Duncan Lyster

Oxford, UK | duncan.lyster@physics.ox.ac.uk | +44 7477 865213 | LinkedIn & GitHub: duncanLyster

Planetary physicist nearing completion of a DPhil at Oxford, with experience in thermal modelling, remote sensing, and spacecraft data analysis. Developer of the TEMPEST model applied to NASA's Lucy mission and Saturn's icy moons. Skilled in Python, scientific communication, and collaborative research with a strong interest in contributing to Europa-focused mission science through thermal modelling and instrument-driven analysis.

EDUCATION & RESEARCH

DPhil Candidate in Planetary Physics at University of Oxford *October 2023 – Present*
Researching the thermal emission of airless planetary bodies with a focus on thermophysical modelling and mission-driven data interpretation. Developed TEMPEST, a Python-based model for analysing spacecraft observations, applied to data from the NASA Lucy mission and Saturn's icy moons. Currently extending & applying the model to Icy Moons, tumbling bodies and flyby observations.

Key responsibilities and achievements
- Lead developer of the TEMPEST model for interpreting infrared data and planning spacecraft operations
- Analysed asteroid observations for NASA's Lucy mission and contributed to the surface composition working group
- Implementing Icy moon-specific model updates including eclipses, subsurface heating effects, seasonality
- Delivered talks at EGU, EPSC, IAC, and BPSC; co-authored multiple peer-reviewed abstracts & conference papers
- Participated in the ESA Concurrent Engineering Workshop (2023), contributing to the design of a concept space mission. Led project continuation, resulting in a conference paper accepted to IAC 2024.
- Organised and chaired the UK Planetary Forum Early Career Meeting (2025), attended by over 100 early career researchers

Outreach and teaching
- Graduate Teaching Assistant, St Edmund Hall - delivered tutorials in Statistical Mechanics, Electromagnetism & Optics, and Quantum Physics
- Ran interactive school workshops and physics demos at the Cherwell School and History of Science Museum (Oxford)

Leadership roles
- President (2025/26) & Vice President (2024/25): St Edmund Hall MCR: coordinated events and represented graduate student interests
- President, Oxford University Salsa Society: led a 12-person committee and oversaw a £40,000 annual budget
- Graduate Student Representative, AOPP: liaised between students and department leadership
- Treasurer, AOPP Social Society: managed finances and helped deliver student-led event

MPhys in Physics with Astrophysics (First Class) from University of Exeter, with exchange study at University of Wollongong *2014 - 2018*
Master's research focused on the impact of mineral dust on exoplanet hydrological cycles, published in Nature Communications. Conducted global climate simulations using the UK Met Office supercomputer. Broad academic training in astronomy, optics, and computational physics, with scientific programming projects in C and Python including three-body orbital simulations and statistical modelling.

Teaching and mentoring
- Online STEM tutor (2015–2020) for secondary students in the UK and internationally, specialising in university preparation
- Supported over 30 students, many of whom exceeded predicted grades and secured competitive placements

PROFESSIONAL & TEACHING EXPERIENCE

School of Physics – University of New South Wales (2022 – present) **Sydney, Australia**

Technical Officer (2022 – 2023)

- Managed teaching labs and educational demonstrations for lectures.
- Supported curriculum development and ran public engagement events including school tours and planetarium shows.
- Used CAD and metalwork skills to support the development and maintenance of laboratory equipment and demonstrations.
- Contributed to the development of a large-format digital writing display adopted across the department.
- Received Dean's Education Excellence Award for contributions to innovative teaching delivery.

Assessor, Introduction to Astronomy (2023 – present)

- Assessed a wide range of first-year undergraduate assignments, providing clear feedback to support students' understanding of astronomy concepts.

Acoustics Consultant, SLR Consulting *(2021 – 2022)* **Sydney, Australia**

Acoustics Consultant on the Warringah Freeway upgrade project:

- Delivered technical reports and client guidance for infrastructure projects.
- Built trusting and collaborative working relationships with clients, stakeholders, and team members

Founder, Lyster Surfcraft Ltd *(2017 –2021)* **Exeter & Bristol, UK**

Ran a sustainable surfboard company, overseeing innovation, manufacturing, and commercial operations:

- Designed, patented, and produced eco surfboards using a novel wooden internal skeleton structure.
- Raised >£30k in funding and led all aspects of product development and business operations.
- Designed and built custom machinery and workshop infrastructure for small-scale composite manufacturing.

PUBLICATIONS & AWARDS

Publications

- D. Lyster, C. Howett, J. Penn "Predicting Surface Temperatures on Airless Bodies: An Open-Source Python Tool" *EPSC 2024*. https://doi.org/10.5194/epsc2024-1121
- D. Lyster, C. Howett, N. Bowles, R. Evans, T. Warren, K. Nowicki "Optimising Thermal Mapping Instrument Filters to Unveil Enceladus' Subsurface Secrets" *EGU 2024*. https://doi.org/10.5194/egusphere-egu24-20872
- D. Lyster, C. Howett, N. Bowles, K. Nowicki, R. Evans, T. Warren "Tailoring Infrared Filters for Global Mapping of Enceladus' Surface Temperatures" *IAC 2024*. https://doi.org/10.52202/078357-0104
- K. Janischet al. (incl. D. Lyster) "Detection and Tracking of Space Debris in Cislunar Environment - A Phase 0 Mission Design" *IAC 2024*. https://doi.org/10.52202/078365-0132
- I. Boutle, M. Joshi, F.H. Lambert, N. Mayne, D. Lyster, J. Manners, R. Ridgway, K. Kohary, "Mineral dust increases the habitability of terrestrial planets but confounds biomarker detection." *Nature Communications 11, 2731 (2020).* https://doi.org/10.1038/s41467-020-16543-8
- D. Lyster, Water sports board with internal skeleton structure, *Patent WO 2021/019201 A1*

Awards

- William R Miller Graduate Accommodation Scholarship (£6000) – awarded on basis of academic excellence
- Offered the St Catherine's College Leathersellers' Scholarship (£10,000) – Declined in favour of existing award
- Dean's Education Excellence Award, UNSW (2022)
- Engineers in Business Silver Award, Royal Academy of Engineers (£2,000) - 2019
- Graduate Entrepreneur Maintenance Fund, Exeter (£12,000) - 2019
- Michael Morley Prize – awarded for highest mark in 'Scientific Methods in Archaeology' module - 2017

PERSONAL PROJECTS

Currently designing and building a custom high-end espresso machine from scratch, applying skills in practical aspects of physics, engineering, mechanical design, and electronics.

Learning Spanish, Salsa dancing & teaching