

Aditya Vijaykumar

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RESEARCH INTERESTS Gravitational Wave Astronomy and Astrophysics, Tests of General Relativity and Cosmology, Scientific Computing

EDUCATION **International Centre for Theoretical Sciences (ICTS-TIFR), Bengaluru**
Research Scholar and Graduate Student in Physics 2018 - Present

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

EMPLOYMENT **Graduate Student**
International Centre for Theoretical Sciences (ICTS-TIFR), Bengaluru
Mentored by *Prof. Parameswaran Ajith* Aug 2018 - Present
Member of the *LIGO Scientific Collaboration* and the *LIGO-India Scientific Collaboration*

Summer Research Intern
International Centre for Theoretical Sciences (ICTS-TIFR), Bengaluru
Mentored by *Prof. Parameswaran Ajith* May 2018 - July 2018
Topic - *Cosmological Large-scale Structure probes using gravitational-wave observations*

Visiting Student (Masters Thesis)
Centre for High Energy Physics (CHEP), Indian Institute of Science (IISc), Bengaluru, India
Mentored by *Prof. Chethan Krishnan* July 2017 - April 2018
Topic - *Complexity in context of Locality, Entanglement and Quantum Gravity*

Summer Research Intern
The Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune, India
Mentored by *Prof. Raghunathan Srianand* May 2016 - July 2016
Topic - *Analysis of Quasar Absorption Lines from SDSS Photometric Data*

Summer Research Intern
The National Centre for Radio Astrophysics (NCRA-TIFR), Pune, India
Mentored by *Prof. Yashwant Gupta* May 2015 - July 2015
Topic - *Testing the fast transient detection pipeline of the GMRT*

- PAPERS (SHORT AUTHORLIST)
10. **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?
In Press, *MNRAS*, [arXiv:2202.08673](#).
 9. **Aditya Vijaykumar**, Ajit Kumar Mehta, Apratim Ganguly
Detection and parameter estimation challenges of Type-II lensed binary black hole signals
Submitted to *Physical Review D*, [arXiv:2202.06334](#).
 8. Sumit Kumar, **Aditya Vijaykumar**, Alexander H. Nitz
Detecting Baryon Acoustic Oscillations with third generation gravitational wave observatories,
In Press, *The Astrophysical Journal*, [arXiv:2110.06152](#).
 7. M. Saleem et al. (including **Aditya Vijaykumar**)
The Science Case for LIGO-India
Class. Quantum Grav. 39 025004, [arXiv:2105.01716](#).
 6. **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,
Submitted to *Physical Review Letters*, [arXiv:2005.01111](#).
In press: [Astrobites](#).

5. **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 (2021), [arXiv:2003.12832](#).
In press: [phys.org](#).

PAPERS (LONG
AUTHORLIST,
WITH
SUBSTANTIAL
CONTRIBUTION)

4. Abbott et al. (LIGO Scientific and Virgo Collaborations)
Tests of General Relativity with GWTC-3,
[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](#).

SEMINARS AND
TALKS

- *Constraints on the time variation of the gravitational constant using binary neutron star observations at **Second Chennai Symposium on Gravitation and Cosmology***, Chennai, India, February 2022 (Online Invited Seminar)
- *Probing Large Scale Structure using Binary Black Hole Observations at **Instituut-Lorentz for Theoretical Physics, Leiden University***, Leiden, Netherlands, June 2020 (Online Invited Seminar)
- *Constraints on Black Hole Mimickers using GWTC-1 at **ICTS In-house Symposium***, ICTS, Bengaluru, India, February 2020 (Contributed Poster)
- *Probing Large Scale Structure using Binary Black Hole Observations at **ICTS In-house Symposium***, ICTS, Bengaluru, India, February 2020 (Contributed Talk)
- *Probing Large Scale Structure using Binary Black Hole Observations at **International Conference on Gravitation & Cosmology***, IISER, Mohali, India, December, 2019 (Contributed Talk)
- *Probing Large Scale Structure using Binary Black Hole Observations at **The Inter-University Centre for Astronomy and Astrophysics (IUCAA)***, Pune, India, September 2019 (Invited Talk)
- *Probing Large Scale Structure using Binary Black Hole Observations at **Max Planck Institute for Gravitational Physics***, Hannover, Germany, June 2019 (Invited Talk)
- *Probing Large Scale Structure using Binary Black Hole Observations at **GR22 and Amaldi13***, Valencia, Spain, July 2019 (Contributed Talk)
- *Gravitational Lensing from Orbiting Binary at the **Paper Presentation competition of APOGEE 2017***, BITS Pilani, India (Contributed Talk, First runner-up)

TEACHING

- 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. *Astrophysical Stochastic GW Foreground*, July 2021.
 2. *Numerical Hydrodynamics*, May 2020.

3. *Advanced General Relativity*, July 2019.

MENTORSHIP	<ul style="list-style-type: none">• Kruthi Krishna (IISc → Radboud University) Sep 2020 - <i>Present</i>• Harsh Narola (IISER, Tirupati → Utrecht University) Sep 2020 - <i>Present</i>
OTHER CONFERENCES AND MEETINGS	<ul style="list-style-type: none">• Semester Participant, Advances in Computational Relativity, ICERM, Brown University, USA. September 2020 - December 2020 (Online)• Participant, Discussion Meeting - Astrophysics of Supermassive Black Holes, ICTS, Bengaluru, India, December 2019• Participant, Discussion Meeting - Future of Gravitational Wave Astronomy, ICTS, Bengaluru, India, August 2019• Participant, ICTS Summer School on Gravitational Wave Astronomy, ICTS, Bengaluru, India, July 2017, July 2018, July 2019, May 2020, July 2021.
OUTREACH	<ul style="list-style-type: none">• Co-PI of the <i>IndiaBioscience Outreach Grant</i> to communicate science using stage theatre.• Panelist at the <i>Bengaluru: The Astronomy City</i>, 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 <i>Quantum Voyages</i> as a part of Cosmic Zoom Online Exhibition, April 2021• Articles on the ICTS blog:<ol style="list-style-type: none">1. A Conversation with ICTS Scientists Studying the Indian Monsoon, November 20192. Summer School on Gravitational Wave Astronomy, November 2019• Talk titled <i>The Whats, Whys and Hows of Gravitational-wave Astronomy</i>, BMS College of Engineering, Bengaluru, November 2019• Talk titled <i>Gravitational Waves - A New Tool for Cosmology!</i> at Vigyan Samagam, Visvesvaraya Industrial and Technological Museum, Bengaluru, India, August 2019
TECHNICAL SKILLS	Programming Languages - Python, C, C++, Shell Script Softwares - MATLAB, Mathematica Tools/Frameworks - L ^A T _E X, Git
SCORES AND AWARDS	<ul style="list-style-type: none">• Fulbright-Nehru Doctoral Research Fellowship 2023 (Host Institution: The University of Chicago)• ICTS Graduate Fellowship 2018-2023• Secured all-India rank 21 in the Joint Entrance Screening Test (JEST), 2018 for admission into Physics PhD programmes in India• Awarded the ICTS S.N. Bhatt Memorial Excellence Fellowship, 2018• Scored 960/990 on the Subject GRE in Physics, October 2017• Selected for the Summer Research Fellowship of the Indian Academy of Sciences in 2016• Recipient of the INSPIRE-DST Scholarship for Higher Education for the period 2013 to 2018
REFERENCES	<ul style="list-style-type: none">• Prof. Parameswaran Ajith, ICTS – ajith@icts.res.in• Dr. Shasvath Kapadia, ICTS – shasvath.kapadia@icts.res.in• Dr. Sumit Kumar, AEI Hannover – sumit.kumar@aei.mpg.de• Prof. Bala Iyer, ICTS – bala.iyer@icts.res.in