

Sanika S. Khadkikar

Fourth Year Graduate Student at The Pennsylvania State University

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EDUCATION

The Pennsylvania State University, State College, PA <i>Ph.D. in Physics</i> <i>Exploring the fundamental physics of neutron stars using astrophysics and gravitational waves</i> Advisor: Bangalore Sathyaprakash	2022 -
Birla Institute of Science and Technology, Pilani, India <i>M. Sc. (Hons) in Physics</i> <i>B.E. (Hons) in Mechanical Engineering</i> <i>Quasi-stationary sequences of hyper-massive neutron stars with exotic equations of state</i> Advisor: Sarmistha Banik	2017 - 2022
The Pennsylvania State University, State College, PA <i>BITS Pilani exchange program</i> <i>Binary neutron star post-merger signal analysis using wavelet transforms</i> Advisor: Bangalore Sathyaprakash and Sujith R.	2021 - 2022

RESEARCH INTERESTS

Neutron stars, gravitational wave data analysis, black holes, multimessenger astronomy, compact object binaries, nuclear astrophysics, next generation gravitational wave detectors, dark matter

SELECTED FELLOWSHIPS AND HONORS

John Randall Shuman Troxell Memorial Scholarship in Physics <i>Pennsylvania State University</i> <i>Annual merit-based fellowship awarded by the Eberly College of Science at Penn State</i>	2025
Edward M. Frymoyer Honors Scholarship <i>Eberly College of Science, Pennsylvania State University</i> <i>Awarded for an excellent academic record and achievements</i>	2025
Edward A. and Rosemary A. Mebus Graduate Fellowship in Physics <i>Eberly College of Science, Pennsylvania State University</i> <i>Awarded for an excellent academic record and achievements</i>	2025
Division of Gravitational Physics Best Student Speaker <i>American Physical Society</i> <i>Awarded for the best student presentation at the annual APS Eastern Gravity meeting</i>	2025
Physics and Astronomy for Women+ Research Travel Grant <i>Pennsylvania State University</i> <i>Merit-based scholarship awarded for women+ physicists to travel to a conference</i>	2025
Rick Robinett Service Award <i>Pennsylvania State University</i> <i>Awarded by the Department of Physics for efforts in science communication and outreach to a larger community</i>	2025
Distinguished Student Award <i>American Physical Society</i> <i>Awarded by APS's Forum on International Physics to outstanding students</i>	2025

in any field of physics

W. Donald Miller Graduate Fellowship 2025

Pennsylvania State University

Annual merit-based fellowship awarded by the Eberly College of Science at Penn State

David C. Duncan Graduate Fellowship 2025

Pennsylvania State University

Annual merit-based fellowship awarded by the Eberly College of Science at Penn State

Division of Gravitational Physics Travel Grant 2025

American Physical Society

Travel grant awarded by APS's Division of Gravitational Physics to allow student members to present their work at the APS meeting.

Peter Eklund Award for Scientific Communication (Honorable mention) 2025

Pennsylvania State University

Awarded by the Department of Physics for excellence in scientific communication of research

ACCESS Computing Grant (Co-PI) 2024

National Science Foundation

500k Compute Hours awarded by the National Science Foundation as a Co-PI

I am STEM Award 2024

Pennsylvania State University

Student speaking contest to inspire future scientists in STEM

Homer F. Braddock Scholarship in Biology, Chemistry, and Physics 2022

Pennsylvania State University

Merit-based scholarship awarded by the Eberly college of Science at Penn State to first-year graduate students

Off-Campus International Master's Thesis Fellowship 2021

Birla Institute of Technology and Science

Merit-based scholarship awarded by BITS-Pilani to complete an exchange year in a foreign country

Charpak Indo-France Research Scholarship 2021

Government of France

Ranked first nationwide in the highly competitive Charpak Research Fellowship program, awarded to fewer than 1% of applicants from India to intern in France.

LIGO Summer Undergraduate Research Fellowship (SURF) 2020

California Institute of Technology

Selected as one of four students in India for a fully funded research internship at the LIGO Laboratory, Caltech.

BITS Pilani Merit Scholarship 2018–2021

Birla Institute of Technology and Science

Awarded 50 % tuition waiver for four consecutive years

INSPIRE Award 2014

Government of India

One of 25 high school students across India to receive an award from the Government of India for scientific aptitude and research potentials

INVITED TALKS

Seminar at Max Planck Institute for Gravitational Physics, Potsdam <i>Potsdam, Germany</i>	<i>Upcoming</i>
Seminar at Gran Sasso Science Institute <i>L'Aquila, Italy</i>	<i>Upcoming</i>
Department Colloquium at University of California, San Diego <i>San Diego, CA</i>	<i>Upcoming</i>
Department Colloquium at Indian Institute of Technology, Bombay <i>Mumbai, India</i>	2025
Lecture at State College Area High School <i>State College, PA</i>	2025
Seminar at LIGO Hanford Observatory <i>Hanford, WA</i>	2025
Lecture at the Institute of Nuclear Theory <i>Seattle, WA</i>	2025
Astronomy on Tap <i>State College, PA</i>	2025
AstroChat Talk at University of California, Berkeley <i>Berkeley, CA</i>	2025
Department Colloquium at California State University Fullerton <i>Fullerton, CA</i>	2025
Einstein Telescope Nuclear Astrophysics Call <i>Virtual</i>	2025

CONTRIBUTED TALKS

Prospects in Theoretical Physics Summer School (Poster Presentation) <i>Princeton University, NJ</i>	2025
Nuclear Physics from Multi-Messenger Mergers Summer School <i>Indiana University, IN</i>	2025
American Physical Society Eastern Gravity Meeting <i>University of New Hampshire, NH</i>	2025
Neighborhood Workshop <i>State College, PA</i>	2025
American Physical Society Global Summit Meeting 2025 <i>Anaheim, CA</i>	2025
American Astronomical Society 245 Meeting <i>Oxon Hill, MD</i>	2025
LIGO-Virgo Collaboration Meeting <i>virtual</i>	2024
American Physical Society April Meeting 2024 <i>Sacramento, CA</i>	2024
Penn State Primordial Universe and Gravity Seminar <i>State College, PA</i>	2021, 2023, 2024, 2025
LIGO-SURF Presentation <i>California Institute of Technology (virtual)</i>	2020
Finesse Interferometric Modelling Workshop and Hackathon <i>IUCAA, Pune, India</i>	2020

PUBLICATIONS

I have authored 15 papers with > 450 citations, including 6 short-author papers with > 280 citations, combined, as of October 30, 2025.

SHORT-AUTHOR PUBLICATIONS

- **Khadkikar, S.**, & Singh, D. (2025). A case study of GW190425 for classifying binary neutron star versus binary black hole mergers and constraining asymmetric dark matter with gravitational wave detectors. arXiv. <https://arxiv.org/abs/2507.07895>
- **Khadkikar, S.**, Gupta, I., Kashyap, R., Chandra, K., Gamba, R., et al. (2025, February 5). Precise and accurate neutron star radius measurements with next generation gravitational wave detectors. Physical Review D, 112(6), 063020. <https://doi.org/10.1103/PhysRevD.112.063020>
- Gupta, I., et al. incl **Khadkikar, S.**, (2023). Characterizing gravitational wave detector networks: From A# to Cosmic Explorer. Class.Quant.Grav. 41 (2024) 24, 245001. <https://doi.org/10.1088/1361-6382/ad7b99>
- Evans, M., et al. incl **Khadkikar, S.**, (2023). Cosmic Explorer: A submission to the NSF MPSAC ngGW Subcommittee. arXiv. <https://arxiv.org/abs/2306.13745>
- **Khadkikar, S.**, Mangat, C. S., and Banik, S. (2022). Quasi-stationary sequences of hyper-massive neutron stars with exotic equations of state. Journal of Astrophysics and Astronomy, 43(2), 57. <https://doi.org/10.1007/s12036-022-09849-0>
- **Khadkikar, S.**, Raduta, A. R., Oertel, M., and Sedrakian, A. (2021). Maximum mass of compact stars from gravitational wave events with finite-temperature equations of state. Physical Review C, 103(5), 055811. <https://doi.org/10.1103/PhysRevC.103.055811>

COLLABORATION PUBLICATIONS

Member of the LIGO–Virgo–KAGRA (LVK) Collaboration since 2020. Served about eight distributed weeks during O4 on the Parameter Estimation Rotation (PE ROTA) and currently act as liaison for the GWTC-5 study as one of four analysts responsible for production runs and validation across multiple Bayesian inference pipelines.

- LIGO Scientific Collaboration, Virgo Collaboration, and KAGRA Collaboration, A. G. Abac et al. incl **Khadkikar, S.**, (2025, September 9). Directed searches for gravitational waves from ultralight vector boson clouds around merger remnant and galactic black holes during the first part of the fourth LIGO Virgo KAGRA observing run. arXiv: <https://arxiv.org/abs/2509.07352>
- KAGRA Collaboration, Virgo Collaboration, and LIGO Scientific Collaboration, A. G. Abac et al. incl **Khadkikar, S.**, (2025, September 9). GW250114: Testing Hawking's area law and the Kerr nature of black holes. Physical Review Letters, 135(11), 111403. <https://doi.org/10.1103/PhysRevLett.135.111403>
- LIGO Scientific Collaboration, Virgo Collaboration, and KAGRA Collaboration, A. G. Abac et al. incl **Khadkikar, S.**, (2025, August 28). Upper limits on the isotropic gravitational wave background from the first part of LIGO Virgo and KAGRA's fourth observing run. arXiv: <https://arxiv.org/abs/2508.20721>
- LIGO Scientific Collaboration, Virgo Collaboration, and KAGRA Collaboration, A. G. Abac et al. incl **Khadkikar, S.**, (2025, August 25). Open data from LIGO Virgo and KAGRA through the first part of the fourth observing run. arXiv: <https://arxiv.org/abs/2508.18079>
- LIGO Scientific Collaboration, Virgo Collaboration, and KAGRA Collaboration, A. G. Abac et al. incl **Khadkikar, S.**, (2025, August 25). GWTC 4.0: Updating the gravitational wave transient catalog with observations from the first part of the fourth LIGO Virgo KAGRA observing run. arXiv: <https://arxiv.org/abs/2508.18082>
- LIGO Scientific Collaboration, Virgo Collaboration, and KAGRA Collaboration, A. G. Abac et al. incl **Khadkikar, S.**, (2025, July 16). All sky search for long duration gravitational wave transients in the first part of the fourth LIGO Virgo KAGRA observing run. arXiv: <https://arxiv.org/abs/2507.12282>
- LIGO Scientific Collaboration, Virgo Collaboration, and KAGRA Collaboration, A. G. Abac et al. incl **Khadkikar, S.**, (2025, July 16). All sky search for short gravitational wave bursts in the first part of

the fourth LIGO Virgo KAGRA observing run. arXiv: <https://arxiv.org/abs/2507.12374>

- LIGO Scientific Collaboration, Virgo Collaboration, and KAGRA Collaboration, A. G. Abac et al. incl **Khadkikar, S.**, (2025, July 10). *GW231123: A binary black hole merger with total mass 190–265 solar masses*. arXiv: <https://arxiv.org/abs/2507.08219>

TO BE SUBMITTED SOON

- **S. Khadkikar** and B. S. Sathyaprakash. “A Fully Geometric Approach to Model Selection in Data Analysis”. *Expected In: (2025)*.
- **S. Khadkikar**. “The Fault Is Not in Our Stars, but in Our Priors: Physics-Informed Priors for Neutron Star Inference”. *Expected In: (2025)*.
- L. Suleiman, **S. Khadkikar**, and S. Guillot. “Systematic Biases in NICER Neutron Star Radius Measurements”. *Expected In: (2025)*.
- **S. Khadkikar**, M. Emma, A. Abac, N. Kunert, T. Dietrich, and V. Sagun. “Can Dark Matter Halos Around Neutron Stars Have Detectable Signatures in Gravitational Waves?”. *Expected In: (2025)*.

TEACHING AND MENTORSHIP

Graduate Teaching Assistant <i>Department of Physics, Pennsylvania State University</i> Quantum Information and Computing Introductory Electromagnetism Introductory Mechanics	2022–2024
Undergraduate Teaching Assistant <i>Department of Physics, BITS Pilani</i> Statistical Mechanics	2020

LEADERSHIP AND ACADEMIC SERVICE

Student Representative <i>Executive Committee of the American Physical Society’s Division of Gravitational Physics</i> Elected Student Representative to the APS Division of Gravitational Physics Executive Committee following nomination by the DGRAV Nominating Committee and an open election of the division membership.	2026-2028
Council Member <i>Gravitational-Wave Early Career Scientists (GWECS)</i> Represented the Cosmic Explorer Consortium on the GWECS council and contributed to efforts supporting early-career researchers through resources, opportunities, and community initiatives.	2025
Chair of the Early Career Scientists Group <i>Cosmic Explorer Consortium</i> Coordinated early-career activities, mentorship efforts, and liaison with the executive board.	2025
GAPP Graduate Student Liaison <i>Department of Physics, Pennsylvania State University</i> Arranged and managed the Gravity, Astrophysics and Particle Physics seminars with faculty.	2024
Gravi-tea Time Podcast (Co-creator) <i>Institute for Gravitation and the Cosmos, Penn State</i> Produced episodes explaining breakthroughs in astrophysics for advanced undergrads and grads.	2024

Founder, Physics Journal Club <i>BITS Hyderabad</i> Fostered collaborative learning and research discussions.	2021
Secretary, AD ASTRA Astronomy Club <i>BITS Hyderabad</i> Initiated projects (e.g., horn antenna for galaxy rotation curves), organized fests and trivia sessions.	2019
Team Manager & Suspension Engineer, Vulcan Racing <i>BITS Hyderabad</i> Managed off-roading automobile team; contributed to suspension design and project coordination.	2019

OUTREACH AND SOCIAL SERVICE

Host, Astro[sound]bites Podcast <i>American Astronomical Society</i> One of four hosts that host this astronomy podcast for general outreach.	2025
Author, GW250114 Factsheet <i>LIGO Education and Public Outreach (EPO) Team</i> Designed the official GW250114 factsheet, translating key scientific results for broad public and media engagement.	2025
Outreach Chair of PAW+ <i>Physics and Astronomy for Women+, Pennsylvania State University</i> <ul style="list-style-type: none"> Organized invited physics talks from renowned physicists for women and other underrepresented groups in physics. Organized a fully physics-based experiment section for the Easterly Parkway School Fair in State College for children from kindergarten to grade 12. Designed and coordinated a physics-themed escape room for the Haunted-U event at Penn State near Halloween to engage young minds in science. 	2025
Graduate Student Newsletter Editorial Team <i>Eberly College of Science, Pennsylvania State University</i> <ul style="list-style-type: none"> Co-editor for the Graduate Student Newsletter circulated throughout Penn State. Interviewed several individuals to highlight their research in the Graduate Student Spotlight section. Helped coordinate the publication of LIGO-related press releases through the official Penn State communications office. 	2025
PAW Pals Volunteer <i>Physics and Astronomy for Women+, Pennsylvania State University</i> Led demonstrations and discussions in local elementary schools to engage kids in science.	2023–2025

PROFESSIONAL REFERENCES

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