Stuttgarter Physikalisches Kolloquium

Fachbereich Physik, Universität Stuttgart
Max-Planck-Institut für Festkörperforschung
Max-Planck-Institut für Intelligente Systeme

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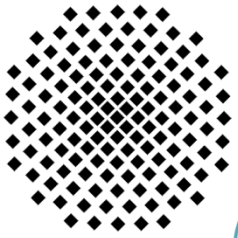

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Ultraslow to Ultrafast: Light-matter interactions in correlated electron systems

Ece Uykur - Antrittsvorlesung
Helmholtz-Zentrum Dresden-Rossendorf

Abstract

Strongly correlated electron systems are a class of materials where physical properties cannot be described with conventional theories for metals/insulators and possess one of the greatest challenges in the condensed matter research. Charge, spin, and lattice degrees of freedom in correlated electron systems lead to competing interactions and eventually the emergence of exotic phases, such as high temperature superconductivity, quantum criticality, Mott insulator state, and quantum Hall effects.

Light is a common probe of these exotic phases. Optical experiments are most sensitive to charge degree of freedom, yet they also can access spin and lattice contributions, especially when magnetic field, external pressure, and strain are used in conjunction with light. In this talk, I will present new phenomena in topological correlated materials revealed using optical measurements. I will discuss the conventional (“slow”) broadband optical studies and the prospects of the ultrafast transient states in these materials.