

# Xander Byrne

*Astrophysics PhD Student*

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## Research Interests

- Exoplanet composition and habitability
- Polluted white dwarfs
- Data science & machine learning

## Education

**Ph.D. in Astronomy**, Institute of Astronomy, University of Cambridge 2023—  
Dissertation: *Big-data insights into the white dwarf population*.  
Supervisor: Dr Amy Bonsor

**M.Sci in Natural Sciences (Astrophysics)**, University of Cambridge 2019–23  
Graduated 1st class with distinction.

## Publications

- **X. Byrne**, A. Bonsor, L. K. Rogers et al. (2024). *Semi-supervised spectral classification of DESI white dwarfs by dimensionality reduction*. MNRAS, in press. doi:10.1093/mnras/stae2478
- **X. Byrne**, R. A. Meyer, E. P. Farina, et al. (2024). *Quasar Island - three new  $z \sim 6$  quasars, including a lensed candidate, identified with contrastive learning*. MNRAS, 530(1), 870-880. doi:10.1093/mnras/stae902.
- **X. Byrne**, O. Shorttle, S. Jordan et al. (2024). *Atmospheres as a Window to Rocky Exoplanet Surfaces*. MNRAS, 527(4), 10748-10759. doi:10.1093/mnras/stad3914.

## Awards, Grants etc.

- **MASt/Part III Bursary** (£3500) Institute of Astronomy  
Funding the conversion of my Masters' thesis to a published paper over the course of a summer internship.
- **MPIA Summer Internship** (€3750) Max-Planck-Institut für Astronomie  
Funding a summer internship: *Searching for Lensed High-Redshift Quasars using Unsupervised Machine Learning*.
- **Winifred Georgia Holgate-Pollard Memorial Prize** (£1650) University of Cambridge  
Awarded for the best performance in the Natural Sciences (Astrophysics) examinations.
- **John Spencer Wilson Prize** (£500) St Catharine's College, Cambridge  
Awarded in recognition of exceptional performance in the Natural Sciences examinations.

## Awarded Telescope Time

### As Co-I:

- *White dwarfs as a means to probe core formation in exoplanetary systems*; PI Rogers  
65h VLT/X-Shooter spectroscopy (115.28F4)
- *Characterising a  $z \sim 6$  gravitationally-lensed BAL quasar candidate*; PI Meyer  
2.9h VLT/X-Shooter spectroscopy (113.26CY)
- *Measuring the mass of the SMBHs powering two lensed  $z \sim 6$  quasars*; PI Meyer  
4.23h Gemini (DDT) FLAMINGOS-2 spectroscopy (DT-2022B-029)

## Technical Experience

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- **Programming Languages:** Python, C++, MATLAB
- **Astronomy Software:** EsoRex, EsoReflex, DS9, TOPCAT, PyTorch, TensorFlow

## Teaching

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- Supervisor**, Part II Astrophysics, University of Cambridge 2023—
- Conducted small-group teaching, marking solutions
    - *Relativity* (GR): 8 students
    - *Stellar Dynamics & Structure of Galaxies* (orbits & potentials): 8 students
  - Produced popular revision notes ( $\sim 2500$  hits per year)

## Talks

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### Invited Talks:

- **ExoCoffee – MPIA, Heidelberg** Feb 2024  
*Atmospheres as a Window to Rocky Planet Surfaces*
- **Data Intensive Science Seminar Series – Maxwell Centre, Cambridge** Feb 2024  
*Contrastive Learning and High-Redshift Quasars*
- **Physics Evening – St Catharine's College, Cambridge** May 2023  
*Worlds Anew: Exoplanets and their Characterisation*

### Contributed Talks:

- **Wednesday Seminar Series – Institute of Astronomy, Cambridge** Oct 2024  
*Spectral Classification of White Dwarfs by Dimensionality Reduction*
- **Astro Data Science Discussion Group – KICC, Cambridge** Jan 2024  
*Contrastive Learning and High-Redshift Quasars*
- **Galaxy Coffee – MPIA, Heidelberg** Sep 2022  
*Searching for Gravitationally-Lensed High-Redshift Quasars with Unsupervised Machine Learning*

## Professional Service

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- **Organiser, Wednesday Seminar Series** 2024—  
A long-running seminar series given by PhD students and postdocs at the Institute of Astronomy.
- **Organiser, PhD/Postdoc Jamboree** Oct 2024  
A social 'introduction' event for the Institute's PhDs and postdocs.
- **Tech Assistant, IoA50 conference** Jul 2024  
Assisting speakers at a large conference with presentations, mics etc.
- **Organiser, Undergraduate Journal Club** 2023–24  
A journal club for undergraduates, also offering career advice.

## Outreach

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- **The Naked Scientists, BBC Radio 5 Live** Mar 2023—  
National radio show and podcast. Several appearances both live and in pre-recorded segments
- **Public Open Evenings, Institute of Astronomy** 2022—  
Visits for the general public, involving a public lecture and stargazing.
- **Cambridge Hands-On Science (CHaOS) event: Crash Bang Squelch** Mar 2024  
Outreach talk: *How to find an Alien Planet*
- **Birmingham Schools Science Network** Sep 2023  
Outreach talk: *Worlds Anew: Quasars, Exoplanets, and the Search for Life.*
- **HiSPARC Project** 2018–22  
Teaching sessions and sparking research projects for high-school physics students, particularly girls

- **Varsity Sci 2021** Oct 2021  
Outreach talk: *The Messier Catalogue: 110 objects in 10 minutes.*
- **Cambridge University Physics Society** Aug 2020  
Outreach talk: *Negative mass: matter that's lighter than light.*

## Press Coverage

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- **NOIRLab Stories Blog:** *AI Aids in Search for Cosmic Gems in Ocean of Data* Jul 2024