

Dr Valentina Di Marco

 valeaussie |  Valentina Di Marco |  www.valentinadimarco.com |

SUMMARY

I am a postdoctoral fellow at the University of Melbourne, working on pulsar science, as part of Oz-Grav Australian Centre of Excellence and the International Pulsar Timing Array (IPTA) consortium. My current research focuses on understanding the nanohertz gravitational-wave sky, a new way of observing the Universe at the lowest gravitational-wave frequencies we can access, and the pulsars we use to observe it. I do this by developing statistical methods and applying them to real data across pulsar and gravitational-wave astronomy. This covers Bayesian characterisation of pulsar noise, searches for the nanohertz gravitational-wave background, continuous-wave and pulsar searches using hidden state-space methods, and new pulsar-search techniques using interferometers.

My PhD addressed a fundamental problem for the field, the statistical reliability of pulsar timing array detections, from the significance of the gravitational-wave background to the inference of its spectrum, and developed more rigorous and efficient approaches to pulsar noise modelling.

I hold an H1 MPhil in computational statistics and a First Class Honours degree in mathematics. Before returning to research, I spent over a decade in industry in digital marketing and data analytics.

PUBLICATIONS

First-author publications

Di Marco, Valentina, Nir Guttman, et al. (Mar. 2026). “A transdimensional sampling framework for pulsar timing noise modelling”. In: *arXiv e-prints*, arXiv:2603.23817, arXiv:2603.23817. DOI: [10.48550/arXiv.2603.23817](https://doi.org/10.48550/arXiv.2603.23817). arXiv: [2603.23817](https://arxiv.org/abs/2603.23817) [[astro-ph.IM](#)].

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Di Marco, Valentina, Andrew Zic, Ryan M. Shannon, and Eric Thrane (Aug. 2024). “Systematic errors in searches for nanohertz gravitational waves”. In: *Monthly Notices of the Royal Astronomical Society* 532.4, pp. 4026–4034. DOI: [10.1093/mnras/stae1750](https://doi.org/10.1093/mnras/stae1750). arXiv: [2403.13175](https://arxiv.org/abs/2403.13175) [[astro-ph.HE](#)].

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Co-author publications

Cardinal Tremblay, Jacob et al. (Feb. 2026). “A Multimessenger Search for the Supermassive Black Hole Binary in 3C 66B with the Parkes Pulsar Timing Array”. In: *The Astrophysical Journal Letters* 998.2, L42, p. L42. DOI: [10.3847/2041-8213/ae3c98](https://doi.org/10.3847/2041-8213/ae3c98). arXiv: [2508.20007](https://arxiv.org/abs/2508.20007) [[astro-ph.HE](#)].

Chen, Yiqin et al. (Feb. 2026). “Searching for anisotropy in the gravitational wave background using the Parkes Pulsar Timing Array”. In: *Physical Review D* 113.4, 043042, p. 043042. DOI: [10.1103/czxp-zrd6](https://doi.org/10.1103/czxp-zrd6). arXiv: [2602.11529](https://arxiv.org/abs/2602.11529) [[astro-ph.HE](#)].

- Curyło, Małgorzata et al. (July 2026). “Frequency- and phase-resolved polarimetry of millisecond pulsars and its application to timing”. In: *Monthly Notices of the Royal Astronomical Society* 549.4, stag835, stag835. DOI: [10.1093/mnras/stag835](https://doi.org/10.1093/mnras/stag835). arXiv: [2512.09220](https://arxiv.org/abs/2512.09220) [astro-ph.HE].
- Hu, Xiao-Song et al. (June 2026). “Constraints on ultralight scalar and dark photon dark matter from PPTA DR3 and EPTA DR2”. In: *Physical Review D* 113.12, 123019, p. 123019. DOI: [10.1103/wff3-b1fs](https://doi.org/10.1103/wff3-b1fs). arXiv: [2605.02172](https://arxiv.org/abs/2605.02172) [astro-ph.CO].
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