

## Subhajit Dandapat

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### EDUCATION

**Tata Institute of Fundamental Research**, Mumbai  
*Department of Astronomy & Astrophysics*  
*Research Scholar*,  
Joined on August, 2019

**Indian Institute of Science Education and Research**, Bhopal  
*BS-MS Dual Degree, Physics*  
May, 2019

CGPA: 8.89/10.00

### CURRENT AFFILIATION AND MEMBERSHIPS

Currently, I am a graduate student at TIFR Mumbai working with Prof. [A. Gopakumar](#) (DAA) and I have been engaged in collaborative work with the [Indian Pulsar Timing Array \(InPTA\)](#), the [International Pulsar Timing Array \(IPTA\)](#), and the [LIGO-Virgo-KAGRA Collaboration \(LVK\)](#). My research primarily focuses on “*Modeling Hecto and Nano-Hertz Gravitational Wave sources and examining their observational implications*”.

### RESEARCH INTERESTS

1. Gravitational Wave.
2. Theoretical Astrophysics.
3. General Theory of Relativity.
4. Computational Physics.

### PUBLICATIONS

1. Cho, G., **Dandapat, S.** and Gopakumar, A., “Instantaneous third post-Newtonian accurate expressions for the radiated energy and angular momentum during hyperbolic encounters of non-spinning compact objects”, published Physical Review D, 2022 (<https://doi.org/10.1103/PhysRevD.105.084018>)
2. Singha, J., Surnis, M. P., Joshi, B.C., ..., **Dandapat, S.**, and the InPTA Collaboration, 2021, “Evidence for profile changes in PSR J1713+0747 using the uGMRT”, MNRASL, 507, L57 ([arXiv:2107.04607](https://arxiv.org/abs/2107.04607))
3. Nobleson, K., ..., **Dandapat, S.**, and the InPTA Collaboration, 2021, “Low-frequency wideband timing of InPTA pulsars observed with the uGMRT” (<https://doi.org/10.1093/mnras/stac532>)
4. Joshi, B., ..., **Dandapat, S.**, and the InPTA Collaboration, 2022, “Nanohertz Gravitational Wave Astronomy during the SKA Era: An InPTA perspective”, published in JApA. 43, 2, 98. (<https://doi.org/10.1007/s12036-022-09869-w>).
5. Srivastava, A., ..., **Dandapat, S.**, and the InPTA Collaboration, 2023, “Noise analysis in the Indian Pulsar Timing Array Data Release I”, ([arXivprints: 2303.12105](https://arxiv.org/abs/2303.12105)).
6. **Dandapat, S.**, Ebersold, M., Susobhanan, A. et al. “Gravitational Waves from Black Hole Encounters: Prospects for Ground and Galaxy-Based Observatories”, 2023 : **accepted for publication in Physical Review D.**: [arXivprints: 2305.19318](https://arxiv.org/abs/2305.19318), Document: **LIGO-P2300013-v1**.
7. Paladi, A K., ..., **Dandapat, S.**, and the InPTA Collaboration, 2023, “Multi-band Extension of the Wideband Timing Technique”, ([arXivprints:2304.13072](https://arxiv.org/abs/2304.13072)).

## ONGOING RESEARCH WORKS

- *Fully Analytic PTA signals induced by Burst with Memory (BWM) events from hyperbolic encounters of Black-Hole binaries: accuracy, computational expenses and identifying the signals in the simulated dataset: **Dandapat et al 2023 (in prep)**.*
  - In collaboration with our colleagues from IPTA in India and the US, specifically Abhimanyu S., Prerna Rana, Lankeswar Dey, and A. Gopakumar.
- *Identifying BWM signature in LIGO-VIRGO-KAGRA (LVK) data: **Dandapat et al 2023 (in prep)**.*
  - This ongoing effort is in collaboration with mainly the LVK colleagues at the University of Zürich, namely Yumeng Xu, Michael Ebersold, Shubhanshu Tiwari, and A. Gopakumar.
- *Searching for BWM signature in the International Pulsar Timing Array (IPTA) dataset: **Dandapat et al 2023 (in prep)**.*
  - This is part of an Indian Pulsar Timing Array (InPTA) project led by me.
- *Comparing Pulsar Timing Array Posteriors.*
  - Adapted [tensiometer](#) package to compare various posteriors arise from PTA Single Pulsar Noise Analysis, Gravitational Wave Background Searches both in European Pulsar Timing Array (EPTA) and IPTA dataset. I contributed with tables and Figures in two EPTA Data Release 2 manuscripts. Along with that, I am in charge of the posterior comparison group of the upcoming IPTA 3P+ comparison paper.

## CONFERENCE ATTENDED /TALKS

1. Accepted for giving talk on *Characterizing Burst with Linear Memory Events with LIGO-Virgo-KAGRA and Pulsar Timing Array Observatories* in [Amaldi15](#) virtual conference, July 17-21, 2023.
2. Invited to present two of my recent efforts on *searching Burst with memory event in IPTA dataset* and *Comparing PTA posteriors* in [IPTA Science meeting: 19-23 June, 2023](#).
3. “IPTA GWA hackweek on 3P+ comparisons”, virtually on zoom, **6-8 March, 2023**; Presented our ongoing efforts on comparing posteriors that arises from various PTA analysis.
4. “Gravitational Wave Orchestra” in-person held on **UCLouvain, Belgium; Sep 8-9, 2022**; presented a poster on “**Stochastic gravitational wave background spectrum due to supermassive black hole binaries in precessing eccentric orbits**”.
5. “EPTA 2021 Winter meeting” virtually on zoom; Dec 6-8, 2021 and “Astronomy Society of India meeting” in-person held on **IIT Roorkee**; Mar 25-29, 2021. “**Modeling GW burst with linear memory events**” .
6. “EPTA 2021 Summer meeting” virtually on zoom; Apr 21-23, 2021. “**Effect of relativistic pericentre advance on the SGWB due to eccentric SMBH binaries**” .
7. **ICTS Summer School On Gravitational-Wave Astronomy** conducted on-line during July 05 – 16, 2021.

## RESEARCH VISIT

I have visited Prof. Jetzer’s group at University of Zürich (<https://www.physik.uzh.ch/en/groups/jetzer.html>) from **15 th July to 30th September, 2022** for LIGO-Virgo-KAGRA (LVK) collaborative work.

## MASTER'S THESIS

- **Duration:** May, 2018 - May, 2019.
- **Title:** Chiral Anomalies In Quantum Field Theory
- **Advisors:**  
Dr. Nabamita Banerjee, IISER Bhopal  
Dr. Suvankar Dutta, IISER Bhopal
- I worked on Chiral anomalies in QFT, particularly with pion to two-photons decay process.

## INTERNSHIPS

- Summer Project (2017): **“Path integrals in Quantum Mechanics”**, at ‘Indian Institute Of Science Education and Research Bhopal’, under Dr. Suhas Gangadharaiah.
- Summer Project (2016): **“Steiner Trees and Spanning Trees Configurations in Multi-pin Soap Film”**, at ‘Indian Institute Of Technology Kharagpur’, under Dr. Sugata Pratik Khastagir.

## IMPORTANT COURSES UNDERTAKEN

**TIFR:** • Astronomy & Astrophysics I,II • General Theory of Relativity • Computational Physics • Advanced Quantum Mechanics  
**IISER:** • General Theory of Relativity • Cosmology • Quantum Field Theory I,II • Quantum Information Theory • Many Body Quantum Mechanics of Degenerate Gases • Complex Analysis

## SKILLS

- **Software Skills:**
  - Python, C, Mathematica and Maple.
  - TEMPO2, ENTERPRISE (Pulsar timing analysis package), BILBY (Bayesian interface library for LIGO search studies).
- **Theoretical Skills:**
  - **Theoretical modelling and building templates for Gravitational Wave sources.**
  - Feynman Amplitudes/Scattering Matrix Calculations and their regularization/ Renormalization.

## REFERENCES

1. **Prof. Achamveedu Gopakumar**  
Professor, Department of Astronomy & Astrophysics  
Tata Institute of Fundamental Research, Mumbai, India  
Email: gopu.tifr@gmail.com
2. **Prof. Bhal Chandra Joshi**  
Senior Professor, National Centre for Radio Astrophysics  
- Tata Institute of Fundamental Research, Pune, India  
Email: bhalchandrajos@gmail.com
3. **Dr. Maria Haney**  
Associated Faculty, Nikhef, Science Park 105,  
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