

# Lewys Richards

lewrib@outlook.com

07910 732 124

## EDUCATION

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### University of Glasgow, UK

2017-2022

M.Sci Physics with Astrophysics, 2:1.

Undergrad projects include:

**- Master's Dissertation: Impact of peculiar velocities on standard siren measurements of the Hubble constant**

- Using cosmological simulations to investigate the peculiar velocities within local-group-like structures, so as to gauge the impact on  $H_0$  measurements for the LIGO Scientific Collaboration.

**- Literature Review - Weak Gravitational Lensing as a Probe of Dark Matter**

- Investigated the theory, methods, observations made, discoveries, and potential future of the field.
- Developed knowledge of general relativity, observational methods, and numerical methods, as well as the skill of critical analysis and evaluation.

**- Astronomical Imaging, Image Analysis & Data Analysis**

- Observed and imaged the Uranus system using an ODK-16 telescope, solving positions using *Astrometry.Net*. Compared imaged positions to expected positions from *JPL HORIZONS system* to ascertain the light travel time.
- Analysed observations of Cepheid variable stars, applying Fourier Series, least-square non-linear fits, and  $\chi^2$  statistics to the magnitude power spectra to determine periods, and hence investigated a period-luminosity relation.

**- Physics Labs and Numerical Methods**

- Applied Gaussian Elimination, including pivot methods, to solve systems of linear equations in Python. Developed and tested algorithms within Python for numerical methods of solving ODEs, such as a 4th order Runge-Kutta algorithm. Developed Python algorithms for numerically solving 1st and 2nd order PDEs.
- Medical imaging labs, including calibrating scintillation detectors and their use in measuring the shielding rates of various materials, comparing gamma cameras with different collimators for different applications, and analysing clinical scans of patients to observe both imaging artifacts and potential diseases.

### Currie Community High School, UK

2011-2017

6th Form: SQA Advanced Higher - Maths & Physics; SQA Higher - Computing

5th Form: SQA Higher - Maths, Physics, Chemistry, Biology & Music, all at A

4th Form: SQA National 5 - 8  $\times$  National 5s, all at A

## TECHNICAL SKILLS

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Technical experience includes: Python, particularly NumPy, pandas, SciPy, Matplotlib and AstroPy; Git; L<sup>A</sup>T<sub>E</sub>X and beamer; Microsoft Office.

## WORK EXPERIENCE

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**Molly's Delicatessen & Cafe, Edinburgh** 2017, 2018 & 2019 Summer vacations  
*Barista and counter work*

**British Geological Survey, Edinburgh** May 2014  
*Geomagnetism and Marine Geology; Marine Operations and Engineering*

- Created leaflet on Space Weather and work of the Geomagnetism department
- Mapped offshore marine bed using backscatter data
- Learnt a variety of methods for welding metals and usage of a metalworking lathe

**UK Astronomy Technology Centre, Royal Observatory of Edinburgh** June 2014  
*Astronomy data analysis and observation engineering*

- Used SalsaJ to analyse the colour index and intensity of stars to identify red supergiants.
- Explored potential usage and designs of Spectrometer Carrying Automated Robotics using Arduino and CAD.

## AWARDS & MEASURES OF ESTEEM

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Edinburgh Schools Sports Ambassador - 2015-2017

Chief Scout Platinum Award - 2016

Member of Go4SET Scotland National Final winning team - 2013

## EXTRA-CURRICULAR

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Secretary, Glasgow University Fencing Club - 2019-2020, 2021-2022

Treasurer, Glasgow University Fencing Club - 2020-2021

Senior Prefect and volunteer assistant in School's Science Faculty - 2016-2017

Chair of School's Student Sports Council - 2016-2017

Member of Edinburgh Schools Classical Guitar Ensemble - 2014-2017

Volunteer Assistant Coach at Harmeny Athletics Club - 2013-2016