



Sonderforschungsbereich TRR 160

Kohärente Manipulation wechselwirkender Spinanregungen
in maßgeschneiderten Halbleitern

Integrated Research Training Group (IRTG)

Seminarankündigung

Dienstag, 31.05.2022, 14:15 Uhr

ONLINE

<https://tu-dortmund.zoom.us/j/94705306167?pwd=elJrQTFlaDdaen-VOSThzVHBqbVAwQT09#success>

“Tailoring materials properties by ultrafast laser driving of collective modes”

Vortragende/r: Prof. Edoardo Baldini
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Abstract:

The ability to precisely tune material properties at ultrafast (i.e., sub-picosecond) timescales and room temperature is key to opening new routes toward high-speed optoelectronics, energy sciences, and quantum devices. Ultrashort laser pulses have the potential to engineer various interactions at the micro- and nano-scale, steer phase transitions along preferential pathways, and coherently control structure-function relationships. This tailored material design by light relies on different manifestations of the light-matter interaction, requiring an exquisite control over the properties of the light field itself. In this talk, I will discuss how the laser excitation of specific collective modes can yield new forms of nonequilibrium functional control in materials, leading to the modulation of optical, magnetic, ferroelectric, and topological properties. In particular, I will focus on the resonant driving of magnetic excitons in van der Waals magnetic insulators. I will show how this protocol enables the realization of an emergent antiferromagnetic metallic phase and the simultaneous coherent manipulation of magnetism, introducing the framework of magneto-excitonics. Finally, I will describe the opportunities offered by the development of novel driving schemes in the terahertz range and their combination with advanced probes of electronic and crystal structure.