

Calvin Sykes

Astronomy PhD Candidate **Durham University**

1995/08/06 (citizenship: UK)

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Interests

Cosmological simulations

ightharpoonup HI absorbtion statistics at $z\sim3$

CGM structure and kinematics

Radiative transfer

Skills -

Programming

Python + SciPy stack

Fortran, C

C++

HPC & Software

Numba, Cython

slurm

LTFX, Bash, Linux

OpenMP, MPI

Git

Research Experience

2017 -Ph.D. researcher

Durham University, UK Developed an ionisation balance code to predict $\mathrm{H}\alpha$ fluorescence present

from gas in star-free dark matter haloes (RELHICs). Demonstrated that observations of these objects can provide constraints on the UV

background and primordial helium abundance.

Performed radiative transfer calculations with Cloudy to aid in analy-

sis of observational data from MUSE.

Ran suite of cosmological hydrodynamical simulations with radiative transfer post-processing, and performed analysis to investigate HI

absorption statistics and absorber cross-sections.

2016 – 2017 M.Phys. student Lancaster University, UK

Durham University, UK

Investigated the prospects for direct detection of a singlet scalar

dark matter particle by the LUX experiment.

Publications

July 2019 Fluorescent rings in star-free dark matter haloes

C. Sykes, M. Fumagalli, R. Cooke, T. Theuns, A. Benitez-Llambay

MNRAS; 487(1), 609

Oct. 2019 Gas filaments of the cosmic web located around active galaxies in

a protocluster

H. Umehata, M. Fumagalli, I. Smail, Y. Matsuda, A. M. Swinbank, S. Cantalupo, C. Sykes, R. J. Ivison, C. C. Steidel, A. E. Shapley, J. Vernet, T. Yamada, Y. Tamura, M. Kubo, K. Nakanishi, M. Kajisawa, B.

Hatsukade, K. Kohno. Science; 366(6461), 97

Feb. 2020 Determining the primordial helium abundance and UV back-

ground using fluorescent emission in star-free dark matter haloes

C. Sykes, M. Fumagalli, R. Cooke, T. Theuns

MNRAS; 492(2), 2151

in prep. The ENGinE simulations: exploring neutral gas in EAGLE

C. Sykes, M. Fumagalli, R. Cooke, T. Theuns

MNRAS; to be submitted

Education

Postgraduate Study

2017 -Ph.D. in Astronomy

present Completion expected: 2021

Supervisors: Prof. Michele Fumagalli, Prof. Ryan Cooke

2016 – 2017 M.Phys. in Physics, Astrophysics and Cosmology Lancaster Univ., UK

Title: Constraints on singlet scalar dark matter from thermal history

and direct detection.

Supervisors: Dr. John McDonald

Grade: 1st Class (82%)

Undergraduate Study

2014 – 2016 **B.Sc.** in Physics, Astrophysics and Cosmology Lancaster Univ., UK

Grade: 1st Class (81%)

2009 – 2013 Secondary school Knights Templar School, Baldock, UK

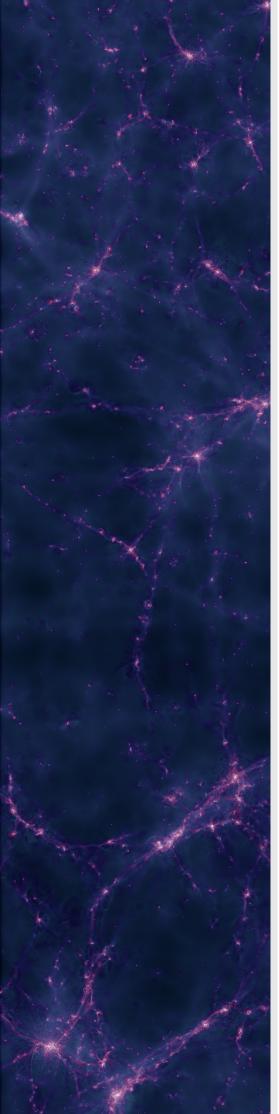
> **A-Levels:** Four (2A*, 2A) **GCSEs:** Twelve (9A*, 2A, 1B)

Other Training

August 2019 **SAMCRT Summer School** University of St. Andrews, UK

Topics covered included Monte Carlo radiative transfer and radiation

hydrodynamics



Teaching Experience

Undergraduate Courses

PHYS 1101: Discovery Skills in Physics 2018-19.

2020-21 Delivered introductory Python programming workshops to first-year

students

2019-20 **PHYS 3561: Computing Project**

Mentored third-year students undertaking research-based program-

ming projects

Conferences and Presentations

June 2017 Physics @ Lancaster Annual Conference Lancaster, UK

15 min. talk

July 2018 **Intergalactic Interconnections** Marseille, France

Flash talk

Dec. 2018 Virgo Consortium meeting Leiden, Netherlands

15 min. talk

DEX XV Workshop January 2019 Edinburgh, UK

15 min. talk

What Matters Between Galaxies June 2019 Spineto, Italy

Flash talk and poster

August 2019 **Small Galaxies, Cosmic Questions** Durham, UK

15 min. talk

January 2020 **DEX XVI Workshop**

15 min. talk

Departmental 30 min. talks Various Durham, UK

Honours and Awards

January 2018 Prize for best talk at DEX XV workshop

January 2019 Runner-up for best talk at DEX XVI workshop

Service

Regular participation in departmental outreach events, including Outreach

planetarium roadshows and annual "Celebrate Science" festival

Durham, UK

Durham University, UK

Conference LOC member for "Small Galaxies, Cosmic Questions" conference and

organisation DEX XVI workshop

Part time

work

Volunteering

Student Ambassador for Physics department, assisted in planning and running visit days for prospective undergraduate students

Activity leader at Scouts youth group in connection with the Duke of

Edinburgh's Award scheme, which I have completed to Gold level Participated in mathematics mentoring scheme for A-level school

students

Personal

I enjoy outdoor pursuits, and have been an active member of university clubs including hiking, kayaking and climbing.

References

Advisor Prof. Michele Fumagalli University of Milano-Bicocca, Italy

michele.fumagalli@unimib.it

Advisor Prof. Ryan Cooke Durham University, UK

ryan.j.cooke@durham.ac.uk Collaborator **Prof. Tom Theuns**

tom.theuns@durham.ac.uk