

# Louise Welsh

ASTRONOMER

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## Research Interests

Chemical evolution across cosmic time, the first stars and galaxies, the stellar initial mass function, reionisation quenching, near-pristine absorption line systems, high resolution spectroscopy, and upcoming quasar surveys.

## Employment

### University of Milano Bicocca

POSTDOCTORAL RESEARCHER

Milan, Italy

Sep. 2021 - PRESENT

## Education

### Centre for Extragalactic Astronomy, Durham University

PHD IN ASTROPHYSICS

Durham, UK

Oct. 2017 - Sep. 2021

- Thesis: 'A window to the first stars: An investigation of chemically near-pristine environments'
- Advisors: Dr. Ryan Cooke and Prof. Michele Fumagalli

### Lancaster University

MASTER OF PHYSICS (MPHY): 1<sup>st</sup> CLASS (HONS)

Lancaster, UK

Oct. 2012 - Jul. 2016

- Thesis: 'Investigating cold dark matter candidates'
- Advisor: Dr. John McDonald

## Awards

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|------|--|---------------------------------|
| 2021 | <b>Keith Nicholas Prize</b> , Awarded for outstanding overall performance by a postgraduate student.                           | <i>Durham University</i>        |
| 2019 | <b>Durham University Learning and Teaching Award</b> , Awarded for developing dedicated teaching practices.                    | <i>Durham University</i>        |
| 2019 | <b>Martin and Beate Block Award</b> , Awarded to a promising young physicist at the Aspen winter meeting 'Into the Starlight'. | <i>Aspen Centre for Physics</i> |
| 2016 | <b>Azzedine Hammiche Prize</b> , Awarded for exceptional fourth year project work.   | <i>Lancaster University</i>     |

## Talks (3 invited, 17 total)

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|-----------|---|--------------------------|
| Jan. 2022 | <b>NOAO Friday Lunch Astronomy Seminar Hour (FLASH)</b> , (invited) TBD                                     | <i>Virtual</i>           |
| Oct. 2020 | <b>The Rise of Metals and Dust in Galaxies through Cosmic Time</b> , The carbon isotopes of the first stars | <i>Virtual</i>           |
| Oct. 2020 | <b>SAZERAC - The First Stars</b> , The chemical enrichment of near-pristine systems                         | <i>Virtual</i>           |
| Oct. 2020 | <b>Cambridge galaxy group discussion</b> , The chemical enrichment of near-pristine systems                 | <i>Virtual</i>           |
| Sep. 2020 | <b>PGR Induction Event</b> , (invited) A Postgrad's experience  | <i>Virtual</i>           |
| Sep. 2020 | <b>MIT BBL Talk</b> , The chemical enrichment of near-pristine systems                                      | <i>Virtual</i>           |
| Jul. 2020 | <b>Isotopes as a Probe of the Growth of Galaxies</b> , (invited) Cancelled due to COVID-19                  | <i>Sesto, Italy</i>      |
| Jul. 2020 | <b>SAZERAC</b> , Searching for the carbon isotopes of the first stars                                       | <i>Virtual</i>           |
| Jul. 2020 | <b>Caltech Tea Talk</b> , The carbon isotopes of the first stars  | <i>Virtual</i>           |
| Jan. 2020 | <b>DEX XVI Workshop</b> , A bound on the carbon isotope ratio with ESPRESSO                                 | <i>Durham, UK</i>        |
| Sep. 2019 | <b>PGR Induction Event</b> , A Postgrad's experience  | <i>Durham, UK</i>        |
| Jul. 2019 | <b>Small Galaxies, Cosmic Questions</b> , A Window to the First Stars                                       | <i>Durham, UK</i>        |
| Mar. 2019 | <b>Into the Starlight: The End of the Cosmic Dark Ages</b> , Modelling chemical enrichment by Pop. III SNe  | <i>Aspen, US</i>         |
| Mar. 2019 | <b>KIPAC Tea Talk</b> , A window to the first stars   | <i>Stanford, US</i>      |
| Mar. 2019 | <b>Cosmo Club</b> , A window to the first stars   | <i>UC Santa Cruz, US</i> |
| Jan. 2019 | <b>DEX XV</b> , A window to the first stars   | <i>Edinburgh, UK</i>     |
| Jul. 2018 | <b>Friday Lunch Astronomy Talk</b> , The multiplicity of the first stars                                    | <i>Durham, UK</i>        |

## Proposal History as Principle Investigator

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|------|---|------|
| 2021 | <b>VLT/UVES</b> , 18 hours, P108.         | ESO  |
| 2021 | <b>Keck I/HIRES</b> , 1 night, 2021B.     | NOAO |
| 2020 | <b>VLT/ESPRESSO 1-UT</b> , 9 hours, P105. | ESO  |
| 2020 | <b>VLT/UVES</b> , 20 hours, P105.         | ESO  |
| 2019 | <b>WHT/ISIS</b> , 7 nights, 2019B.        | ING  |

## Teaching

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|--|-------------------|
| 2019 - 2021 <b>Demonstrator</b> , Level 2: Stars and Galaxies                    | Durham University |
| 2018 - 2020 <b>Demonstrator</b> , Level 1: Further Mathematics for Geoscientists | Durham University |
| 2018 - 2019 <b>Demonstrator</b> , Level 1: Maths toolkit for Scientists          | Durham University |

## Committees

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|   |                   |
|---|-------------------|
| 2020 – 2021 <b>OCW social</b> , Member of committee responsible for organising department social events.              | Durham University |
| Jan. 2020 <b>DEX XVI</b> , LOC member for the “2020 Vision: progress and tensions in astronomy” workshop.             | Durham University |
| Aug. 2019 <b>Small Galaxies, Cosmic Questions</b> , LOC member for the “Small Galaxies, Cosmic Questions” conference. | Durham University |
| 2018 – 2019 <b>Astronomy Journal Club</b> , Co-convenor of a weekly meeting of first year postgraduate students.      | Durham University |

## Outreach

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### Planetarium

North East, UK

SHOW PROVIDER

Oct. 2018 - Sep. 2020

Delivered shows on the constellations and planets at events (including multiple science festivals) and local schools using an inflatable planetarium.

## Computing Skills

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**Programming** Python, git,  $\text{\LaTeX}$ , Jupyter notebooks, slurm batch systems, RStudio.

## Publications

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- **L. Welsh**, R. Cooke, & M. Fumagalli (2021) "The stochastic enrichment of Population II stars", MNRAS, 500, 5214
- R. Cooke, **L. Welsh**, M. Fumagalli, & M. Pettini (2020) "A limit on Planck-scale froth with ESPRESSO", MNRAS, 494, 4884
- **L. Welsh**, R. Cooke, M. Fumagalli, & M. Pettini (2020) "A bound on the  $^{12}\text{C}/^{13}\text{C}$  ratio in near-pristine gas with ESPRESSO", MNRAS, 494, 1411
- **L. Welsh**, R. Cooke, & M. Fumagalli (2019) "Modelling the chemical enrichment of Population III supernovae: the origin of the metals in near-pristine gas clouds", MNRAS, 487, 3363