Neev Shah

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Education

The University of Arizona 2024 - 2029 (expected)
PhD in Astronomy and Astrophysics
Advisor: **Dr. Mathieu Renzo**
Grade: 4.0/4.0

Indian Institute of Science Education & Research, Pune, India 2019 - 2024
BS-MS in Science
CGPA: 9.2/10 (Physics GPA: 9.3)

Relevant Coursework

Graduate:
Core: Introduction to Computing, Statistical Methods, Physics for Astrophysics, Galaxies, Interstellar Medium, Astronomical Instrumentation, Stars and Planets, Cosmology
Elective: Stellar Evolution from an Observational perspective, Writing Across the Space Sciences

Graduate Research Experience

I work on modeling the evolution of massive stars in binaries, in order to understand a wide range of phenomena such as gravitational wave sources, X-ray binaries, (pair-instability) supernovae, other transients etc. I use tools such as `MESA` to model their detailed evolution, guided by observational constraints from a variety of sources such as LIGO-Virgo-KAGRA, Gaia, X-ray observations etc. I also have experience in working with population synthesis codes such as `COSMIC`. More generally, I am interested in leveraging theory, modeling, and multi-wavelength electromagnetic and gravitational wave observations to improve our understanding of various stages of massive (binary) evolution and associated transients, and understand their impact on their surroundings, such as the environments of the galaxies that they inhabit.

Masters Research Experience

Effects of Lensing in Population Inference of Gravitational-Wave Sources
Advisor: **Dr. Parameswaran Ajith, ICTS-TIFR, Bengaluru** Aug 2023 - April 2024

Undergrad Research Experience

Developing a novel classifier between gravitational-wave signals and transient noise sources
Advisors: **Dr. Jess McIver, UBC Vancouver**, **Dr David Stenning, SFU** May 2022 - Aug 2023

Core-collapse in self-interacting dark matter halos
Advisor: **Dr. Susmita Adhikari, IISER Pune** Aug 2021 - Aug 2023

Finding black holes orbiting stellar companions in the Milky Way with TESS
Advisor: **Dr. Sourav Chatterjee, TIFR, Mumbai** June 2021 - Dec 2021

Publications & Preprints

1. **Neev Shah**, Mathieu Renzo, Koushik Sen, Aldana Grichener, Katelyn Breivik
   Unraveling the Origin of Unequal Mass Gravitational Wave Events: Insights from a Galactic High Mass X-ray Binary
   (submitted to **ApJ**, **arXiv:2602.12327**, **zenodo**)
2. Koushik Sen et. al (including **Neev Shah**)
   Interacting binaries on the Main Sequence as in-situ tracers of mass transfer efficiency and stability
   (**ApJ**, **arXiv:2511.15347**)
3. Christian Burt, Mathieu Renzo, Aldana Grichener, **Neev Shah**
   On the prevalance of early mass transfer for very massive binaries
   (**RNAAS**)
4. Chirag Chawla, Sourav Chatterjee, **Neev Shah**, Katelyn Breivik
   Detecting Detached Black Hole binaries through Photometric Variability
   (**ApJ**, **arXiv:2310.16891**)

5. **Neev Shah**, Susmita Adhikari
The abundance of core–collapsed subhalos in SIDM: insights from structure formation in ΛCDM
(**MNRAS**, **arXiv:2308.16342**)

6. **Neev Shah**, Alan Knee, Jess McIver, David Stenning
Waves in a forest: A Random Forest Classifier to distinguish between Gravitational Waves and Glitches
(**CQG**, **arXiv:2306.13787**)

Fellowships, Awards & Grants

- Theoretical Astrophysics Program (TAP) Travel Grant ($1000 USD) - KITP Conference: "Stellar-Mass Black Holes at the Nexus of Optical, X-ray, and Gravitational Wave Surveys" 2025
- Travel Grant ($1000 USD) - Posydon Summer School, SkAI Institute, Chicago, USA 2025
- IAU Travel Grant (500 EUR) - IAU Massive Stars Symposium, Ensenada, Mexico 2025
- Theoretical Astrophysics Program (TAP) Travel Grant ($500 USD) - 2025 MESA Summer School, KU Leuven, Belgium 2025
- Science GradCollege Fellowship ($3000) – The University of Arizona 2024
- Long Term Visiting Students Program fellowship ($1350 USD) - ICTS-TIFR, Bengaluru 2023
- MITACS Globalink Research Internship ($9000 CAD) - fully funded award for a 12 week research internship at UBC, Vancouver 2022
- Academic Excellence Award ($60 USD) - CNR Rao Foundation for the best academic performance 2022
- KVPY Fellowship ($4600 USD) - Department of Science & Technology, Government of India 2020-2024
- INSPIRE-DST Scholarship for Higher Education ($960 USD) - Department of Science & Technology, Government of India 2019 - 2020

Talks & Posters (*Invited)

- NOIRLab Flash Talk May 2026
- Gravitational Wave Journal Club, UC San Diego* March 2026
- Steward Observatory Symposium (Talk), The University of Arizona March 2026
- TAP "Meet-Yourself-Event" (Talk), The University of Arizona Feb 2026
- AAS 247 (Talk), Phoenix, AZ Jan 2026
- Big Boom (Talk), The University of Arizona Dec 2025
- KITP Conference (Talk) - The Lifecycle of Stellar Black Holes Nov 2025
- IAU Symposium (Poster), Ensenada, Mexico Sept 2025
- Steward Observatory Symposium (Talk), The University of Arizona Nov 2024
- Big Boom (Talk), The University of Arizona Oct 2024
- Astronomical Society of India Meeting (Poster), Bengaluru, India Jan 2024
- ICGC Conference (Talk), Guwahati, India Dec 2023
- ICGC Conference (Poster), Guwahati, India Dec 2023
- LIGO-Virgo-KAGRA Fall meeting (Poster), Cardiff Sept 2022
- IISER Pune - IUCAA Cosmology Group Meeting (Talk) June 2023
- LIGO Detector Characterization Group (Talk) April 2023
- UBC LIGO Group (Talk) Aug 2022

Technical Skills

Programming Languages - Python (Skilled), Fortran (basic), Matlab (novice) and C++ (novice)
Python Modules - bilby, pycbc, numpy, matplotlib, pandas, scipy, astropy, scikit-learn, colossus
Software - `MESA`, `COSMIC`
Tools/Frameworks - LaTeX, Git, GitHub, HPC, SLURM, Condor, Linux

Observing Experience

Bok 90" Telescope, B&C (Spectroscopy) - 3 nights

Service & Outreach

- Referee for Nature Astronomy 2026-
- **Astrobites author (2025–present)** – a daily astrophysical literature journal that aims to write about research articles in a brief format that is accessible to undergraduate students in the physical sciences who are interested in active research. Below are my articles:
  - Too big to fit? Recipes on how (not) to create the black hole binary that you find in your backyard
  - Sagittarius A* only eats half its lunch, but where does it come from?
  - Keep your ν-eyes open: Messengers from a Common Envelope
  - Spinning into the merging binary black hole family tree
  - Meet the AAS Keynote Speakers: Dr Saavik Ford (Interview)
  - Meet the AAS Keynote Speakers: Dr Danny Milisavljevic (Interview)
  - Meet the AAS Keynote Speakers: Dr Priyamvada Natarajan (Interview)
  - Meet the AAS Keynote Speakers: Dr Maya Fishbach (Interview)
- Astrobites DEI Committee (Member) 2025-
- Steward Observatory Grad Council (Member) 2025-
- Science Coffee - Steward Observatory (organizer) 2025-
- Space Drafts - Tucson's version of Astronomy on Tap (organizer) 2026-
- Steward Observatory Symposium (organizer) - October 2024, March 2025, October 2025, March 2026
- Astrobites Undergraduate Research article on my project on self-interacting dark matter halos.
- An article for the Gravity Spy blog (a citizen science project) to showcase my research on glitches.
- Club Coordinator - Aakashganga: The IISER Pune Astronomy & Astrophysics Club 2020-2021
- Science Outreach Head - Mimamsa 2020-2021
- Volunteer for Spread the Smile in Feb 2020 - An outreach programme of Disha, IISER Pune. We reach out to village schools near Pune and stay over for a weekend to perform experiments and interact with the students.

Schools & Workshops

- 2025 Posydon Summer School - SkAI institute, Chicago
- 2025 MESA Summer School - KU Leuven, Belgium
- Science Communication Workshop – Steward Observatory, The University of Arizona (Feb 2025)
- Astromatic 2023 Machine Learning Workshop and Hackathon - Ciela Institute, Universite de Montreal
- ICTS Gravitational Waves Summer School 2023: Numerical Relativity, Relativistic Hydrodynamics, Numerical Methods for Partial Differential Equations.
- 2023 Introductory Summer School in Astronomy & Astrophysics - Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune: Lectures and Tutorials in observational and theoretical astrophysics as well as multi-wavelength data analysis
- 2022 Gravitational Wave Astronomy NorthWest (GWANW) meeting - LIGO-Hanford: Student workshop with tutorials on LIGO, NANOGrav, ML & LISA
- Gravitational Wave Open Data Workshop (2021)
- Code/Astro 2021: Software development workshop and best practices for building sustainable open-source packages for astronomy applications. Developed a **Python package** from scratch on PyPI.

Professional Memberships

- *Member*, **American Astronomical Society** September 2024 – present
- *Member*, **LIGO Scientific Collaboration** May 2022 – October 2023