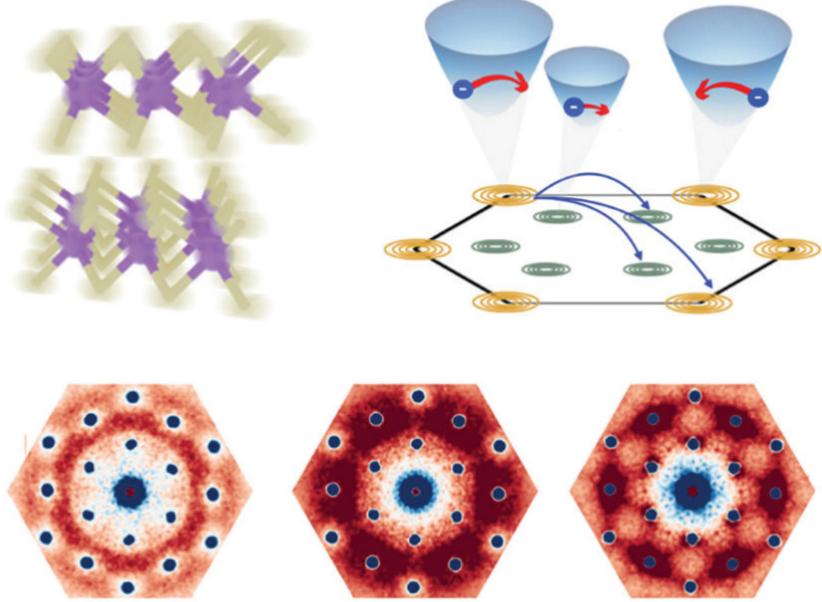


<https://uni-due.zoom-x.de/j/64228670246?pwd=RjVQeFNIUkRKRkpINVpKYXhJaFNLdz09> (gilt für alle Vorträge)

Revealing microscopic interactions in nanomaterials on the ultrafast timescale



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The microscopic coupling between lattice vibrations (phonons) and charge carriers are at the origin of a plethora of exotic condensed matter phenomena, such as superconductivity, charge density waves, and soft-mode phase transitions. These phonon-carrier interactions are also essential for explaining electrical and thermal transport, as well as energy conversion processes in materials for photovoltaics or future quantum technologies. Given their central role in nearly all condensed matter phenomena, gaining access to these microscopic interactions is essential. In the first half of this talk, we will show that ultrafast electron diffuse scattering (UEDS) yields insights into the non-equilibrium lattice dynamics in two-dimensional materials by providing access to momentum-resolved electron-phonon and phonon-phonon coupling. We will discuss our recent work which investigates the interplay of carrier screening and electron-phonon interactions in the semiconductor MoS₂. In the second half of the talk, we will report on our latest progress towards setting up an instrument for coherent 2D spectroscopy in the visible-NIR range, a technique that complements UEDS by providing microscopic insights on the electronic response of materials. In particular, we will show that our instrument is well-suited to investigate excitons and exciton-polaritons in 2D materials.