

# Oliver Burch

Undergraduate Theoretical Physicist

olivergtburch@gmail.com | 07914 636 688 | Sheffield, England | linkedin.com/in/oliver-burch-846b80263 | Portfolio: olivergtburch.com

## PROFILE

Undergraduate theorist at the University of Sheffield with a fundamental record in computational, quantum and molecular dynamics research. Combines a rigorous mathematical framework with programming skills (Python, Mathematica, LaTeX) to produce a strong record of supervised academic writing. Eager to contribute to research collaborations and apply analytical problem solving in a challenging environment.

## EDUCATION

### BSc Theoretical Physics — University of Sheffield

September 2024 – Present

Key modules: Classical & Quantum Physics (87%) · Differential Equations (90%) · Quantum Optics (96%) · Special Relativity & Subatomic Physics (86%) · Mathematical Modelling (80%)

### A-Levels — Chatham and Clarendon Grammar School, Ramsgate

September 2017 – June 2024

Further Mathematics (A), Mathematics (A), Physics (A), History (A).

## RESEARCH & PUBLICATIONS

### A Topological Assessment of the RK4 Method for Chaotic Driven Damped Pendulums

Undergraduate Researcher | March 2026

Assessed the RK4 method's performance in modelling chaotic dynamics of a simulated damped driven pendulum, successfully capturing topological features including braiding and unstable periodic orbits.

### Your Future Quantised: The Practical Superpower of Quantum Mechanics and Global Sustainability

Review Author, supervised by Prof. Matt Meers | March 2026

Reviewed current and future potential of quantum mechanical applications to technology, with particular focus on contributions to the UN Sustainable Development Goals.

### On the Components of Kinetic Energy During a Barostatted Molecular Dynamics Simulation of Methanol Diffusion in Water

Undergraduate Researcher, supervised by Prof. Sarah Harris | December 2025

Analysed methanol diffusion using the TIP3P water model in AMBER simulation software.

### Determining Planck's Constant From Photodiode Responses to LEDs of Differing Wavelengths

Lab Researcher, supervised by Prof. Mark Quinn | June 2025

### Mechanical Efficiency and Thermodynamic Cycle Analysis of a Stirling Engine

Lab Researcher, supervised by Prof. Mark Quinn | February 2025

All papers are available to read in full at [olivergtburch.com](http://olivergtburch.com)

## TECHNICAL SKILLS

### Programming & Software

Python (NumPy, Matplotlib) · Wolfram Mathematica · LaTeX · AMBER Simulation Software

### Physics Focus Areas

Quantum Mechanics · Special Relativity · Statistical Thermodynamics · Computational Physics · Quantum Optics

### Professional Skills

Scientific Writing & Presentation · Data Visualisation · Critical Analysis · Chairing & Minute-Taking

## EMPLOYMENT

### Barista — IC Café, University of Sheffield

2025 – 2026

Prepared coffee and hot food in a fast-paced university café; developed time management skills and strengthened interpersonal communication in a customer-facing role.

### **Bar Staff — Harpers Cocktail Bar, Broadstairs**

*Summer 2024*

Learned 35 cocktails within a month to serve customers at a high-volume festival two months after starting. Operated with limited staff, requiring speed, composure and independent judgement under pressure.

### **Front of House & Barista — Archive Coffee Store & Home Kitchen, Ramsgate**

*April 2023 – February 2024*

Worked across front of house, bar and kitchen support roles. Built strong customer service skills, particularly around dietary requirements and allergy awareness.

## **VOLUNTEERING**

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### **ACT (Action Community Thanet), Ramsgate**

*April 2021 – December 2023*

Chaired and minute-took youth-led meetings; sat on hiring committee for youth centre leadership. Co-organised a charity fundraiser for MPS raising £349.80; ran two sleep-outs for Thanet Shelter and Support; ran 15 km raising £50 to keep the local youth centre open.

### **Movember Foundation**

*Ongoing*

Participated in two charity rugby matches, raising awareness of men's health issues among hundreds of attendees. Shaved my head to fundraise, generating over £200 for the charity.

### **Physics Group Chair — Chatham and Clarendon Grammar School**

*2023 – 2024*

Delivered presentations and interactive problem-solving sessions to A-level students, including olympiad-style problem classes, to encourage engagement with physics beyond the curriculum.

## **ACHIEVEMENTS & INTERESTS**

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- Duke of Edinburgh Bronze Award (2023)
- Sat on interview panel for recruitment of new youth centre leadership, Ramsgate (2023)
- Invited to join Thanet Youth Council (2023)
- Top try-scorer for U16 at TWRUFC (2019); try featured on Sky News Instagram
- 10 years of guitar experience; performed with groups SUNPYG and Spiral Eyes
- Sold photography at an art exhibition raising funds for a local redevelopment project
- Interests: Lacrosse, model building, reading (currently: *Quantum Field Theory for the Gifted Amateur*), walking