DEVESH GIRI

DeveshGiri | deveshgiri | deveshgiri.github.io | devesh.giri@students.iiserpune.ac.in

Education

2026 (expected)	BS-MS at **Indian Institute of Science Education and Research, Pune, IN**
2021	Class 12th (AISSCE) at **Disha Delphi Public School, Kota, Rajasthan**
2019	Class 10th (ICSE) at **H. P. Children's Academy, Gorakhpur, U.P.**

Publications (InspireHEP/arXiv)

Giri, Devesh and Bhooshan Gadre (2025). "Sub-Solar Mass Intermediate Mass Ratio Inspirals: Waveform Systematics and Detection Prospects with Gravitational Waves". In: *arXiv preprint arXiv:2511.13324*.

Afroz, Samsuzzaman, **Giri, Devesh**, et al. (2025). "The population of hierarchical binary black hole mergers observed through GWs". In: *prep.*

Projects/Software/Code Releases

`playgwtc` Link to **Read***the***Docs** documentation

It is an open-source user-friendly Python command-line tool for fetching, processing, and visualizing data for gravitational-wave events from the Gravitational Wave Open Science Center. This tool allows you to browse GW events through prefix-search, instantly generate high-quality plots, including time-frequency Q-transforms of the raw detector strain data from chosen detectors, and theoretical waveform models based on the event's physical parameters. Installable through `pip`: Link to *PyPI* page

Experience

Tata Institute of Fundamental Research, Mumbai, IN June 2025 - present

Visiting Master's Thesis Student *Guide: Dr. Suvodip Mukherjee*

- Modeled effects of three-body encounters on gravitational radiation from black hole binaries.
- Quantified 'dephasing' of *perturbed* waveforms with respect to the vacuum waveforms and noted differences in observable quantities.
- Explored constraining the parameter space of primordial black holes using three-body interactions.

IUCAA, Pune, IN *and* **BITS-Pilani, IN** June 2025 - present

Research Internship *Guides: Dr. Sajal Mukherjee, Dr. Apratim Ganguly*

- Studied the FastEMRIWaveforms (`FEW`) formalism for Intermediate- and Extreme- Mass Ratio Inspirals.
- Quantified the role of eccentricity for IMRI systems in the deci-hertz GW frequency band.

Nikhef, Amsterdam, NL October 2023 - December 2024

Research Internship *Guide: Dr. Bhooshan Gadre*

- Quantified the detectability and waveform systematics aspects of sub-solar mass intermediate mass ratio inspirals (SSM-IMRIs) with the current and future GW detectors.
- Performed in-depth fitting factor studies using differential evolution and Bayesian parameter estimation studies to understand parameter biases/error, and waveform systematics. Familiarized with IMRPhenomX and BHPTNRSurrogate waveform models.
- Demonstrated the significant effects of higher harmonics for IMRI systems and need to develop aligned and precessing spin waveform surrogates.

Vanderbilt University, Nashville, USA May 2023 - July 2023

Summer Internship *Guide: Dr. Karan Jani*

- Completed PyCBC tutorials and familiarized with using PyCBC Inference and Bilby for bayesian parameter estimation.
- Worked on studying the improvement in parameter estimates by including LIGO-India in the detector network.
- Demonstrated $30\% - 90\%$ improvements in different parameters through bayesian parameter estimation for GW190521-like systems.

Schools/Lectures/Courses

CIERA, Northwestern University, IL, USA (online) August 2025

`Code/Astro 2025` *A Software Engineering Workshop for Astronomy* *Guides: Dr. Jason Wang, Dr. Sarah Blunt*

- Hands-on tutorials and lectures on Development Environments, Programming Paradigms, `Git` Mechanics, Debugging, Parallel Programming, `jax`, Releasing Code, Code Documentation, Software Testing, Anti-Discriminatory Practices, and Code Profiling.
- As a part of the workshop project, released an open-source (pip installable) software `playgwtc` with command-line tools for fetching, processing, and visualizing data for gravitational-wave events from the Gravitational Wave Open Science Center.

International Centre for Theoretical Sciences - TIFR, Bengaluru, IN July 2025

GW Summer School *Guides: Dr. Surhud More, Dr. Chiara Caprini, Dr. Tirthankar Roy Choudhury*

- Undertook three courses: Probing the early universe using GW observations; Cosmography using GW standard sirens; and, Probing large-scale structure using GW observations
- Besides the rigorous theoretical lectures, gained practical experience in GW Population Analysis, Cosmological Parameter Inference and N-Body Cosmological Simulations. Hands-on experience with different softwares/codes used for such studies: `GWCOSMO`, `ICAROGW` and `GADGET-4`
- Delivered a flash talk and presented a poster on SSM-IMRIs.

National Centre for Radio Astrophysics - TIFR, Pune, IN May 2022 - August 2022

CCS Lectures *Guides: Prof. Yashwant Gupta, Prof. Ruta Kale, Prof. Yogesh Wadadekar*

- An overview of multi-wavelength astronomy (with qualitative descriptions of astrophysical objects), mechanism of radio telescopes and GMRT.
- Learned to work with FITS files and about mean and median stacking with some optimising techniques like the Binapprox algorithm.
- An exposure of equatorial/Galactic coordinates.
- An exposure of Astronomy Catalogues. Worked with AT20G BSS catalogue and SuperCOSMOS all-sky catalogue to learn about cross-matching.
- Learned about optimisation and used NumPy optimisation, Sorting optimisation and Binary search optimisation.
- Learned about k-d trees optimisation using Astropy

The University of Sydney, Australia (Coursera)

Data-driven Astronomy *Guides: Prof. Tara Murphy, Dr. Simon Murphy*

- Course conducted by Dr. Tara Murphy and Dr. Simon Murphy, focussing on working with large datasets, implementing algorithms, and learning from data using ML tools. I will be learning to work with files from exoplanet surveys, pulsar detections, galaxy clusters, etc., using Python and SQL.

Skills

Programming languages and softwares	Python, Bash, Git, LaTeX, MATLAB, PyCBC, Bilby, GWCOSMO, ICAROGW, GADGET-4
Operating systems	macOS, Linux, Windows
Cluster computing	HTCondor

Conferences/Talks/Seminars

The Future of Gravitational-Wave Astronomy, ICTS-TIFR October'25, 27 - October'25, 31

Pune-Mumbai Cosmology & **Astro-Particle meeting** October'25, 27 - October'25, 31

33^{rd} **IAGRG Conference, BITS-Pilani** January'25, 02 - January'25, 04

Workshops

Workshop on Gravitational Waves and LIGO-India October 2024
BITS, Pilani

Gravitational Wave Open Data Workshop April 2024
gwosc.org and *IUCAA*

Workshop on Data Science in Astronomy December 2023
IUCAA

Volunteer Experience

Presenter November 22, 2025
Frontiers of Science, 2025 *TIFR, Mumbai, IN*

- The Frontiers of Science is an annual one day program at TIFR's Colaba campus introducing the world of research in basic Sciences. Running for more than a decade, it comprises of laboratory visits, lectures/demonstrations by scientists and researchers curated to give glimpses into modern scientific research.
- Presented and explained the research areas in Gravitational Wave (Astro-/)Physics on the behalf of < `data`|`theory` > `Universe` `Lab` supervised by Dr. Suvodip Mukherjee.

Core Member and Tutor August 2022 - April 2023
Mindspark, DISHA *IISER, Pune, IN*

- Mindspark, DISHA is an initiative by the students of IISER-Pune which imparts education to underprivileged students of Grade 8 by conducting classes every Saturday and Sunday. I worked to design the structure of Mathematics lectures and also volunteered for weekly lectures as a tutor.