Aditya Vijaykumar

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Employment

CITA Postdoctoral Fellow — Sep 2023 - *Present*
Canadian Institute for Theoretical Astrophysics (CITA), Toronto

Graduate Student — Aug 2018 - Aug 2023
International Centre for Theoretical Sciences (ICTS-TIFR), Bengaluru

Fulbright-Nehru Doctoral Research Fellow — Aug 2022 - Mar 2023
Department of Physics, The University of Chicago

Education

International Centre for Theoretical Sciences (ICTS-TIFR), Bengaluru — 2018 - 2023
PhD in Physics. Mentor: Prof. Ajith Parameswaran.
Thesis Title: *Exploring gravity, astrophysics, and cosmology with gravitational waves*

Birla Institute of Technology and Science (BITS), Pilani — 2013 - 2018
M.Sc. (Hons.) Physics and B.E. (Hons.) Mechanical Engineering

Grants and Awards

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 India
4. **Co-PI, IndiaBioscience Outreach Grant 2022**, *Communicating Science Through Theatre*, (100,000 INR)
5. **Graduate Fellowship 2018-2023**, ICTS-TIFR
6. **S.N. Bhatt Memorial Excellence Fellowship 2018**, ICTS-TIFR
7. **Summer Research Fellowship 2016**, Indian Academy of Sciences
8. **INSPIRE-DST Scholarship for Higher Education 2013-2018**, Government of India

Publication Summary

- 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

- **9 invited conference talks**
- **20 seminars**
- **10 contributed talks**

Selected Service

LIGO-Virgo-KAGRA Collaboration

- 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 `bilby` and `bilby_pipe` software packages
- Eccentric parameter estimation taskforce member
- Low-latency parameter estimation expert rota
- Elected postdoctoral member, LIGO Academic Advisory Committee (LAAC)

Journal Referee

• Nature • Physical Review D • Astrophysical Journal Letters • Astrophysical Journal • Machine Learning: Science and Technology

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 Amaldi13, 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.	Avinash Tiwari (IUCAA, Pune)	May 2023 - *Present*
5.	Kaustubh Gupta (IISER, Pune → Swinburne University)	May 2022 - May 2023
6.	Adhrit Ravichandran (IIT Roorkee → UMass Dartmouth)	Sep 2021 - Aug 2022
7.	Kruthi Krishna (IISc → Radboud University)	Sep 2020 - Aug 2021
8.	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)

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
Submitted to PRD, 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 et al. (including **Aditya Vijaykumar**)
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)

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.