WWU MÜNSTER

Aktuelle Fragen
der Nanophysik

Montag, 07.01.2019 um 15:15 Uhr
Ort: Seminarraum 87, Wilhelm Klemm-Straße 10

The dark and bright side of mono- and bilayer transition metal dichalcogenides

Dr. Thorsten Deilmann

DTU PHYSICS
Department of Physics
Lyngby, Denmark

Transition metal dichalcogenides (TMDCs) possess unique opto-electronic properties, including strongly bound excitons and trions. So far, most studies have focused on the optically active excitations. In recent experiments, however, the existence of dark states has been highlighted, which are equally important in many respects.
I will discuss dark and bright excitations in TMDC monolayers due to the different spin character of the involved quantum mechanical states. Both two-particle excitations (excitons) and three-particle excitations (trions) are observed in TMDCs with strong binding energies compared to bulk semiconductors with similar band gaps. Another reason why excitons might be dark are the different momenta of electrons and holes. Again we employ ab initio many-body perturbation theory within the GW/BSE approximation and describe the entire q-resolved exciton band structure in different TMDCs. Finally, studies on bilayers will be present in which further dark and bright excitations can be observed with electrons and holes on different layers.