

Charlie Mpetha

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Institute for Astronomy, University of Edinburgh
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RESEARCH EXPERIENCE

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

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

- PhD with taught courses.

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

- 1st class (Summa Cum Laude) MSc in Astrophysics (Distance learning).

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

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

PUBLICATIONS

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 Λ 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

Kavli Institute for Cosmological Physics, University of Chicago

Survey Science Group Meeting. February 2025, Chicago, USA.

MIT Kavli Institute

Monday Afternoon Talks. February 2025, Cambridge, USA.

Institute for Theory and Computation, Harvard-Smithsonian Center for Astrophysics

ITC Luncheon. January 2025, Cambridge, USA.

Yale Center for Astronomy and Astrophysics - Invited Talk

January 2025, New Haven, USA.

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.

Posters

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

AWARDS AND FUNDING

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/Piazzzi Vacation Research Scholarship: £266 per week for six weeks

TEACHING AND MENTORSHIP

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

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

Large Scale Structure Journal Club

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