ROBERT CLEMENSON

Founders Building (FW-119), Royal Holloway University of London, Egham, TW20 0EX
robert.clemenson@rhul.ac.uk ◇ www.RobertClemenson.com

EDUCATION

PhD, Theoretical Physics: *September 2020 - Present*
Sussex University
Focuses: Supervised by Professor Stephan Huber. Applications of HEP to Astrophysics and Cosmology.

MMathPhys, Mathematical and Theoretical Physics: *October 2019 - June 2020*
Oxford University
Focuses: Groups & Representation Theory, Quantum Field Theory, String Theory, Cosmology, Supersymmetry & Supergravity, Astroparticle Physics.

BA, Physics: *October 2016 - June 2019*
Oxford University
Focuses: Classical Physics, Quantum Mechanics, Particle Physics, Astrophysics, General Relativity.

High School Qualifications: *September 2013 - June 2015*
The King Edmund School
A Levels: Physics (A), Chemistry (A), Mathematics (A*), Further Mathematics (A*).
AS Levels: Additional Further Mathematics (A), Biology (C).

AWARDS & SCHOLARSHIPS

Jack Petchey Young Achievers Award March 2014
The Jack Petchey Foundation

Awarded in recognition of the extracurricular maths club I set up and ran for talented students aged 11 - 14 at the King Edmund School while I was a student.

University College Exhibition October 2017 - June 2018
University College, Oxford

Academic scholarship awarded for exceptional performance in first year physics examinations.

University College Scholarship October 2018 - June 2020
University College, Oxford

Academic scholarship awarded for exceptional performance in first & second year physics examinations, then renewed for maintained performance in third year examinations.

RESEARCH INTERESTS

My research interests are centred on the intersections of HEP and Cosmology. In my PhD I have so far been working in the area of phase transitions & holography; attempting to learn more about phase transitions in the early Universe from the 5D dual perspective of the Randall-Sundrum model.

I am also motivated by the prospect of constraining fundamental physics via astrophysical observations. LISA represents a significant opportunity for us to learn more about physics in the very early universe; be this via gravitational wave signals of first order cosmological phase transitions, or the potential detection of gravitational wave signatures of inflation or cosmic strings.

RESEARCH POSITIONS

Doctoral Research Scholar - UC Riverside January 2022 - June 2023
UC Riverside - Department of Physics

Working with Professor Flip Tanedo on searching for evidence of neutrino-dark matter interactions in the Diffuse Supernova Neutrino Background, and phenomenology in 5D warped geometry models.

Undergraduate Research Fellow - Caltech June 2019 - August 2019
Caltech - Department of Mathematics

Working with Dr Sarthak Parikh. In this project, we were developing the AdS/CFT dictionary entry for conformal blocks. Explicitly proving proposed expressions for the holographic duals of the 6 and 7 point global conformal blocks, and later proposing the form of the holographic dual of the n point conformal block in the comb channel. I was acknowledged in the paper detailing the latter part of this work (hep-th:1911.09190 page 36).

Part time Research Student - Oxford University January 2019 - December 2019
Oxford University - Beecroft Institute of Particle Astrophysics and Cosmology

Working with Dr Harry Desmond and Dr Shahab Joudaki. Developing, and researching mathematical tools to evaluate the degree to which a multivariate distribution (in our case, simulated weak lensing data) can be described as 'Gaussian' (via the Edgeworth expansion, and the Copula function). Exploring the extent to which deviations from the standard Gaussian form of the likelihood function affects the parameter constraints within a cosmological model.

Undergraduate Research Fellow - Caltech June 2018 - September 2018
Caltech - Department of Applied Physics

Working within the Bellan Plasma Physics group. The primary goal of this project was the integration of an acousto-optic modulator (AOM) into the experimental set up for performing laser induced fluorescence within the Caltech dusty plasma experiment. We were successful in this goal, and investigated the benefits the AOM provided over the conventional mechanical chopper used to pulse the beam.

TEACHING

Teaching Fellow January 2024 - Present
Royal Holloway, University of London - Integrated Foundation Year

Modules: Foundation Mathematics 1, Foundation Mathematics 2, Foundation Physical Sciences 1, Foundation Physical Sciences 2, Engineering Society. Delivering lectures, leading seminars, course design, exam marking. This is a permanent teaching faculty position, equivalent to a grade 8 lecturer.

Teaching Assistant April 2022 - June 2022
University of California, Riverside - Department of Physics

Running office hours and problem classes for Professor Tanedo's 'Introduction to Particle Physics' class.

Doctoral Tutor January 2021 - Present
Sussex University - Department of Mathematics

Spring Term 2021: Numerical Analysis (Second Year Course), Analysis 1 (First Year Course), Mathematics Demystified (First Year Course). Autumn Term 2021: Algebra (Second Year Course), Advanced Numerical Analysis (Third & Fourth Year Course), Functional Analysis (Third & Fourth Year Course), Financial Mathematics (Second Year Course). Autumn Term 2023: Linear Algebra (First Year Course), Analysis 1 (First Year Course). Spring Term 2024: Optics, Waves and Modern Physics (Foundation Year Course). Marking student problem sets, and running workshops for groups of up to twenty students.

Doctoral Tutor October 2021 - Present
Sussex University - Department of Physics

Autumn Term 2021: Mechanics & Relativity (First Year Course), Mathematical Methods 1 (First Year Course). Autumn Term 2023: Mechanics & Relativity (First Year Course). Marking student weekly problem sets, and running workshops for groups of up to twenty students.

A Level Physics & Maths Tutor August 2020 - October 2020
Open Tutoring UK

Tutoring students via Zoom in preparation for Autumn A Level resits on a voluntary basis, in response to disruption to education caused by Covid-19. Typically students decide which past papers they want to go through ahead of time, and I walk them through my solutions by sharing my tablet screen as a whiteboard.

DEPARTMENTAL ROLES & COMMITTEES

Physics Postgraduate Research Representative October 2021 - October 2022
Sussex University

Representing the interests of Physics Postgraduate Research (PGR) students on various departmental committees. This role included co-organising the 2022 Sussex University Mathematical and Physics Sciences Postgraduate Researcher Led Conference

OTHER ROLES

Visiting Lecturer November 2024 - Present
Southend Planetarium

Delivering public lectures on topics in physics aimed at the general public. Lectures have included: 'Black Hole Basics', 'Pulsars'.

Trustee Governor June 2024 - Present
The King Edmund School

Supervising the schools budget, and setting the strategic direction of the school as part of a panel of other governors. Leading STEM outreach programs.

EVENTS ORGANISED

2022 Sussex University MPS PGR Conference May 2022
Sussex University

Organising the Sussex University Mathematical and Physical Sciences Postgraduate Researcher Led Conference. I set the schedule, designed the poster advertisement and the program booklet.

TALKS & PRESENTATIONS

Caltech SURF Seminar Day August 2018
Caltech

Title: 'Laser Induced Fluorescence of a Dusty Plasma with an Acousto-Optic Modulator'

Caltech SURF Seminar Day August 2019
Caltech

Title: 'Holographic Duals of Comb-Channel Conformal Blocks in Arbitrary Space-Time Dimension'

Sussex Theoretical Particle Physics Internal Seminar December 2020
Sussex University

Title: 'Holography & Conformal Blocks'

Sussex Theoretical Particle Physics Internal Seminar June 2021
Sussex University

Title: 'Radion Stabilisation with a Confining Gauge Field'

APS April Meeting April 2022
New York, US

Conference Presentation: 'Radion Stabilization with Bulk Fields'

Cornell Grad Student Phenomenology Seminar April 2022
Cornell University

Conference Presentation: 'Radion Stabilization with Bulk Fields'

2022 Sussex University MPS PGR Conference May 2022
Sussex University

Conference Presentation: 'The Randall-Sundrum Model and Holography'

Phenomenology 2022 Symposium May 2022
Pittsburgh, Pennsylvania, US

Conference Presentation: 'Searching for Neutrino-Dark Matter Interactions in the Diffuse Supernova Neutrino Background'

Phenomenology 2023 Symposium May 2023
Pittsburgh, Pennsylvania, US

Conference Presentation: 'Mechanisms for Radion Stabilization with Bulk Fields'

OUTREACH & WIDENING PARTICIPATION

Newsletter Editor & Contributor December 2016 - December 2021
The King Edmund School

Coordinating, compiling and editing contributor articles to a termly physics newsletter aimed at science students aged 11-18 at the King Edmund School in Essex. I also write a termly article detailing my work from the previous term. Previous editions can be viewed *here*.

STEM Outreach Volunteer June 2015 - Present

Delivering supercurricular classes designed to be accessible introductions to some university level content. Topics covered have included: 'Special Relativity', 'Mathematics for Physicists', 'Astrophysics', 'Stellar Astrophysics', 'Particle Physics'. I decided the content to be covered, prepared the lessons, and designed handouts for the students.

Physics Outreach Livestreaming January 2021 - April 2021

Livestreaming live Q&A sessions (recordings watchable *here*), and delivering prepared talks of various areas of physics (recordings watchable *here* and *here*) - aimed at undergraduate and pre-undergraduate physics students.

University College Outreach Ambassador October 2017 - June 2020
University College, Oxford

Delivering outreach talks to students from ages 12 to 17. Topics ranging from general university applications to subject specific physics academic tasters.

Outreach Talks & Public Engagement November 2015 - Present

Delivering outreach talks to students from ages 12 to 17, with topics ranging from university admissions to subject specific physics academic tasters. Delivering public lectures to a general audience.

- Outreach Talk (Year 11 + Year 12) - The King Edmund School - 04/11/2015
- Outreach Talk (Year 12) - The King Edmund School - 16/06/2016
- Outreach Talk (Year 12) - The King Edmund School - 23/06/2016
- Outreach Talk (Year 12) - The King Edmund School - 30/06/2016
- Outreach Talk (Year 12) - The King Edmund School - 07/07/2016
- Outreach Talk (Year 12) - The King Edmund School - 12/09/2016
- Outreach Talk (Year 12) - The King Edmund School - 06/12/2016
- Outreach Talk (Year 12) - The King Edmund School - 07/12/2016
- Outreach Talk (Year 12) - The King Edmund School - 08/12/2017
- Outreach Talk (Year 12) - The King Edmund School - 28/03/2017
- Outreach Talk (Year 12) - The King Edmund School - 27/06/2017
- Outreach Talk (Year 12) - The King Edmund School - 29/06/2017
- Outreach Talk (Year 12) - The King Edmund School - 05/07/2017
- Outreach Talk (Year 12) - The King Edmund School - 11/07/2017
- Outreach Talk (Year 12) - The King Edmund School - 12/09/2017
- Outreach Talk (Year 11) - The King Edmund School - 19/12/2017
- Outreach Talk (Year 10 + Year 11 + Year 12) - William de-Ferrers School - 20/12/2017
- Outreach Talk (Year 10) - The King Edmund School - 21/03/2018
- Outreach Talk (Year 12) - The King Edmund School - 18/06/2018
- Outreach Talk (Year 12) - The King Edmund School - 19/06/2018
- Outreach Talk (Year 12) - The King Edmund School - 20/06/2018
- Outreach Talk (Year 12) - The King Edmund School - 10/09/2018
- Outreach Talk (Year 12) - The King Edmund School - 11/09/2018
- Outreach Talk (Year 12) - The King Edmund School - 17/09/2018
- Outreach Talk (Year 9 + Year 10) - The King Edmund School - 18/12/2018
- Outreach Talk (Year 12) - The King Edmund School - 16/09/2019
- Outreach Talk (Year 12) - The King Edmund School - 17/09/2019
- Outreach Talk (Year 12) - The King Edmund School - 23/09/2019
- Outreach Talk (Year 12) - The King Edmund School - 24/09/2019
- Outreach Talk (Year 12) - The King Edmund School - 26/09/2019
- Outreach Talk (Year 12) - The King Edmund School - 30/09/2019

- Outreach Talk (Year 12) - The King Edmund School - 01/10/2019
- Outreach Talk (Year 10) - The King Edmund School - 19/12/2019
- Outreach Talk (Year 10) - Oxford University - 03/02/2019
- Outreach Talk (Year 12) - The King Edmund School - 09/09/2020
- Outreach Talk (Year 7 + Year 8 + Year 10) - The King Edmund School - 13/07/2021
- Outreach Talk (Year 10 + Year 12) - The King Edmund School - 14/07/2021
- Outreach Talk (7th Grade) - Cheyenne Mountain Jr High - 15/05/2023
- Outreach Talk (Year 12 + Year 13) - The King Edmund School - 01/12/2023
- Public Lecture ('Black Hole Basics') - Southend Museum - 01/03/2025

CONFERENCES & MEETINGS ATTENDED

COSPAR 2018 July 2018
Pasadena, California, US

Strings 2020 August 2020
(virtual)

Young Theorists Forum 20 December 2020
Durham, UK (virtual)

XI NExT PhD Workshop June 2021
Sussex, UK (virtual)

UK Annual Theory Meeting December 2021
Durham, UK (virtual)

Snowmass Theory Frontier February 2022
Santa Barbara, California, US

Bay Area Particle Theory Seminar March 2022
San Francisco, California, US

APS April Meeting April 2022
Manhattan, New York, US

2022 Sussex University MPS PGR Conference May 2022
Sussex University

Phenomenology 2022 Symposium May 2022
Pittsburgh, Pennsylvania, US

ComSciCon 2022 August 2022
Cambridge, Massachusetts, US

Phenomenology 2023 Symposium May 2023
Pittsburgh, Pennsylvania, US

HE Teaching Development Conference (THESIS) June 2024
Egham, Surrey, UK

TECHNICAL FLUENCIES

Programming Languages

Python. Matlab. Mathematica. Maple.

Word Processors & Design Software

LaTex. Adobe InDesign. Adobe Photoshop. Adobe Illustrator.

OTHER PUBLICATIONS

Roots and their Branches - Univ's Liberation Magazine October 2018
University College, Oxford

Article: 'Feynman's Flower - Physics & Poetry'

MEDIA APPEARANCES

BBC Radio 5 live March 14th 2018

Interviewed on BBC Radio 5 Live following the death of Professor Stephen Hawking. A recording can be heard *here*.