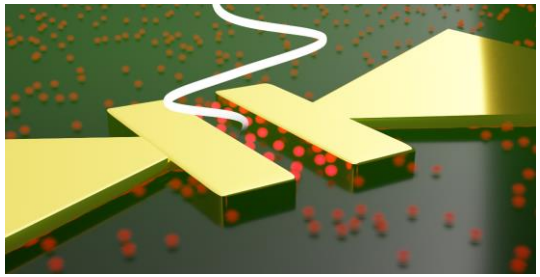
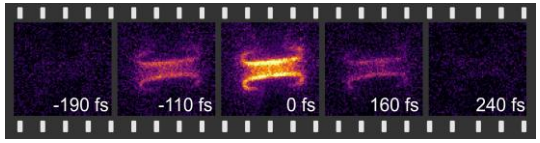
Physikalisches Kolloquium

Universität Konstanz

Prof. Dr. Georg Herink
University of Bayreuth

Di. 18.06.2024
15:15 Uhr
P 603
im Anschluss Getränke und Snacks





Sub-cycle Movies of Local Electric Waveforms using Nanocrystals

Ultrafast waveforms at multi-Terahertz frequencies govern a broad range of elementary excitations in condensed matter – including the motion of conduction electrons, atomic vibrations and quasi-particle excitations. Critical field extensions are often spatially confined below sub-diffraction scales and underlie surface polaritons in layered 2D-materials, metamaterials and nanoscale devices.

In this lecture, I will introduce a fluorescence-based microscope to capture sub-cycle movies of evolving far-infrared electric near-fields. The approach employs the quantum-confined Stark-effect in semiconductor nanocrystals acting as ultrafast probes coated onto the sample. Based on far-field microscopy in the visible spectrum, we directly image momentary electric field distributions at super-resolution with bandwidths exceeding several THz. We also derive strategies to break the symmetric response of the Stark-effect to access the absolute polarity of the waveforms. Furthermore, I will discuss regimes of intense excitations and present the THz-driven transient enhancement of quantum dot luminescence – establishing single-cycle high-field THz biasing as an ultrafast probe to access carrier dynamics within nanostructures.

Host:
Dr. Ron Tenne

Organisation:
Prof. Dr. Bechinger