

Ajit Kumar Mehta

Email: ajitkm@cmi.ac.in
Phone: +91 44 7196 1000

Office: H1, SIPCOT IT Park,
Siruseri, Tamil Nadu 603103

Research interests

Gravitational-Wave astrophysics: Searches and Population Modeling, Astrophysics of/with Compact Objects, Gravitational Lensing, Tests of Gravity, Waveform Modeling

Education

International Centre for Theoretical Sciences (ICTS) Bengaluru, India
PhD in Gravitational-wave astronomy Aug 2014 – July 2019
Dissertation title: *Exploring gravitational-wave astrophysics: source modeling, tests of general relativity and gravitational lensing*

Indian Institute of Science Education and Research (IISER) Thiruvananthapuram, India
Integrated BS-MS Aug 2009 – April 2014
Physics (major), Mathematics (minor)
Thesis title: *Dynamics of open quantum systems*

Honors and scholarships

IOP Publishing's top cited [paper](#) of the year 2022
Honorable mention in Gravitational-Wave-International-Committee-Braccini Thesis Prize 2019
Council of Scientific and Industrial Research (CSIR) fellowship 2016
Graduate research fellowship, Tata Institute of Fundamental Research 2014
Innovation in Science Pursuit for Inspired Research (INSPIRE) fellowship 2009

Employment history

Assistant Professor Sept 2025 - Present
Chennai Mathematical Institute (CMI), Siruseri, Chennai, Tamil Nadu, India

Postdoctoral fellow Oct 2022 - Aug 2025
Mentor: [Tejaswi Venumadhav Nerella](#)
University of California at Santa Barbara (UCSB), California, USA

Postdoctoral fellow Nov 2019 - Sept 2022
Mentor: [Alessandra Buonanno](#)
Max Planck Institute for Gravitational Physics (AEI), Potsdam, Germany

Graduate student Aug 2014 - Oct 2019
Mentor: [Parameswaran Ajith](#)
International Centre for Theoretical Sciences (ICTS), Bengaluru, India

Teaching experience

International Centre for Theoretical Sciences (ICTS), TIFR
Tutor, [Gravitational radiation from post-Newtonian sources and inspiralling compact binaries](#) Summer 2019
Summer School on Gravitational Wave Astronomy
Teaching assistant, A course on Mathematical methods for Physics Spring 2019
Tutor, [Gravitational lensing of electromagnetic and gravitational waves](#) Summer 2018
Summer School on Gravitational Wave Astronomy
Teaching assistant, A course on Numerical methods for Physics and Astrophysics Spring 2018
Tutor, [Neutron Star Physics](#) Summer 2017
Summer School on Gravitational Wave Astronomy

Student supervision

University of California at Santa Barbara (UCSB)
Jiayu Wang (undergrad student) May 2023 - December 2024

Max Planck Institute for Gravitational Physics (AEI), Potsdam
Elise Sanger (PhD student) June 2022 - September 2022

International Centre for Theoretical Sciences (ICTS), TIFR
Tousif Islam (long-term-visiting program student) August 2018 - April 2019
Elizabeth Bennewitz (undergrad student) summer 2018
Dhanpal Siddharth (M.Sc. thesis) August 2017 - April 2018

Professional roles

Referee
Astrophysical Journal (ApJ), Astrophysical Journal Letters (ApJL), Journal of Cosmology and Astroparticle Physics (JCAP), Journal of Astrophysics and Astronomy (JAA), Universe

Scientific organizer
Young Astronomer's Meet, Sept 2019

Member of LIGO Scientific Collaboration (LSC) Aug 2017 – April 2023

Roles in LIGO Scientific Collaboration

Analyst and Reviewer for [Tests of General Relativity with Binary Black Holes from the second LIGO-Virgo Gravitational-Wave Transient Catalog](#), *Phys. Rev. D* 103, 122002 (2021).

Member of the paper writing team and analyst for [Search for lensing signatures in the gravitational-wave observations from the first half of LIGO-Virgo's third observing run](#), *The Astrophysical Journal (ApJ)*, Volume 923, Number 1 (2021).

Analyst for [Tests of General Relativity with GWTC-3](#), *Phys. Rev. D* 112, 084080 (2021).

Publications

(See also, [inspire](#), [google scholar](#))

Refereed publications

[Binary black hole population inference combining confident and marginal events from the IAS-HM search pipeline](#)

A. K. Mehta, D. Wadekar, I. Anantpurkar, J. Roulet, T. Venumadhav, T. Islam, J. Mushkin, B. Zackay, M. Zaldarriaga *Phys. Rev. D* 112, 124023 (2025)

[Data-driven extraction, phenomenology and modeling of eccentric harmonics in binary black hole merger waveforms](#)

T. Islam, T. Venumadhav, **A. K. Mehta**, I. Anantpurkar, D. Wadekar, J. Roulet, J. Mushkin, B. Zackay, M. Zaldarriaga, *Phys. Rev. D* 112, 044070 (2025)

[New binary black hole mergers in the LIGO-Virgo O3b data](#)

A. K. Mehta, S. Olsen, D. Wadekar, J. Roulet, T. Venumadhav, J. Mushkin, B. Zackay, M. Zaldarriaga, *Phys. Rev. D* 111, 024049 (2025)

[A new approach to template banks of gravitational waves with higher harmonics: reducing matched-filtering cost by over an order of magnitude](#)

D. Wadekar, T. Venumadhav, **A. K. Mehta**, J. Roulet, S. Olsen, J. Mushkin, B. Zackay, M. Zaldarriaga, *Phys. Rev. D* 110, 084035 (2024)

[New search pipeline for gravitational waves with higher-order modes using mode-by-mode filtering](#)

D. Wadekar, T. Venumadhav, J. Roulet, **A. K. Mehta**, B. Zackay, J. Mushkin, M. Zaldarriaga, *Phys. Rev. D* 110, 044063 (2024)

[Laying the foundation of the effective-one-body waveform models SEOBNRv5: improved accuracy and efficiency for spinning non-precessing binary black holes](#)

Lorenzo Pompili et al. [with **A. K. Mehta**], *Phys. Rev. D* 108, 124035 (2023)

[Tests of General Relativity with Gravitational-Wave Observations using a Flexible-Theory-Independent Method](#)

A. K. Mehta, A. Buonanno, A. Ghosh, N. Sennett, J. Steinhoff, *Phys. Rev. D* 107, 044020 (2023)

[Detection and parameter estimation challenges of Type-II lensed binary black hole signals](#)

A. Vijayakumar, **A. K. Mehta**, A. Ganguly, *Phys. Rev. D* 108, 043036 (2023)

[Constraints on compact dark matter from gravitational wave microlensing](#)

S. Basak, A. Ganguly, K. Haris, S. Kapadia, **A. K. Mehta**, P. Ajith, *The Astrophysical Journal Letters (ApJL)*, 926 L28 (2022)

[Observing intermediate-mass black holes and the upper-stellar-mass gap with LIGO and Virgo](#)

A. K. Mehta, A. Buonanno, J. Gair, M. C. Miller, E. Farag, R. J. deBoer, M. Wiescher, F.X. Timmes, *The Astrophysical Journal (ApJ)*, Volume 924, Number 1 (2022)

[A detailed analysis of GW190521 with phenomenological waveform models](#)

H. Estellés et al. [with **A. K. Mehta**], *The Astrophysical Journal*, Volume 924, Number 2 (2022)

[Testing the nature of gravitational-wave polarizations using strongly lensed signals](#)

S. Goyal, K. Haris, **A. K. Mehta**, P. Ajith, *Phys. Rev. D* 103, 024038 (2021)

[Testing the “no-hair” nature of binary black holes using the consistency of multipolar gravitational radiation](#)

T. Islam, **A. K. Mehta**, A. Ghosh, V. Varma, P. Ajith, and B. S. Sathyaprakash, *Phys. Rev. D* 101, 024032 (2020)

[Search for gravitational lensing signatures in LIGO and Virgo events](#)

O. Hannuksela, K. Haris, K. Ng, S. Kumar, **A. K. Mehta**, D. Keitel, T. F. Li, P. Ajith, *Astrophysical Journal Letters (ApJL)* Volume 874, Number 1 (2019)

[Including mode mixing in a higher-multipole model for gravitational waveforms from nonspinning black-hole binaries](#)

A. K. Mehta, P. Tiwari, N. K. Johnson-McDaniel, C. K. Mishra, Vijay Varma, Parameswaran Ajith, *Phys. Rev. D* 100, 024032 (2019)

[A “no-hair” test for binary black holes](#)

S. Dhanpal, A. Ghosh, **A. K. Mehta**, P. Ajith, B. S. Sathyaprakash, *Phys. Rev. D* 99, 104056 (2019)

[Identifying strongly lensed gravitational wave signals from binary black hole mergers](#)

K. Haris, **A. K. Mehta**, Sumit Kumar, Tejaswi Venumadhav, P. Ajith, *arXiv:1807.07062* (2018) (Accepted by *Phys. Rev. D*)

[Accurate inspiral-merger-ringdown gravitational waveforms for non-spinning black-hole binaries including the effect of subdominant modes](#)

A. K. Mehta, C. K. Mishra, V. Varma, P. Ajith, *Phys. Rev. D* 96, 124010 (2017)

[LIGO Scientific Collaboration papers with significant contribution](#)

[Tests of General Relativity with Binary Black Holes from the second LIGO-Virgo Gravitational-Wave Transient Catalog](#)

R. Abbott et al. [with **A. K. Mehta**], *Phys. Rev. D* 103, 122002 (2021)

[Search for lensing signatures in the gravitational-wave observations from the first half of LIGO-Virgo’s third observing run](#)

R. Abbott et al. [with **A. K. Mehta**], *The Astrophysical Journal (ApJ)*, Volume 923, Number 1 (2021)

[Tests of General Relativity with GWTC-3](#)

R. Abbott et al. [with **A. K. Mehta**], *Phys. Rev. D* 112, 084080 (2021)

[Preprints on arxiv](#)

[Significant increase in sensitive volume of a gravitational wave search upon including higher harmonics](#)

A. K. Mehta, D. Wadekar, J. Roulet, I. Anantpurkar, T. Venumadhav, J. Mushkin, B. Zackay, M. Zaldarriaga, T. Islam, *arXiv:2501.17939* (2025) (Submitted to *Physical Review Letter*)

[Improving gravitational wave search sensitivity with TIER: Trigger Inference using Extended strain Representation](#)

D. Wadekar, A. Pimpalkar, M. H.-Y. Cheung, B. Wandelt, E. Berti, **A. K. Mehta**, T. Venumadhav, J. Roulet, T. Islam, B. Zackay, J. Mushkin, M. Zaldarriaga, *arXiv:2507.08318* (2025) (**Accepted** by *Physical Review D*)

[Searching for intermediate mass ratio binary black hole mergers in the third observing run of LIGO-Virgo-KAGRA](#)

M. H. Cheung, D. Wadekar, **A. K. Mehta**, T. Islam, J. Roulet, E. Berti, T. Venumadhav, B. Zackay, M. Zaldarriaga, *arXiv:2507.01083* (2025) (**Accepted** by *Physical Review D*)

[gwharmon: first data-driven surrogate for eccentric harmonics in binary black hole merger waveforms](#)

T. Islam, T. Venumadhav, **A. K. Mehta**, I. Anantpurkar, D. Wadekar, J. Roulet, J. Mushkin, B. Zackay, M. Zaldarriaga *arXiv:2504.12420* (2025) (submitted to *Physical Review Letter*)

New black hole mergers in the LIGO-Virgo O3 data from a gravitational wave search including higher-order harmonics

D. Wadekar, J. Roulet, T. Venumadhav, **A. K. Mehta**, S. Olsen, B. Zackay, J. Mushkin, M. Zaldarriaga, *arXiv:2312.06631 (2023)* (**Accepted** by *Physical Review D*)

Invited talks

Future GW observations: Detector technology & data analysis, invited panelist at The Future of Gravitational-Wave Astronomy Meeting, International Centre for Theoretical Sciences (ICTS), Bengaluru, India (October 2025)

Ripples in Spacetime: Ten years of Gravitational Wave Physics and Astrophysics, Indian Institute of Technology Madras (IITM), Chennai, India (September 2025)

New binary black hole mergers from the public LIGO-Virgo O3 data, 22nd Lomonosov Conference on Elementary Particle Physics, Moscow State University, Moscow, Russia (August 2025) (virtual)

Probing the upper-stellar-mass gap with LIGO and Virgo, HELIUM25 Workshop - Helium burning and perspectives for underground labs, Helmholtz-Zentrum Dresden-Rossendorf (HZDR), Dresden, Germany (July 2025) (virtual)

IAS-HM pipeline: a brief overview of the framework and the results, Institute for Gravitational and Subatomic Physics, Utrecht University, Netherlands (June 2025).

Gravitational waves as a probe for fundamental physics and astronomy, Indian Institute of Technology (IIT) Madras, Chennai, India (August 2024)

Astrophysics of new binary black hole mergers from the public LIGO-Virgo O3 data using IAS search pipeline with higher-order modes, School of Physics & Astronomy, Cardiff University, Cardiff, UK (June 2024).

New methods for extracting binary black hole mergers from LIGO-Virgo data, Indian Institute of Technology (IIT), Gandhinagar, India (March 2024).

New binary black hole mergers from the public LIGO-Virgo O3 data, Tata Institute of Fundamental Research (TIFR), Mumbai, India (March 2024).

Introduction to IAS GW search pipeline, Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune, India (March 2024).

Decoding gravitational-wave search pipelines, Indian Institute of Astrophysics (IIA), Bengaluru, India (November 2023).

Observing intermediate-mass black holes and the upper-stellar-mass gap with LIGO and Virgo at International Centre for Theoretical Sciences (ICTS), Bengaluru, India (May 2022).

What can we learn by detecting massive BHs via gravitational waves (GWs)?, the Sabarmati Seminar Series at Indian Institute of Technology (IIT), Gandhinagar, India (July 2021).

Search for lensing signatures in the gravitational-wave observations from the first-half of LIGO-Virgo's third observing run, the LIGO-Virgo-KAGRA (LVK) collaboration webinar, Germany (May 2021).

Gravitational waves : a brief survey, public talk at Birla Institute of Technology, Mesra, India (May 2018).

Contributed talks

Significant increase in sensitive volume of a gravitational wave search upon including higher harmonics, American Physical Society (APS) Global Physics Summit, Anaheim, California, USA (March 2025).

Gravitational waves as a probe for fundamental physics and astronomy, Imperial College, London, UK (September 2024).

A new search pipeline for gravitational waves with higher-order modes using mode-by-mode filtering, Gravitational Wave Physics and Astronomy Workshop (GWPAW), Birmingham, UK (May 2024).

A new efficient approach to searching for gravitational waves with higher-order harmonics, American Physical Society (APS) April Meeting, Sacramento, California, USA (April 2024).

Extracting new binary black hole mergers from the public LIGO-Virgo O3 data, Indian Institute of Science Education and Research (IISER), Mohali, India (March 2024).

Details of gravitational wave searches, and astronomy with binary black hole mergers, Raman Research Institute (RRI), Bengaluru, India (March 2024).

Constraining alternative theories of gravity with the inspirals of binary black hole mergers at 31st Texas Symposium on Relativistic Astrophysics, Prague, Czech Republic (September 2022).

Tests of General Relativity with gravitational-wave observations using a flexible-theory-independent Method at 23rd International Conference on General Relativity and Gravitation (GR23), Beijing, China July 2022) (virtual).

The detection and parameter estimation challenges of Type-II lensed binary black hole signals at American Physical Society (APS) April meeting (April 2022) (virtual).

Measurement of intermediate mass black hole binaries within the mass gap with upcoming LIGO-Virgo observations at American Physical Society (APS) April meeting (April 2021) (virtual).

Re-analyzing GW190521: is this really a mass gap event? at LIGO-Virgo Collaboration (LVC) meeting (March 2021) (virtual).

Search for strongly lensed gravitational wave signals from binary black hole mergers at International Centre for Theoretical Sciences (ICTS), Bengaluru, India (March 2019).

Including mode-mixing in a higher-multipole model for gravitational waveforms from non-spinning black-hole binaries and test of general relativity using higher multipoles at Indian Association for General Relativity and Gravitation, Birla Institute of Technology and Science (BITS), Pilani - Hyderabad, India (January 2019).

A “no-hair” test for binary black holes at Indian Institute of Astrophysics (IIA), Bengaluru, India (April 2018).

Checking the consistency between the different polarizations of gravitational waves at Penn State University (PSU), State College, PA, USA (March 2018).

An introduction to post-Newtonian, numerical relativity and black hole perturbation theory at International Centre for Theoretical Sciences (ICTS), Bengaluru, India (January 2018).

References

[Parameswaran Ajith](#)

International Centre for Theoretical
Sciences, Survey No. 151,
Shivakote, Hesaraghatta Hobli,
Bengaluru- 560 089, India
email: ajith@icts.res.in

[Tejaswi Venumadhav Nerella](#)

University of California,
Santa Barbara, California,
93106-2100, USA
email: teja@ucsb.edu

[Bala Iyer](#)

International Centre for Theoretical
Sciences, Survey No. 151,
Shivakote, Hesaraghatta Hobli,
Bengaluru- 560 089, India
email: bala.iyer@icts.res.in

[Alessandra Buonanno](#)

Max Planck Institute for Gravitational Physics,
Am Mühlenberg 1,
D-14476 Potsdam, Germany
email: alessandra.buonanno@aei.mpg.de
contact: brit.holland@aei.mpg.de

[Matias Zaldarriaga](#)

Institute for Advanced Study
1 Einstein Drive, Princeton,
New Jersey, 08540 USA
email: matiasz@ias.edu

[Jan Steinhoff](#)

Max Planck Institute for Gravitational Physics,
Am Mühlenberg 1,
D-14476 Potsdam, Germany
email: jan.steinhoff@aei.mpg.de