

## My UROP research experience in the Centre for Cold Matter (Summer 2016)

I am a 2<sup>nd</sup> year Physics student and, as many of my fellow students, I am still unsure about what type of career I want to pursue in my near future. So I decided to apply to a summer placement here in the Physics department, in order to experience what life in a research environment would be like, should I decide to do a PhD and continue with my studies after the degree.

The process to secure myself a UROP was not as easy as I expected; I had to email several members of the department, and not all of them replied promptly. Also, I met some of them in person but many had already offered the placement to other students. However, after a couple months of emailing and knocking on doors (in the period between January and March), I finally secured a place in the Centre for Cold Matter (CCM).

My project consisted of designing a high Q resonant circuit for an electro optical modulator (EOM) that could be used in one of the experiments here in the CCM to cool molecules down. This project was essentially practical, as I had to assemble and test how different electronic components responded in the range of frequencies close to a given resonance (a few megahertz), as to maximize the Q factor of the device.

Initially, for the first couple of weeks, I had to both learn the theoretical background of the work I was to perform, and practice with some simple LRC circuits; this gave me a rough idea of what to expect from the final EOM circuit and taught me how to spot any mistakes before things became more complicated.

After that, I mainly worked in the lab, testing different arrangements and different materials for the components (inductors, transformers, etc), and recording their response in the target frequency range until I achieved some reasonably good results.

Unfortunately, I did not have time enough to fully test the optical response of the device, as my UROP experience came to an end after 8 weeks. However, I have to say that at the beginning of the summer such span of time seemed incredibly long to me, but as I came to understand more and more about my project, the whole process of learning/working became more interesting and more stimulating, and 8 weeks turned out to be not that long of a period after all.

I feel that during this experience I have learned a lot in terms of actual knowledge, but also in terms of mental approach to the process of research itself. For example, I often came to experience the feeling of frustration (e.g. if the electronics did not respond as expected) or achievement (e.g. if I successfully tackled a problem) while doing my work. I learned how to face those situations and make the most of them without losing my motivation, as well as always aiming at doing better. In particular, most of what I learned came from the obstacles and the difficulties I found on the way, and I understood that everyone gets stuck at some point, but what makes the difference is the ability to find different approaches to solve that particular problem.

Additionally, I would like to thank Prof. Sauer and Dr. Truppe for guiding me through this intense but always stimulating journey, and for spending their time teaching me the basis of how to conduct an independent investigation. Every time I had a question or I asked for a clarification about my work they were always available to help me almost immediately and provide me with some important feedback as to incentive my independent thinking.

In conclusion, I would recommend this experience to anyone interested in pursuing an academic career, as it provided me with a deep insight of what working in research actually means, and helped me improving my capabilities to tackle difficult problems and deal with unexpected situations.

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