Travel Report: University of California, Santa Barbara

Gabriel Zihlmann, November 20, 2017

I decided to do my Master's thesis in the USA, and thanks to Prof. M. Poggio I could make contact with Prof. A Jayich at the University of California, Santa Barbara (UCSB) who leads a research group investigating nitrogen vacancy (NV) centers in diamond. NV centers have unique properties that provide the possibility to manipulate and read their electronic spin state even under ambient conditions which allows to precisely measure weak magnetic fields with NV centers. One particular project pursued in the group at UCSB immediately caught my attention: Using NV centers to measure the magnetic field produced by propagating action potentials from single neurons of *Aplysia californica*. NV center magnetometry also allows to do to magnetic field imaging with a wide-field microscope allowing to identify ferromagnetic cells, and in a related project blood cells of a sea organism which are known to be full of iron were to be investigated.

My work consisted of a wide variety of tasks: Designing and performing the necessary modification to an existing setup to allow spatially resolved magnetometry, testing the device with ferromagnetic particles, simulating expected measurement results, and establishing a protocol to harvest blood cells for investigation. Unfortunately, there were many hurdles to overcome—too many for such a short six month stay, such that no conclusive measurements could be done after the demonstration of the measurement principle. My working permission expired right when things finally started to work.

The UCSB campus is right on the coast. Don't be deceived by the innocent looking blue ocean water–it is freezing.

Santa Barbara is a beautiful small city on the central coast of California. The chilly pacific acts as an efficient air conditioner which makes the region very appealing: Almost always sunny, but almost never too hot or too cold. A number of well developed bike paths and the Santa Ynez mountains close by make the region very attractive for bicycling.

My visa also included a 30-day period to explore the country, and after a road-trip through most of California I returned to Basel in late summer 2017, and I can now look back on my time in Santa Barbara as a very instructive time. I was given the chance to work with exceptionally committed and talented people from which I could learn many things about the work in an interdisciplinary field, and about experimental research in general. Some of the most valuable results from my work are very general: I learned to understand how much time it takes to thoroughly design, conduct and analyze an experiment, and I experienced the importance of team work and communication. Last but not least did this opportunity enable me to improve my language skills to an extent which would not have been possible otherwise. I can only recommend doing a project abroad!

I would also like to use this opportunity to express my gratitude for the generous financial support from the Argovia travel grant for my stay abroad.