

Shrobana Ghosh

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Research Profile

My research focuses on modeling gravitational-wave sources to understand compact objects, strong gravity, and the environments in which these objects evolve. I am especially interested in extending gravitational waveform models beyond isolated binary black hole mergers to probe more complex astrophysical scenarios and possible new physics.

Waveform modeling: Developer of multipole asymmetry model; contributor to [PhenomXO4a](#), [PhenomXPNR](#)

Exotic physics: Gravitational wave signatures of superradiant instabilities, phenomenology of exotic compact object merger ([PhenomDECO](#))

Research & Academic Background

Max Planck Institute for Gravitational Physics (AEI Hannover) 2022–present
Research Associate — Compact binary coalescences; waveform modeling; GW signatures of exotic matter.

Cardiff University 2019–2022
Research Associate — Numerical relativity–based waveform models for LIGO analyses.

University of Mississippi PhD Physics, 2019
Dissertation: *Gravitational radiation from superradiant instabilities of rotating black holes.*

Publications

- A. Tiwari, A. Vijaykumar, S. J. Kapadia, **S. Ghosh** and A. B. Nielsen *Phys. Rev. D* **113**, 104072 (2026)
- **S. Ghosh** and M. Hannam [arxiv:2505.16380](#)
- E. Hamilton et al., (including **S. Ghosh**) [2507.02604](#)
- J. Mielke, **S. Ghosh**, F. Ohme and A. Borchers *Phys. Rev. D* **111**, 064009 (2025)
- A. Borchers, F. Ohme, J. Mielke and **S. Ghosh** *Phys. Rev. D* **110**, 024037 (2024)
- J. Thompson, E. Hamilton, L. London, **S. Ghosh**, P. Kolitsidou, C. Hoy and M. Hannam, *Phys. Rev. D* **109**, 063012 (2024)
- **S. Ghosh**, P. Kolitsidou and Mark Hannam, *Phys. Rev. D* **109**, 024061 (2024)
- E. Hamilton, E. Fauchon-Jones, M. Hannam, C. Hoy, C. Kalaghatgi, L. London, J. E. Thompson, D. Yeeles, **S. Ghosh**, S. Khan, P. Kolitsidou, A. Vano-Vinuales, *Phys. Rev. D* **109**, 044032 (2024)
- S. Ghosh, *Gravitational waves from superradiant instabilities of rotating black holes* *Modern Physics Letters A* Vol. 36, No. 33, 2130024 (2021) **Invited review**
- **S. Ghosh**, E. Berti, R. Brito, M. Richartz, *Phys. Rev. D* **99**, 104030 (2019)
- R. Brito, **S. Ghosh**, E. Barausse, E. Berti, V. Cardoso, I. Dvorkin, A. Klein, P. Pani *Phys.Rev. D* **96**, 064050 (2017)
- R. Brito, **S. Ghosh**, E. Barausse, E. Berti, V. Cardoso, I. Dvorkin, A. Klein, P. Pani, *Phys. Rev. Lett.* **119**, 131101 (2017).

Collaboration papers with specific contributions

- GW250114: testing Hawking’s area law and the Kerr nature of black holes - LVK collaboration [2509.08054](#)
Contribution: Building model that was used in analysis
- Black Hole Spectroscopy and Tests of General Relativity with GW250114 -LVK collaboration [2509.08099](#)
Contribution: Built model that was used in analysis
- GW230814: investigation of a loud gravitational-wave signal observed with a single detector - LVK collaboration [2509.07348](#)
Contribution: Built model that was used in analysis, reviews

- GWTC 4.0: An Introduction to Version 4.0 of the Gravitational-Wave Transient Catalog - LVK collaboration [2508.18080](#)
Contribution: Analysis and reviews
- GWTC 4.0: Methods for Identifying and Characterizing Gravitational-wave Transients - LVK collaboration [2508.18081](#)
Contribution: Built model that was used in analysing events
- GW231123: a Binary Black Hole Merger with Total Mass 190-265 M_{\odot} - LVK collaboration [2507.08219](#)
Contribution: Built model that was used in analysis

Honors & Awards

- **Marie Skłodowska-Curie Actions Seal of Excellence -2025** (score 96.4%, funding threshold-97%)
- Newton International Fellowship, reserve list, 2025
- **Marie Skłodowska-Curie Actions Seal of Excellence -2024** (score 88%, funding threshold-92%)
- Graduate School Dissertation Fellowship, Jan 2019 – May 2019
- First Prize for oral presentation Mississippi Academy of Science 82nd Annual Meeting, Feb 2018 (Physics and Engineering Division)
- APS Women in Physics Grant, University of Mississippi, 2017

Communication & Teaching

- **Invited Review**, *Modern Physics Letters A* (2021): *Gravitational waves from superradiant instabilities of rotating black holes.*
- **Selected talks and visits:**
 - Invited to Simons collaboration meeting on Black holes and strong gravity, New York (2026)
 - Invited talk at IFPU Focus Week on “Numerical relativity and fundamental fields”, Trieste (2025)
 - Panelist on PAX-X and Cosmic Explorer Symposium (2025)
 - Invited to workshop in Banff International Research Station (2024)
 - Invited Cosmology Seminar at Oxford University (2020)
- **Teaching:**
 - Co-taught Advanced General Relativity & Gravitational Waves, master’s course with Prof. Bernard Schutz, Cardiff University, 2021.
 - TA for undergraduate mechanics/electromagnetism labs and recitations (UMiss, 2014–2018), received consistent positive feedback

Leadership & Professional Service

- **Equal Opportunity Officer:** AEI Hannover (2023–present): Recognized by the Institute’s Managing Director with a commendation and performance bonus for sound judgment in handling complex and sensitive institutional matters.
- **Organizer:**
 - Early career researchers social event at LIGO–Virgo–KAGRA Collaboration Meeting (Cardiff, 2022)
 - Strong Gravity & Binary Dynamics with GW Observations (Mississippi, 2017).
- **Project management:** Produced numerical-relativity simulations and coordinated the group’s high-performance computing allocation at Cardiff, tracking and reallocating runs to optimize resource use for a public numerical relativity [simulations catalog](#).
- **APS Women in Physics Grant:** to start a Women in Physics group at the University of Mississippi (2017); served as Vice-President (2018) and Treasurer (2017) in the group.

Professional Memberships

- Member, LIGO Scientific Collaboration
- Member, [Simons Collaboration on Black Holes and Strong Gravity](#)