Amelia Cordwell.

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http://cordwella.github.io/

An Early Career Researcher in Theoretical Astrophysics with a focus on bringing analytical and simulation based methods together in the study of the dynamics of astrophysical discs. I have prior experience working in data science, software development and university level teaching.

Education

2022 – 2026 **Ph.D., University of Cambridge** in Applied Mathematics and Theoretical Physics.
Thesis title: *Planet-disc interactions in Protoplanetary Discs*. Supervisor: Roman R. Rafikov.
Expected graduation: September 2026

2020 **B.Sc.(Hons), University of Auckland** with First Class Honors. (UK Masters Equivalent)
Thesis title: *Asteroid Lightcurves from the MOA-II Database*.

2017 – 2019 **B.Sc., University of Auckland** in Physics.
Graduated with a GPA of 8.6, on a scale from 1 to 9, (an average grade of A). Key courses in Physics, Mathematics and Computer Science.

Publications

1. **A. Cordwell** and R. R. Rafikov, "Early stages of gap opening by planets in protoplanetary discs," *Monthly Notices of the Royal Astronomoical Society*, vol. 534, no. 2, pp. 1394–1413, Oct. 2024. DOI: 10.1093/mnras/stae2089. arXiv: 2407.01728 [astro-ph.EP].
2. **A. Cordwell**, A. A. Chapple, S. Chung, F. S. Wells, and G. R. Willmott, "Ferrofluid drop impacts and Rosensweig peak formation in a non-uniform magnetic field," *Soft Matter*, vol. 19, no. 25, pp. 4676–4685, Jun. 2023. DOI: 10.1039/D3SM00701D. arXiv: 2204.05523 [physics.flu-dyn].
3. **A. Cordwell**, N. J. Rattenbury, M. T. Bannister, *et al.*, "Asteroid Lightcurves from the MOA-II Survey: a pilot study," *Monthly Notices of the Royal Astronomoical Society*, vol. 514, no. 2, pp. 3098–3112, Aug. 2022. DOI: 10.1093/mnras/stac674.
4. **A. Cordwell**, N. Wilkinson, E. Abraham, and K. Berkenbusch, "New Zealand's research workforce," *Report prepared for the New Zealand Ministry for Business, Innovation & Employment. https://www.dragonfly.co.nz/publications/cordwell_research_2022.html*, 2022.

Awards

2024 Smith-Knight Rayleigh-Knight Mathematics Essay Prize (University of Cambridge)
2022 Cambridge-Rutherford Memorial PhD Scholarship
2021 Royal Astronomical Society of New Zealand Best Conference Speaker 2021
2020 First in Course Award in PHYSICS 753: The Dynamic Universe (University of Auckland)
University of Auckland Postgraduate Honours / PG Diploma Scholarship
2019 University of Auckland 2019 Senior Scholar Award
First in Course Award in PHYSICS 334: Statistical Physics and Condensed Matter, PHYSICS 356: Particle Physics and Astrophysics (University of Auckland)
2018 First in Course Award in PHYSICS 203: Relativity and Quantum Physics (University of Auckland)
University of Auckland Physics Department Scholarship

Employment and Outreach

Teaching Experience

2025–2026 **Undergraduate Supervisor** *Newnham College - University of Cambridge* Taught small group classes for Part 1A Physics.

2019– 2020 **Teaching Assistant/Graduate Teaching Assistant** *Physics Department - University of Auckland* Assisted with the delivery and teaching for a range of first year physics courses.

Public Outreach

2024 **Institute of Astronomy Open Day.** Developed a booth to represent the Astrophysical Fluid Dynamics group aimed at primary school age students and parents. Explained and showed (with an experimental demonstration) how rotating fluids are different to static fluids and what this means for dynamics space.

2019 **University of Auckland Open Day.** Member of the open day booth giving information about the Physics department to prospective students.

2018 **Museum of Transport and Technology (MOTAT) STEM Fair presenter for the University of Auckland.** Outreach to families and primary school age children about physics.

Other Employment

2022 **Graduate Data Scientist** *Dragonfly Data Science* Performed research leading to a report for the New Zealand Ministry for Business Innovation and Employment.

2021 **Research Assistant** *Department of Physics - University of Auckland.* Continued prior research on ferrofluid droplet impacts and asteroid lightcurves.

Nov. 2020 - Feb. 2021 **Special Projects Intern** *Rocket Lab.* Performed confidential research at the request of the CEO.

Dec 2019 – Feb 2020 **Summer Research Studentship - Ferrofluid Droplet Impacts** *Physics Department - University of Auckland* Performed experimental studies of ferrofluid droplets hitting a surface under a magnetic field at high speed. Developed video analysis codes in python.

Nov 2018 – Feb 2019 **Summer Research Studentship - Asteroids** *Physics Department - University of Auckland* Developed an automated astronomical image processing pipeline to extract asteroid lightcurves from the MOA-II astronomical database.

2017–2018 **Lead Creative Technologist** *Unleash Space - University of Auckland* Part time supervision, workshop development and training provision for a makerspace.

Mar. 2017–2018 **Junior Software Developer** *Catalyst IT* Software development in Python for the Catalyst Cloud (OpenStack) computing team (part time and holidays during study).

Nov. 2016– Feb. 2017 **Openstack Intern Developer** *Catalyst IT*

Talks and Conferences

2025 Conference Talk. "Wave damping in (proto-planetary) discs: The relative importance of viscous, thermal and non-linear wave damping". DYNAMIX Conference 2025 in Cambridge.

Invited Seminar. "Understanding the initial stages of planet-driven gap formation". Exoplanet Seminars, Institute of Astronomy, University of Cambridge.

Talks and Conferences (continued)

- Outreach Talk. "Pretty Pictures of Protoplanetary Discs: Understanding the birthplace of planets". Part of the Pudding Seminar series given to a non-science audience at Newnham College.

2024

- Conference Talk. "How do planets carve smooth gaps in inviscid discs?". UKI Discs Conference 2024 at the University of Warwick.
- Conference Talk. "How do planets carve smooth gaps in inviscid discs?". New Heights in Planet Formation Conference 2024 in Munich.
- Attendee. Dustbusters Winter School II. ENS de Lyon, France.

2021

- Conference Talk. "Asteroid lightcurves in the MOA-II survey". Royal Astronomical Society of New Zealand Conference 2021 in Wellington.
- Conference Talk. "Ferrofluids and microfluidics: Magnetic forces and droplet impacts". New Zealand Institute of Physics & PHYSIKOS 2021 Conference in Wellington.

Computing Skills

Programming
- Experienced with Python (SciPy, Numpy, Pandas, as well as web frameworks), MATLAB, C++, R, SQL, Bash, LaTeX, …

HPC
- Experience with multiple different HPC clusters, including using MPI and SLURM.

Athena++
- Experienced with 2 and 3 dimensional simulations of astrophysical discs.

References

Prof. Roman R. Rafikov
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University of Cambridge,
Wilberforce Road, Cambridge CB3 0WA, UK.
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Prof. Henrik Latter
PhD Graduate Advisor,
University of Cambridge,
Wilberforce Road, Cambridge CB3 0WA, UK.
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