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　　　　　　　　　　　　　　　　　　　　　　　　　2019 – 2024
University of Cambridge, Institute of Astronomy / Churchill College　　　Cambridge, UK

BSc (Hons) Physics　　　　　　　　　　　　　　　　　　　　　　　　2018
University of Tasmania　　　　　　　　　　　　　　　　　　　　　Hobart, AUS

BSc Physics and Applied Mathematics　　　　　　　　　　　　　2015 – 2017
University of Tasmania　　　　　　　　　　　　　　　　　　　　　Hobart, AUS

Technical Skills

Programming / scripting languages: Python (pandas, numpy, scipy, mpi4py), C++, LaTeX, 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 ($\sim$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

Referees

Christopher Reynolds PhD Supervisor   **Martin Krause** Colleague and Co-author
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