Esha Sajjanhar

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Education

Integrated PhD in Astrophysics *Aug 2025 onwards*
National Centre for Radio Astrophysics, TIFR

Post-Graduate Diploma in Advanced Studies and Research (DipASR) ***GPA 3.89/4.0***
Ashoka University *Aug 2024 – May 2025*

Graduated *Magna Cum Laude* with an advanced major in physics, a minor and thesis in astronomy. Awarded for academic excellence in Physics and placed on the Dean's list for academic excellence in all semesters.

B.Sc. (Hons) Physics ***GPA 3.82/4.0***
Ashoka University *Aug 2021 – May 2024*

Graduated *Magna Cum Laude* and placed on the Dean's list for academic excellence in all semesters.

Research Experience

Studying QPOs in GX339-4 using AstroSat *Ashoka University*
Post-Graduate Diploma Thesis (Advisor: Prof. Dipankar Bhattacharya) *Aug 2024 - May 2025*

- Used X-ray data from AstroSat to study quasi-periodic oscillations (QPOs) in the low mass X-ray binary GX339-4.
- Studied the timing properties of QPOs to understand Comptonisation in the black hole corona.

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

- Studied the morphology of the radio jet of the AGN NGC3516 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 *Ashoka University*
Research Assistantship (Advisor: Prof. Dipankar Bhattacharya) *Jun – Aug 2023*

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

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

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.

Successful Telescope Proposals

GMRT Proposal 48_079 (2025). *Searching for Evidence of Episodic Activity in the Changing Look AGN NGC3516*. PI: **Esha Sajjanhar**. Co-I: Salmoli Ghosh, Preeti Kharb.

NRAO VLBA Proposal VLBA/25A-171 (2024). *Searching for a Parsec-scale Jet in the Changing Look AGN NGC 3516*. PI: **Esha Sajjanhar**. Co-I: Salmoli Ghosh, Preeti Kharb.

Publications

Ghosh, S., Kharb, P., **Sajjanhar, E.**, Pasetto, A., and Sebastian, B., "*Magnetic Field in the Lobes of the Seyfert Galaxy NGC 3516: Suggestions of a Helical Field*", The Astrophysical Journal, vol. 989, no. 1, Art. no. 40, 2025.

Bhattacharya, R.; Debnath, A.; **Sajjanhar, E.**; Sardeshpande, S.; Tenorio Hernández, P.; and Torres Heredia, J.R., "*Challenging Predictions of Inflationary Models with CMB Data*" (2022). 2022 REYES Proceedings.

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 university's 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*
Participant *ICTS, TIFR*

Introductory course on geometry and topology with an emphasis on their physical applications to polymers and membranes instructed by Prof. Joseph Samuel.

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:* 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
Misc.	ds9

Programming Languages

Python, Bash

Others

LaTeX

Other interests: *Reading, Writing, Astrophotography*