Amber Malpas

Astrophysics PhD Student

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Education

PhD Astronomy | Present
MSc Astronomy with First Class Honours | 2016
BSc Mathematics and Physics | 2014
Waikato Diocesan School for Girls | 2010

Skills

Languages: Python, Bash, MATLAB | Basics of: R, VBA, C, SQL, Java, HTML, and CSS
Other: LaTeX, Git, MS Office
Certifications: Privacy Breach Reporting, Health ABC, Privacy Act 2020 CCC Manager's Cert for Sale and Supply of Alcohol (valid 2014-2015,2017-2018), First Aid 2015, R for Programmers, Learn Statistic with R, How to Deploy a Website, How to Make a Website with NameCheap, Learn Git GitHub, Learn the Command Line, Learn Advanced Python 3: Functional Programming

Extra-Curricular

Outreach | University of Canterbury | 2017-2023
- Assisting with many open days and outreach events
- Operating and demonstrating solar telescopes for public viewing
- running labs on radioactivity for high school students

Women & Girls in Astronomy Panel | 2019

Festival Assistant | Aoraki Mackenzie Dark Sky Reserve Board | 2017
- Setting up events
- Ticket sales & admissions management

Physsoc | Events Coordinator (2013), Treasurer (2014) General Exec. (2015, 2016, 2018)
- Organising social & outreach events
- Marketing
- Accounts management

Dungeon Master | Dungeons and Dragons Home Games
- Creating adventure modules
- Organising, running, & mediating game nights
- Spell card design
- Terrain building

Employment History

2017-2019 Senior Teaching Assistant — University of Canterbury
I educated students on concepts of electromagnetism, relativity, gravity, data analysis skills (e.g. coding in Python and MATLAB), practical astronomical observing, image processing, and report writing. I managed and guided other teaching assistants (TAs).

2015-2016,2023 Senior Laboratory Teaching Assistant — University of Canterbury
I trained others in the use of lab equipment, taught physics concepts, and assessed formal reports. I also supervised and mentored TAs.

2017-2019 Mentor — Elaine P. Snowden Astronomy School
During a one week Easter-holiday camp for high-school students, I educated students on physics concepts in a lab environment, guided basic telescope constructions, and advised their observing at University of Canterbury Mount John Observatory (UCMJO) in Lake Tekapo to support them in achieving their research goals and empowered them to become more confident and capable astronomers.

Research and Projects

2017-Present Analysing Microlensing Events — University of Canterbury | KMTNet, Spitzer
In collaboration with the KMTNet, I analysed multi-lens signal, light-curves (flux measurements over time) data to characterise the lens.

2021-2022 Gaussian Process Regression — University of Canterbury | KMTNet, Spitzer
In response to criticisms made against some Spitzer microlensing signals, I developed an innovative Gaussian Process modelling approach to fit systematic errors in the Spitzer light-curve data. This provided a more robust method for coping with large systematic uncertainties in low-signal data.

2018-2019 Galactic Modelling for Microlensing — University of Canterbury
I investigated methods to perform galactic model analysis on microlensing events, for which the mass-distance degeneracy was not broken, to infer likely masses and distances. This project gave me the opportunity to better understand Bayesian inference as well as state-of-the-art Galactic modelling techniques and their limitations and applications.

2015-2016 Follow-up of Transiting Exoplanets — University of Canterbury | KELTSouth
I collected photometric and spectroscopic data, using telescopes at UCMJO, as part of a follow-up effort for exoplanet candidates provided by the KELT-South project. KELT-South uses a wide-field, surveying, photometric telescope to search for transiting exoplanets.

2014 Imaging and Quantifying Strontium — University of Canterbury | MARS
I tested image processing techniques concerning the identification of strontium using the MARS-CT (spectral CT) scanner being developed at the University of Canterbury (with the University of Otago and CERN). MARS uses spectral information, gathered by discrete-energy photon-counting detectors, to identify material composition. Strontium was of clinical interest because it can replace calcium in bone, allowing for measuring and tracking of new bone growth.

Publications

A. Malpas et al. — OGLE-2017-BLG-1038: A Possible Brown-Dwarf Binary Revealed by Spitzer Microlensing Parallax — AJ (2022)

J. Labadie-Bartz et al. — KELT-22Ab: A Massive, Short-Period Hot Jupiter Transiting a Near-solar Twin — ApJ (2019)

L. Y. Temple et al. — WASP-167b/KELT-13b: Joint discovery of a hot Jupiter transiting a rapidly rotating F1V star — Monthly Notices (2017)

C. J. Bateman et al. — Segmentation enhances material analysis in multi-energy CT: A simulation study — IVCNZ (2013)