

# Charlie Mpetha

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Institute for Astronomy, University of Edinburgh  
charliempetha.github.io

## RESEARCH EXPERIENCE

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Sep 2023 - Sep 2024: **University of Waterloo Study Abroad Project**

- Title: 'Prospects for using the infall region to probe cosmology'.

Sep 2020 - Mar 2025: **University of Edinburgh PhD**

- Title: 'Weak lensing of gravitational waves'.

May 2020 - Sep 2020: **Liverpool John Moores University Masters Project**

- Title: 'Investigating Gravitational Redshifting in SPIDERS Galaxy Clusters'.

Oct 2018 - May 2019: **Lancaster University Masters Project**

- Title: 'The Dynamics of a Novel Oscillating Scalar Field Dark Energy'.

Jul 2018 - Sep 2018: **Royal Observatory, Edinburgh Summer Internship**

- Title: 'Investigating Galaxy Blending in Weak Lensing Shear Measurements'.

## EDUCATION

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Sep 2020 - Mar 2022: **University of Edinburgh**

- PhD with taught courses.

Oct 2019 - May 2020: **Liverpool John Moores University**

- 1<sup>st</sup> class (Summa Cum Laude) MSc in Astrophysics (Distance learning).

Jul 2015 - Sep 2019: **Lancaster University**

- 1<sup>st</sup> class (Summa Cum Laude) MPhys in Particle Physics and Cosmology.

## PUBLICATIONS

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**Cosmology from UNIONS weak lensing profiles of galaxy clusters.**

Mpetha C. T. et al. 2025, Submitted to MNRAS. [arxiv : 2501.09147]

**The infall region as a complementary probe to cluster abundance.**

Mpetha C. T. et al. 2024, MNRAS, 10.1093/mnras/stae1637

**Constraining cosmological parameters using the splashback radius of galaxy clusters**

Haggar R., Amoura Y., Mpetha C. T. et al. 2024, ApJ, 10.3847/1538-4357/ad5cee

**Impact of weak lensing on bright standard siren analyses**

Mpetha C. T. et al. 2024, PRD, 10.1103/PhysRevD.110.023502.

**Future prospects of testing extensions to  $\Lambda$ CDM through the weak lensing of gravitational waves**

Mpetha C. T. et al. 2023, PRD, 10.1103/PhysRevD.107.103518.

**Gravitational redshifting of galaxies in the SPIDERS cluster catalogue**

Mpetha C. T. et al. 2021, MNRAS, 10.1093/mnras/stab544.

## PRESENTATIONS

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### **Max Planck Institute for Extraterrestrial Physics - Invited Talk**

January 2025, Garching, Germany.

### **Cosmological and Astrophysical Synergies: Tactics for the Latest Era**

September 2024, Tagliolo Monferrato, Italy.

### **University of Maryland**

Visiting speaker. August 2024, Maryland, USA.

### **Cosmology from Home**

June 2024, Online conference.

### **UNIONS Collaboration - Invited Talk**

Presented at UNIONS collaboration weak lensing meeting. Feb 2024 & Jun 2024, Online.

### **American Astronomical Society Annual meeting**

January 2024, New Orleans, USA.

### **LISA Collaboration - Invited Talk**

LISA collaboration community meeting. January 2023, Online.

### **Durham-Edinburgh eXtragalactic Workshop XIX**

January 2023, Edinburgh, UK.

### **Probing the Universe with Multimessenger Astrophysics**

September 2022, Sestri-Levante, Italy.

### **UK Cosmology Meeting**

May 2022, Newcastle, UK.

### **Posters**

CASCA, GWPAW, SUPA Annual Gathering, Tonale Winter School (received poster prize).

## AWARDS AND FUNDING

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### **2023 Leverhulme Study Abroad Scholarship: £23,040 over one year**

To study or undertake research at a centre of learning in any country except the UK or USA.

### **2019 Research Academy Prize**

Awarded by Lancaster University for one of the top three masters project grades in the year.

### **2019 Outstanding Final Year Performance**

Awarded by Lancaster University for one of the top four overall grades in the final year.

### **2018 Cormack/Piazzi Vacation Research Scholarship: £266 per week for six weeks**

## TEACHING AND MENTORSHIP

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### **Oct 2024 - Present: Volunteer Tutor**

- Volunteer tutoring with the Sudanese Community Group, Edinburgh.

### **July - August 2024: Summer Student Mentor**

- Mentored a high school student on a project visualising simulated galaxy clusters.

Oct 2020 - Present: **Teaching Assistant**

- Nominated for *Student Tutor of the Year* in the 2022 Student-Led Teaching Awards.

November 2019 - September 2023: **Maths and Physics Tutor**

- Tutored school students ages 11 – 18, and adults, on a range of topics in Maths and Physics.

## COLLABORATIONS

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### **Euclid Collaboration**

Leading a Standard Project on gravitational redshift in the galaxy clusters science working group.

### **UNIONS Collaboration**

Leading a project using UNIONS weak lensing profiles of clusters for cosmological constraints.

## LEADERSHIP AND SERVICE

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### **Large Scale Structure Journal Club**

Organised/chaired a weekly cosmology journal club at the University of Edinburgh for over a year.