Sanika S. Khadkikar

Fourth Year Graduate Student at The Pennsylvania State University

251 Pollock Road, University Park, PA 16802 | sanika@psu.edu | Website | ORCID

EDUCATION

The Pennsylvania State University, *State College, PA* 2022 -
Ph.D. in Physics
Exploring the fundamental physics of neutron stars using astrophysics and gravitational waves
Advisor: Bangalore Sathyaprakash

Birla Institute of Science and Technology, *Pilani, India* 2017 - 2022
M. Sc. (Hons) in Physics
B.E. (Hons) in Mechanical Engineering
Quasi-stationary sequences of hyper-massive neutron stars with exotic equations of state
Advisor: Sarmistha Banik

The Pennsylvania State University, *State College, PA* 2021 - 2022
BITS Pilani exchange program
Binary neutron star post-merger signal analysis using wavelet transforms
Advisor: Bangalore Sathyaprakash and Sujith R.

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

Graduate Student International Research Award 2026
Pennsylvania State University
Sole recipient selected from a university-wide pool of over 12,600 graduate students across all Penn State campuses for excellence in international research.

John Randall Shuman Troxell Memorial Scholarship in Physics 2025
Pennsylvania State University
Annual merit-based fellowship awarded by the Eberly College of Science at Penn State

Edward M. Frymoyer Honors Scholarship 2025
Eberly College of Science, Pennsylvania State University
Awarded for an excellent academic record and achievements

Edward A. and Rosemary A. Mebus Graduate Fellowship in Physics 2025
Eberly College of Science, Pennsylvania State University
Awarded for an excellent academic record and achievements

Division of Gravitational Physics Best Student Speaker 2025
American Physical Society
Awarded for the best student presentation at the annual APS Eastern Gravity meeting

Physics and Astronomy for Women+ Research Travel Grant 2025
Pennsylvania State University
Merit-based scholarship awarded for women+ physicists to travel to a conference

Rick Robinett Service Award 2025
Pennsylvania State University
Awarded by the Department of Physics for efforts in science communication

and outreach to a larger community

Distinguished Student Award 2025
American Physical Society
Awarded by APS's Forum on International Physics to outstanding students 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 — *Upcoming*
Potsdam, Germany

Seminar at Gran Sasso Science Institute — *Upcoming*
L'Aquila, Italy

Department Colloquium at University of California, San Diego — *Upcoming*
San Diego, CA

Department Colloquium at Indian Institute of Technology, Bombay — *2025*
Mumbai, India

Lecture at State College Area High School — 2025
State College, PA

Seminar at LIGO Hanford Observatory — 2025
Hanford, WA

Lecture at the Institute of Nuclear Theory — 2025
Seattle, WA

Astronomy on Tap — 2025
State College, PA

AstroChat Talk at University of California, Berkeley — 2025
Berkeley, CA

Department Colloquium at California State University Fullerton — 2025
Fullerton, CA

Einstein Telescope Nuclear Astrophysics Call — 2025
Virtual

CONTRIBUTED TALKS

Prospects in Theoretical Physics Summer School (Poster Presentation) — 2025
Princeton University, NJ

Nuclear Physics from Multi-Messenger Mergers Summer School — 2025
Indiana University, IN

American Physical Society Eastern Gravity Meeting — 2025
University of New Hampshire, NH

Neighborhood Workshop — 2025
State College, PA

American Physical Society Global Summit Meeting 2025 — 2025
Anaheim, CA

American Astronomical Society 245 Meeting — 2025
Oxon Hill, MD

LIGO-Virgo Collaboration Meeting — 2024
virtual

American Physical Society April Meeting 2024 — 2024
Sacramento, CA

Penn State Primordial Universe and Gravity Seminar — 2021, 2023, 2024, 2025
State College, PA

LIGO-SURF Presentation — 2020
California Institute of Technology (virtual)

Finesse Interferometric Modelling Workshop and Hackathon — 2020
IUCAA, Pune, India

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 2022–2024
Department of Physics, Pennsylvania State University

Quantum Information and Computing
Introductory Electromagnetism
Introductory Mechanics

Undergraduate Teaching Assistant 2020
Department of Physics, BITS Pilani

Statistical Mechanics

LEADERSHIP AND ACADEMIC SERVICE

Student Representative 2026-2028
Executive Committee of the American Physical Society's Division of Gravitational Physics

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.

Council Member 2025
Gravitational-Wave Early Career Scientists (GWECS)

Represented the Cosmic Explorer Consortium on the GWECS council and contributed to efforts supporting early-career researchers through resources, opportunities, and community initiatives.

Chair of the Early Career Scientists Group 2025
Cosmic Explorer Consortium

Coordinated early-career activities, mentorship efforts, and liaison with the executive board.

GAPP Graduate Student Liaison 2024
Department of Physics, Pennsylvania State University

Arranged and managed the Gravity, Astrophysics and Particle Physics seminars with faculty.

Gravi-tea Time Podcast (Co-creator) 2024
Institute for Gravitation and the Cosmos, Penn State

Produced episodes explaining breakthroughs in astrophysics for advanced undergrads and grads.

Founder, Physics Journal Club 2021
BITS Hyderabad

Fostered collaborative learning and research discussions.

Secretary, AD ASTRA Astronomy Club 2019
BITS Hyderabad

Initiated projects (e.g., horn antenna for galaxy rotation curves), organized fests and trivia sessions.

Team Manager & Suspension Engineer, Vulcan Racing 2019
BITS Hyderabad

Managed off-roading automobile team; contributed to suspension design and project coordination.

OUTREACH AND SOCIAL SERVICE

Host, Astro[sound]bites Podcast 2025
American Astronomical Society

One of four hosts that host this astronomy podcast for general outreach.

Author, GW250114 Factsheet 2025
LIGO Education and Public Outreach (EPO) Team

Designed the official GW250114 factsheet, translating key scientific results for broad public and media engagement.

Outreach Chair of PAW+ 2025
Physics and Astronomy for Women+, Pennsylvania State University

- 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.

Graduate Student Newsletter Editorial Team 2025
Eberly College of Science, Pennsylvania State University

- 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.

PAW Pals Volunteer 2023–2025
Physics and Astronomy for Women+, Pennsylvania State University

Led demonstrations and discussions in local elementary schools to engage kids in science.

PROFESSIONAL REFERENCES

Prof. Bangalore Sathyaprakash
The Pennsylvania State University
State College, PA, USA
bss25@psu.edu

Prof. Jocelyn Read
California State University, Fullerton
Fullerton, CA, USA
jread@fullerton.edu

Prof. Tim Dietrich
Max Planck Institute for Gravitational Physics
Potsdam, Germany
tim.dietrich@uni-potsdam.de

Prof. Floor Broekgaarden
University of California, San Diego
San Diego, CA, USA
floor.fbroekgaarden@ucsd.edu

Dr. Lami Suleiman
Deutsches Elektronen-Synchrotron (DESY)
Hamburg, Germany
lami.suleiman@desy.de

Prof. Nils Andersson
University of Southampton
Southampton, United Kingdom
N.A.Andersson@southampton.ac.uk

Prof. David Radice
Pennsylvania State University
State College, PA, USA
dur566@psu.edu

Prof. Sanjay Reddy
University of Washington
Seattle, WA, USA
sareddy@uw.edu

Prof. Eugenio Bianchi
Pennsylvania State University
State College, PA, USA
ebianchi@psu.edu

Dr. Violetta Sagun
University of Southampton
Southampton, United Kingdom
V.Sagun@soton.ac.uk