

Conaire Deagan

Astrophysics PhD Candidate | University of New South Wales
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Education

Doctor of Philosophy in Physics — University of New South Wales Feb 2023 – Nov 2026
(expected)

Advisors: A/Prof. Ben Montet, Dr Sarah Martell

Thesis: Posterior Inference and Information Content in Stellar Surface Mapping

Bachelor of Advanced Studies (Honours) — University of Sydney Jul 2021 – Jul 2022

Advisors: Prof. Peter Tuthill, Dr Ben Pope

Thesis: Advanced astrometry: Modelling the TOLIMAN space telescope

Bachelor of Science (Physics & Mathematics) — University of Sydney Feb 2018 – Jun 2021

Leadership

UNSW AstroStats Club — Co-founder, Instructor, and Organiser Jan 2026 – Present
UNSW Sydney

- Design and deliver workshops on Bayesian inference, statistics, and ML for PhD students and research staff.
- Materials publicly available: github.com/ConaireD/UNSW_Astro_Stats_Club

Early Career Researcher Representative 2024
UNSW Sydney

Represented ECR interests within the astronomy department and attended faculty meetings

Astronomy Journal Club — Organiser Q3 2023 – 2025
UNSW Sydney

Publications

First-author

Astrometric exoplanet detection survives solar-like stellar contamination

Deagan, C., Montet, B. T., Tuthill, P., Ferraro, M., Lyu, R., & Sheehan, E.

MNRAS, 549, *stag966* (2026)

[doi:10.1093/mnras/stag966](https://doi.org/10.1093/mnras/stag966) • [arXiv:2605.18953](https://arxiv.org/abs/2605.18953)

Inferring hemispheric asymmetries of stellar active regions through the information content of astrometric signals

Deagan, C., & Montet, B. T.

MNRAS, 548, *stag675* (2026)

[doi:10.1093/mnras/stag675](https://doi.org/10.1093/mnras/stag675) • [arXiv:2601.11707](https://arxiv.org/abs/2601.11707)

Co-author

TOLIMAN mission: a low-cost space telescope for high-precision narrow-angle astrometry

Tuthill, P., et al. (incl. Deagan, C.)

Research Experience

PhD Research — UNSW (NEWTS Research Group / TOLIMAN Project) Feb 2023 – Present

- Developed information-theoretic frameworks for stellar surface reconstruction, demonstrating that astrometry breaks degeneracies inherent to photometry-only inversions.
- Built a simulation-based inference pipeline (neural posterior estimation, normalising flows, VAE learned priors) recovering full posteriors over stellar surfaces from photometric and astrometric time series; released as the tested, open-source package [starspot-sbi](#).
- Analysed decade-long, multi-wavelength photometric datasets treating the Sun as a star.

Defence Science and Technology Group — Internship First Quarter 2025

- Developed ML models for nuclear safety monitoring, including event detection, classification, and localisation.
- Outperformed a competing Los Alamos National Laboratory model in two of three evaluation metrics.
- Applied Gaussian processes, transformer-based autoencoders, recurrent neural networks, contrastive learning, and saliency analysis.

Research Assistant — Sydney Astrophotonic Instrumentation Laboratory, University of Sydney Jul 2022 – Jun 2024

Teaching & Mentoring

Head Tutor — QBUS3600: Business Analytics in Practice Jun 2024 – Present
University of Sydney

Tutor — QBUS3600, QBUS6600, BUSS6002 Jul 2022 – Jun 2024
University of Sydney

Marker — PHYS4016: Bayesian Data Inference and Machine Learning
University of Sydney

Technical Skills

Programming: Python (advanced; PyTorch, sbi, NumPy/SciPy), L^AT_EX
Statistics / ML: Bayesian inference, simulation-based inference, normalising flows, variational autoencoders, Gaussian processes, Fisher information, MCMC and nested sampling, contrastive learning, representation learning, anomaly detection
Computing: High-performance computing, Linux, Git/GitHub

References

Available upon request.