

RISE REPORT

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I completed my internship at the Institute for Physics of Johannes-Gutenberg Universität Mainz over 10 weeks. I worked in the graphene subgroup of the Kläui group, part of the large cluster of Material Science groups at the university. Coming from the UK, I had no Visa issues and chose to use the bank account of my PhD supervisor to receive stipend money, rather than opening a German bank account. I used the app WG-Gesucht to find housing and was able (with a lot of searching!) to find affordable accommodation in Mainz within walking distance of the university.

As a RISE intern in a large experimental physics group I was able to learn about how research in Germany (and in general) worked. The professor is the all-important face and leader of the group, contacting less senior group members mainly through group and subgroup meetings. The bulk of the working group consisted of PhD students and Post-Docs, as well as some bachelor and masters students. There were also quite a few visiting students from around the world. The group was busy with over 40 or so researchers requiring to use the experimental equipment on a daily basis. New data was constantly being produced and everyone was extremely competent and knowledgeable. I was amazed at how everyone in the lab seemed to be under pressure to produce results yet also managed to maintain a calm and friendly atmosphere. There was a real effort to include everyone in social events both during and outside work: everyone was invited to attend the daily mensa lunch and once every few weeks there would be a dinner or social event after work which was well attended.

My role in the group was largely supportive. My PhD supervisor was in the middle of a lot of low temperature cryostat measurements when I arrived and so as well as assisting with data analysis I was also able to observe the measurements themselves. The measurements involved subjecting nitrogen-doped graphene to strong electric and magnetic fields and trying to observe oscillations in magnetoresistance known as Shubnikov-de-Haas oscillations. I was also able to learn about the transfer process of graphene from copper to silicon substrates, which involved working in a 'clean-room' in order to minimise contamination of samples.

As I learnt very quickly with experimental physics, things could never be expected to go to plan and often machines would break and experiments would go wrong. Researchers would have to quickly change plans for their own experiment if someone else had reported problems with equipment they were planning to use. Often the problems arose for no earthly reason and despite weeks of careful planning the results simply could not be produced. I learnt a lot about the patience required of an experimental physicist to keep trying and adjusting experiments where things went wrong, however frustrating it was.

I also learnt a lot from attending presentations and seminars, where the level of physics was often far beyond my current level as an undergraduate yet I was still able to learn from the questions asked afterwards. I learnt how critical and astute one has to be listening to a scientific pitch, questioning each step and saving concentration for the areas of greatest interest.

Outside of work I was able to enjoy the hot summer in Mainz, with summer festivals occurring almost weekly by the river Rhine. Mainz is in an area of Germany famed for its wine and there was certainly no shortage of opportunities to enjoy it. It is also not far from many other beautiful places and I used weekends to explore other areas of Germany and Europe. To be in an area of the world with such a high density of interesting places to visit was one of the best things about my time in Germany, and I would recommend to any RISE intern to take advantage of this too.

My time as a RISE intern taught me a lot about material science, experimental physics and life in Germany. It was my first experience living abroad for any extended period of time and I enjoyed slowly getting used to the (albeit small) differences in everyday life from the UK. I was especially aware of the far superior language skills of the Germans, knowing as a bare minimum two languages. As a classic monolingual Brit it certainly made me realise the importance of learning languages which is something I will take back to the UK with me. I admired the more balanced life of the Germans I came across - placing sport, outdoors and time away from work with higher importance than I was used to. And while Sunday trading laws I found initially strange, I eventually came to appreciate the peace and quiet of a Sunday in which most shops and businesses were shut.

My DAAD funded RISE internship gave me the opportunity to experience Germany and life abroad whilst developing my skillset as a physicist. I have had the opportunity to adapt to a new working life in a country I previously had no knowledge about, and having completed this internship would surely return if the opportunity arose. I will return to my studies in the UK with a finer knowledge of material science and a broader understanding of Germany and Europe. It has been a wonderful experience and I would like to thank the DAAD for funding my studies here.

I agree that my report and accompanying pictures may be used by the DAAD in printed materials, presentations, and on websites in order to inform funding organizations, sponsors, and students about the RISE program.