# Priyam Das

**PhD Candidate, UNSW Canberra (ADFA)**
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## About Me

I am an astrophysicist working at the interface of observations and modelling. My research combines detailed integral-field spectroscopic analysis, spectral diagnostics, and data-driven methods to investigate explosion physics, shock conditions, and the 3D structure of ejecta. I am experienced in large-scale spectral analysis and reduction of IFU datasets (MUSE, FORS2, etc), comparison with hydrodynamical explosion models, and developing machine-learning tools for kinematic and morphological studies. I am actively pursuing postdoctoral fellowships to continue research into supernova progenitors and remnant evolution.

## Research Interests

- Explosion physics and progenitor diagnostics for Type Ia supernovae
- Integral-field spectroscopy, 3D kinematic reconstruction, and comparison to models
- Shock physics and non-equilibrium line diagnostics
- Automated data reduction and ML tools for large IFU datasets
- Theoretical cosmological models including wormholes and sonic black holes

## Education

PhD candidate in Astrophysics, The University of New South Wales (UNSW Canberra), School of Science.
Apr 2023 – present.
Thesis: Integral-field spectroscopy of Type Ia supernova remnants.
Supervisors: Ivo R. Seitenzahl, Ashley J. Ruiter, Simon Murphy.

M.Sc. in Physics, Amity University, India (2019–2021).
Thesis: Traversable Wormholes in the Milky Way galaxy with global monopole charge.
Supervisor: Prof. Mehedi Kalam.

B.Sc. (Hons) in Physics, Durgapur Government College, Kazi Nazrul University, India (2016–2019).

## Telescope Time

**A/2025B/31 – "Probing Helium Enrichment and Shock Physics in SNR 0548–70.4 with KOALA"**
Investigators: Priyam Das (PI), Chris Lidman, Ashley Ruiter, Ivo Seitenzahl.
**Awarded** observing time of **3 dark nights** with the KOALA IFU on the Anglo-Australian Telescope (AAT), 2025B semester.

**P117 – "Constraining Explosion Parameters and Progenitor System for Kepler's SNR Using Optical Spectroscopy"**
Investigators: Priyam Das (PI), Ivo Seitenzahl, et al. (2025). **Applied** for MUSE observations, 32 hours, ESO VLT.

**P117 – "Deep optical tomography to revealing progenitor system and explosion mechanism of SNR 0519-69.0."**
Investigators: Priyam Das (PI), Ivo Seitenzahl, et al. (2025). **Applied** for MUSE observations, 32 hours, ESO VLT.

**JWST Cycle 5 – "Tracing Reverse Shocked Ejecta and Dust Evolution in the Type Ia Supernova Remnant SNR 0509–67.5."**
Investigators: Priyam Das (PI), Samar Safi Harb (CoPI), Ivo Seitenzahl (CoPI), Ashley Ruiter (CoPI), et al. (2025). **Applied** for NIRSpec IFU and MIRI MRS IFU, 40.3 hours, JWST, STSCI.

## Selected Publications and Media Coverage

Das, P., et al. (2025). Calcium in a supernova remnant as a fingerprint of a sub-Chandrasekhar-mass explosion. Nature Astronomy, 9, 1356.
Featured on the journal cover (September issue). Received widespread international press coverage, including an ESO press release and features in Forbes, Reuters, National Geographic, BILD, Physics Today, and others (Altmetric score: 807).

Mandal, S., et al. (2025). Was SNR 0509–67.5 the result of a double detonation? arXiv:2509.02422 (preprint).

Das, P., et al. (2022). Wormhole in the Milky Way galaxy with global monopole charge. Eur. Phys. J. C, 82, 342.

## Work Experience

Laboratory demonstrations and physics support for undergraduate students (casual work), UNSW Canberra. (2023-present).

PhD Candidate, UNSW Canberra, School of Science (Apr 2023 – present).

Visiting PhD student at HITS in the Group "Physics of Stellar Objects" of Prof. Dr Friedrich Röpke (Oct — Dec 2025).

Assistant Professor (Physics), Bengal College of Engineering and Technology, India (Oct 2021 – Apr 2023).

Associate Researcher, Acadecraft Pvt Ltd, India (Jul 2021 – Nov 2021).

## Grants & Awards

Development and Research Training Grant (DRTG) (AUD $2800), UNSW Canberra (2025).

Runner-up, Best Presentation, (Australian National Institute for Theoretical Astrophysics) ANITA summer school (2024).

## Computational Skills

- Programming: Python, Git/GitHub
- Workflows: ESO Reflex, MUSE DRS, MUSE-ZAP, FORS2 DRS, QFitsView, LaTeX

## Selected Talks & Presentations

Contributed talk, "**Imaging the signature of type Ia supernova explosion mechanism, a novel approach using optical IFS to study the reverse shocked ejecta**" at 'One Hundred Years of Supernova Science', Sweden (2025).

Contributed talk, "**Integral field spectroscopy of type Ia supernova remnants**" at 'HITS Winter Workshop', Heidelberg (2024).

Poster, "**Observational study of the reverse shocked ejecta in SNR 0509-67.5**" at 'Supernova Remnant III', Greece (2024).

Contributed talk, "**Spectroscopy on reversed shocked ejecta of a type Ia supernova remnant**" at 'ANITA Summer School', Australia (2024).

Poster, "**Observational study of the reverse shocked ejecta and their ionized states in SNR 0509-67.5**" at 'Transients Down Under', Australia (2024).

## Summer Schools and Trainings

JWST Master class, University of Sydney (Sept 2024).
Australian National Institute for Theoretical Astrophysics (ANITA) summer school (Jan 2024).
Astronomical Society of Australia (ASA) ECR Python Workshop, Macquarie University (Sept 2023).