

Caitlin Walsh – PhD Physics

Doctoral School Research Award

International Summer School on Computational Quantum Materials (ISSCQM) 2022

I was very grateful to the Royal Holloway Doctoral Research Awards for enabling me to attend the International Summer School on Computational Quantum Materials 2022 in Orford National Park, Quebec, Canada. I had been accepted to attend the school in June 2020 but it was unfortunately cancelled due to Covid-19 restrictions, and this is the first time the school was able to run again.

I was able to gain hands on experience in a variety of state-of-the-art computational methods in my field, including ABINIT, TRIQS, Wannier90, and COMSCOPE. The school also introduced me to the necessary theoretical background to understand these methods, such as density functional theory and dynamical mean field theory calculations, quantum Monte Carlo methods, including an introduction to diagrammatic Monte Carlo methods. Furthermore the school ran a ‘many body physics refresher’ which contained much of the many body physics background of my field.

Overall the school was incredibly useful for writing the methodology section of my thesis, especially by training me in the numerical methods that go into the codes that I use. This was crucial and so helpful at this time as I am in my writing up period currently. Furthermore I gained a lot of skills using computational packages that are available to study the many body physics problem and beyond, which will support my future research. I also received an overview on applications of these methods to current problems.

I was able to present a poster of my research for the first time during my PhD, which was very exciting, and I really enjoyed being able to learn about all of the work being done by my fellow students in the poster session as well. Answering questions about my research is also very good practice for my viva.

The Jouvence resort in Orford national park is located by Lake Stukely, so in our downtime we were able to enjoy the location with activities such as canoeing, paddleboarding, kayaking, hiking, etc. Below is a picture from one of our lunchtimes between lectures!



On the Saturday we did a 19km hike up the local Mont Chauve, where the view from the summit (at 595m altitude) is pictured below:



The school had a total of 69 participants from nearly 40 institutions. This diverse background of participants was a great environment to foster international connections and I was lucky to have both gained friends and expanded my network. I was also able to discuss in person for the first time with academics I've been collaborating with for four years. We took a group photo towards the end of the school which I've included below. My research group in my department is very small, so this



is the first time I've been immersed in such a large research environment and able to discuss with so many people, which was excellent.

I was particularly proud to have been able to organise a women's social night during the course of the school. Physics is a subject with a strong gender imbalance already, and my field especially (Condensed Matter physics) has a particularly discouraging gender ratio. Only 10% of the participants of the school were women. I chose to organise a spa and boardgames night in the second week to support, uplift, and network with my fellow women scientists, which was a great success, and I hope the organisers will continue at the next school.

I'll conclude by reiterating how grateful I am to the Royal Holloway Doctoral Research Awards for funding this trip and enabling me to attend a school that was invaluable for both my thesis writing and development as a researcher.