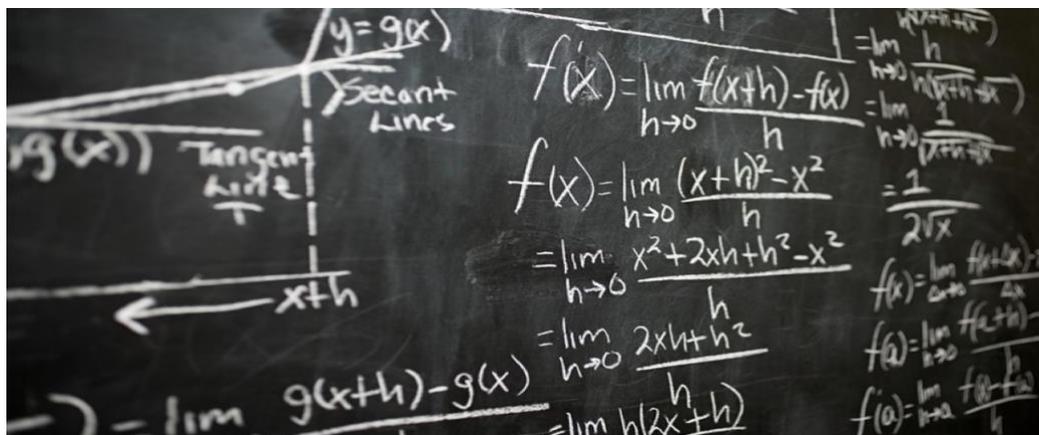


Reduced Order Modelling for Lithium Sulfur Batteries



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 paid internships for undergraduate students to spend 8 weeks working on battery related projects.

Project title: Reduced Order Modelling for Lithium Sulfur Batteries

Project description:

The demand for high-capacity batteries with greater performance requires the next generation of beyond-Lithium-ion batteries. Lithium-Sulfur batteries have a theoretical specific energy capacity 3-5 times larger than traditional Lithium-ion batteries. However, understanding of Li-S batteries is limited due to their highly complex electrochemical processes and therefore hinders researcher's ability to enhance the technology enough for widespread adoption. Mathematical models of Li-S batteries can play an important role in the development of this technology by explaining experimental results, guiding further experiments and cell designs.

The project aims to use mathematical techniques to reduce model complexity in order to work with and analyse the streamlined system. By investigating a complex model, we can systematically reformulate and approximate the model to produce something far simpler. Once models are sufficiently simplified, a variety of advancements can be made. In particular, the new model will more efficiently find

- the initial parametrisation of the complex models,
- optimal cell design parameters,
- and can be applied to Battery Management Systems due to computational efficiency.

Supervisor: [Dr. Monica Marinescu](#), [Dr. Michael Cornish](#)

University: Imperial College London

Location: *In-person, hybrid, or remote positions are available.*

Start date: The internship is a full-time role for 8 weeks during June – September 2022.

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 at most £400 for 35 hours per week will be provided, dependent on location. 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 Masterclasses and 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 should be comfortable with Python, Multivariate Calculus, and Ordinary Differential Equations (ODEs). An understanding of how batteries work is desirable, but not essential. There may be an option to work with Partial Differential Equations (PDEs) depending on time and candidate.

You will be working with a leading research group to develop reduced order models mathematically and then implement these models in Python. This work can be cited by subsequent researchers. You will become more familiar with Python, ODEs, reduced order modelling, physical modelling, and battery technology. As part of The Faraday Institution's 2023 intern cohort you will enter an end-of-project poster competition – the winners of which will be invited to present their poster at the Faraday Institution Conference in November 2023.

To express your interest, please fill out [this form](#) by April 9th, 2023. We will be in contact shortly thereafter. Interviews are expected to be held at the end of April.

Diversity

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