



Thursday, April 6th 2017 - 13:30
CFEL Seminar room IV (Bldg. 99)

Michael Lorke

Institute for Theoretical Physics, Bremen University

Carrier dynamics in MoS₂

In the context of the current interest in transition-metal dichalcogenides, we study the optical generation and relaxation of excited carriers and their influence on optical properties.

A main source of carrier relaxation in these systems is the interaction of the excited carriers with phonons. To analyze carrier-phonon scattering and dephasing, we solve kinetic equations, based on ab-initio carrier-phonon interaction matrix elements, both for carriers and phonons, including heating effects due to the excitation of non-equilibrium phonons. We find that within 100fs the electrons have relaxed into the valleys of the band structure, demonstrating fast carrier dynamics, which is accompanied by the generation of non-equilibrium phonons. This process is followed by carrier cooling on a timescale of about 1ps, which is consistent with recent experimental findings. Additionally, I will discuss shortcomings of the so-called generalized Kadanoff-Baym ansatz for the solution of the Kadanoff-Baym equations of the nonequilibrium Green's function technique.

Host: Angel Rubio

