

Payton E. Rodman

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Summary

Graduate researcher with a strong foundation in scientific computing and expertise in data analysis using Python. Proficient in delivering impactful insights using advanced data science methodologies, visualization tools (e.g. matplotlib, seaborn), and high-performance computing (HPC) resources on large data sets (>80TB). Adept at translating technical concepts for diverse audiences, I thrive in roles requiring innovation, precision, and scalable solutions to data-driven challenges. I am seeking a role in data science/Machine Learning where I may apply my skills to real-world problems and learn new methods.

Education

PhD Astronomy <i>University of Cambridge, Institute of Astronomy / Churchill College</i>	2019 – 2024 Cambridge, UK
BSc (Hons) Physics <i>University of Tasmania</i>	2018 Hobart, AUS
BSc Physics and Applied Mathematics <i>University of Tasmania</i>	2015 – 2017 Hobart, AUS

Technical Skills

Programming / scripting languages: Python (pandas, numpy, scipy, mpi4py), C++, L^AT_EX, MATLAB, SQL
Visualisation: VisIt, matplotlib, seaborn
Other tools: git, Athena++, PLUTO, High-Performance Computing (HPC)

Projects

- Mapping barometric pressure migraine risk worldwide** Dec 2024 – Jan 2025
- Analysed weather data in Python to find geographic trends in barometric pressure variation, a common trigger for migraine headache.
 - Produced unit tests to verify 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
- Contributed novel C++ code to existing simulation frameworks, adhering to the established best practices and code style.
 - Analysed the results of large (~100TB combined) datasets using parallelised Python.
 - Developed reports in the form of journal articles and presentations on the findings, presented to both expert and lay audiences.
- Probing intracluster gas with Faraday Rotation from black hole jets** Feb 2018 – Nov 2018
Honours thesis
- Investigated how Faraday Rotation measurements of black hole jets could be used to help constrain host galaxy properties, improving galaxy mass estimates 6-fold.
 - Produced and analysed analytic jet and galaxy cluster models in Python.
 - Reported findings in print and contributed talks at conferences and meetings.
- The spectral signature of interstellar scintillation** Nov 2016 – Feb 2017
Summer Research Internship
- Analysed large-scale, multi-year astrophysical surveys to quantify variability in radio sources caused by inhomogeneities in the interstellar and intergalactic medium.

- Cleaned raw data and identified extreme outliers.
- Verified a new method for real-time detection of Extreme Scattering Events on historical data, identifying three new candidates.

Environmental drivers of radio jet asymmetry

Nov 2015 – Feb 2016

Summer Research Internship

- Utilised data from the citizen science project *Radio Galaxy Zoo* to study whether nearby galaxy clustering affects the physical properties of galaxy jets.
- Obtained galaxy clustering data from the FIRST survey via SQL.
- Performed analysis in MATLAB.
- 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*

Jan 2020: X-ray BunClub, *Department talk*


Sep 2019: UTAS School of Natural Sciences, *Department talk*

Dec 2017: AIP 2017 Summer Meeting, *Poster*

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

Feb 2017: CSIRO 15 Minutes of Fame event, *Project presentation*

Publications

4 publications in peer-reviewed journals, 2 first-author. 1 first-author in preparation. 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

Public Outreach

2017–2019: Tastrofest, invited public lectures on black holes

2016–2019: University of Tasmania Open Days and Cub Scout Visits, regular volunteer

2019: Tasmanian Youth Science Forum Panellist

2018: UTAS Science & Engineering Investigation Awards Head Judge

2018: BeakerStreet@TMAG Roving Scientist

2018: Festival of Bright Ideas Presenter

2018: Young Tassie Scientist