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| <b>Title of PhD Project</b>                                       | <b>Non-Equilibrium Transport in High-Tc Superconductors</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Type</b>                                                       | Experimental                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Supervisor(s)</b>                                              | Prof. Philip Moll<br>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 <math>\text{YBa}_2\text{Cu}_3\text{O}_{6+x}</math>.</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><br>Dr. Carsten Putzke: <a href="mailto:carsten.putzke@mpsd.mpg.de">carsten.putzke@mpsd.mpg.de</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Research Group Website:</b>                                    | <a href="https://www.mpsd.mpg.de/research/microstructured-quantum-matter">https://www.mpsd.mpg.de/research/microstructured-quantum-matter</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |