Lauren Mason

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PROFILE

First class MSci and BA Natural Sciences graduate from the University of Cambridge, specialising in Astrophysics. Experience in observational astrophysics research, and interested in the processes of star and planet formation.

EDUCATION

University of Cambridge, Selwyn College, BA and MSci Natural Sciences   **2021 - 2025**
MSci grade: I
Courses followed: Astrophysical Fluid Dynamics, Structure and Evolution of Stars, Dynamics of Astrophysical Discs, Extrasolar Planets: Atmospheres and Interiors, Planetary System Dynamics, Formation of Galaxies, Astrostatistics
BA grade: II.i
Year 3: Astrophysics
Year 2: Physics, Mathematics
Year 1: Physics, Chemistry, Materials Science, Mathematics

Princethorpe College   **2014 - 2021**
A-Levels: Physics (A*), Chemistry (A*), Maths (A*), Further Maths (A*)
GCSEs: Twelve GCSEs, all at A*/9

RESEARCH AND WORK EXPERIENCE

Institute of Astronomy – Master's Project   **Cambridge, Oct 2024 – Jul 2025**
Galactic Archaeology with alpha abundances in the ancient inner Milky Way
Supervisor: Anke Ardern-Arentsen
Focused on the study of old stars in the inner Milky Way, as unique probes of the early formation and evolution of our Galaxy.
- Derived [Fe/H] and [Mg/H] abundances from ~850 Pristine Inner Galaxy Survey (PIGS) spectra of metal-poor (-2.5 < [Fe/H] < -1.25) giant stars, using an equivalent width fitting and radiative transfer method.
- Provided the largest homogeneous sample so far of alpha abundances for metal-poor stars in the inner 4kpc of the Milky Way, supporting a scenario of rapid star formation in the early inner Galaxy.
- Performed dynamical analysis of the [Mg/Fe] – [Fe/H] plane, suggesting that several of the extreme low [Mg/Fe] outlier stars may trace an accreted population.
- Presented my work to the PRISTINE collaboration at the *PRISTINE Science Meeting 2025*.

ESO – Summer Internship   **Garching, Jul-Oct 2024**
Zooming into the environment around young protostars – an ALMA view of B1-c and IRAS 2A on disk scales (working title) – Mason, Nazari et al. in prep.
Supervisor: Pooneh Nazari
- Used high angular resolution ALMA data to investigate the spatial morphology of molecules surrounding two class 0 protostars, B1-c and IRAS 2A.
- Analysis carried out using CARTA and CASA.
- Presented my work at *Summer Research Programme Farewell Workshop*.
- Attended lectures on astronomy and instrumentation, as well as weekly seminars and journal clubs at ESO and nearby institutes, and joined talks at the New Heights in Planet Formation 2024 conference.
- Attended *NTT Observing School* – two nights of observing time, with the science goal of observing FU Orionis candidates.

Cavendish Laboratory, Department of Physics – Summer Internship   **Cambridge, Jun-Aug 2023**
Supervisor: Chris Braithwaite
Designed and implemented improvements to Cambridge's undergraduate Physics practical classes, including development of new experiments which modernise the student experience. Involved detailed practical work, electrical engineering, programming in MATLAB, Python, and Arduino, and research review. Highlights include:
- Wrote analysis notebook for Ultrasound practical class in Python, implementing non-linear least-squares fit for analysing amplitude of ultrasound diffraction patterns as measured by the student.
- Identified problems with Faraday Effect experimental setup, involving electrical testing of PCBs.
- Devised "Introduction to Arduino" experiment for first year physicists.

CERN, Converter Controls Electronics Group – Work Shadow   **Geneva, Aug 2019**
Shadowed: Ben Todd
- Gained an insight into an international and multidisciplinary environment at the forefront of physics, engineering, and technology.
- Built relationships and made contacts with STEM professionals to expand my network.

EXTRA-CURRICULAR EXPERIENCE AND OUTREACH

Convolutional Neural Network for MNIST Dataset   **Jan 2024**
- Implemented machine learning techniques to develop a convolutional neural network for handwritten number recognition, using PyTorch.
- Achieved 99% accuracy on the MNIST dataset.

Cambridge Hands-On Science (CHaOS)   **Dec 2021 – pres.**
Venues Officer (2024 – 25), Secretary (2023 – 24), Volunteers Officer (2022 – 23), Physics Coordinator (2021 – 22)
- Organised and led science outreach events in Cambridge during term time, and a seven week roadshow around the UK over summer, reaching over 6000 children each year.

SKILLS MODULES

CATAM Astrophysics Projects   **Dec 2023**
Completed computational projects and reports investigating astrophysics-related themes, in Python.
- Calculated cosmological lookback times; measured distances for a range of cosmological models, tested uniformity of comoving density for a sample of 114 quasars up to $z = 3.0$.
- Modelled ionisation of interstellar gas near stars; compared structure of ionised region around main sequence stars of 3 varying masses, and a quasar.

CATAM Mathematics Projects   **Jul 2023**
Completed computational projects and reports investigating mathematical themes, in Python.
- Ordinary Differential Equations (Numerical Methods) – awarded 100%.
- Matrices Over Finite Fields.

Introduction to Computing in Python   **Feb 2023**
- Simulated planetary orbits using Euler, Leapfrog, and RK4 methods.
- Implemented a Monte Carlo method to estimate $\ln(2)$.

Physics Research Skills Module   **Feb 2023**
- Created and presented a poster on Fictitious Forces.
- Designed and performed a diffraction experiment to successfully measure wavelength of a laser, delivered presentation on results.

Computer Practicals in Excel   **Jan 2023**
- Solution of linear equations by Gauss-Jordan elimination. Effect of rounding error and partial pivoting.
- Solution of Laplace's equation using Jacobi and Gauss-Seidel methods.
- Eigenfunction expansion in Sturm-Liouville ODEs. Effect of number of expansion functions on accuracy.

OTHER

Languages: English (Native), German (Intermediate), French (Intermediate).

Interests: Member of Cambridge University Astronomical Society, regularly attending talks and ObsNights. Flute (Grade 8). Junior Treasurer of Cambridge University Science Fiction Society (2022-24).