



IMPRS UFAST Call for PhD applications 2021/2022



Coherent Terahertz Emission in High- T_c Superconductors

A. Cavalleri-2

Title of PhD Project	Coherent Terahertz Emission in High-T_c Superconductors
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>Terahertz emission is generally observed upon impulsive optical excitation only in media with inversion or time-reversal symmetry breaking. For this reason, in superconductors this phenomenon has typically been detected under current bias or in a magnetic field. Recently, our group has discovered an anomalous coherent terahertz emission in high-T_C cuprates with charge stripe order, in absence of magnetic fields or external biases. The symmetry breaking induced by the coexistence of superconductivity with stripes is likely to underpin the emission mechanism, although the underlying microscopic physics is still unclear.</p> <p>Aiming at investigating, controlling, and optimizing this phenomenon, the PhD candidate will first focus on the design and realization of an advanced optical setup, combining photo-excitation in the near- and mid-infrared with high efficiency detection of emitted terahertz radiation in the time domain. Experiments on high-T_C cuprates and other superconductors will be carried out, in possible combination with high external pressures and magnetic fields. The results will be analyzed and interpreted in close contact with our theory collaborators.</p> <p>This new approach has the potential to become a sensitive probe for symmetries of coexisting orders and, more generally, to reveal interesting light-matter coupling mechanisms at femtosecond timescales.</p>
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