Koustav Chandra

Indian Institute of Technology Bombay

koustav.chandra@iitb.ac.in

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

S6 Fishing massive black hole binaries with THAMES
Kritti Sharma, **Koustav Chandra,** Archana Pai
Submitted to Physical Review D arXiv: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
Physical Review D 106, 123003 arXiv:2207.01654

S4 GW190521 as a black-hole merger coincident with the ZTF19abanrhr flare
Juan Calderón Bustillo, Samson H.W. Leong, **Koustav Chandra**, Barry McKernan, K. E. S. Ford
arXiv:2112.12481

S3 An optimized PyCBC search for gravitational waves from intermediate-mass black hole mergers
Koustav Chandra, V. Villa-Ortega, T. Dent, C. McIsaac, 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. McIsaac, Archana Pai, I. W. Harry, G. S. Cabourn Davies, K. Soni
The Sixteenth Marcel Grossmann Meeting, pp. 3277-3285 (2023) arXiv:2110.01879

CONFERENCE PARTICIPATION

Talks

- First gravitational-wave search for intermediate-mass black hole binaries with higher-order harmonics
32nd Meeting OF Indian Association for General Relativity and Gravitation (IAGRG)
Indian Institute of Science Education and Research, Kolkata, India, Dec' 22
- 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 ZTF19abanrhr 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