

AKSHITA MITTAL

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

EDUCATION

Integrated MS in Physics with Minor in Data Science IISER Thiruvananthapuram	Expected: July 2024
<ul style="list-style-type: none">CGPA: 8.63/10 (3.7/4)Relevant coursework: General Theory of Relativity and Cosmology — Mathematical Methods in Physics — Astrophysics — Statistical and Data Analysis Methods in Astronomy — Electromagnetism and Special Theory of Relativity — Computational Techniques and Programming Languages — Machine Learning — Introduction to Probability — Introduction to Data Science — Nuclear and Particle Physics — Optics	
Higher Secondary (Grade 12) West Point School, Kotkapura, Punjab	2018
<ul style="list-style-type: none">Percentage: 93.2Coursework: Physics — Chemistry — Mathematics — Physical Education	
Secondary (Grade 10) Dasmesh Public School, Kotkapura, Punjab	2016
<ul style="list-style-type: none">GPA: 10Coursework: Physics — Chemistry — Biology — Mathematics — Social Science	

RESEARCH INTERESTS

Compact binary mergers, multimessenger astronomy, fast parameter estimation, machine learning, pipeline development, Bayesian statistics, tests of general relativity

RESEARCH EXPERIENCE

Institute for Gravitation and the Cosmos, Penn State University <i>Resarch Project, PI: Prof. Bangalore Sathyaprakash</i>	Jun 2024 – Present <i>Pennsylvania, USA</i>
<ul style="list-style-type: none">To identify matter signatures in quasi-normal modes of remnant black holes in neutron star mergers	
School of Physics, IISER Thiruvananthapuram <i>Master's Thesis, PI: Dr. Soumen Basak</i>	Aug 2023 – Apr 2024 <i>Trivandrum, India</i>
<ul style="list-style-type: none">Explored the impact of eccentricity and spin mismodeling on parameter estimation (PE) for binary sourcesBuilt PyCBC plugin 'teobecc' to accommodate eccentricity and spinConducted PE and comparative analysis to understand parameter mismodeling [Thesis]	
Graduate School of Science, Kyoto University <i>Machine Learning Project, PI: Prof. Takahiro Tanaka</i>	May 2023 – Aug 2023 <i>Kyoto, Japan</i>
<ul style="list-style-type: none">Using an excess power method and convolutional neural network (CNN) for an all-sky search of continuous GWs for DECIGOEstimated the parameter space and number of grid points to cover the whole skyProposed and compared two methods to minimise the number of grid points	
IISER Thiruvananthapuram × IUCAA <i>Data Science Minor Thesis, PI: Dr. Apratim Ganguly, Dr. Shabnam Iyyani</i>	Jan 2023 – Apr 2023 <i>Trivandrum, India</i>
<ul style="list-style-type: none">Conducted predictive GW analysis to explore underlying population distribution of compact binary parameters in the deci-hertz bandGenerated a black hole population, noise and signals using bilby and PyCBCEvaluated the signal-to-noise ratio (SNR) for different frequency bandsDemonstrated enhanced capabilities of proposed deci-hertz observatory [Thesis]	
Max Planck Institute for Gravitational Physics <i>Internship, PI: Dr. Frank Ohme</i>	July 2022 – Sept 2022 <i>Hannover, Germany</i>
<ul style="list-style-type: none">Used PyCBC to study effect of mass and distance on SNR of inspiralling binaries and on the mass of the gravitonStudied modified dispersion relations in context of third-generation gravitational-wave detectors	
Inter-University Centre for Astronomy and Astrophysics <i>Internship, PI: Prof. Sanjit Mitra</i>	Apr 2021 – June 2021 <i>Pune, India</i>
<ul style="list-style-type: none">Learnt to conduct injection studies and parameter estimation for binary merger events using the bilby frameworkAttained proficiency in Python programming within the Vim editorConducted literature survey for the use of GW higher-order modes in post-merger data analysis	
Thapar Institute of Engineering and Technology <i>Internship, PI: Dr. Mamta Gulati</i>	July 2020 – Sept 2020 <i>Patiala, India</i>
<ul style="list-style-type: none">Studied 'Fundamental Astronomy' by Hannu Karttunen and 'Astrophysics for Physicists' by Arnab Rai ChoudhariDelivered regular presentations showcasing notes and insights during weekly sessions	

AWARDS, HONORS, AND FELLOWSHIPS

Hall of Fame, Science and Technology Council, IISER Thiruvananthapuram <ul style="list-style-type: none">Felicited for contributions to Exhibit A and the quizzing society at IISER Thiruvananthapuram	2024
oSTEM Graduate Application Aid Program <ul style="list-style-type: none">Selected for financial aid for graduate school application fees, aimed at gender and sexuality minorities in STEM	2023
Deutscher Akademischer Austauschdienst WISE (DAAD WISE) <ul style="list-style-type: none">Selected for the DAAD WISE fellowship to support research with Dr. Frank Ohme, MPI for Gravitational Physics, Hannover	2022
International Astronomy and Astrophysics Competition (IAAC) <ul style="list-style-type: none">Awarded the Gold Honor in IAAC 2020 for promotion to the final level	2020
SIMIODE Challenge Using Differential Equations Modeling (SCUDEM) <ul style="list-style-type: none">Received the Meritorious Award for solution on 'Problem A: Decay of Oil Agglomerates from the Deepwater Horizon Accident'	2020
Researchathon <ul style="list-style-type: none">Received gold medal in national-level physics research competition organized by the National Institute of Technology, Surat, India	2020

WORKSHOPS AND CONFERENCES

Cosmology from Home <ul style="list-style-type: none">Received exposure to the latest research in cosmology	2024
LISC Continuous Gravitational Waves Workshop <ul style="list-style-type: none">Acquired a foundational understanding of utilizing PyFstat for the analysis of continuous gravitational-wave (CGW) dataDeveloped proficiency of CGW data analysis methods: matched filtering, F-statistic, parameter space metric	2021
LIGO-India Education and Public Outreach (LIEPO) <ul style="list-style-type: none">Developed science communication for LIGO research, bridging the gap between academia and the wider public	2021

OUTREACH

Reading Between the Lines <i>Founder</i> <ul style="list-style-type: none">Founded an Ambedkarite reading circle at IISERCoordinating weekly book discussions and meetings, organising events to foster awareness	2023
Inventa Magazine <i>Managing Editor</i> <ul style="list-style-type: none">Led an intercollegiate team from 7 IISERs, NISER, IISc, and CEBS in a year-long projectProduced an educational podcast episode with Department of Science and Technology, RajasthanDeveloped and maintained website for the magazine	2021-22
Ether <i>Editor, Designer</i> <ul style="list-style-type: none">Wrote articles, reviews, and edited and designed editions	2020-22
Exhibit A <i>Founding member, Editor, Designer</i> <ul style="list-style-type: none">Wrote articles, coordinated, edited, and typeset editionsModerated interviews with eminent faculty in STEMSelected works: Hema Somanathan's Encounters With Bees, Ecology and the People of Science [The Wire Science]	2019-22
Club of Mathematics, IISER Thiruvananthapuram (CMIT) <i>Coordinator</i> <ul style="list-style-type: none">Wrote the by-laws and foundational framework for IISER's official mathematics club	2019-20

PRESENTATIONS AND POSTERS

"Impact of parameter mismodeling on gravitational-wave searches" <ul style="list-style-type: none">Final presentation for master's degree in physics	2024
"Impact of non-eccentric gravitational waveforms on eccentric gravitational-wave searches for LISA" <ul style="list-style-type: none">Midterm presentation for master's degree in physics	2023
"Exploring the Scope of Multiband Detection with Next-Generation Gravitational Wave Detectors" <ul style="list-style-type: none">Thesis presentation for minor degree in data science	2023
"How to Win an Internship: A Modern Guide to the Art of Applying" <ul style="list-style-type: none">Delivered oral presentation to IISER students on advice to secure internships in STEM	2022
"A Star is [Un]Born: Understanding Stellar Collapse" <ul style="list-style-type: none">Course project presentation for PHY5128: General Theory of Relativity and Cosmology	2022
"Estimating the Hubble Constant" <ul style="list-style-type: none">Course project presentation for PHY5132: Statistical and Data Analysis Methods in Astronomy	2022
"Materials Science Approaches to Increase LIGO Detectors' Sensitivity" <ul style="list-style-type: none">Presentation in online seminar organized by Society of Materials and Mechanical Engineers, IIT Ropar	2021
"Decay of Oil Agglomerates from the Deepwater Horizon Accident " <ul style="list-style-type: none">Delivered oral presentation on mathematical modelling for SCUDEM V	2020
"P vs. NP: An Overview" <ul style="list-style-type: none">Poster presentation of an introduction to the P vs. NP Millennium Prize Problem at the annual science fest <i>Anvesha</i>	2019

TEACHING EXPERIENCE

PHY312: Classical Mechanics | *Teaching Assistant*

Aug 2023 – Nov 2023

- Invigilated examinations and quizzes and maintained attendance records for students

OTHER WORK EXPERIENCE

Research Matters | *Writer*

2021-Present

- Conducting comprehensive literature reviews and readings across physics, climate change, and government policy

Dreamscape Media | *Social Media Strategist*

2021-Present

- Collaborating with a notably experienced team on advertising and social media management
- Managing and organizing calendars, scheduling posts, and maintaining regular client interaction

SKILLS AND MISCELLANEOUS

Programming

Python | R | MATLAB | Wolfram Mathematica

Technical Skills

Bayesian inference | Machine learning | Injection studies | Population studies

Modules

bilby | gwosc | PyCBC | LDC | lisa | lalsuite

Markup

Latex | HTML | CSS

Designing

Adobe InDesign | Adobe Illustrator | Adobe Spark

Other Interests

Activism | Hindustani music | Feminist and anti-caste literature