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KOLLOQUIUM PHYSIK

Thema

Exciton physics in atomically-thin semiconductors

Vortragender

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Ort

Hörsaalgebäude II
Hörsaal 2

Zeit

Dienstag, den 10.01.2017
16:30 Uhr

Kolloquiums-Kaffee ab 16:00 Uhr
im Raum P2-E0-414
(Alle sind herzlich eingeladen)

Im Auftrag der Dozenten
der Fakultät Physik
Der Dekan

Einladender: **Prof. Dr. Markus Betz**

Exciton physics in atomically-thin semiconductors

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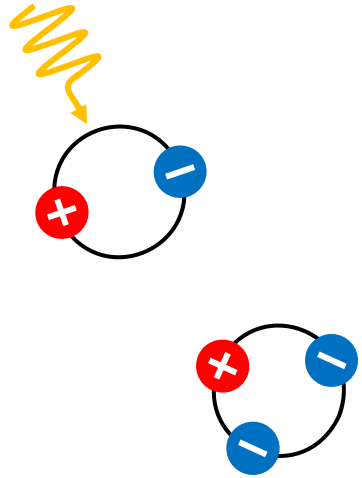

Since the discovery of graphene, a single sheet of carbon atoms, research focused on two-dimensional (2D) van der Waals materials evolved rapidly due the availability of atomically thin, thermally stable crystals with intriguing physical properties. The 2D materials naturally inherit major traits associated with systems of reduced dimensionality: strongly enhanced interactions, efficient light-matter coupling, and sensitivity to the environment. In particular, the considerable strength of the Coulomb forces, i.e., electrical attraction and repulsion between the charge carriers, introduces a rich variety of many-body phenomena. It leads to the emergence of atom-like electron-hole quasi-particles, such as excitons, trions, and biexcitons, with unusually high binding energies and efficient light absorption.

In this talk, I will focus on the physics of excitons in semiconducting 2D materials, largely determining the optical response of these ultra-thin layers. The observation of exciton binding energies on the order of many 100's of meV and the marked deviation of the electron-hole attraction from the conventional Coulomb law will be discussed. The results reflect both strong carrier confinement and the distinctive nature of the dielectric screening in atomically thin systems. I will further describe how some of the more extreme non-equilibrium conditions such as strong photo-excitation and high electrical doping can profoundly alter the many-body interactions.