SHUBHAGATA BHAUMIK

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EDUCATION

PhD, University of Florida, *Gainesville, FL, USA* 2019 - Current
Search for Eccentric Binary Black Hole Mergers with Gravitational Waves
Major: Physics; Supervisor: Prof. Imre Bartos
GPA: 3.97/4.00

BS-MS Dual Degree, Indian Institute of Science Education and Research, *Kolkata, India* 2014 - 2019
Major: Physics; Supervisor: Prof. Rajesh Kumble Nayak
GPA: 8.5/10.0

RESEARCH INTERESTS

Gravitational wave data analysis, multi-messenger astrophysics, astrophysical interpretations of black hole populations, machine learning applications to gravitational wave physics.

RESEARCH EXPERIENCE

Graduate Research Assistant May 2020 - Current
University of Florida (UF)

- Member of a large scientific collaboration (LIGO-Virgo-KAGRA) and leading the collaboration's efforts on the search for gravitational waves from binary black holes with eccentric orbits.
- Developed a search for eccentric binary black hole mergers using modeled and unmodeled algorithms.
- Source property extraction of gravitational wave signals from binary black holes with eccentric orbits using Markov-chain Monte Carlo methods.

Master's Thesis May 2018 - May 2019
Indian Institute of Science Education and Research, Kolkata

- Carried out research on the applications of particle swarm optimization algorithm in gravitational wave data analysis. In particular, I worked on improving the performance of the algorithm for detection of weak signals.
- Incorporated machine learning techniques in the implementation of Particle Swarm Optimization.

HONORS & AWARDS

Charles Vincent and Heidi Cole McLaughlin Dissertation Fellowship 2024

UF College of Liberal Arts and Sciences Travel Grant 2024

Association for Academic Women's (AAW) Emerging Scholar Award 2024

American Astronomical Society (AAS) FAMOUS Travel Grant 2024

Charles F. Hooper Jr. Memorial Award 2023
Awarded to senior graduate students in physics who have shown distinction in research and teaching.

UF College of Liberal Arts and Sciences Travel Grant 2023

Steigleman Fellowship 2022
Awarded to a graduate student for notable achievements in the field of astrophysics.

Institute for High Energy Physics and Astrophysics Fellowship 2020
Awarded to a first year graduate student pursuing research in high energy physics or astrophysics, selected by a committee of faculty in Institute for High Energy Physics and Astrophysics.

INSPIRE Fellowship 2014 - 2019
Awarded to students who are among the top 1% of all students appearing for 12th grade examinations and are pursuing courses in Natural Sciences during BS or MS, awarded by Department of Science and Technology, Govt. of India.

PRESENTATIONS

Invited Presentations

- University of Warsaw, *Warsaw, Poland* Oct. 2024
  Expanding the Gravitational Wave Frontier: Detecting Exceptional Binary Black Hole Mergers with a Model-Independent Search
- University of Texas-Austin, *Austin, TX, USA* June 2024
  Search for Eccentric Black Holes Coalescences with Gravitational Waves
- University of Miami Physics Conference, *Miami, FL, USA* Dec. 2023
  Search for Eccentric Black Hole Coalescences during the Third Observing Run of LIGO and Virgo
- University of Miami Physics Conference, *Miami, FL, USA* Dec. 2022
  Search for Eccentric Binary Black Hole Mergers with Gravitational Waves

Contributed Presentations

- LIGO-Virgo-KAGRA Collaboration September Meeting, *Barcelona* Sept. 2024
- LIGO-Virgo-KAGRA Collaboration March Meeting, *Baton Rouge, LA* March 2024
- Graduate Student and Postdoc Seminar, *UF Physics* Feb. 2024
- American Astronomical Society (AAS) 243rd Winter Meeting, *New Orleans, LA* Jan. 2024
- LIGO-Virgo-KAGRA Collaboration September Meeting, *Virtual* Sep. 2023
- American Physical Society April Meeting, *Minneapolis, MN* April 2023
- LIGO-Virgo-KAGRA Collaboration March Meeting, *Evanston, IL* March 2023
- LIGO-Virgo-KAGRA Collaboration September Meeting, *Virtual* Sep. 2022
- Graduate Student and Postdoc Seminar, *UF Physics* Oct. 2021
- LIGO-Virgo-KAGRA Collaboration September Meeting, *Virtual* Sep. 2021

COLLABORATION PAPERS

Collaboration papers in which I have made direct contributions.

LIGO-Virgo Collaboration [including **S. Bhaumik** as **lead analyst**], *Search for Eccentric Black Hole Coalescences during the Third Observing Run of LIGO and Virgo*, ApJ. 973 (2024) 2, 132, arXiv:2308.03822

SHORT AUTHOR-LIST PUBLICATIONS

S. Bhaumik, V. Gayathri, I. Bartos, J. Anglin, G. Carullo, J. Healy, S. Klimenko, J. Lange, C. Lousto, T. Mishra, M. J. Szczepańczyk, *Gravitational Wave Detector Sensitivity to Eccentric Black Hole Mergers*, submitted to PRD, arXiv:2410.15192 (2024).

T. Mishra, **S. Bhaumik**, V. Gayathri, M. J. Szczepańczyk, I. Bartos, S. Klimenko, *Gravitational Waves Detected by a Burst Search in LIGO/Virgo's Third Observing Run* , submitted to PRD, arXiv:2410.15191 (2024).

M. J. Szczepańczyk, Yanyan Zheng,... **S. Bhaumik**,... et al. *Optically targeted search for gravitational waves emitted by core-collapse supernovae during the third observing run of Advanced LIGO and Advanced Virgo*, Phys. Rev. D 110 4, 042007 (2024), arXiv:2305.16146.

H. L. Iglesias, J. Lange, I. Bartos, **S. Bhaumik**, R. Gamba, V. Gayathri, A. Jan, R. Nowicki, R. O'Shaughnessy, D. Shoemaker, R. Venkataramanan, K. Wagner, *Eccentricity estimation for five binary black hole mergers with higher-order gravitational wave modes*, ApJ. 972 (2024) 1, 65, arXiv:2208.01766.

M. Szczepańczyk, F. Salemi, S. Bini, T. Mishra, G. Vedovato, V. Gayathri, I. Bartos, **S. Bhaumik**, M. Drago, O. Halim, C. Lazzaro, A. Miani, E. Milotti, G. Prodi, S. Tiwari, S. Klimenko, *Search for gravitational-wave bursts in the third Advanced LIGO-Virgo run with coherent WaveBurst enhanced by machine learning*, Phys .Rev. D 107 6, 062002 (2023).

T. Mishra, B. O'Brien, M. Szczepańczyk, G. Vedovato, **S. Bhaumik**, V. Gayathri, G. Prodi, F. Salemi, E. Milotti, I. Bartos, S. Klimenko, *Search for binary black hole mergers in the third observing run of Advanced LIGO-Virgo using coherent WaveBurst enhanced with machine learning*, Phys. Rev. D 105, 083018 (2022).

T. Mishra, B. O'Brien, V. Gayathri, M. Szczepańczyk, **S. Bhaumik**, I. Bartos, S. Klimenko, *Optimization of model independent gravitational wave search for binary black hole mergers using machine learning*, Phys. Rev. D 104, 023014 (2021).

ACADEMIC SERVICES

Service within LIGO-Virgo-KAGRA Collaboration

Reviewer, TEOBResumS-DALI (eccentric) waveform — Dec. 2023 - Present

Rota member, Online Parameter Estimation for Gravitational-wave Candidates in LIGO-Virgo-KAGRA's Fourth Observing Run — Aug. 2023 - Present

Science Summary Author, Search for Eccentric Black Hole Coalescences during the Third Observing Run of LIGO and Virgo [link] — 2023

At University of Florida

Organizer, Graduate Student and Postdoc Seminars in Astrophysics — Aug. 2021 - Dec. 2022

OUTREACH & MENTORING

One-on-one Mentoring for Graduate Students, Physics Graduate Community, UF — Sep. 2022 - Current

Guest Lecturer, Lincoln Middle School, Gainesville — Oct. 2022

Member, UF Physics Inclusivity, Equity and Diversity Alliance (IDEA) — Aug. 2021 - Dec. 2023

Research Mentor

- Urja Shah [Undergraduate student → Georgia Tech] — Aug. 2020 - May 2021
- Jeremiah Anglin [Graduate Student] — Aug. 2023 - Present

TEACHING EXPERIENCE

Graduate-level Electromagnetism [Grader]	Fall 2024
Graduate-level Classical Mechanics [Grader]	Fall 2023, Spring 2024, Fall 2024
Graduate-level Quantum Mechanics [Grader]	Fall 2023, Spring 2024, Fall 2024
Mechanics 1	Spring 2024
Physics 1 [Online]	Fall 2023
Physics 1	Fall 2022, Spring 2023
Introductory Physics Laboratory [Online]	Fall 2020, Spring 2021
Introductory Physics Laboratory	Fall 2019, Spring 2020

REFERENCES

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