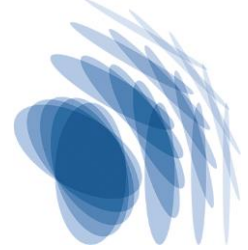


Max-Planck-Institut für Struktur und Dynamik der Materie

Max Planck Institute for the Structure and Dynamics of Matter



IMPRS UFAST Call for PhD applications 2022/2023

AC1- Nonlinear Terahertz Studies of High-Temperature Superconductors



Title of PhD Project	Nonlinear Terahertz Studies of High-Temperature 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>Nonlinear terahertz (THz) spectroscopy has emerged as an effective tool to study the microscopic properties of complex solids, being sensitive to the symmetry of low energy degrees of freedom and complementing already existing nonlinear optical probes.</p> <p>A prominent example is given by THz third harmonic generation, which has recently been applied in the study of materials in which charge-stripe order and superconductivity coexist. These charge stripes do not couple to light at linear order but nevertheless participate in higher order responses.</p> <p>Similarly, other techniques such as electric-field induced second harmonic and THz emission spectroscopy have revealed a sensitivity to nonlinear Josephson physics of superconducting cuprates, as well as the ability to unveil the spatial arrangement of the superconducting state and its interaction with charge order. The PhD candidate will further develop these methods, integrating them into pump-probe experimental schemes and possibly combining them with other external stimuli, such as magnetic fields or high pressures. The ultimate goal will be to use the nonlinear THz response to thoroughly understand and characterize recently discovered photoinduced superconducting states in high-T_c cuprates as well as in organic superconductors.</p>
Contact person for scientific questions about the project:	Andrea Cavalleri andrea.cavalleri@mpsd.mpg.de Daniele Nicoletti daniele.nicoletti@mpsd.mpg.de

