Prajakta Mane

Final Year, Physics Major, BS-MS, IISER Mohali

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Education

Indian Institute of Science Education and Research, Mohali — *Mohali, Punjab, India*

Integrated BS-MS Dual Degree, Physics Major with Astronomy and Astrophysics Minor — *Aug. 2019 - Jun. 2024 (Exp.)*

Cumulative Performance Index (CGPA): 8.3/10

Research Experience

Identifying Gravitational Lenses in Rubin LSST Data — *IUCAA, Pune*

Master's Thesis and INSPIRE Project; Supervisors: Dr Surhud More, Associate Professor, Dr Anupreeta More, Scientific Officer, Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune — *Apr. 2022 - Present*

- Developing a difference imaging pipeline, within the LSST Stack Framework, to identify the strongly lensed Type Ia Supernovae (SNIa) from the upcoming Vera-Rubin Telescope's LSST survey data.
- Prepared and analysing simulated dataset of multiply-imaged SNIa systems to look for a pattern that can act as an early-detection marker for multiple-imaged SNIa systems in future searches.
  Skillset involved: Gravitational Lensing, SNIa Modelling Templates, LSST Stack Software, HTCondor, High-Throughput Computing, Elementary PostgreSQL, Python Packages: lsst, SNCosmo

Study of Disk Winds in the X-ray Binary Systems — *IISER Mohali*

Supervisor: Dr Aru Beri, INSPIRE Faculty, Department of Physics, IISER Mohali — *Jun. 22 - Sept. 22; Sept. 23 - Present*

- Studying launching mechanism of the disk winds observed in the highly inclined X-ray binary systems by performing spectral analysis and high-resolution spectroscopy on observed X-ray spectra of one such system.
  Skillset involved: Accretion in X-ray Binary Systems, Spectral Fitting, CIAO (Chandra Interactive Analysis of Observations) Software, NASA HEASOFT Utilities: NICERDAS (NICER Data Analysis Software), XSPEC and SPEX (X-Ray Spectral Fitting Packages)

Study of the Tidal Disruption Events — *IISER Mohali*

INSPIRE Project; Supervisor: Dr Aru Beri, INSPIRE Faculty, Department of Physics, IISER Mohali — *May. 2021 - Jul. 2021*

- Carried out a literature review to familiarise myself with our current understanding of tidal disruption events, analysed Swift-XRT spectral data of a tidal disruption event candidate, and learned to model the accretion in such systems.
  Skillset involved: Spectral Fitting, NASA HEASOFT Utilities: XSPEC (X-Ray Spectral Fitting Package)

Application of Clustering Algorithms in RNA Velocity — *IISER Mohali*

In collaboration with Devang Liya, IISER Mohali and Dr. Ashwin Jainarayanan, University of Oxford — *May. 2020 - Jul. 2020*

- This project aimed to reconstruct the cell dynamics by analysing the amount of spliced and unspliced RNA within each cell. I worked on COVID-19 and Glioblastoma patients' data and constructed velocity maps using various dimensional reduction, clustering and fitting algorithms in R and Python. This work was left unfinished owing to data-related restrictions at a later stage.
  Skillset involved: Dimension reduction techniques: PCA, UMAP, tSNE; Data clustering algorithms: KNN; Python Packages: scVelo, Scanpy, CellRank; R Packages: velocyto.R.

Reading Project in Quantum Chemistry — *IISER Mohali*

INSPIRE Project; Supervisors: Dr Ramesh Ramchandran, Associate Professor, Department of Chemistry, IISER Mohali — *May. 2020 - Jul. 2020*

- Learnt the basics of quantum encryption and coded specific functions required to program the NMR machines in the lab in Fortran.
  Skillset involved: Elementary Fortran programming.

Computational Skills

Python	lsst, SNCosmo, AstroPy, GWpy, scVelo, Scanpy, CellRank, Matplotlib, Numpy, Scipy
Mission-specific data analysis software	LSST Stack, CIAO, NICERDAS
R	velocyto.R, Seurat, seurat-disk, dplyr
Other Languages	Elementary Fortran and C++; Matlab, Mathematica
Web-development	HTML, CSS, Elementary Java and Django
Misc.	Linux Operating System, HTCondor, LaTex, Elementary PostgreSQL, Arduino Uno

Relevant Coursework

Astronomy	Relativistic Cosmology and the Early Universe, Galaxies and Cosmology, Astrophysical Processes and Stars, Introduction to Astrophysical Fluids, Astronomy and Astrophysics (Introductory Astronomy)
Physics	Nuclear and Particle Physics, Atomic and Molecular Physics, Quantum Mechanics I and II, Classical Mechanics I and II, Quantum Computation and Quantum Information, Statistical Mechanics, Math Methods for Physicists, Electrodynamics, Waves and Optics, Thermodynamics
Math	Probability and Statistics, Introductory Linear Algebra and Group Theory, Curves and Surfaces, Analysis in One Variable
Computational	Computational Methods in Physics, Number Theory and Cryptography

Workshops and Conferences

ZTF Summer School 2023 *University of Minnesota, USA*

Virtual Attendee *Jul. 24 to 28, 2023*

Participated virtually in the ZTF (Zwicky Transient Facility) summer school that aimed to provide graduate-level astronomy students with hands-on experience and training in processing of ZTF and other transient survey data using modern data science techniques.

Vigyan Vidushi 2023 – Physics *HBCSE, TIFR, Mumbai, India*

In-person Participant *Jun. 20 to Jul. 1, 2023*

One of the 40 (out of 700 applicants) participants across India to participate in the TIFR advanced program in Physics for women students in first-year of MSc. Participated in various physics modules, from Electrodynamics to Thinking Through Problems. Got exposure to the field of Physics Education Research.

Introductory Summer School in Astronomy and Astrophysics *IUCAA, Pune*

Virtual Attendee *May. 16 to Jun. 17, 2022*

Attended lectures on topics in astrophysics and cosmology, ranging from X-ray binaries, fluids and plasma physics to gravitational waves and gravitational lensing by faculty members from IUCAA, TIFR, and other leading research institutes in India.

Conferences for Undergraduate Women in Physics (CUWiP) *American Physical Society*

Virtual Attendee *Feb. 11 and 12, 2023*

Attended the virtual 2023 APS Conferences for Undergraduate Women in Physics (CUWiP) that aims to help undergraduate women continue in physics by providing them with information about graduate school and professions in physics and access to other women mentors of all ages with whom they can share experiences, advice, and ideas.

Vijyoshi National Science Camp 2019 *IISc, Bangalore*

INSPIRE Fellow *Dec. 2019*

Selected for and participated in the annual national science camp in India, organised by KVPY in collaboration with the INSPIRE program, at the Indian Institute of Science, Bangalore. The camp aimed to provide a forum for interactions between bright young students and leading researchers in various branches of Science and Mathematics.

Awards and Activities

Department of Science and Technology, Government of India

Recipient of INSPIRE-SHE Scholarship *2019 - Present*

- INSPIRE Scholarship for Higher Education (INSPIRE-SHE) is offered to the top 1 percentile students on the national level based on their 10+2 level exam performance by the Department of Science and Technology to promote students to take up science research as a career option.

American Physical Society *IISER Mohali*

Student Ambassador *Sept. 2023 - Present*

- One of the 83 students selected worldwide to represent the American Physical Society (APS), to discuss problems faced by undergraduate students in physics worldwide, and to be a mediator between the APS and the students in India to provide solutions.

The Astronomy Club *IISER Mohali*

Club Convener *Nov. 2021 - Oct. 2022*

- As the convener of The Astronomy Club, a student-run astronomy club of IISER Mohali, organised various public outreach events, competitions, and talks related to astronomy to promote astronomy among the students of the institute and the members of the public.
- Was responsible for managing the club's social media, collaborating with other student-run clubs and other institutes for outreach activities, and utilising the club funds efficiently.
- Led the organisation of astronomy-based activities for IISER Mohali Foundation Day, 2022. Hosted over 300 school students from grade 3 to grade 12 for a total of 8 astronomy-based demos and activities designed and developed by club members.
- Led the organisation of the first-of-its-kind, two-day-long astronomy symposium at IISER Mohali in hybrid mode to provide exposure to research topics in astronomy to the newly enrolled students. The symposium included talks presented by 14 former students of the institute and was attended by about 100 participants from various institutes.

Women in Physics, Math and Astronomy, WiPMA, Initiative *IISER Mohali*

Co-founder and Core Team *Dec. 2021 - Jun. 2023*

- Co-founded the Women in Physics, Math and Astronomy, a one-of-its-kind group among all the national institutes, at IISER Mohali, with the aim to encourage undergraduate women to continue their careers in physics, math, and astronomy while providing a safe space to talk about issues faced, particularly by women in these fields.
- Organized various academic events, informal sessions, and public talks addressing the gender disparity in science, focussing on physics, math, and astronomy.
- Collaborated with members of the GATI (Gender Advancement for Transforming Institutions) initiative by the Government of India to raise awareness about the issue of gender disparity in STEM by arranging talks and conducting interviews.

Extra-curricular Interests

Ornithology An avid, amateur birder, having identified over 130 bird species in the span of less than three years.

Crochet Amateur crochet artist, especially interested in making small decoration artefacts.

Sports Badminton and chess for recreation, competed in district-level badminton tournaments, competed in inter-batch womens' chess tournaments in the third and fourth year (secured third position) of undergrad.

Books/Podcasts A voracious reader, also enjoys podcasts, specifically into science fiction, mystery thrillers, and comics.