

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: *Clues to exoplanet composition from stellar spectra*.
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. (2025). *Finding rare classes in large datasets: the case of polluted white dwarfs from Gaia XP spectra*. RASTI, 4. doi:10.1093/rasti/rzaf044
- **X. Byrne**, A. Bonsor, L. K. Rogers et al. (2024). *Semi-supervised spectral classification of DESI white dwarfs by dimensionality reduction*. MNRAS, 535(3), 2246–2259. 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

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)

Grants, Awards & Prizes

- **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.

Talks

Invited Talks:

- **White Dwarf Meeting – University of Warwick** Feb 2025
Big-Data Methods for Polluted WDs – Past, Present and Future
- **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

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

Technical Experience

- **Programming Languages:** Python, C++, MATLAB
- **Astronomy Software:** EsoRex, EsoReflex, DS9, TOPCAT, PyTorch, TensorFlow
- **Datasets:** Gaia, DESI, SDSS, GALAH

Professional Service

Conferences & Seminars:

- **Organiser, UK White Dwarf Science Meeting** Mar 2026
Coordinating invitations, payments, scheduling, and talks for a national one-day meeting.
- **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** 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.

Other:

- **Co-chair, LGBTQ+ Focus Group, Institute of Astronomy** 2025–26
Organising departmental events.
- **Organiser, Undergraduate Journal Club** 2023–24
A journal club for undergraduates, also offering career advice.

Teaching

- Supervisor**, Part II Astrophysics, University of Cambridge 2023—
- Conducted small-group teaching, marking solutions
 - *Relativity* (GR): 18 students
 - *Stellar Dynamics & Structure of Galaxies* (orbits & potentials): 8 students
 - Produced [popular revision notes](#) (~ 2500 hits per year)

Outreach

- **The Naked Scientists, BBC Radio 5 Live** Mar 2023—
National radio show and podcast. Numerous appearances both live and in pre-recorded segments

- **IoA+KICC Open Day** 2024—
Organising and running activities, talks, and demonstrations for the general public.
- **Public Open Evenings, Institute of Astronomy** 2022—
Visits for the general public, involving a public lecture (which I gave in 2025 and 2026) and stargazing.
- **Asdan Summer School, St Catharine's College, Cambridge** Aug 2025
Outreach talk: *Worlds Anew: Exoplanetary Astronomy*
- **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

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