I started at the PI1 with my Bachelor thesis about the order parameter of superconducting iron pnictides. For that, I used a Mach-Zehnder THz interferometer for performing transmission measurements between 3 cm-1 and 37 cm-1 on thin samples. In my master thesis I continued to work on iron pnictides and investigated several electron-doped europium-based 122 compounds in the infrared region, with a SQUID-magnetometer and via transport measurements. The focus of this thesis was to learn more about re-entrant superconductivity as well as to confirm the presence of a re-entrant spin glass phase in electron-doped 122 compounds. Between the two theses I had the opportunity to work as a Hiwi where I could reactivate a Bruker 120 FTIR spectrometer and build up the corresponding laboratory.

In my PhD study, I work in a collaboration project between the PI1 and the Robert Bosch GmbH. For automated driving, reliable information about the street condition, whether it is dry, wet (including information about the layer thickness), icy, or snowy is important to guarantee a save but still fast traveling. Here, basic research about the optical properties of different asphalt types has to be performed as well as finding a proper physical model to describe them. Since asphalt is a diffuse scatterer – similar to a Lambertian one – common setups for reflection measurements are not suitable, therefore, a self-made setup is used. It is a perfect example how the basic Fresnel equations can be used to learn about a rather complex compound with direct relation to a practical application – namely automated driving / sensor development.