

Payton E. Rodman

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Professional Experience

Software Engineer

Mar 2025 – Present

Darktrace

- Developed and maintained software for real-time data acquisition and processing across cloud environments.
- Integrated new components into existing production systems, from design through to deployment.
- Collaborated with cross-functional teams to ensure system reliability and data integrity at scale.

Education

PhD Astronomy

2019 – 2024

University of Cambridge, Institute of Astronomy / Churchill College

Cambridge, UK

Gates-Cambridge scholar

BSc (Hons) Physics

2018

University of Tasmania

Hobart, AUS

GPA: 7.0/7.0 and University Medal

BSc Physics and Applied Mathematics

2015 – 2017

University of Tasmania

Hobart, AUS

GPA: 7.0/7.0

Technical Skills

Programming / scripting languages: Python, C++, MATLAB, SQLite

Analysis and visualisation: pandas, numpy, scipy, astropy, h5py, VisIt, matplotlib, seaborn

Other tools: git, conda, jupyter, Athena++, PLUTO, High-Performance Computing (HPC), Redis, uv/poetry, mpi4py

Software development practices: CI/CD pipelines, test-driven development (TDD)

Languages: English (native), French (A2)

Projects

Mapping barometric pressure migraine risk worldwide

Dec 2024 – Jan 2025

- Mapped geographic trends in barometric pressure variation, a common trigger for migraine headache.
- Analysed and cleaned 10 years of historical weather data from 8,189 weather stations across 210 countries in Python.
- Produced unit tests to verify the output of core functions under the pytest framework.

Magnetic field evolution in black hole accretion disks and relativistic jets

Oct 2019 – Dec 2024

PhD thesis

[Code]

- Produced and analysed simulated black hole accretion disk and relativistic jet data, quantifying the evolution of magnetic fields in highly energetic plasmas.
- Contributed novel C++ code to existing simulation frameworks, adhering to the established best practices and code style.
- Analysed large (~100TB combined) datasets using MPI-parallelised Python on HPC.
- Produced journal articles and presentations on the findings, presented to both expert and non-expert audiences.

Probing intracluster gas with Faraday Rotation from black hole jets Feb 2018 – Nov 2018
Honours thesis [Blog]

- Used Faraday Rotation measurements of black hole jets to investigate their potential for constraining host galaxy properties.
- Produced and analysed analytic jet and galaxy cluster models in Python.
- Improved galaxy mass estimates sixfold by including Faraday Rotation data.
- Reported findings in print and contributed talks at conferences and meetings.

The spectral signature of interstellar scintillation Nov 2016 – Feb 2017
Summer Research Intern - CSIRO Astronomy and Space Science (CASS) [Code]

- Analysed spectral data from 2,232 quasars observed in the Australian Telescope Extreme Scattering Events (ATESE) survey to quantify radio source variability.
- Developed and validated a structure function-based approach for assessing scintillation strength.
- Verified a new method for real-time detection of Extreme Scattering Events on historical data, identifying three new candidates.

Radio Galaxy Zoo: observational evidence for environment as the cause of radio source asymmetry Nov 2015 – Feb 2016
Summer Research Intern - University of Tasmania

- Utilised data from the citizen science project *Radio Galaxy Zoo* to study whether nearby galaxy clustering affects the physical properties of galaxy jets.
- Analysed properties of an initial sample of 2,679 candidate sources, utilising observational data from SDSS and radio surveys (FIRST and ATLAS) obtained using SQL.
- Validated predictions of radio source dynamics models, showing that denser environments negatively correlate with lobe extension and luminosity for FR-II sources at a 4σ level.
- Findings reported in print and presented at conferences.

Presentations and Posters

Apr 2024: Churchill College Conference on Everything, *Contributed talk (non-expert audience)*


Nov 2022: University of Bremen, *Invited talk*

Sep 2022: 31st Symposium on Relativistic Astrophysics, Prague, *Contributed talk*

Dec 2017: AIP 2017 Summer Meeting, *Poster*

Aug 2017: From Black Hole to Environment, *Poster*

Publications

4 publications in peer-reviewed journals, 2 first-author. Full record available at  <https://orcid.org/0000-0002-1624-9359>

Highlighted Awards and Scholarships

2024: Churchill College Conference On Everything Prize for best talk in the physical sciences

2019: Gates-Cambridge Scholarship

2019: University Medal

2018: Dean's Honour Roll for Bachelor of Science with Honours

2018: Ken McCracken Prize for the best Honours thesis in the discipline of Physics

2018: Vice-Chancellor's Leadership Award