

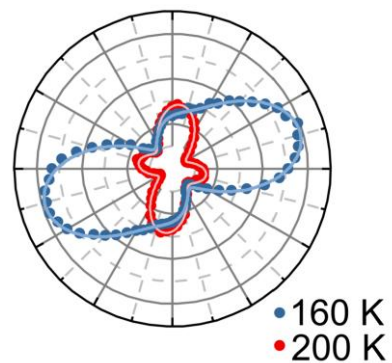
Bachelor or Master Project

Exploring Symmetry Changes Using Second-Harmonic Generation

This project focuses on numerical analysis and interpretation of an experimental dataset obtained from second-harmonic generation (SHG) measurements across a phase transition.

Second-harmonic generation is a powerful technique to investigate symmetry-changing phase transitions. While all materials can reflect light, only materials with certain symmetries can generate a nonlinear second-harmonic response. The polarization dependence of the SHG signal encodes the symmetry of the material, while the intensity contains information about the magnitude of the order parameter that emerges at the phase transition.

We recently observed pronounced changes in the SHG polarization dependence near a strongly-correlated magnetic, electronic, and structural phase transition in a complex oxide. The goal of the project is to model these measurements by fitting the data to SHG responses expected for different crystallographic point groups. By analyzing the fit results, you will determine how the order parameter evolves through the phase transition and gain insight into the underlying symmetry changes of the material.



The project is well suited for Bachelor or Master students with an interest in spectroscopy, symmetry analysis, and computational data evaluation. Prior experience with programming or data fitting is helpful but not required.

If you would like to contribute to understanding phase transitions through nonlinear optics, get in touch! Contact: christian.tzschaschel@physik.uzh.ch