

Long-lived non-thermal phases of strongly correlated electrons

Eckstein Martin

University of Hamburg

Ultrafast laser excitation offers a pathway to explore complex materials, and unveil states which are inaccessible through conventional equilibrium routes. Mott insulators, and more generally correlated electron systems at the verge of Mott localisation are a promising class of materials for this endeavour, since they exhibit exotic phenomena and complex phase diagrams already in equilibrium. Non-equilibrium superconductors, exciton condensates, or magnetic phases have been reported [1]. Key questions are (i), how one can stabilize such non-thermal phases, extending their lifetimes or even inducing metastability, and (ii), whether one can find a simple universal description of such states, akin to a non-thermal free energy which depends only on few relevant slow variables. In my talk, we will examine possible mechanisms for long time stability, as well as theoretical ideas to unravel the long-time dynamics of such quantum systems.

[1] Yuta Murakami, Denis Golež, Martin Eckstein, Philipp Werner, arXiv:2310.05201.