SFB 1249 *N*-HETEROPOLYZYKLEN ALS FUNKTIONSMATERIALIEN

UNIVERSITÄT HEIDELBERG ZUKUNFT SEIT 1386

SFB 1249 – Kolloquium

05. November 2025

16:15 Uhr, Hörsaal West

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Functional materials under external stimuli: element specific insights by X-rays

Polarization-dependent X-ray absorption spectroscopy (XAS) is a well-established and powerful tool to study the electronic and magnetic properties of matter in an element- and orbital-selective manner. These properties can be significantly altered by external stimuli to achieve a specific functionality of the material e.g. a tailoring of magnetic properties. Various stimuli can be used to achieve this goal: temperature, pressure or electromagnetic fields like visible light or microwaves but also static electric or magnetic fields for example. External stimuli affect the crystallographic atomic structure, the magnetic interactions and the electronic configuration of atoms in the materials and hence these stimuli can drive and modify various phase transitions, which are at the heart e.g. of magneto-caloric materials. A thorough understanding of the mechanisms involved in these processes on atomic length scales are important both from a fundamental point of view, but also for design of new multifunctional materials for advanced applications.

In this talk, I will introduce the concept of polarization-dependent XAS for (magnetic) materials and present several examples of external stimuli applied to identify and tailor individual material properties: the change in temperature and external magnetic field drive the phase transition in magneto-caloric FeRh and $La(Fe,Si)_{13}$. Time-resolved XAS with an optical pump pulse reveals correlation effects in Ni and NiO and microwave-excitations allow to investigate local excitations and dynamic magnetic coupling.