Esha Sajjanhar

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Education

Post-Graduate Diploma in Advanced Studies and Research (DipASR) *Aug 2024 – Present*
Ashoka University *GPA 4.0/4.0*
Pursuing an advanced major in Physics with a minor in Astronomy, and writing a thesis under Prof. Dipankar Bhattacharya.

B.Sc. (Hons) Physics *Aug 2021 – May 2024*
Ashoka University *GPA 3.82/4.0*
Graduated *Magna Cum Laude* and awarded Dean's list for academic excellence in all semesters.

Research Experience

PI for 18-hour Observation with the Very Long Baseline Array *Upcoming*
NRAO Semester 2025A (Co-authors: Salmoli Ghosh, Dr. Preeti Kharb)

- Awarded 18 hours on the VLBA during semester 2025A as principal investigator (proposal ID VLBA/25A-171)
- Searching for a parsec-scale jet in the changing-look AGN NGC 3516 using a multi-frequency observation to explore radio variability associated with changing-look events.

Studying QPOs in GX339-4 using AstroSat *Ongoing*
Post-Graduate Diploma Thesis (Advisor: Prof. Dipankar Bhattacharya) *Ashoka University*

- Using X-ray data from AstroSat to study quasi-periodic oscillations (QPOs) in the low mass X-ray binary GX339-4.
- Probing the physical mechanisms behind QPOs by identifying and characterising them using Comptonization models

Multi-Scale Radio Study of NGC 3516 *May – Jul 2024*
Visiting Students' Research Programme (Advisor: Dr. Preeti Kharb) *National Centre for Radio Astrophysics*

- Studied the morphology of the radio jet of the AGN NGC 3516 at multiple spatial scales using archival VLA and VLBA data.
- Examined variability of the core of a changing-look AGN to find radio signatures of a changing-look event

Detecting HI (21 cm) Line Signal Using a Horn Antenna *Jun – Aug 2023*
Research Assistantship (Advisor: Prof. Dipankar Bhattacharya) *Ashoka University*

- Observed galactic HI line using a low-cost horn antenna and found the spectrum to be in agreement with LAB survey.
- Worked closely on designing an undergraduate lab experiment on using the horn antenna to observe galactic HI.

Evaluating Predictions of Inflationary Models *Jul – Sep 2022*
Research Internship (Advisor: Prof. Sául Ramos-Sánchez) *Old Dominion University*

- Studied the predictions of various inflationary models and evaluated their agreement with CMB data from Planck.

Publications

A Multi-Epoch, Multi-Scale Study of the Changing-Look AGN NGC 3516 and its Relation to Accretion *In preparation*
Ghosh, S.; ***Sajjanhar, E.***; Kharb, P.

Challenging Predictions of Inflationary Models with CMB Data *2022*
Bhattacharya, R.; Debnath, A.; ***Sajjanhar, E.***; Sardeshpande, S.; Tenorio Hernández, P.; Torres Heredia, J. R.
DOI 10.25776/996j-jz39

Projects

Studying the Kosterlitz-Thouless Phase Transition in the 2D XY model *Monsoon 2023*
Course: Statistical Physics; Instructor: Prof. Bikram Phookun
Studied the Kosterlitz-Thouless phase transition and its effects on specific heat and vorticity by numerically modelling the 2D XY model.

Modelling Gravitational Effects of Stellar Oblateness *Summer 2022*
Advisor: Prof. Bikram Phookun
Analysed the effects of stellar oblateness on stable planetary orbits by measuring their precession numerically.

Modelling Orbits Around Binary Star Systems *Spring 2022*
Course: Mathematical Physics I; Instructor: Prof. Vikram Vyas

Evaluated the stability of various possible S-type and circumbinary orbits in a binary star system using an n-body simulation.

Teaching Assistant Positions

AST1080: Observing the Cosmos (Introductory Astronomy Lab) *Spring 2024*
Course instructors: Prof. Dipankar Bhattacharya, Prof. Somak Raychaudhury *Ashoka University*

Lodha Genius Programme (Mathematics Module) *Summer 2023*
Mentorship programme in science and mathematics for high school students. *Ashoka University*

Conferences and Schools

Radio Astronomy Winter School *December 2023*
Part of 25 student cohort selected across India *IUCAA-NCRA*

11-day school consisting of lectures and experiments in the techniques of Radio Astronomy organized jointly by the Inter-University Centre for Astronomy and Astrophysics (IUCAA) and the National Centre for Radio Astrophysics (NCRA).

Ashoka Student Astronomy Conference *11 November 2023*
Organizer & Presenter *Ashoka University*

Organized the first student conference on amateur Astronomy with a focus on undergraduate research in Radio Astronomy and presented work on using a low-cost radio telescope to observe the 21cm line.

Curves and Surfaces: Geometry and Physical Application *May - Jun 2022*
Summer School instructed by Prof. Joseph Samuel *International Centre for Theoretical Sciences*

Introductory course on geometry and topology with an emphasis on their physical applications to polymers and membranes.

Nuclear and Particle Physics Mentorship *Aug - Oct 2021*
Mentors: Prof Raúl Briceño, Prof Andrew Jackura *Old Dominion University*

Introductory course in the paradigms of research in nuclear and particle physics.

Talks and Posters

***Talk:* The Kosterlitz-Thouless Phase Transition in the 2D XY Model** *Apr, 2024*
2nd place, Meera Memorial Paper Reading Competition *St. Stephen's College, University of Delhi*

***Poster:* Observing Galactic Hydrogen** *Feb, 2023*
Ashoka Science Research Festival *Ashoka University*

***Talk:* Gravitational Effects of Stellar Oblateness** *Mar 2023*
Meera Memorial Paper Reading Competition *St. Stephen's College, University of Delhi*

***Talk:* Introduction to Python for Physics** *Spring 2024*
Ashoka Physics Society Annual Workshop *Ashoka University*

***Talk:* Multi-Messenger Astronomy** *Summer 2023*
Young Scholars Programme for High School Students *Ashoka University*

Technical Proficiencies

Astronomical Software and Tools

Optical	IRAF, Siril
X-Ray	HEASOFT, XSpec, GHATS
Radio	AIPS, CASA
General	ds9

Programming Languages

Python, Bash

Others

LaTeX

Leadership Roles

Editor, Ashoka Physics Journal *Apr 2023 - May 2024*
Headed editorial and website teams for Ashoka Physics Society *Ashoka University*
Ashoka Physics Journal 2024 Ashoka Physics Society Webpage

Other interests: *Reading, Writing, Astrophotography*