

# Louise Amber Welsh

## Curriculum Vitæ

Centre for Extragalactic Astronomy  
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## Employment & voluntary work

### Vocational

- 2019 **Data Science Intern**, *Department for Education*, London, UK.  
3 month internship during which I developed machine learning techniques to detect anomalous student pathways.

## Education

- 2017–2021 **PhD**, *Centre for Extragalactic Astronomy*, Durham, UK.  
Supervisors: Dr. Ryan Cooke and Prof. Michele Fumagalli.  
In progress. So far I have:
- Developed a stochastic chemical enrichment model to investigate both Population III and Population II enriched systems.
  - Utilised this model to investigate the chemical enrichment of the most metal-poor DLAs.
  - Provided the first bound on the carbon isotope ratio in a near-pristine gaseous system using ESPRESSO science verification data.
  - Conducted a search for chemically near-pristine gas using the William Herschel Telescope and the Hale 200 inch telescope. Currently planning further observations of the most promising systems using a high resolution instrument.
- 2012–2016 **BSc MPhys**, *University of Lancaster*, Lancaster, UK, *1st Class (Hons)*.  
Masters project: Investigating potential cold dark matter candidates

## Awards and Fellowships

- 2019 **Associate Fellow**, Higher Education Academy, London, UK.
- 2019 **Durham University Learning and Teaching Award**, Durham University, Durham, UK.  
Awarded for developing dedicated teaching practices.
- 2019 **Martin and Beate Block Award**, Aspen Centre for Physics, Colorado, US.  
Awarded to promising young physicists.
- 2017–2021 **Royal Society Studentship**, Durham University, Durham, UK.
- 2016 **Azzedine Hammiche Prize**, Lancaster University, Lancaster, UK.  
Awarded for exceptional fourth year project work.

## Talks and Seminars

### Invited talks

- July 2020 **Isotopes as a Probe of the Growth of Galaxies**, Sesto, Italy.  
(Cancelled due to COVID-19)

### Contributed talks

- July 2020 **SAZERAC**, Virtual.  
Searching for the carbon isotopes of the first stars
- July 2020 **Caltech Tea Talk**, Virtual.  
The carbon isotopes of the first stars
- Jan 2020 **DEX XVI Workshop**, Durham, UK.  
A bound on the carbon isotope ratio with ESPRESSO
- Oct 2019 **PGR Induction Event**, Durham, UK.  
A Postgrad's experience

- July 2019 **Small Galaxies, Cosmic Questions**, Durham, UK.  
A Window to the First Stars
- Mar 2019 **Into the Starlight: The End of the Cosmic Dark Ages**, Aspen, US.  
Modelling the chemical enrichment by Population III supernovae
- Mar 2019 **KIPAC Tea Talk**, Stanford, US.  
A window to the first stars
- Mar 2019 **Cosmo Club**, UC Santa Cruz, US.  
A window to the first stars
- Jan 2019 **DEX XV**, Edinburgh, UK.  
A window to the first stars
- Jul 2018 **Friday Lunch Astronomy Talk**, Durham, UK.  
The multiplicity of the first stars

## Successful Telescope Proposals (Principle Investigator)

- 2020 **ESPRESSO**, VLT, ESO. Allocation – 10 hours.  
The isotopes of the first stars
- 2020 **UVES**, VLT, ESO Allocation – 20 hours.  
Uncovering the chemical fingerprint of the first stars with the most metal-poor DLAs
- 2019 **ISIS**, WHT, ING. Allocation – 7 nights.  
Uncovering the signatures of the first stars in the most metal-poor DLAs

## Teaching

- 2018–2019 Demonstrator for level 2 Stars and Galaxies module
- 2017–2019 Demonstrator for level 1 Further Mathematics for Geoscientists module
- 2017–2018 Demonstrator for level 1 Maths toolkit for Scientists

## Committees

- 2019 – 2020 **DEX XVI LOC**, *Member*, Durham, UK.  
Member of the Local Organising Committee for the “2020 Vision: progress and tensions in astronomy” workshop held in January 2020
- 2018–2019 **Small Galaxies, Cosmic Questions LOC**, *Member*, Durham, UK.  
Member of the Local Organising Committee for the “Small Galaxies, Cosmic Questions” conference held in August 2019
- 2017–2018 **First Year Astronomy Journal Club**, *Co-convenor*, Durham, UK.  
Coordinated a weekly meeting of first year postgraduate students to discuss recent papers and share knowledge.

## Outreach

- 2018 –2020 **Planetarium**, North East, UK.  
Part of the Durham team that takes our inflatable planetarium to local schools and delivers shows on the constellations and planets.

### Other Events

- Oct 2019 **Celebrate Science**, Durham, UK.  
Planetarium
- Oct 2018 **Celebrate Science**, Durham, UK.  
Planetarium
- Apr 2018 **Schools Science Festival**, Durham, UK.  
Galaxy Makers

## Computer skills

Python, L<sup>A</sup>T<sub>E</sub>X, R Studio, Microsoft Office suite

## Interests

Running  
Hiking  
Exploring

## Publications

- 2020 Ryan Cooke, **Louise Welsh**, Michele Fumagalli, et al. MNRAS, 494, 4884-4890. A limit on Planck-scale froth with ESPRESSO. (May, 2020).  
**Louise Welsh**, Ryan Cooke, Michele Fumagalli, et al. MNRAS, 494, 1411-1423. A bound on the  $^{12}\text{C}/^{13}\text{C}$  ratio in near-pristine gas with ESPRESSO. (March, 2020).
- 2019 **Louise Welsh**, Ryan Cooke, and Michele Fumagalli. MNRAS, 487, 3363-3376. Modelling the chemical enrichment of Population III supernovae: the origin of the metals in near-pristine gas clouds. (August, 2019).

### Submitted

The stochastic enrichment of Population II stars

### In progress

Are the most metal-poor DLAs often quenched post-reionisation?