Md Arif Shaikh

Assistant Professor

Gravitational wave astrophysicist working on various aspects of gravitational wave physics, including waveform modeling, data analysis, and tests of general relativity using gravitational wave observations.

arifshaikh.astro@gmail.com | https://mdarifshaikh.com | +91 8601923985

Positions

Assistant Professor November 2023 – Present
Department of Physics, *Vivekananda Satavarshiki Mahavidyalaya*
Manikpara, West Bengal, 721513, India

Postdoctoral Fellow July 2022 – November 2023
Department of Physics and Astronomy, *Seoul National University*
1 Gwanak-ro, Gwanak-gu, Seoul 08826, Korea
Advisor: Hyung Mok Lee

Postdoctoral Fellow July 2019 – June 2022
Astrophysical Relativity, *International Centre for Theoretical Sciences*
Hesaraghatta Hobli, Karnataka, 560089, India
Advisor: Parameswaran Ajith

Education

Doctor of Philosophy (PhD) July 2014 – June 2019
Harish-Chandra Research Institute
Chhatnag Road, Jhunsi, Prayagraj, 211019, Uttar Pradesh, India
Cosmology & High Energy Astrophysics
Advisor: Tapas Kumar Das (tapas@hri.res.in)

Master of Science (MSc) July 2012 – June 2014
Harish-Chandra Research Institute
Chhatnag Road, Jhunsi, Prayagraj, 211019, Uttar Pradesh, India
Cosmology & High Energy Astrophysics
Advisor: Tapas Kumar Das (tapas@hri.res.in)

Bachelor of Science (BSc) July 2009 – June 2012
Jadavpur University
188, Raja S.C. Mallick Rd, Kolkata 700032, India
Faculty of Physics

Publications

Short author publications

19. Nee, P. J., Ravichandran, A., Field, S. E., Islam, T., Pfeiffer, H. P., Varma, V., Boyle, M., Ceja, A., Ghadiri, N., Kidder, L. E., Kumar, P., Maurya, A., Morales, M., Ramos-Buades, A., Ravishankar, A., Rink, K., Rüter, H. R., Scheel, M. A., Shaikh, M. A., Tellez, D. "Eccentric binary black holes: A new framework for numerical relativity waveform surrogates.", 2025, arXiv:2510.00106

18. Tiwari, A., Bhat, S. A., Shaikh, M. A., Kapadia, S. J. "Testing the nature of GW200105 by probing the frequency evolution of eccentricity." *Astrophys. J.*, **995**, *1*, 2025, arXiv:2509.26152

17. Bhat, S. A., Tiwari, A., Shaikh, M. A., Kapadia, S. J. "Eccentricity evolution consistency test to distinguish eccentric gravitational-wave signals from eccentricity mimickers." *Phys. Rev. D*,

112, *12*, 2025, arXiv:2508.14850

16. Shaikh, M. A., Varma, V., Ramos-Buades, A., Pfeiffer, H. P., Boyle, M., Kidder, L. E., Scheel, M. A. "Defining eccentricity for spin-precessing binaries." *Class. Quant. Grav.*, **42**, 2025, arXiv:2507.08345

15. Chartier, N., Shaikh, M. A., Lee, H. M., Kim, J. "Comparison between best-fit eccentricity definitions and the standardized definition of eccentricity." *Phys. Rev. D*, **112**, *2*, 2025, arXiv:2503.19538

14. Deka, U., Prabhu, G., Shaikh, M. A., Kapadia, S. J., Varma, V., Field, S. E. "Surrogate modeling of gravitational waves microlensed by spherically symmetric potentials." *Phys. Rev. D*, **111**, *10*, 2025, arXiv:2501.02974

13. Deka, U., Chakraborty, S., Kapadia, S. J., Shaikh, M. A., Ajith, P. "Probing the charge of compact objects with gravitational microlensing of gravitational waves." *Phys. Rev. D*, **111**, *6*, 2025, arXiv:2401.06553

12. Shaikh, M. A., Bhat, S. A., Kapadia, S. J. "A study of the inspiral-merger-ringdown consistency test with gravitational-wave signals from compact binaries in eccentric orbits." *Phys. Rev. D*, **110**, *2*, 2024, arXiv:2402.15110

11. Shaikh, M. A., Varma, V., Pfeiffer, H. P., Ramos-Buades, A., van de Meent, M. "Defining eccentricity for gravitational wave astronomy." *Phys. Rev. D*, **108**, *10*, 2023, arXiv:2302.11257

10. Singh, M. K., Divyajyoti, D., Kapadia, S. J., Shaikh, M. A., Ajith, P. "Improved early-warning estimates of luminosity distance and orbital inclination of compact binary mergers using higher modes of gravitational radiation." *Mon. Not. Roy. Astron. Soc.*, **513**, *3*, 2022, arXiv:2202.05802

9. Maity, S., Shaikh, M. A., Tarafdar, P., Das, T. K. "Carter-Penrose diagrams for emergent spacetime in axisymmetrically accreting black hole systems." *Phys. Rev. D*, **106**, *4*, 2022, arXiv:2106.07598

8. Wei, W., Huerta, E. A., Yun, M., Loutrel, N., Shaikh, M. A., Kumar, P., Haas, R., Kindratenko, V. "Deep Learning with Quantized Neural Networks for Gravitational-wave Forecasting of Eccentric Compact Binary Coalescence." *Astrophys. J.*, **919**, *2*, 2021, arXiv:2012.03963

7. Singh, M. K., Kapadia, S. J., Shaikh, M. A., Chatterjee, D., Ajith, P. "Improved early warning of compact binary mergers using higher modes of gravitational radiation: A population study." *Mon. Not. Roy. Astron. Soc.*, **502**, *2*, 2021, arXiv:2010.12407

6. Kapadia, S. J., Singh, M. K., Shaikh, M. A., Chatterjee, D., Ajith, P. "Of Harbingers and Higher Modes: Improved gravitational-wave early-warning of compact binary mergers." *Astrophys. J. Lett.*, **898**, *2*, 2020, arXiv:2005.08830

5. Shaikh, M. A., Maity, S., Nag, S., Das, T. K. "Effective sound speed in relativistic accretion discs around Schwarzschild black holes." *New Astron.*, **69**, 2019, arXiv:1806.04084

4. Shaikh, M. A., Das, T. K. "Linear perturbations of low angular momentum accretion flow in the Kerr metric and the corresponding emergent gravity phenomena." *Phys. Rev. D*, **98**, *12*, 2018, arXiv:1803.09896

3. Shaikh, M. A.. "Relativistic sonic geometry for isothermal accretion in the Kerr metric." *Class. Quant. Grav.*, **35**, *5*, 2018, arXiv:1705.04918

2. Datta, S., Shaikh, M. A., Das, T. K. "Acoustic geometry obtained through the perturbation of the Bernoulli's constant." *New Astron.*, **63**, 2018, arXiv:1612.07954

1. Shaikh, M. A., Firdousi, I., Das, T. K. "Relativistic sonic geometry for isothermal accretion in the Schwarzschild metric." *Class. Quant. Grav.*, **34**, *15*, 2017, arXiv:1612.07963

SXS Collaboration

1. Scheel, M. A., others. "The SXS Collaboration's third catalog of binary black hole simulations.", 2025, arXiv:2505.13378

LVK Collaboration

34. Abac, A. G., others. "Directional Search for Persistent Gravitational Waves: Results from the First Part of LIGO-Virgo-KAGRA's Fourth Observing Run.", 2025, arXiv:2510.17487

33. Abac, A. G., others. "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.", 2025, arXiv:2509.07352

32. Abac, A. G., others. "GW250114: Testing Hawking's Area Law and the Kerr Nature of Black Holes." *Phys. Rev. Lett.*, **135**, *11*, 2025, arXiv:2509.08054

31. Abac, A. G., others. "GWTC-4.0: Constraints on the Cosmic Expansion Rate and Modified Gravitational-wave Propagation.", 2025, arXiv:2509.04348

30. Abac, A. G., others. "Upper Limits on the Isotropic Gravitational-Wave Background from the first part of LIGO, Virgo, and KAGRA's fourth Observing Run.", 2025, arXiv:2508.20721

29. Abac, A. G., others. "Open Data from LIGO, Virgo, and KAGRA through the First Part of the Fourth Observing Run.", 2025, arXiv:2508.18079

28. Abac, A. G., others. "GWTC-4.0: Updating the Gravitational-Wave Transient Catalog with Observations from the First Part of the Fourth LIGO-Virgo-KAGRA Observing Run.", 2025, arXiv:2508.18082

27. Abac, A. G., others. "GWTC-4.0: Population Properties of Merging Compact Binaries.", 2025, arXiv:2508.18083

26. Abac, A. G., others. "GWTC-4.0: Methods for Identifying and Characterizing Gravitational-wave Transients.", 2025, arXiv:2508.18081

25. Abac, A. G., others. "GWTC-4.0: An Introduction to Version 4.0 of the Gravitational-Wave Transient Catalog.", 2025, arXiv:2508.18080

24. Abac, A. G., others. "All-sky search for long-duration gravitational-wave transients in the first part of the fourth LIGO-Virgo-KAGRA Observing run.", 2025, arXiv:2507.12282

23. Abac, A. G., others. "All-sky search for short gravitational-wave bursts in the first part of the fourth LIGO-Virgo-KAGRA observing run.", 2025, arXiv:2507.12374

22. Abac, A. G., others. "GW231123: a Binary Black Hole Merger with Total Mass 190-265 M_o.", 2025, arXiv:2507.08219

21. Abac, A. G., others. "Search for Continuous Gravitational Waves from Known Pulsars in the First Part of the Fourth LIGO-Virgo-KAGRA Observing Run." *Astrophys. J.*, **983**, *2*, 2025, arXiv:2501.01495

20. Abac, A. G., others. "Search for Gravitational Waves Emitted from SN 2023ixf." *Astrophys. J.*, **985**, *2*, 2025, arXiv:2410.16565

19. Abac, A. G., others. "A Search Using GEO600 for Gravitational Waves Coincident with Fast Radio Bursts from SGR 1935+2154." *Astrophys. J.*, **977**, *2*, 2024, arXiv:2410.09151

18. Raman, G., others. "Swift-BAT GUANO Follow-up of Gravitational-wave Triggers in the Third LIGO-Virgo-KAGRA Observing Run." *Astrophys. J.*, **980**, *2*, 2025, arXiv:2407.12867

17. Abac, A. G., others. "Observation of Gravitational Waves from the Coalescence of a 2.5-4.5 M $_o$ Compact Object and a Neutron Star." *Astrophys. J. Lett.*, **970**, *2*, 2024, arXiv:2404.04248

16. Abac, A. G., others. "Ultralight vector dark matter search using data from the KAGRA O3GK run." *Phys. Rev. D*, **110**, *4*, 2024, arXiv:2403.03004

15. Fletcher, C., others. "A Joint Fermi-GBM and Swift-BAT Analysis of Gravitational-wave Candidates from the Third Gravitational-wave Observing Run." *Astrophys. J.*, **964**, *2*, 2024, arXiv:2308.13666

14. Abac, A. G., others. "Search for Eccentric Black Hole Coalescences during the Third Observing Run of LIGO and Virgo." *Astrophys. J.*, **973**, *2*, 2024, arXiv:2308.03822
13. Abbott, R., others. "Search for Gravitational-lensing Signatures in the Full Third Observing Run of the LIGO-Virgo Network." *Astrophys. J.*, **970**, *2*, 2024, arXiv:2304.08393
12. Abbott, R., others. "Open Data from the Third Observing Run of LIGO, Virgo, KAGRA, and GEO." *Astrophys. J. Suppl.*, **267**, *2*, 2023, arXiv:2302.03676
11. Abbott, R., others. "Search for subsolar-mass black hole binaries in the second part of Advanced LIGO's and Advanced Virgo's third observing run." *Mon. Not. Roy. Astron. Soc.*, **524**, *4*, 2023, arXiv:2212.01477
10. Abbott, R., others. "Search for Gravitational-wave Transients Associated with Magnetar Bursts in Advanced LIGO and Advanced Virgo Data from the Third Observing Run." *Astrophys. J.*, **966**, *1*, 2024, arXiv:2210.10931
9. Abbott, R., others. "Model-based Cross-correlation Search for Gravitational Waves from the Low-mass X-Ray Binary Scorpius X-1 in LIGO O3 Data." *Astrophys. J. Lett.*, **941**, *2*, 2022, arXiv:2209.02863
8. Abbott, R., others. "Search for continuous gravitational wave emission from the Milky Way center in O3 LIGO-Virgo data." *Phys. Rev. D*, **106**, *4*, 2022, arXiv:2204.04523
7. Abbott, R., others. "First joint observation by the underground gravitational-wave detector KAGRA with GEO 600." *PTEP*, **2022**, *6*, 2022, arXiv:2203.01270
6. Abbott, R., others. "Search for gravitational waves from Scorpius X-1 with a hidden Markov model in O3 LIGO data." *Phys. Rev. D*, **106**, *6*, 2022, arXiv:2201.10104
5. Abbott, R., others. "All-sky search for continuous gravitational waves from isolated neutron stars using Advanced LIGO and Advanced Virgo O3 data." *Phys. Rev. D*, **106**, *10*, 2022, arXiv:2201.00697
4. Abbott, R., others. "Tests of General Relativity with GWTC-3.", 2021, arXiv:2112.06861
3. Abbott, R., others. "All-sky search for gravitational wave emission from scalar boson clouds around spinning black holes in LIGO O3 data." *Phys. Rev. D*, **105**, *10*, 2022, arXiv:2111.15507
2. Abbott, R., others. "Searches for Gravitational Waves from Known Pulsars at Two Harmonics in the Second and Third LIGO-Virgo Observing Runs." *Astrophys. J.*, **935**, *1*, 2022, arXiv:2111.13106
1. Abbott, R., others. "Constraints on the Cosmic Expansion History from GWTC-3." *Astrophys. J.*, **949**, *2*, 2023, arXiv:2111.03604

Research Visits

20. Chunglee Kim, Ewha Womans University, Seoul, Korea, October 20, 2025 – October 21, 2025
19. Hyung Mok Lee, Seoul National University, Seoul, Korea, October 15, 2025 – October 25, 2025
18. Prayush Kumar, ICTS-TIFR, Bangalore, India, August 4, 2025 – August 10, 2025
17. Shasvath Kapadia, IUCAA, Pune, India, June 16, 2025 – June 22, 2025
16. Hyung Mok Lee, Seoul National University, Seoul, Korea, October 10, 2024 – October 20, 2024
15. Hyung Won Lee, Inje University, Gimhae, Korea, November 2, 2023 – November 3, 2023
14. Shasvath Kapadia, IUCAA, Pune, India, June 18, 2023 – June 21, 2023
13. Prayush Kumar, ICTS-TIFR, Bangalore, India, June 15, 2023 – June 18, 2023
12. Zhoujian Cao, BNU, Beijing, China, May 9, 2023 – May 11, 2023
11. Arman Shafieloo, KASI, Daejeon, Korea, April 19, 2023 – April 20, 2023

10. Young Bok Bae, IBS, Daejeon, Korea, April 18, 2023 – April 19, 2023
9. Junichi Yokoyama, UoT, Tokyo, Japan, November 17, 2022 – November 19, 2022
8. Hisa-aki Shinkai, OIT, Osaka, Japan, November 15, 2022 – November 17, 2022
7. Kunihito Ioka, YITP, Kyoto, Japan, November 13, 2022 – November 15, 2022
6. Frank Ohme, AEI, Hannover, Germany, April 20, 2022 – April 24, 2022
5. Harald Pfeiffer, AEI, Potsdam, Germany, March 20, 2022 – April 20, 2022
4. Tapas Kumar Das, HRI, Allahabad, India, November 15, 2019 – November 25, 2019
3. P Ajith, ICTS-TIFR, Bangalore, India, March 25, 2019 – April 6, 2019
2. P Ajith, ICTS-TIFR, Bangalore, India, September 27, 2017 – October 11, 2017
1. Tarun Souradeep, IUCAA, Pune, India, September 6, 2014 – October 20, 2014