

# Subhajit Dandapat

## Curriculum Vitae

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Nationality: Indian



### About me

Currently, I am a Postdoctoral Research Fellow at the National University of Singapore. I have been engaged in collaborative work with the [Indian Pulsar Timing Array \(InPTA\)](#), the [International Pulsar Timing Array \(IPTA\)](#) consortia, and have previously worked with the [LIGO-Virgo-KAGRA Collaboration \(LVK\)](#). I am primarily interested in modeling gravitational wave (GW) sources, with a major focus on their data analysis implications. My current scientific interests focus on the application of **Machine Learning** and **Artificial Intelligence** techniques in GW data analysis. My research encompasses nano-Hertz gravitational wave astronomy and modeling gravitational wave sources using the Post-Newtonian approximation.

### Education

- 2024–current **Postdoctoral Research Fellow**, *Department of Physics, National University of Singapore, Singapore*  
**Advisor:** Dr. Alvin Chua
- 2019–2024 **Doctor of Philosophy in Astrophysics**, *Department of Astronomy & Astrophysics, Tata Institute of Fundamental Research, Mumbai, Maharashtra, India*  
**Thesis title:** *Modeling Nano and Hecto Hertz Gravitational Wave sources and their observational implications*  
**Advisor:** Prof. A. Gopakumar
- 2014–2019 **BS-MS Dual Degree in Physics**, **Indian Institute of Science Education and Research**, Bhopal, Madhya Pradesh, India  
**MS Thesis title:** *Chiral Anomalies in Quantum Field Theory*  
**Studied:** *Physics (Major), Mathematics, and Chemistry*  
**CGPA:** 8.89/10

### Important Roles

- 2023 - present ○ Co-leading the **IPTA Data Release 3 Search** for Gravitational Wave Burst with memory project.  
○ Co-led the quantitative comparisons of various posteriors that arose from the very recent three independent PTA efforts by the Australian, European, Indian, and North American PTA collaborations. This was very recent IPTA project that compared various aspects of the independent results on the nHz stochastic GW background search among three PTA ([Arxiv:2309.00693](https://arxiv.org/abs/2309.00693)).
- 2022 - 2023 ○ As the **Deputy Managing Leader (DML)** responsible for both the data reduction working group and the Data backup group within the InPTA collaboration, my duties involved overseeing the management of all processed [pinta](#) output files from the uGMRT dataset and ensuring their proper analysis. This involves conducting reviews of the backup procedures for the raw data as well.

### Skills

- Programming Languages Python, Wolfram Language, bash, C,  $\text{\LaTeX}$
- Computing Software MATHEMATICA, MAPLE
- Astrophysical Software ENTERPRISE, BILBY, TEMPO2, PINT

## Research Publications

### Peer-Reviewed Publications with Major Contribution

- [1]\* **Dandapat, S.**, Ebersold, M., Susobhanan, A., et al. (2023). Gravitational waves from black-hole encounters: Prospects for ground and galaxy-based observatories. *Phys. Rev. D*, 108, 024013. **DOI:**[10.1103/PhysRevD.108.024013](https://doi.org/10.1103/PhysRevD.108.024013). [arxiv:2305.19318](https://arxiv.org/abs/2305.19318) [gr-qc, astro-ph.GA]
- [2]\* Cho, G., **Dandapat, S.**, & Gopakumar, A. (2022). Third order post-newtonian gravitational radiation from two-body scattering: Instantaneous energy and angular momentum radiation. *Phys. Rev. D*, 105, 084018. **DOI:** [10.1103/PhysRevD.105.084018](https://doi.org/10.1103/PhysRevD.105.084018). [arxiv:2111.00818](https://arxiv.org/abs/2111.00818) [gr-qc]

### Non-Peer-Reviewed Publications with Major Contribution

- [3]\* **Dandapat, S.**, Susobhanan, A., Dey, L., Gopakumar, A., et al. 2023. An efficient prescription to search for linear gravitational wave memory in pulsar timing array data and its application to the NANOGrav 12.5-year dataset. [arXiv:2402.03472](https://arxiv.org/abs/2402.03472) [astro-ph.HE]
- [4]\* Agazie, G., ..., **Dandapat, S.**, et al. (2023). Comparing recent PTA results on the nanohertz stochastic gravitational wave background. [arXiv:2309.00693](https://arxiv.org/abs/2309.00693) [astro-ph.HE]

### Other Peer-Reviewed Publications

- [5] Antoniadis, J., ..., **Dandapat, S.**, et al. (2023a). The second data release from the European Pulsar Timing Array II. Customised pulsar noise models for spatially correlated gravitational waves. *Astronomy & Astrophysics* 678 (2023): A49. **DOI:**[10.1051/0004-6361/202346842](https://doi.org/10.1051/0004-6361/202346842). [arXiv: 2306.16225](https://arxiv.org/abs/2306.16225) [astro-ph.HE]
- [6] Antoniadis, J., ..., **Dandapat, S.**, et al. (2023b). The second data release from the European Pulsar Timing Array III. Search for gravitational wave signals. *Astronomy & Astrophysics* 678 (2023): A50. **DOI:** [10.1051/0004-6361/202346844](https://doi.org/10.1051/0004-6361/202346844). [arXiv: 2306.16214](https://arxiv.org/abs/2306.16214) [astro-ph.HE]
- [7] Srivastava, A. et al. (2023). Noise analysis of the Indian Pulsar Timing Array data release I. *Phys. Rev. D*, 108(2), 023008. **DOI:**[10.1103/PhysRevD.108.023008](https://doi.org/10.1103/PhysRevD.108.023008). [arXiv: 2303.12105](https://arxiv.org/abs/2303.12105) [astro-ph.HE]
- [8] Chandra Joshi, B. et al. (2022). Nanohertz gravitational wave astronomy during SKA era: An InPTA perspective. *J. Astrophys. Astron.*, 43(2), 98. **DOI:**[10.1007/s12036-022-09869-w](https://doi.org/10.1007/s12036-022-09869-w). [arXiv: 2207.06461](https://arxiv.org/abs/2207.06461) [astro-ph.HE]
- [9] Nobleson, K. et al. (2022). Low-frequency wideband timing of InPTA pulsars observed with the uGMRT. *Mon. Not. Roy. Astron. Soc.*, 512(1), 1234–1243. **DOI:**[10.1093/mnras/stac532](https://doi.org/10.1093/mnras/stac532). [arXiv: 2112.06908](https://arxiv.org/abs/2112.06908) [astro-ph.IM]
- [10] Tarafdar, P., ..., **Dandapat, S.**, et al. (2022). The Indian Pulsar Timing Array: First data release. *Publ. Astron. Soc. Austral.*, 39, e053. **DOI:**[10.1017/pasa.2022.46](https://doi.org/10.1017/pasa.2022.46). [arXiv: 2206.09289](https://arxiv.org/abs/2206.09289) [astro-ph.IM]
- [11] Singha, J. et al. (2021). Evidence for profile changes in PSR J1713+0747 using the uGMRT. *Mon. Not. Roy. Astron. Soc.*, 507(1), L57–L61. **DOI:**[10.1093/mnrasl/slab098](https://doi.org/10.1093/mnrasl/slab098). [arXiv: 2107.04607](https://arxiv.org/abs/2107.04607) [astro-ph.HE]

### Non-Peer-Reviewed Publications

- [12] Antoniadis, J., et al. (2023c). The second data release from the European Pulsar Timing Array IV. Search for continuous gravitational wave signals. [arXiv: 2306.16226 \[astro-ph.HE\]](#)
- [13] Antoniadis, J. et al. (2023d). The second data release from the European Pulsar Timing Array: V. Implications for massive black holes, dark matter and the early Universe. [arXiv: 2306.16227 \[astro-ph.CO\]](#)
- [14] Paladi, A. K. et al. (2023). Multi-band Extension of the Wideband Timing Technique. [arXiv: 2304.13072 \[astro-ph.IM\]](#)
- [15] Kikunaga, Tomonosuke, et al. (2023). Low-frequency pulse-jitter measurement with the uGMRT I: PSR J0437 –4715. [arXiv:2312.01875 \[astro-ph.HE\]](#)

## Fellowships

- 2023 **Sarojini Damodaran Fellowship** for international travel at TIFR
- 2022 **Pauli Center for Theoretical Studies visitor program Fellowship**, ETH and University of Zürich, July 15 - September 17, 2022

## Seminars and Conference Presentations

- 2023
  - “**Detection and Characterization of Burst with Linear Memory Events with Pulsar Timing Array and LIGO-Virgo-KAGRA Observatories**”; In person talk on Astrophysics group of Milan-Bicocca; December 5, 2023.
  - “**Characterizing Burst with Linear Memory Events with LIGO-Virgo-KAGRA and Pulsar Timing Array Observatories**”; [Amaldi15](#) virtual conference; July 17-21, 2023. [[YouTube link](#)]
  - “**Searching Burst with memory event in IPTA dataset and Comparing PTA posteriors**”; [IPTA Science meeting](#); 19-23 June, 2023.
  - “**Comparing PTA posteriors**” IPTA GWA hackweek on 3P+ comparisons virtually on zoom; 6-8 March, 2023.
- 2022 “**Stochastic gravitational wave background spectrum due to supermassive black hole binaries in precessing eccentric orbits**”; [Gravitational Wave Orchestra](#) in-person held on UCLouvain, Belgium; Sep 8-9, 2022.
- 2021
  - “**Modeling GW burst with linear memory events**”; 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.
  - “**Effect of relativistic pericentre advance on the SGWB due to eccentric SMBH binaries**”; EPTA 2021 Summer meeting virtually on zoom; Apr 21-23, 2021.

## Research Visits

- 2023
  - Visited Prof. Alberto Sesana’s [B Massive group](#) at Milano-Bicocca from **4 th December to 8th December, 2023** for IPTA collaborative work.
  - Visited Prof. [Jetzer’s group](#) at University of Zürich from **20 th November to 1st December, 2023** for LVK collaborative work.
- 2022 Visited Prof. [Jetzer’s group](#) at University of Zürich from **15 th July to 30th September, 2022** for LVK collaborative work.

## References

- **Prof. A. Gopakumar**  
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