

Aditya Vijaykumar

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| EMPLOYMENT | CITA Postdoctoral Fellow Canadian Institute for Theoretical Astrophysics (CITA), Toronto Graduate Student International Centre for Theoretical Sciences (ICTS-TIFR), Bengaluru Fulbright-Nehru Doctoral Research Fellow Department of Physics, The University of Chicago | Sep 2023 - Present Aug 2018 - Aug 2023 Aug 2022 - Mar 2023 |
| EDUCATION | International Centre for Theoretical Sciences (ICTS-TIFR), Bengaluru PhD in Physics. Mentor: Prof. Ajith Parameswaran. Thesis Title: <i>Exploring gravity, astrophysics, and cosmology with gravitational waves</i> Birla Institute of Technology and Science (BITS), Pilani M.Sc. (Hons.) Physics and B.E. (Hons.) Mechanical Engineering | 2018 - 2023 2013 - 2018 |
| GRANTS AND AWARDS | <ol style="list-style-type: none">1. Justice Oak Award for Outstanding thesis in Astronomy 2024, Astronomical Society of India (ASI)2. V. V. Narlikar Best Thesis Award 2024, Indian Association for General Relativity and Gravitation (IAGRG)3. Fulbright-Nehru Doctoral Research Fellowship 2022, US Department of State and Government of India4. Co-PI, IndiaBioscience Outreach Grant 2022, <i>Communicating Science Through Theatre</i>, (100,000 INR)5. Graduate Fellowship 2018-2023, ICTS-TIFR6. S.N. Bhatt Memorial Excellence Fellowship 2018, ICTS-TIFR7. Summer Research Fellowship 2016, Indian Academy of Sciences8. INSPIRE-DST Scholarship for Higher Education 2013-2018, Government of India | |
| PUBLICATION SUMMARY | <ul style="list-style-type: none">• NASA-ADS Library• 25 short-author list papers, including 18 as first/second author.• 6 LIGO-Virgo-KAGRA Collaboration papers with significant contributions, including 1 as chair of the paper writing team | |
| TALKS SUMMARY | <ul style="list-style-type: none">• 9 invited conference talks• 20 seminars• 10 contributed talks | |
| SELECTED SERVICE | LIGO-Virgo-KAGRA Collaboration <ul style="list-style-type: none">• Paper writing team chair for the GWTC-4.0 populations paper• Parameter estimation study team lead for the GW231123 massive binary black hole• Developer of <code>bilby</code> and <code>bilby_pipe</code> software packages• Eccentric parameter estimation taskforce member• Low-latency parameter estimation expert rota• Elected postdoctoral member, LIGO Academic Advisory Committee (LAAC) Journal Referee <ul style="list-style-type: none">• Nature • Physical Review D • Astrophysical Journal Letters • Astrophysical Journal • Machine Learning: Science and Technology | |

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| INVITED CONFERENCE TALKS | 1. Gravitational Wave Physics and Astrophysics Workshop, Atlanta | December 2025 |
| | 2. The Lifecycle of Stellar Black Holes, KITP, Santa Barbara | November 2025 |
| | 3. Future of Gravitational Wave Astronomy, ICTS, Bengaluru | October 2025 |
| | 4. European Physical Society Conference on High Energy Physics, Marseille (virtual) | July 2025 |
| | 5. Scientific Machine Learning in Gravitational Wave Astronomy, ICERM, Providence | June 2025 |
| | 6. Lyman Break Galaxies Workshop, Toronto | May 2025 |
| | 7. PAX Meeting, London, UK (panelist) | July 2024 |
| | 8. The Quest for Precision Gravitational-wave Cosmology, KICP, Chicago | September 2022 |
| | 9. Second Chennai Symposium on Gravitation and Cosmology, Chennai (virtual) | February 2022 |
| LIST OF SEMINARS | 1. Weinberg Institute Seminar, UT Austin | November 2025 |
| | 2. Astrophysics and Relativity Seminar, ICTS | July 2025 |
| | 3. TAPIR Seminar, Caltech | March 2025 |
| | 4. Seminar, UCLA | March 2025 |
| | 5. IGC seminar, Penn State University | October 2024 |
| | 6. Gravitational wave seminar, IUCAA | August 2024 |
| | 7. Gravity Exploration Institute seminar, Cardiff University | July 2024 |
| | 8. CIERA seminar, Northwestern University | June 2024 |
| | 9. GRAPPA seminar, University of Amsterdam | May 2024 |
| | 10. Strong seminar, Niels Bohr Institute | April 2024 |
| | 11. CITA Seminar, University of Toronto | January 2024 |
| | 12. TASTY Seminar, University of Toronto | January 2024 |
| | 13. IUCAA gravitational wave seminar, Pune | July 2023 |
| | 14. Physics seminar, IISER Pune | July 2023 |
| | 15. Physics seminar, IIT Gandhinagar | June 2023 |
| | 16. Gravitational wave seminar, Seoul National University (virtual) | October 2022 |
| | 17. IGC seminar, Penn State University | August 2022 |
| | 18. Lorentz Institute seminar, Leiden (virtual) | June 2020 |
| | 19. IUCAA gravitational wave seminar, Pune | September 2019 |
| | 20. Albert Einstein Institute seminar, Hannover | July 2019 |
| CONTRIBUTED TALKS | 1. APS Meeting, Anaheim, CA | March 2025 |
| | 2. Midwest Relativity Meeting, Ann Arbor, MI | November 2024 |
| | 3. CASCA Meeting, Toronto | June 2024 |
| | 4. Gravitational waves: A new ear on the chemistry of galaxies, Leiden | April 2024 |
| | 5. Globular Clusters and their Tidal Tails, Toronto | May 2024 |
| | 6. Joint CITA-PI Gravitational waves meeting | October 2023 |
| | 7. Pune-Mumbai Cosmology Meeting | August 2023 |
| | 8. ICTS In-house Symposium, Bengaluru | February 2020 |
| | 9. International Conference on Gravitation & Cosmology, Mohali | December 2019 |
| | 10. GR22 and Amaldi3, Valencia | July 2019 |
| MENTORSHIP | 1. Sarah Han (University of Toronto) | May 2025 - Present |
| | 2. Cissy Kuang (University of Toronto) | May 2025 - Present |
| | 3. Ben Stadel (University of Alberta) | May 2024 - Present |
| | 4. Neha Sharma (ICTS, Bengaluru) | Oct 2023 - Present |
| | 5. Avinash Tiwari (IUCAA, Pune) | May 2023 - Present |
| | 6. Kaustubh Gupta (IISER, Pune → Swinburne University) | May 2022 - May 2023 |
| | 7. Adhrit Ravichandran (IIT Roorkee → UMass Dartmouth) | Sep 2021 - Aug 2022 |
| | 8. Kruthi Krishna (IISc → Radboud University) | Sep 2020 - Aug 2021 |
| | 9. Harsh Narola (IISER, Tirupati → Utrecht University) | Sep 2020 - Aug 2021 |

TEACHING

- Instructor and organizer, **LIGO-Virgo Collaboration Gravitational-Wave Open Data Workshop #5 and #6** at ICTS.
- Tutor for the **Numerical Relativity** graduate course, ICTS, Jan-April 2022.
- Co-organizer and tutor, **ICTS Workshop on Parameter Estimation with bilby**, ICTS, Bengaluru, India, August 2020 (Online)
- Tutor, **Light and Beyond—Summer Course for Undergraduate Students by Prof. Rajaram Nityananda**, June 2020 (Online)
- Tutor, **LIGO-Virgo Collaboration Gravitational-Wave Open Data Workshop #3**, May 2020 (Online)
- Tutor for the following mini-courses, **ICTS Summer Schools on Gravitational Wave Astronomy**, ICTS, Bengaluru, India:
 1. *Compact binary evolution, rates and population modelling*, June 2022.
 2. *Astrophysical Stochastic GW Foreground*, July 2021.
 3. *Numerical Hydrodynamics*, May 2020.
 4. *Advanced General Relativity*, July 2019.

OUTREACH

- Interactive session with school students, The Academy School, Pune, August 2025.
- Talk on gravitational-wave astronomy, ASX Symposium, University of Toronto, March 2025.
- Talk on gravitational-wave astronomy, University of Toronto Undergraduate Astronomy Union Seminar, November 2024.
- Co-PI of the *IndiaBioscience Outreach Grant* to communicate science using stage theatre.
- Panelist at the *Bengaluru: The Astronomy City*, a Q&A event organized for **National Science Day**, February 2022.
- Mediator for the **Contagion Exhibition**, Science Gallery Bengaluru, April-July 2021.
- Moderated a discussion with Prof. Smitha Vishveshwara on her collaborative science theatre project *Quantum Voyages* as a part of **Cosmic Zoom Online Exhibition**, April 2021
- Articles on the **ICTS blog**:
 1. *A Conversation with ICTS Scientists Studying the Indian Monsoon*, November 2019
 2. *Summer School on Gravitational Wave Astronomy*, November 2019
- Talk titled *The Whats, Whys and Hows of Gravitational-wave Astronomy*, **BMS College of Engineering, Bengaluru**, November 2019
- Talk titled *Gravitational Waves - A New Tool for Cosmology!* at **Vigyan Samagam**, Visvesvaraya Industrial and Technological Museum, Bengaluru, India, August 2019
- Biweekly interactive outreach sessions in rural primary schools, 2019

REFERENCES

1. Prof. Maya Fishbach, CITA, fishbach@cita.utoronto.ca
2. Prof. Parameswaran Ajith, ICTS-TIFR, ajith@icts.res.in
3. Prof. Daniel E. Holz, The University of Chicago, holz@uchicago.edu
4. Prof. Benjamin Farr, University of Oregon, bfarr@uoregon.edu
5. Prof. Shasvath J. Kapadia, IUCAA, shasvath.kapadia@iucaa.in

PAPERS (SHORT AUTHORLIST)

* denotes joint first-author papers, † denotes student supervised.

27. N.V. Krishnendu, Tamara Evstafyeva, *Aditya Vijaykumar, William E. East et al.
Implications of GW₂₄₁₀₁₁ for rotating exotic compact objects
Submitted to PRL, [arXiv:2511.17341](https://arxiv.org/abs/2511.17341).
26. Madison VanWyngarden, Maya Fishbach, Aditya Vijaykumar, Alexandra G. Guerrero, Daniel E. Holz
How Low Can You Go: Constraining the Effects of Catalog Incompleteness on Dark Siren Cosmology
Submitted to ApJ, [arXiv:2511.04786](https://arxiv.org/abs/2511.04786).
25. Hui Tong et al. (including Aditya Vijaykumar)
Evidence of the pair instability gap in the distribution of black hole masses
Submitted to Nature, [arXiv:2509.04151](https://arxiv.org/abs/2509.04151).

24. Colm Talbot et al. (including **Aditya Vijaykumar**)
Inference with finite time series II: the window strikes back
Submitted to CQG, [arXiv:2508.11091](#).
23. Avinash Tiwari, Prolay Chanda, Shasvath J. Kapadia, Susmita Adhikari, **Aditya Vijaykumar**, Basudeb Dasgupta
Profiling Dark Matter Spikes with Gravitational Waves from Accelerated Binaries
Submitted to PRL, [arXiv:2508.03803](#).
22. Andris Doroszmai, Isobel M. Romero-Shaw, **Aditya Vijaykumar**, Silvia Toonen, et al.
Hierarchical Triples vs. Globular Clusters: Binary black hole merger eccentricity distributions compete and evolve with redshift
Submitted to MNRAS, [arXiv:2507.23212](#).
21. [†]Avinash Tiwari, **Aditya Vijaykumar**, Shasvath J. Kapadia, Shrobana Ghosh, Alex B. Nielsen
A pipeline to search for signatures of line-of-sight acceleration in gravitational wave signals produced by compact binary coalescences
Submitted to PRD, [arXiv:2506.22272](#).
20. Kanchan Soni, **Aditya Vijaykumar**, Sanjit Mitra
Assessing the potential of LIGO-India in resolving the Hubble Tension
Submitted to CQG, [arXiv:2409.11361](#).
19. [†]Avinash Tiwari, **Aditya Vijaykumar**, Shasvath J. Kapadia, Sourav Chatterjee, Giacomo Fragione
Profiling stellar environments of gravitational wave sources
Phys. Rev. D **112**, 084034, [arXiv:2407.15117](#).
18. Alexandra G. Hanselman, **Aditya Vijaykumar**, Maya Fishbach, Daniel E. Holz
Gravitational-wave dark siren cosmology systematics from galaxy weighting
ApJ **979** 9, [arXiv:2405.14818](#).
17. Sreejith Nair, ^{*}**Aditya Vijaykumar**, Sudipta Sarkar
Bounds on the charge of the graviton using gravitational wave observations
JCAP **11** (2024) 004, [arXiv:2405.05038](#).
16. ^{*}**Aditya Vijaykumar**, Alexandra G. Hanselman, Michael Zevin
Consistent eccentricities for gravitational wave astronomy: Resolving discrepancies between astrophysical simulations and waveform models
ApJ **969** 132, [arXiv:2402.07892](#).
15. Mukesh Kumar Singh, Shasvath J. Kapadia **Aditya Vijaykumar**, Parameswaran Ajith
Impact of higher harmonics of gravitational radiation on the population inference of binary black holes
ApJ **971** 23, [arXiv:2312.07376](#).
14. [†]Kruthi Krishna, ^{*}**Aditya Vijaykumar**, Apratim Ganguly, et al
Accelerated parameter estimation in Bilby with relative binning
[arXiv:2312.06009](#).
13. **Aditya Vijaykumar**, Maya Fishbach, Susmita Adhikari, Daniel E. Holz
Inferring host galaxy properties of LIGO-Virgo-KAGRA's black holes
ApJ **972** 157, [arXiv:2312.03316](#).
12. Divyajyoti, N.V. Krishnendu, Muhammed Saleem, Marta Colleoni, **Aditya Vijaykumar**, K.G. Arun, Chandra Kant Mishra
Effect of double spin-precession and higher harmonics on spin-induced quadrupole moment measurements
Phys. Rev. D **109**, 023016, [arXiv:2311.05506](#).
11. [†]Avinash Tiwari, ^{*}**Aditya Vijaykumar**, Shasvath J. Kapadia, Giacomo Fragione, Sourav Chatterjee
Accelerated binary black holes in globular clusters: forecasts and detectability in the era of space-based gravitational-wave detectors
MNRAS, **527**, 8586, [arXiv:2307.00930](#).

10. **Aditya Vijaykumar**, [†]Avinash Tiwari, Shasvath J. Kapadia, K.G. Arun, Parameswaran Ajith
Waltzing binaries: Probing line-of-sight acceleration of merging compact objects with gravitational waves
ApJ 954 105, [arXiv:2302.09651](#).
In press: Astrobites
9. [†]Adhrit Ravichandran, **Aditya Vijaykumar**, Shasvath J. Kapadia, Prayush Kumar
Rapid Identification and Classification of Eccentric Gravitational Wave Inspirals with Machine Learning
Submitted to PRD, [arXiv:2302.00666](#).
8. Srashti Goyal, **Aditya Vijaykumar**, Jose Maria Ezquiaga, Miguel Zumalacarregui
Probing lens-induced gravitational-wave birefringence as a test of general relativity
Phys. Rev. D 108, 024052, [arXiv:2301.04826](#).
In press: Astrobites
7. Bikram Keshari Pradhan, **Aditya Vijaykumar**, Debarati Chatterjee
Impact of updated Multipole Love and f -Love Universal Relations in context of Binary Neutron Stars
Phys. Rev. D 107, 023010, [arXiv:2210.09425](#).
6. **Aditya Vijaykumar**, Shasvath J. Kapadia, Parameswaran Ajith
Can a binary neutron star merger in the vicinity of a supermassive black hole enable a detection of a post-merger gravitational wave signal?
MNRAS, 513, 3577, [arXiv:2202.08673](#).
5. **Aditya Vijaykumar**, Ajit Kumar Mehta, Apratim Ganguly
Detection and parameter estimation challenges of Type-II lensed binary black hole signals
Phys. Rev. D 108, 043036, [arXiv:2202.06334](#).
4. Sumit Kumar, **Aditya Vijaykumar**, Alexander H. Nitz
Detecting Baryon Acoustic Oscillations with third generation gravitational wave observatories,
ApJ 930 113, [arXiv:2110.06152](#).
3. M. Saleem, Javed Rana, V. Gayathri, ^{*}**Aditya Vijaykumar** et al.
The Science Case for LIGO-India
Class. Quantum Grav. 39 025004, [arXiv:2105.01716](#).
2. **Aditya Vijaykumar**, M. V. S. Saketh, Sumit Kumar, Parameswaran Ajith, Tirthankar Roy Choudhury
Probing the large scale structure using gravitational wave observations of binary black holes,
Phys. Rev. D 108, 103017, [arXiv:2005.01111](#).
In press: Astrobites.
1. **Aditya Vijaykumar**, Shasvath J. Kapadia, Parameswaran Ajith
Constraints on the time variation of the gravitational constant using gravitational wave observations of binary neutron stars,
Phys. Rev. Lett. 126, 141104, [arXiv:2003.12832](#).
In press: [phys.org](#).

PAPERS (LONG
AUTHORLIST,
WITH
SUBSTANTIAL
CONTRIBUTION)

9. Abac et al. (LIGO Scientific, Virgo, and KAGRA Collaborations)
GW241011 and GW241110: Exploring Binary Formation and Fundamental Physics with Asymmetric, High-spin Black Hole Coalescences,
ApJL, [arXiv:2510.26931](#).
8. Abac et al. (LIGO Scientific, Virgo, and KAGRA Collaborations)
Upper Limits on the Isotropic Gravitational-Wave Background from the first part of LIGO, Virgo, and KAGRA's fourth Observing Run,
[arXiv:2508.20721](#).
7. Abac et al. (LIGO Scientific, Virgo, and KAGRA Collaborations) [**Paper Writing Team Lead**]
GWTC-4.0: Population Properties of Merging Compact Binaries,
[arXiv:2508.18083](#).

6. Abac et al. (LIGO Scientific, Virgo, and KAGRA Collaborations)
GWTC-4.0: Updating the Gravitational-Wave Transient Catalog with Observations from the First Part of the Fourth LIGO-Virgo-KAGRA Observing Run,
[arXiv:2508.18082](#).
5. Abac et al. (LIGO Scientific, Virgo, and KAGRA Collaborations)
GW231123: a Binary Black Hole Merger with Total Mass 190-265 M_{\odot} ,
[arXiv:2507.08219](#).
4. Abbott et al. (LIGO Scientific and Virgo Collaborations)
Tests of General Relativity with GWTC-3,
 Accepted to *Physical Review D*, [arXiv:2112.06861](#).
3. Abbott et al. (LIGO Scientific and Virgo Collaborations)
Tests of General Relativity with Binary Black Holes from the second LIGO-Virgo Gravitational-Wave Transient Catalog,
Phys. Rev. D **103** (2021) 12, 122002, [arXiv:2010.14529](#).
2. Abbott et al. (LIGO Scientific and Virgo Collaborations)
GWTC-2: Compact Binary Coalescences Observed by LIGO and Virgo During the First Half of the Third Observing Run,
Phys. Rev. X **11** (2021) 021053, [arXiv:2010.14527](#).
1. P. Virtanen et al. (including **Aditya Vijaykumar** as *SciPy 1.0 Contributor*)
SciPy 1.0—Fundamental Algorithms for Scientific Computing in Python,
Nat Methods **17**, 261–272 (2020), [arXiv:1907.10121](#).