

Koustav Chandra

Indian Institute of Technology Bombay

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EDUCATION

Indian Institute of Technology Bombay | Research Scholar

Aug 2018-Present

Department of Physics

- Expected: July 2023
- Theme: Probing Compact Objects with Gravitational Wave Transients
- Supervisor: Prof. Archana Pai

National Institute of Technology, Rourkela | Graduate Student

April 2013-May 2018

Department of Physics & Astronomy

- Integrated Masters in Science (Physics)
- Thesis: An Algebraic Study of $SO(10)$ Grand Unified Theory
- Supervisor: Prof. Sasmita Mishra

INTERNSHIP

Indian Institute of Technology, Bombay

Summer 2017

Department of Physics

- Topic: A study of ρ^0 decay kinematics
- Supervisor: Prof Basanta Kumar Nandi

Indian Institute of Technology, Bombay

Summer 2016

Department of Physics

- Topic: Elliptic Flow of φ^0 meson and strange quark collectivity
- Supervisor: Prof Basanta Kumar Nandi

Indian Institute of Technology, Mandi

Summer 2015

Department of Physics

- Topic: Magneto-Transport Study of Superconducting materials
- Supervisor: Prof Chandra Shekhar Yadav

RESEARCH INTEREST

Gravitational Wave Searches for intermediate-mass black hole binaries:

Development and deployment of matched-filter and deep-learning based gravitational-wave searches for quasi-spherical intermediate-mass black hole binaries [S3, S5, S6, L3].

Bayesian inference for black-hole binary dynamics and black hole recoils:

Physical characterisation of observed non-canonical gravitational-wave signals and understanding the astrophysical consequence of remnant recoils [S4, S7]

Estimating the astrophysical merger-rate density of intermediate-mass black hole binaries:

Inferring the astrophysical merger rate density of intermediate-mass black hole binary under the assumption of a particular population model, using Monte Carlo techniques. [S1, L3]

PUBLICATIONS

Short Author Papers

- S7 GW190412: measuring a black-hole recoil direction through higher-order gravitational-wave modes
Juan Calderón Bustillo, Samson Leong, **Koustav Chandra**
Submitted to Physical Review Letters [arXiv:2211.03465](https://arxiv.org/abs/2211.03465)
- S6 Fishing massive black hole binaries with THAMES
Kriti Sharma, **Koustav Chandra**, Archana Pai
Submitted to Physical Review D [arXiv:2208.02545](https://arxiv.org/abs/2208.02545)
- S5 First gravitational-wave search for intermediate-mass black hole mergers with higher order harmonics
Koustav Chandra, Juan Calderón Bustillo, Archana Pai, I. W. Harry
Accepted for publication in Physical Review D [arXiv:2207.01654](https://arxiv.org/abs/2207.01654)
- S4 GW190521 as a black-hole merger coincident with the ZTF19abnrhr flare
Juan Calderón Bustillo, Samson H.W. Leong, **Koustav Chandra**, Barry McKernan, K. E. S. Ford
[arXiv:2112.12481](https://arxiv.org/abs/2112.12481)

- S3 An optimized PyCBC search for gravitational waves from intermediate-mass black hole mergers
Koustav Chandra, V. Villa-Ortega, T. Dent, C. Mclsaac, Archana Pai, I. W. Harry, G. S. Cabourn Davies, K. Soni
[Physical Review D 104, 042004](#) [arxiv:2106.00193](#)
- S2 Chirp mass based glitch identification in long-duration gravitational-wave detection
 Nirban Bose, Archana Pai, **Koustav Chandra** and V. Gayathri
[Physical Review D 102, 084034](#) [arXiv:2007.03623](#)
- S1 Numerical relativity injection analysis of signals from generically spinning intermediate mass black hole binaries in Advanced LIGO data
Koustav Chandra, V. Gayathri, Juan Calderón Bustillo, and Archana Pai
[Physical Review D 102, 044035](#) [arXiv:2002.10666](#)

Large Collaboration publications to which I contributed significantly

- L4 Searching for vector boson-star mergers within LIGO-Virgo intermediate-mass black-hole merger candidates
 Juan Calderón Bustillo, Nicholas Sanchis-Gual, Samson H.W. Leong, **Koustav Chandra**, et al.
 Submitted to Physical Review D [arXiv:2206.02551](#)
- L3 Search for intermediate mass black hole binaries in the third observing run of Advanced LIGO and Advanced Virgo
 Abbott et al. (LIGO Scientific, Virgo and KAGRA Collaboration, including **Koustav Chandra**,
[Astronomy & Astrophysics 659, A84 \(2022\)](#) [arxiv:2105.15120](#)
- L2 Compact Binary Coalescences Observed by LIGO and Virgo During the First Half of the Third Observing Run
 Abbott et al. (LIGO Scientific, Virgo and KAGRA Collaboration, including **Koustav Chandra**,
[Physical Review X 11, 021053](#) [arxiv:2010.14527](#)
- L1 GW190521: A Binary Black Hole Merger with a Total Mass of $150 M_{\odot}$
 Abbott et al. (LIGO Scientific, Virgo and KAGRA Collaboration, including **Koustav Chandra**,
[Physical Review Letters 125, 101102](#) [arxiv:2009.01075](#)

Conference Proceedings

- P1 Salient features of the optimised PyCBC IMBH search
Koustav Chandra, V. Villa-Ortega, T. Dent, C. Mclsaac, Archana Pai, I. W. Harry, G. S. Cabourn Davies, K. Soni
 Proceedings of: MG16, [arXiv:2110.01879](#)

CONFERENCE PARTICIPATION

Talks

- Searching for gravitational-wave higher-order modes from asymmetric intermediate-mass black hole binary
23rd International Conference on General Relativity and Gravitation
 Beijing, China, (online), July'22
- Hunting for intermediate-mass black hole with international gravitational-wave observatory network
2nd Chennai Symposium on Gravitation and Cosmology[†]
 Chennai, India, (online), Feb'22
- An optimised PyCBC search for gravitational waves from intermediate-mass black hole mergers
14th Edoardo Amaldi Conference
 Melbourne, Australia, (online), Jul'21.
- An optimised PyCBC search for gravitational waves from intermediate-mass black hole mergers
Sixteenth Marcel Grossmann Meeting Meeting
 Rome, Italy, (online), Jul'21
- Search for Intermediate Mass Black Hole Binary with higher order modes
LIGO-Virgo-KAGRA Collaboration Meeting,
 University of Wisconsin-Madison, USA (online), Mar'21
- Search Sensitivity of IMBHB systems in the gravitational wave window
38th Meeting of Astronomical Society of India,
 Indian Institute of Science Education and Research, Tirupati, India, Feb'20

† - indicates an invited talk

Posters

- Are the sources of GW190521 and ZTF19abanzhr the same?
40th Meeting of Astronomical Society of India
 Indian Institute of Technology, Roorkee, India, Mar'22
- NuRIA: Sensitivity study of generically spinning intermediate mass black hole binaries in Advanced LIGO data
31st meeting of the Indian Association for General Relativity and Gravitation,
 Indian Institute of Technology, Gandhinagar, India (Online), Dec'20
- Increasing the sensitivity of ground-based gravitational wave detectors to a non-GR mode of polarisation
International Conference on Gravitation & Cosmology 2019,
 Indian Institute of Science Education and Research, Mohali, India, Dec'19

SCIENTIFIC OUTREACH

Talks

- How to search Gravitational Waves with PyCBC (tutorial)
Krittika-Winter-Workshops, Techfest-2021,
Indian Institute of Technology, Bombay, India (Online), Jan'21
- Gravitational Waves-101
Vigyan Samagam,
Nehru Science Centre, Mumbai, May 2019

Articles

- **GW190521: The Most Massive Black Hole Collision Observed To Date**,
Tyson Littenberg, Juan Calderón Bustillo and Koustav Chandra,
Summaries of LSC Scientific Publications, Sep'20
- **Search for intermediate mass black hole binaries in the first and second observing runs of the Advanced LIGO and Virgo network**
Koustav Chandra and Archana Pai
Summaries of LSC Scientific Publications, Jun'19

SKILLS

Computing

- **Programming Languages:** Very familiar with both Python and C. Comfortable with Shell Script
- **Operating System:** Familiar with various Linux distributions and macOS
- **Gravitational-Wave software packages:** Conversant with **PyCBC** and **Bilby**

Language

- **Proficient:** English, Hindi
- **Native:** Bengali
- **Basic:** Odia

REFERENCES

- **Archana Pai**,
Department of Physics,
Indian Institute of Technology Bombay,
Mumbai, Maharashtra 400076, India
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- **Ian Harry**,
Institute for Cosmology and Gravitation,
University of Portsmouth,
Portsmouth PO1 2UP, United Kingdom
ian.harry@ligo.org
- **Juan Calderón Bustillo**
Galician Institute for High Energy Physics,
University of Santiago de Compostela,
Praza do Obradoiro, 0, 15705, Spain,
juan.calderon.bustillo@gmail.com