Estuti Shukla

Curriculum Vitæ • April 9, 2026

Department of Physics
Institute for Gravitation and the Cosmos
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EXPERIENCE

Graduate Student Researcher — Aug. 2022 – Present
The Pennsylvania State University — Advisor: Prof. David Radice — *University Park, PA*
- Developing deep learning methods to improve efficiency and accuracy of numerical relativity simulations
- Performing high-resolution simulations of spinning compact binary coalescence

Visiting Student Researcher — Sept. 2021 – Aug. 2022
ICTS–TIFR Bangalore — Advisor: Prof. Prayush Kumar — *Bangalore, India*
- Studied properties of dynamical horizons using numerical relativity simulations with the SpEC code

Research Intern — Oct. 2020 – Aug. 2022
Johns Hopkins University — Advisor: Dr. Vishal Baibhav & Prof. Emanuele Berti — *Remote*
- Investigated nonlinearities associated with first-order quasinormal modes in binary black hole mergers

Research Intern — Jun. – Aug. 2021
IIT Madras — Advisor: Prof. Chandrakant Mishra — *Remote*
- Performed SNR analysis of IMRIs for the proposed space-based gravitational-wave detector DECIGO

Summer Research Intern — Jun. – Sept. 2020
University of Massachusetts Dartmouth — Advisors: Prof. Gaurav Khanna & Prof. Scott Field — *Remote*
- Added remnant Bondi mass and kick velocity functionalities to an open-source EMRI surrogate model
- Credited as a contributor to the public gravity group software package

EDUCATION

The Pennsylvania State University — University Park, PA
Ph.D. in Physics — GPA: 3.80/4.00 — *Aug. 2022 – Present*
- Advisor: Prof. David Radice
- Research: Deep learning applications in numerical relativity, black hole perturbation theory

Indian Institute of Science Education and Research Kolkata — Kolkata, India
B.S.–M.S. in Physics — Major GPA: 9.03/10.00 — *2016 – 2021*
- Master's Thesis: *Static Stars in Cosmological Backgrounds*, advisor Prof. Rajesh Nayak
- DST Inspire Scholarship (Govt. of India, 2016 - 2021)

PUBLICATIONS

[1] R. Gamba, D. Chiaramello, **E. Shukla**, and S. Albanesi, "Spin the black circle II: tidal heating and torquing of a rotating black hole by a test mass on generic orbits," submitted to *Phys. Rev. D*, arxiv:603.28982 (2026)

[2] **E. Shukla**, A. Rashti, R. Gamba, D. Radice, and K. Chandra, "GR-Athena++ simulations of spinning binary black hole mergers," *Class. Quant. Grav.* **43**, 065019 (2026).

[3] R. Perna, O. Gottlieb, **E. Shukla**, and D. Radice, "Connecting GRBs from binary neutron star mergers to nuclear properties of neutron stars," *Phys. Rev. D* **111**, 063015 (2025).

[4] M.H.-Y. Cheung, V. Baibhav, E. Berti, V. Cardoso, G. Carullo, R. Cotesta, W.D. Pozzo, F. Duque, T. Helfer, **E. Shukla**, and K.W.-K. Wong, "Nonlinear effects in black hole ringdown," *Phys. Rev. Lett.* **130**, 081401 (2023).

[5] **E. Shukla**, K. Chandra, R. Gamba, and D. Radice, "Parameter Estimation with GR-Athena++ catalog" (in-prep).

[6] **E. Shukla** and D. Radice," Discovering gauge transformations with neural networks" (in-prep)

TALKS & CONFERENCES

Invited Talks

- Primordial Universe and Gravity (PUG) seminar at IGC, Penn State (Apr. 2024)
- UMass Dartmouth Physics Colloquium Series (virtual) (Sept. 2020)

Contributed Talks

- AI for Gravitational Waves Workshop at CERN, Geneva (May 2026) (Poster Presentation)
- Neighbourhood Workshop at Penn State, University Park (Apr. 2026)
- ICDS Symposium at Penn State, University Park (Sept 2025) (Poster Presentation)
- 35th Midwest Relativity Meeting & Eric Fest at U. Guelph, Canada (Nov. 2025)
- Scientific Machine Learning for GW Astronomy at ICERM, RI (Jun. 2025) (Poster Presentation)
- APS Global Physics Summit 2025 at Denver, CO (Mar. 2025)

Schools & Workshops

- AthenaK Summer School at Penn State, University Park (Jul. 2026)
- Neighbourhood Workshop at Penn State, University Park (2023 - 2026)
- Simulating Extreme Spacetimes with SpEC and SpECTRE at ICERM, RI (Aug. 2024)
- DTP TALENT Summer School on Nuclear Astrophysics, Trento Italy (Jul-Aug. 2024)
- N3AS Summer School in Multi-messenger Astrophysics, UC Santa Cruz (Jul. 2023)
- ICTS School on Physics of Early Universe at ICTS-TIFR, Bangalore (Jan. 2022)
- ICTS Summer School on Gravitational-Wave Astronomy, ICTS-TIFR Bangalore (virtual) (Jul. 2021)
- Gravitational Wave Summer School on Numerical Relativity, ICTS-TIFR Bangalore (virtual) (May 2020)
- Finesse Interferometer Modelling Hackathon (winner) at IUCAA, Pune (Mar. 2020)
- National Science (Vijyoshi) Camp by DST, Gov. of India, IISER Kolkata (2016)

AWARDS & HONORS

APS DGRAV Student Travel Award, APS Global Summit 2025

EUSTIPEN Travel Award, Trento, Italy 2024

Homer F. Braddock Scholarship, Penn State University 2023

DST Inspire Scholarship, Gov. of India 2016-2021

TECHNICAL SKILLS

Programming (Advanced): Python, PyTorch, LaTeX, C/C++, Mathematica
Programming (Intermediate): R, MATLAB
Tools: Git, GNUplot, Origin, GNU/Linux, Windows
Research Areas: Numerical Relativity, Gravitational-Wave Physics, General Relativity, Deep Learning, Black Hole Ringdown, Cosmology

TEACHING AND MENTORSHIP

Teaching Assistant, Penn State University 2022-2024

- PHYS 212 General Physics: Electricity and Magnetism
- PHYS 250 Introductory Physics 1

Teaching Assistant, IISER Kolkata 2020-2021

- General Theory of Relativity & Cosmology (with Prof. Rajesh Nayak)
- Intermediate Quantum Mechanics (with Prof. Soumitro Banerjee)

Undergraduate Student Mentor

- Ben Jhonson, Penn State University (Oct 2025-)
- Patrick A Bush, San Diego State University (now graduate student at Oregon State University) (May-Aug 2024)

PROFESSIONAL ACTIVITIES

Journal Referee

- Classical and Quantum Gravity

Member

- LIGO-Virgo-KAGRA Consortium (2022-)
- American Physical Society Division of Gravitational Physics (2023-)
- Simulating eXtreme Spacetimes Collaboration (2021-2022)

OUTREACH AND SERVICE

Professional Development Co-Chair, Physics and Astronomy for Women+ (PAW+) at Penn State	2024-
Physics Graduate Student Representative, Penn State	2025-
Board Member, Physics Graduate Student Association (PGSA) at Penn State	2025-2026
Delegate for Eberly College of Science, Graduate & Professional Student Association, Penn State	2025-2026
Founder of IKQRAAR, official LGBTQ+ support platform at IISER Kolkata	2021-2022
Founder of Trekking & Adventure Club, IISER Kolkata	2020-2021
Founding Member of Student Alumni Cell, IISER Kolkata	2019-2020
Sponsorship Head of Inquivesta, largest college science festival of India, IISER Kolkata	2019-2020

REFERENCES

Prof. David Radice
Associate professor at the Departments of Physics and Astronomy & Astrophysics
The Pennsylvania State University
email: dur566@psu.edu

Prof. B.S. Sathyaprakash
Elsbach Professor of Physics and Professor of Astronomy and Astrophysics
The Pennsylvania State University
email: bss25@psu.edu

Prof. Eugenio Bianchi
Associate Professor of Physics
The Pennsylvania State University
email: ebianchi@psu.edu

Prof. Romit Maulik
Assistant Professor of Mechanical Engineering
Purdue University
email: rmaulik@purdue.edu

Dr. Rossella Gamba
Postdoc
UC Berkeley
email: rgamba@berkeley.edu