



Physikalisches Kolloquium

Prof Dr. Christoph Lienau

Oldenburg University

Strong couplings in nanosystems: Manipulating transport properties by light

Commonly, when thinking about the transport of charge, energy, or spins in nanosystems, we think about the physical properties of the material under investigation. Consequently, material design is the method of choice for improving transport properties. New ideas are currently emerging which suggest, instead, to use “light” as a resource to alter nanoscale transport. The strong coupling of quantum emitters to light emerges as a new paradigm for directing the optical and electronic transport properties of nanomaterials by all-optical means. At room temperature, however, the underlying light-matter coupling acts on such short time scales that the underlying quantum dynamics, so far, remained mostly elusive. Recent developments in advanced multidimensional electronic spectroscopies overcome this limitation and give new insight into nanoscale energy transport.

In my talk, I will give an introduction into these multidimensional electronic spectroscopies and their applications to selected nanoscale materials. Specifically, I will use them to demonstrate how the strong coupling of excitons in J-aggregated organic semiconductors to surface plasmon polaritons transform the usual diffusive hopping exciton transport into a coherent transport of excitons over mesoscopic distances at room temperature.

Tuesday, May 30, 2023, 2:15 p.m.

H6