

# Esha Sajjanhar

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## Education

### Post-Graduate Diploma in Advanced Studies and Research (DipASR) [🔗](#)

Aug 2024 – Present

Ashoka University

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

[Project report](#) [🔗](#)

### 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

**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](#) [🔗](#)