

Max-Planck-Institut für Struktur und Dynamik der Materie

Max Planck Institute for the Structure and Dynamics of Matter



IMPRS UFAST Call for PhD applications 2025/2026

AC1 – Coherent control of ferroic phenomena



Title of PhD Project	Coherent control of ferroic phenomena
Type	Experimental
Supervisor(s)	Prof. Andrea Cavalleri
Affiliation(s):	Max Planck Institute for the Structure and Dynamics of Matter
Number of positions:	1
Abstract:	<p>A ferroic order is a long-range ordering in solids where an order parameter—such as electric polarization or magnetization—develops a uniform spontaneous arrangement. These phenomena are scientifically intriguing and highly functional at the same time, making them essential to cutting-edge research and modern technological applications. Conventionally, a ferroic order is reversed by static fields – electric, magnetic, or mechanical; however these methods are often slow and energy-intensive.</p> <p>This project proposes to explore new approaches to coherently control ferroic materials using tailored light fields in the mid-infrared and terahertz frequency ranges. In particular, we investigate ultrafast and energy-efficient switching by coherently driving optical phonons and utilizing their anharmonic coupling to the ferroic order parameter.</p> <p>We are offering a PhD position, which provides a unique opportunity to push the technological boundaries of ultrafast coherent control and perform state-of-the-art experiments. This research will not only advance our understanding of ferroic materials but also contribute to the development of next-generation technologies.</p>
Contact person for scientific questions about the project:	Prof. Andrea Cavalleri: andrea.cavalleri@mpsd.mpg.de Dr. Michael Först: michael.foerst@mpsd.mpg.de Dr. Michael Fechner: michael.fechner@mpsd.mpg.de
Research Group Website:	https://qcmd.mpsd.mpg.de/

