



## Soft X-ray Spectroscopy and Microscopy Group

### **Master Thesis: Near edge X-ray absorption fine structure (NEXAFS) spectroscopy with table-top light sources**

Near X-ray absorption edge fine structure spectroscopy (NEXAFS) can provide unique insight into the chemical and electronic structure of matter. In particular, such measurements give access to the composition of materials and the chemical state of specific atomic species within a certain material. Up to now NEXAFS measurements have been almost exclusively possible at synchrotron beamlines.

Nowadays, soft X-ray sources based on high harmonic generation represent a table-top alternative with excellent properties. In particular, modern femtosecond fiber lasers enable compact and powerful sources up to soft X-ray range. The rising power of these sources and particularly their ultra-short pulse durations will allow NEXAFS studies on few-femtosecond timescales, which so far have not been accessible.

You will perform the first NEXAFS measurements with the above-mentioned table-top soft X-ray sources. These measurements will allow determining the quantitative composition of the investigated materials as well as their chemical structure, bindings and states. The technique can be extended by polarimetry in order to determine the orientation of organic functional groups or magnetic domains. In future, pump-probe experiments with synchronized laser pulses will enable seminal studies of ultrafast electronic, chemical and magnetic dynamics on femtosecond time-scales.

**If you are a student looking for an opportunity to work in this field please contact:**

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