

Field Report

From June 2021 to February 2022, I have had the chance to do a research stay at the Oak Ridge National Laboratory (ORNL). The U.S. Department of Energy's (DOE) Oak Ridge National Laboratory is the largest multi-program science and technology laboratory in the U.S. Its scientific research focuses on materials, neutron science, energy, supercomputing and systems biology. The ORNL is located in a relatively small and laid back town of Oak Ridge in East Tennessee. It was one of the original sites of the Manhattan Project - a research and development program to produce the world's first nuclear weapon. Oak Ridge, also known as the "Secret City", gained its nickname for its highly-classified purpose during the WWII. It is around 45 minutes away from the Knoxville's bustling metropolis and about 3 hours away from the state's capital, Nashville. The entirety of East Tennessee is part of Appalachian region and is well-known for its hilly and wooded landscape exhibiting spectacular autumnal colors.

The ORNL is home of multiple large-scale scientific facilities including the Oak Ridge Leadership Computing Facility (OLCF) that provides the world's most advanced computational resources to the open science community. There, one can find the supercomputers SUMMIT, the second fastest supercomputer in the world (it held the number 1 position from November 2018 to June 2020), and FRONTIER, the upcoming largest supercomputer in the world after its commission later this year.

At the ORNL, I was in a research group that develops ab-initio code for large-scale quantum-mechanical and statistical physics calculations. It is very well-suited for ground state calculations of disordered metallic materials. My main tasks was to contribute specific features to the open source code and perform large-scale simulations of extended defects on their clusters. All these tasks required significant mentoring from my supervisor and other experienced researchers in the team. There were also general training provided by the OLCF on how to use the computing clusters efficiently and write optimized code for their specific architectures. Thanks to this ideal working condition, I was able to make some advances in my research quite fast. In addition to that, there were also regular scientific seminars organized, where the recent advances in the field of theories of disordered materials were presented. These seminars were held online and people from all over the world were able to participate. Our research efforts are still continuing even after my return to Austria and have lead to a hopefully fruitful collaboration.

The whole stay was a very memorable experience, which I would suggest everyone to have. My recommendation would be to find a supervisor who is willing to take time for

you and share with you his scientific point of view. I would also recommend doing the stay as early in the studies as possible, especially if you are interested in doing research. Seeing the American way of doing scientific will surely help you later on in your career and will also help you to build connections. The most challenging thing for me were the administrative tasks that I had to complete in the beginning. Things like finding an apartment, applying for a Tennessee driver's license and opening a bank account and so on, can be quite overwhelming at the beginning since most things are handled quite differently back in Austria. Furthermore, the region that I stayed in did not have public transportation and was only accessible by car. Even though staying abroad involves a lot of effort, at the end of the day, you will bring home new experience, new lessons, stories to tell and make you grow as an individual.