, Surat, India

## OTHER PROJECTS AND WORKSHOPS

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### **A Star is [Un]Born: Understanding Stellar Collapse**

- Semester project for course on general relativity and cosmology
- With Dr Sreedhar B Dutta, School of Physics, IISER Thiruvananthapuram
- Review of metrics and Tolmann-Oppenheimer-Volkoff (TOV) equations of different stellar bodies

### **LIGO Interferometer Noise**

- Paper presentation seminar organised by the Society of Materials and Mechanical Engineers, IIT Ropar
- With Dr Joy Mitra, School of Physics, IISER Thiruvananthapuram
- Reduction of thermal noise in LIGO interferometers by change in mirror coatings

### **SCUDEM 2020**

- With Dr Zehor Belkhatir, University of Leicester, England
- Modelling of decay of oil agglomerates from the Deepwater Horizon Accident using differential equations

### **LISC Continuous Gravitational Waves Workshop**

- Organised by ICTS in collaboration with LIGO India
- CGW data analysis basics: matched filtering, F-statistic, parameter space metric
- PyFstat to analyse CGW data

### **LIGO Gravitational Waves Science Communication Workshop**

- Organised by IUCAA and IISER Pune in collaboration with LIGO India
- Interactive sessions and assignments on effective science communication within and without academia

## WORK AND VOLUNTEER EXPERIENCE

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### **Research Matters** | *Writer* | 2021-Present

- Science communication platform by Gubbi Labs
- Reviews of scientific articles on physics, climate change and government policy

### **Dreamscape Media** | *Social Media Strategist* | 2021-Present

- Data and trend analyst for Dreamscape Media
- Core member of Dreamscape Media's social media management team

### **Inventa Magazine** | *Managing Editor* | 2021-22

- Annual inter-IISER magazine in collaboration with CEBS, NISER and IISc
- Member of the Operational Committee of the platform from 2021-22

## COMPUTER SKILLS

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### **Programming Packages**

Python | R | MATLAB | Wolfram Mathematica  
bilby\_pipe | gwosc | PyCBC | lalsuite

## OTHER INTERESTS

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Environmental and political activism | Hindustani music | Quizzing | Feminist and anti-caste literature