



## Einladung

- Es spricht: **Dr. Alexander Steinhoff**  
Institut für Theoretische Physik, Universität Bremen
- Zeit: **Dienstag, 07. Juni 2016, 14:15 Uhr**
- Ort: **Technische Universität Berlin  
Institut für Festkörperphysik  
Hardenbergstraße 36, 10623 Berlin  
Raum EW 731**
- Thema: **„Optical Properties and Carrier Dynamics in  
Transition Metal Dichalcogenides“**

### Abstract:

Monolayers of transition metal dichalcogenide semiconductors have been in the spotlight due to direct optical transitions in the visible spectral range and exciton binding energies of  $\sim 500$  meV.

In particular, there is a strong interest in understanding the influence of excited carriers on optical properties. On the theory-side, ab-initio electronic state calculations provide ground-state single-particle properties and their combination with numerical solutions of the Bethe-Salpeter equation determines the excitonic ground-state absorption. We extend these investigations by studying optical properties in the presence of excited carriers as well as relaxation kinetics. It is shown that absorption spectra are strongly modified due to band-gap renormalization and screening of the Coulomb interaction under the influence of excited carriers, while the photoluminescence signal can be distinctly influenced by optical excitation above or below the electronic band gap. Moreover, the role of strain and the corresponding modifications of the band structure are studied, leading to a characteristic reduction of emission in certain situations. For investigations of the carrier dynamics in MoS<sub>2</sub> we present results for the carrier-carrier Coulomb scattering and carrier-phonon scattering after optical excitation of the monolayer. As for the optical spectra, these investigations are based on ab-initio band structure and interaction matrix elements and reveal ultrafast relaxation of excited carriers.

Gäste sind herzlich willkommen!

Prof. Dr. A. Knorr