

**Exciting [Faraday Undergraduate Summer Experience \(FUSE\)](#) paid internship opportunities for summer 2023.**

Studying a STEM degree? Wondering what career to pursue? Interested in finding out more about the battery sector? Keen to spend time with a dynamic community of pioneering battery researchers seeking to find solutions to support a fully electric future?

The Faraday Institution is offering a total of 55 internships, for undergraduate students to spend 8-weeks working on battery related projects.

**Project title:** Applying Automated Reaction Network Generation to Li-ion Battery Thermal Runaway

**Project description:**

- Ongoing work sets out to develop a micro-kinetic model of the chemical reactions taking place during thermal runaway of Li-ion batteries (LIB). This is to enhance the predictive capabilities of TR models by being based on fundamental chemical theory.
- The development of micro-kinetic models of LIB TR is difficult to the large and complex nature of reactions taking place. The aim of this work will be to apply automated reaction network generation to formulate these networks more efficiently. The project will focus on the generation of the anode, anode-electrolyte reactions to form part of a larger RN for the whole cell. From which battery off gas and related hazards can be predicted.
- Within the work, the candidate will also implement apply reaction network development, transition state theory, computational chemistry and molecular dynamic simulations (density functional theory) using Gaussian 19.

**Learning Objectives:**

- Understand what a LIB is and is made from, what the process of thermal runaway is and how the LIB materials effect thermal runaway
- Learn core topics of computational chemistry
  - reaction network development
  - transition state theory
  - molecular dynamic simulations (density functional theory) using Gaussian 19
  - Automatic network generation
- How to computational chemistry to determine for building micro-kinetic models and simulating reaction systems.

**Additional Information:**

- Interest in programming and modelling is beneficial, however past experience is not needed.
- Chemical engineering degree preferable, but engineering, physics or similar acceptable

**Supervisor:** Prof. Solomon Brown, co-supervised by Dr Peter Bugryniec

**University:** The University of Sheffield

**Location:** In-person (remote/ hybrid possible)

**Start date:** The internship is a full-time role for 8 weeks from June-September 2023

**Eligibility:**

- Be registered full-time undergraduate student from a UK university.
- Undertake the internship within the years of their undergraduate study (i.e., not in final year or during a subsequent Masters' programme).
- Not have been a FUSE intern in a previous year

**Funding:**

A salary of £10.90/ hour across the UK or £11.95 / hour in London will be provided. This will be determined by the working address of the appointee, not the university's location. The funding is provided by the [Faraday Institution](#).

**Additional activities:**

During the FUSE internship you will be able to attend Faraday Institution cohort events which will focus on a variety of topics to further develop your understanding of career opportunities in battery sector. At the end of the programme, you will be invited to to share a poster about your work and prizes will be awarded.

**Application:**

In order to apply for a Faraday Undergraduate Summer Experience (FUSE) 2023 internship, you need to complete the following [SURVEY](#), and send a CV to Prof. Solomon Brown (s.f.brown@sheffield.ac.uk) by 5<sup>th</sup> May 2023.

**Diversity**

The Faraday Institution is committed to creating a dynamic and diverse pool of talent for the fields of battery technology and energy storage.

You can read more about our commitment to Equality, Diversity and Inclusion here:

<https://www.sheffield.ac.uk/study/policies/equality-and-diversity-policy>  
<https://www.sheffield.ac.uk/study/policies/equality-and-diversity-policy>