



## IMPRS UFAST Call for PhD applications 2023/2024

### PM1- Non-Equilibrium Transport in High-T<sub>c</sub> Superconductors



<b>Title of PhD Project</b>	<b>Non-Equilibrium Transport in High-T<sub>c</sub> Superconductors</b>
<b>Type</b>	Experimental
<b>Supervisor(s)</b>	Prof. Philip Moll Dr. Carsten Putzke
<b>Affiliation(s):</b>	Max Planck Institute for the Structure and Dynamics of Matter
<b>Number of positions:</b>	2
<b>Abstract:</b>	<p>The question whether the large variety of electronic ground states in the phase diagram of high-<math>T_c</math> cuprates are competing with or promoting high temperature superconductivity, or if a possible quantum critical point lays at the heart of high-<math>T_c</math> superconductivity is under constant debate.</p> <p>In this project we aim for a better understanding of the interplay between the large number of ground states with a novel approach. Instead of suppressing superconductivity with high magnetic field, which could also affect other phases of interest themselves, we will use high, ultra-short current pulses in micro-structured devices to suppress superconductivity, forcing the system to reveal its unmasked correlated ground state in electrical transport measurements.</p> <p>In addition, the project holds the potential for the discovery of new ground states that are prevented by the formation of cooper pairs in the high-<math>T_c</math> superconducting phase. One example is the stabilization of charge order in high magnetic YBa<sub>2</sub>Cu<sub>3</sub>O<sub>6+δ</sub>.</p> <p>This project combines state of the art experimental capabilities in micro-structuring of quantum matter, the preparation of specialized sample environments by clean-room technology as well as the development of electrical transport measurements in the ultra-fast time scale at low temperatures and high magnetic field.</p>
<b>Contact person for scientific questions about the project:</b>	Prof. Philip Moll: <a href="mailto:philip.moll@mpsd.mpg.de">philip.moll@mpsd.mpg.de</a> Dr. Carsten Putzke: <a href="mailto:carsten.putzke@mpsd.mpg.de">carsten.putzke@mpsd.mpg.de</a>
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