Sumeet Kulkarni

Astrophysicist · Science Educator & Communicator

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Education

University of Mississippi *Oxford, MS*

Ph.D. Astrophysics *August 2017 - January 2024*

- Advisor: Dr. Anuradha Gupta
- Dissertation: *Spins and Kicks: An analysis of dynamical properties of compact binaries using Gravitational Waves*

University of Mississippi *Oxford, MS*

M.Ed. Science Education *January 2020 - December 2021*

- Advisor: Dr. Brooke Whitworth

Indian Institute of Science Education and Research (IISER) *Pune, India*

Integrated B.S. - M.S. *August 2012 - May 2017*

- Physics, Mathematics, Astronomy
- Masters thesis research advisor: Dr. Varun Bhalerao

Professional Experience

2024-2025	**Science Writer/Director**, Veritasium (Remote)
2024	**News Writing Intern**, Nature (Washington DC), between February-July 2024
2022	**AAAS Mass Media Fellow**, Los Angeles Times (Los Angeles, CA) between June-September 2022
2021-2024	**Graduate Research Assistant**, Dept. of Physics & Astronomy, University of Mississippi
2017-2021	**Graduate Teaching Assistant for Astronomy**, Dept. of Physics & Astronomy, University of Mississippi

Awards, Fellowships, & Grants

2024	**Summer Diversity Fellowship**, National Association of Science Writers (NASW)	*$ 3,000*
2023	**The Eric and Wendy Schmidt Award for Excellence in Science Communication**, The National Academies of Science, Engineering & Medicine	*$ 20,000*
	Graduate Dissertation fellowship, University of Mississippi Graduate School	
2022	**Winner, 3-Minute Thesis (3MT) first place in the Masters' category**, UM Graduate School	
	AAAS Mass Media Science & Technology Fellowship, American Association for the Advancement of Science	*$ 8000*
	Outreach Fellow, LIGO Livingston Science Education Center	
	APS Distinguished Student travel award, American Physical Society	*$ 600*
2021	**Winner, 3-Minute Thesis (3MT) joint-first place in the Ph.D. category**, UM Graduate School	
2019	**APS Travel Award**, American Physical Society, Division of Gravitational Physics (DGRAV)	*$ 500*
2012-17	**INSPIRE Fellowship**, Department of Science and Technology, Govt. of India	

Teaching Experience

- **Astronomy 104 (Stars & Galaxies) Lab, Honors section**
  - The Honors Astronomy class at the University of Mississippi has an imaging component that I taught in Fall 2020 and Spring 2021. I guided students to use the 17" PlaneWave reflector with and SBIG10 CCD camera to capture images of star clusters, nebulae, and galaxies that took several hours of exposure time per object. Once the light was captured, I taught students how to process the multi-filter (RGB and narrowband) data to produce the final image.
  - Taught the non-honors portion of the lab in Fall 2019 & Spring 2018. This lab covered topics such as the Hertzsprung-Russell diagram, Cepheid variables, and estimation of the Hubble-Lemaitre constant.
  - Conducted lab sessions, outdoor stargazing sessions, operated telescopes, and graded weekly assignments.
- **Astronomy 103 (Solar System) Lab**
  - Taught in Fall 2017, 2018 & Spring 2019. This lab covered topics such as spectroscopy, size and features of the Moon, sunspots and solar rotation, estimating the size and distances of planets.
  - Conducted lab sessions, outdoor stargazing sessions, operated telescopes, and graded weekly assignments.

Publications

Published

S. Kulkarni, N. K. Johnson-McDaniel, K. S. Phukon, N. V. Krishnendu, A. Gupta. 2024. Inferring spin tilts of binary black holes at formation with plus-era gravitational wave detectors. Phys. Rev. D 109, 043002. *e-Print*: arXiv:2308.05098

S. Kulkarni, S. Padamata, A. Gupta, R. Kashyap, D. Radice. 2023. Numerical Relativity Estimates of the Remnant Recoil Velocity in Binary Neutron Star Mergers. Phys. Rev. D 108, 103023. *e-Print*: arXiv:2308.03955

S. Kulkarni, B. Whitworth. 2022. Podcasts in Science Classrooms: Story-telling for All Ears! The Physics Teacher, 60(6):419–421

N. K. Johnson-McDaniel, **S. Kulkarni**, A. Gupta. 2022. Inferring spin tilts at formation from gravitational wave observations of binary black holes: Interfacing precession-averaged and orbit-averaged spin evolution. Phys. Rev. D, 106(2):023001. *e-Print*: arXiv:2107.11902

S. Kulkarni, S. Padamata, A. Gupta. 2022. Recoil Velocity of Binary Neutron Star Merger Remnants, Proceedings of the International Astronomical Union. 2020;16(S363):250-254. doi:10.1017/S1743921322002022

H. Kumar et al. including **S. Kulkarni**. 2022. India's First Robotic Eye for Time-domain Astrophysics: The GROWTH-India Telescope. The Astronomical Journal, Volume 164, Number 3. *e-Print*: arXiv:2206.13535

K. Mogushi, R. Quitzow-James, M. Cavaglia, **S. Kulkarni**, F. Hayes. 2021. NNETFIX: an artificial neural network-based de-noising engine for gravitational-wave signals. Mach. Learn. Sci. Tech., 2(3):035018. *e-Print*: arXiv:2101.04712

A. Singhal et al. including **S. Kulkarni**. 2021. Deep Co-Added Sky from Catalina Sky Survey Images. MNRAS, Volume 507, Issue 4, November 2021, Pages 4983–4996, *e-Print*: arXiv:2108.00029

S. Kulkarni, K. S. Phukon, A. Reza, S. Bose, A. Dasgupta, D. Krishnaswamy, A. Sengupta. 2019. Random projections in gravitational wave searches of compact binaries, Phys. Rev. D 99, 101503(R). *e-Print*: arXiv:1801.04506

In Prep

S. Kulkarni, N. K. Johnson-McDaniel, J. Swindoll, A. Gupta. SARDIS: Bidirectional Evolution of Binary Black Hole Spin Tilt Angles.

Presentations

- January 2024. **243rd meeting of the American Astronomical Society**. *"Spins and Kicks: the ballet of black holes in compact binary mergers"*. Graduate Dissertation Talk. . . . . New Orleans, LA
- July 2023. **15th Edoardo Amaldi Conference on Gravitational Waves**. *"Inferring spin tilts of binary black holes at formation with plus-era gravitational wave detectors"*. Poster.

  . . . . . Virtual
- June 2023. **242nd meeting of the American Astronomical Society**. *"Recoil velocities of binary neutron star merger remnants"*. Contributed talk. . . . . Albuquerque, NM
- March 2023. **Tata Institute for Fundamental Research (TIFR)**. *"Spins and Kicks: analyzing compact binaries using gravitational waves"*. Invited talk. . . . . Mumbai, India
- November 2022. **4th Shaw-IAU workshop on Astronomy for Education**. Contributed talk. *"Bringing Gravitational Waves into the classroom using Streamlit"*

  . . . . . Virtual
- November 2022. **South-eastern Section of the American Physical Society (SESAPS) Annual meeting**. *"Spin orientations of binary black holes at formation"*. Contributed talk. . . . . Oxford, MS
- April 2022. **American Physical Society (APS) April meeting 2022**. *"Recoil Velocity of Binary Neutron Star Remnants"*. Contributed talk. . . . . New York, NY
- March 2022. **Mississippi Academy of Sciences (MAS) Annual meeting**. *"Education and Outreach at the LIGO Louisiana Science Education Center"*. Poster.

  . . . . . Biloxi, MS
- December 2021. **International Astronomical Union (IAU) Symposium 363: Neutron Star Astrophysics at the Crossroads**. *"Recoil velocity of binary neutron star merger remnants"*. Contributed talk.

  . . . . . Virtual
- August 2021. **MAS Annual meeting**. *"Inferring spin tilts at formation from gravitational wave observations of binary black holes"*. Contributed talk.

  . . . . . Biloxi, MS
- September 2019. **Conference on Science Communication workshop st the American Institute of Physics (ComSciCon-AIP)**. *"Humans of LIGO"*. Poster.

  . . . . . College Park, MD
- April 2019. **APS April meeting 2019**. *"NNETFIX: A Neural NETwork to FIX GW signals overlapping with short duration glitches in LIGO-Virgo data"*. Contributed talk.

  . . . . . Denver, CO
- March 2019. **UM-MSU Joint Symposium**. *"Gravitational Wave signals overlapping with short-duration glitches in LIGO-Virgo data"*. Contributed talk.

  . . . . . Starkville, MS
- April 2018. **APS April meeting 2018**. *"Reconstruction of Glitch-affected Gravitational Wave signals using Machine learning"*. Poster. . . . . Columbus, OH

Professional Development

Outreach

2022	**LIGO Science Education Center**, Led in-person and virtual field trips of middle-school and high-school students, giving tours of LIGO and presenting numerous demos connecting simple physics concepts to cutting-edge gravitational-wave research. Volunteered at science fairs such as the Southeastern Louisiana science fest (April 2022) and STEM NOLA (May 2022).	*Livingston, LA*
2019-23	**Oxford Science Cafe**, co-organized monthly public talks and conversations about science for the local community in Oxford.	
2020-21	**The Ssippin' Science Podcast**, Creator and host of a podcast that shared stories heard at the Oxford Science cafe to a broader audience.	*Oxford, MS*
2017-23	**Outreach at UM Dept. of Physics & Astronomy**, Active in organizing and participating in department outreach events such as the annual Halloween Spooky Physics Night, and the Astronomy Open House which included events such as Astro trivia, Astro art, and creative writing contest.	

Workshops

LIGO Open Data Workshop, Got practical experience working with a wide array of LIGO data analysis codes, tools, and techniques. (March 2018, Pasadena, CA). Organized a local edition at LIGO Livingston in May 2022.

GROWTH Transient Astronomy workshop, Learned the basics of processing FITS data from telescopes and identifying transient objects in large datasets. (August 2019, San Diego, CA)

Open Science Grid workshop, Learned how to run high-throughput scientific code on the open science grid. (July 2019, Madison, WI).

ComSciCon, Conference on Science Communication. Attended ComSciCon-AIP '19, Atlanta '20, Flagship '22, Organized Atlanta '21, Flagship '24

IAS Science Journalism Workshop, (July 2023, Princeton, NJ)

Professional Memberships

American Astronomical Society (AAS)
American Physical Society (APS)
National Association of Science Writers (NASW)
American Association for the Advancement of Science (AAAS)