The University of Manchester
Dalton Nuclear Institute

Dalton Cumbrian Facility

Paid Summer Research Placements

Start date: End May / Early June 2025 **Duration:** 8 weeks

Location: Dalton Cumbrian Facility (DCF), Westlakes Science Park. Those taking up placements will have an opportunity to engage in using our world-leading radiation equipment and purpose-built facilities situated in the exceptionally scenic West Cumbrian countryside. This is a stunning and special environment in which to work, with a low cost of living and easy access to the coast and Lake District National Park.

General requirements:

- Applicants should be studying a STEM subject at University or recently graduated, and also be eligible to work in the UK. A-Level students may be considered in exceptional cases.
- Good laboratory/computer and analytical thinking skills.
- Patience, dedication, time management skills and the ability to work under one's own initiative.
- Effective communication skills and the ability to work as part of a team.

Salary: The successful candidate will be paid £12.66 per hour based on a 35-hour working week.

How to apply: To apply, please send a current CV (2 pages max), your preferred start and finish dates, and a paragraph outlining what qualities you have which will make you particularly successful in your time with us. Applications should be sent by email to dcfreception@manchester.ac.uk with the subject header Summer Placements by Friday 2nd May 2025. Shortlisted candidates will be invited to interview mid May. Dates can be flexible to accommodate exams and other commitments. Interviews may be in person at the Dalton Cumbrian Facility or via Teams.

As an equal opportunities employer we welcome applicants from all sections of the community regardless of age, sex, gender, ethnicity, disability, sexual orientation and transgender status. All appointments are made on merit.

Project Details:

Temperature control stage for a 'virtual moon'

With renewed interest in returning humans to the surface of the moon, and particularly in the prospect of building long term bases there, the question of suitable materials for constructing buildings and structures suitable for long life in the harsh lunar environment arises.

The moon's surface is bombarded by cosmic and solar radiation. Additionally, it experiences large temperature swings between the depths of the lunar night and brilliance of the lunar day. The Dalton Cumbrian Facility (DCF) hosts a suite of ion beam accelerators which can mimic the solar wind and deliver the levels of radiation damage materials would normally accumulate throughout their lifetime in high radiation environments, in a matter of hours, rather than years. DCF has much experience in performing high radiation damage experiments on materials used in nuclear reactors and is planning to bring this knowledge and expertise to understanding the radiation effects on candidate materials suitable for use on the lunar surface by building a 'virtual moon' in one of the experimental end-stations on the ion accelerator.

DCF's normal end-stations already have high temperature sample stages. This summer placement opportunity is to incorporate cooling into one of these stages so that the 'virtual moon' can cycle a sample between lunar day (~+150°C) and lunar night (~-150°C). To achieve the lunar night temperature will require the development of an apparatus to blow cold nitrogen gas (chilled using a liquid nitrogen heat exchanger) through the sample stage to cool it.

As well as assembling the apparatus, the project will require computer control to regulate the cooling part of the cycle and remote monitoring of the liquid nitrogen level in the heat exchanger. The end goal is to achieve a system which can cycle the target stage between the hot and cold levels at a controlled rate and in an automated, repeatable cycle. Materials testing for structural materials to be used on the lunar surface require test samples to be exposed to a minimum of 20 lunar (night-day) cycles. Most of this work will take place in a test environment in one of DCF's labs, with the aim of transferring it to the actual end-station and testing the system there with some artificial lunar regolith at the end of the project should time permit.

The successful candidate will be working with a small team of technical specialists who will be able to guide them in developing the various skills needed to deliver this project: handling of cryogenics, gas handling, use of high vacuum systems, electronics, computer control and programming.