

Payton E. Rodman

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Summary of Research Interests

My current research focuses on the inflow and outflow of material from around supermassive black holes such as those found in the centres of massive galaxies. My thesis aims to investigate how magnetic fields may impact the evolution of both accretion disks and relativistic jets, through the use of the magnetohydrodynamics (MHD) codes Athena++ and PLUTO.

Education

PhD Astronomy Cambridge, UK
University of Cambridge, Institute of Astronomy / Churchill College 2019 – 2024
Thesis: TBA
Supervisor: Professor Christopher Reynolds

BSc (Hons) Physics Hobart, AUS
University of Tasmania 2018
Thesis: Probing Intracluster Gas with Faraday Rotation from Black Hole Jets
Supervisors: Dr Stanislav Shabala, Dr Ross Turner

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

Publications

- Faraday rotation as a probe of radio galaxy environment in RMHD AGN jet simulations*
Jerrim, L. A., Shabala, S. S., Yates-Jones, P. M., Krause, M. G. H., Turner, R. J., Anderson, C. S., Stewart, G. S. C., Power, C., **Rodman, P. E.** (2023), *submitted to MNRAS*
- Evolution of the Magnetic Field in High- and Low- β Disks with Initially Toroidal Fields*
Rodman, P. E., Reynolds, C. S. (2024), *ApJ*, 960:97
- How do magnetic field models affect astrophysical limits on light axion-like particles? An X-ray case study with NGC 1275*
Matthews, J. H., Reynolds, C. S., Marsh, M. C. .D, Sisk-Reynés, J., **Rodman, P. E.** (2022), *ApJ*, 930:90
- Radio Galaxy Zoo: observational evidence for environment as the cause of radio source asymmetry*
Rodman, P. E., Turner, R. J., Shabala, S. S., Banfield, J. K., Wong, O.-I., Andernach, H., Garon, A. F., Kapińska, A. D., Norris, R. P., Rudnick, L. (2019), *MNRAS*, 482(4):5625-5641

Invited and Contributed Talks

Nov 2022: University of Bremen, Invited talk

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

Teaching

Lent 2020: Supervisions for Astrophysical Fluid Dynamics in Part II

Sem 2 2019 Marker for Statistical Physics and Solid State Physics

Sem 1 2018, 2019 Marker for Physics 1A

Sem 2 2018 Marker for Physics 1B

Skills

- Programming / scripting languages: C++, Python, MATLAB, L^AT_EX, Mathematica
- Simulation codes: Athena++, PLUTO
- Languages: English (native), French (A2)

Previous Research Experience

Undergraduate Vacation Scholar

CSIRO Astronomy and Space Science

Supervisor: Dr Cormac Reynolds

Perth, AUS

Nov 2016 – Feb 2017

Used large-scale, multi-epoch surveys to study variability in radio sources caused by inhomogeneities in the interstellar and intergalactic medium.

Summer Research Student

University of Tasmania

Supervisors: Dr Stanislav Shabala, Dr Ross Turner

Hobart, AUS

Nov 2015 – Feb 2016

Used data from the citizen science project *Radio Galaxy Zoo* to study whether nearby galaxy clustering affects the physical properties of AGN jets, with focus on classical double radio galaxies. A paper detailing the findings has been published in MNRAS.

Awards and Scholarships

2019: Gates-Cambridge Scholarship

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

2018: Don Gaffney Scholarship

2017: AIP Summer Meeting Travel Scholarship

2017: Dean's Honour Roll for Bachelor of Science

2017: Australian Institute of Physics Prize for the greatest proficiency in third-year Physics

2017: TEMCO Community Foundation Scholarship in Science

2016: Sir Phillip Fysh Prize for the best student in second-year Physics

2016: CSIRO Undergraduate Vacation Scholarship

2015: Dean's Summer Research Scholarship

2015: John Fox Memorial Prize for the best female student in first-year Physics and Mathematics

2015: F.M. Young Memorial Prize for the greatest proficiency in first-year Bachelor of Science

2015: Dean's Summer Research Scholarship

2015: Dr. Peter Smith Scholarship in the Physical Sciences

Public Outreach

2017–2019: Tastrofest (1hr), 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