Seminarankündigung

Montag, 20. Mai 2019
15:00 Uhr
ZNN, Seminarraum 0.001

“Two-dimensional electronic spectroscopy: Probing the motion of electrons and nuclei in solid state nanostructures and photovoltaic materials.”

A substantial body of recent experimental work has shown that “vibronic quantum coherence”, the strong coupling between electronic and vibrational degrees of freedom can have a profound effect on the transport of energy and charge in a variety of biological and artificial solid state nanostructures. This has triggered substantial experimental efforts towards probing such quantum coherences on ultrafast time scales in rather complex nanosystems at room temperature.

In my talk I will introduce some of these studies with a focus on recent work in our own group in Oldenburg. In particular, I will show that emerging multidimensional electronic spectroscopy techniques have the potential to directly trace the time evolution of the density matrix of such quantum systems. As such, they can give important new insight into a variety of light-induced energy and charge transport phenomena, including charge carrier relaxation and transport in perovskite materials, quantum-coherent electron transport in organic solar cell materials or through conical intersections in molecular thin films. While these spectroscopic studies provide exquisite temporal resolution, they usually lack the spatial information that is necessary to directly visualize light-induced quantum dynamics in nanosystems. At the end of my talk, I will therefore discuss two new experimental tools, plasmonic nanofocusing spectroscopy and ultrafast point-projection electron microscopy, that have the potential to overcome those limitations.

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