



PADERBORN PHOTONICS LECTURE

WEDNESDAY, MAY 10TH 2023 | 16:00 H

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LECTURE HALL A.2

Nanoscale Optical Properties of 2D Materials

Since their discovery 2D semiconductors in the form of transition metal dichalcogenides (TMDC) have gained a lot of attention due to their unique material properties. Importantly, the optical response of these atomically thin materials is dominated by excitons – bound electron hole pairs.

Next to their outstanding optical properties 2D materials also possess exceptional mechanical properties. They are extremely flexible and can withstand mechanical strain of up to 10%.

In the first part of my talk I will show how strain can be used to manipulate the exciton energies as well as the exciton-phonon coupling in TMDC mono- and bilayers at room temperature. In addition, local strain it can be used to create single-photon emitters on demand at low temperatures.

In the second part I will discuss near-field techniques which can be used to investigate the optical properties on the nanoscale. We used this method to investigate the carrier density distribution of intercalated MoS₂ crystals, which show superconductivity at low temperatures. We observed an inhomogeneous distribution of the intercalated molecules.



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