

Aditya Vijaykumar

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EMPLOYMENT	CITA Postdoctoral Fellow Canadian Institute for Theoretical Astrophysics (CITA), Toronto	Sep 2023 - Present
	Graduate Student International Centre for Theoretical Sciences (ICTS-TIFR), Bengaluru	Aug 2018 - Aug 2023
	Fulbright-Nehru Doctoral Research Fellow Department of Physics, The University of Chicago	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>	2018 - 2023
	Birla Institute of Technology and Science (BITS), Pilani M.Sc. (Hons.) Physics and B.E. (Hons.) Mechanical Engineering	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• 30 short-author list papers, including 23 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">• 10 invited conference talks• 23 seminars• 10 contributed talks	
SELECTED SERVICE	<p>LIGO-Virgo-KAGRA Collaboration</p> <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)	
	<p>Journal Referee</p> <ul style="list-style-type: none">• Nature • Physical Review D • Astrophysical Journal Letters • Astrophysical Journal • Machine Learning: Science and Technology • Journal of Cosmology and Astroparticle Physics	

INVITED CONFERENCE TALKS	1. Canadian Association of Physicists Congress, Ottawa 2. Gravitational Wave Physics and Astrophysics Workshop, Atlanta 3. The Lifecycle of Stellar Black Holes, KITP, Santa Barbara 4. Future of Gravitational Wave Astronomy, ICTS, Bengaluru 5. European Physical Society Conference on High Energy Physics, Marseille (virtual) 6. Scientific Machine Learning in Gravitational Wave Astronomy, ICERM, Providence 7. Lyman Break Galaxies Workshop, Toronto 8. PAX Meeting, London, UK (panelist) 9. The Quest for Precision Gravitational-wave Cosmology, KICP, Chicago 10. Second Chennai Symposium on Gravitation and Cosmology, Chennai (virtual)	June 2026 December 2025 November 2025 October 2025 July 2025 June 2025 May 2025 July 2024 September 2022 February 2022
LIST OF SEMINARS	1. Gravity Seminar (Online), University of Mississippi 2. CCAPP Seminar, Ohio State University 3. Weinberg Institute Seminar, UT Austin 4. Strong Gravity Seminar, Perimeter Institute 5. Astrophysics and Relativity Seminar, ICTS 6. TAPIR Seminar, Caltech 7. Seminar, UCLA 8. IGC seminar, Penn State University 9. Gravitational wave seminar, IUCAA 10. Gravity Exploration Institute seminar, Cardiff University 11. CIERA seminar, Northwestern University 12. GRAPPA seminar, University of Amsterdam 13. Strong seminar, Niels Bohr Institute 14. CITA Seminar, University of Toronto 15. TASTY Seminar, University of Toronto 16. IUCAA gravitational wave seminar, Pune 17. Physics seminar, IISER Pune 18. Physics seminar, IIT Gandhinagar 19. Gravitational wave seminar, Seoul National University (virtual) 20. IGC seminar, Penn State University 21. Lorentz Institute seminar, Leiden (virtual) 22. IUCAA gravitational wave seminar, Pune 23. Albert Einstein Institute seminar, Hannover	April 2026 February 2026 November 2025 November 2025 July 2025 March 2025 March 2025 October 2024 August 2024 July 2024 June 2024 May 2024 April 2024 January 2024 January 2024 July 2023 July 2023 June 2023 October 2022 August 2022 June 2020 September 2019 July 2019
CONTRIBUTED TALKS	1. APS Meeting, Anaheim, CA 2. Midwest Relativity Meeting, Ann Arbor, MI 3. CASCA Meeting, Toronto 4. Gravitational waves: A new ear on the chemistry of galaxies, Leiden 5. Globular Clusters and their Tidal Tails, Toronto 6. Joint CITA-PI Gravitational waves meeting 7. Pune-Mumbai Cosmology Meeting 8. ICTS In-house Symposium, Bengaluru 9. International Conference on Gravitation & Cosmology, Mohali 10. GR22 and Amaldi13, Valencia	March 2025 November 2024 June 2024 April 2024 May 2024 October 2023 August 2023 February 2020 December 2019 July 2019
MENTORSHIP	1. Sarah Han (University of Toronto) 2. Cissy Kuang (University of Toronto) 3. Ben Stadel (University of Alberta) 4. Neha Sharma (ICTS, Bengaluru) 5. Avinash Tiwari (IUCAA, Pune)	May 2025 - Present May 2025 - Present May 2024 - Present Oct 2023 - Present 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.
30. †Neha Sharma, **Aditya Vijaykumar**, Prayush Kumar
Rapid inference of gravitational-wave signals in the time domain using a heterodyned likelihood
Submitted to PRD, [arXiv:2601.11239](https://arxiv.org/abs/2601.11239).

29. **Aditya Vijaykumar**, Amanda M. Farah, Maya Fishbach
The maximum mass ratio of hierarchical binary black hole mergers may cause the q - χ_{eff} correlation
 Submitted to ApJL, [arXiv:2601.03457](#).
28. Amanda M. Farah, **Aditya Vijaykumar**, Maya Fishbach
The steep redshift evolution of the hierarchical binary black hole merger rate may cause the z - χ_{eff} correlation
 Submitted to ApJL, [arXiv:2601.03456](#).
27. N.V. Krishnendu, Tamara Evstafyeva, ***Aditya Vijaykumar**, William E. East et al.
Implications of GW_{241011} for rotating exotic compact objects
 Submitted to PRL, [arXiv: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](#).
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](#).
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:2005.01031.
In press: Astrobites.

PAPERS (LONG
AUTHORLIST,
WITH
SUBSTANTIAL
CONTRIBUTION)

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.
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 $190\text{--}265 M_{\odot}$,
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.