



EINLADUNG

zum Vortrag
von

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Controlling defect hybridization with strain in 2D semiconductors

am Dienstag, 16. Mai 2023, um 17:30 Uhr

Ort: Lise-Meitner-Hörsaal, Fakultät für Physik, Universität Wien,
1090 Wien, Strudlhofgasse 4 / Boltzmannngasse 5, 1. Stock
Barrierefreier Zugang: Boltzmannngasse 5, Lift, 1. Stock rechts über den Gang zum
Hintereingang des Hörsaals

Abstract

Mechanical strain is a powerful tuning knob for excitons. We present a multiscale tight-binding simulation for the optical spectra of WSe₂ under nonuniform strain in the presence of point defects [1]. Under the application of strain, conduction-band states are brought into energetic resonance with localized defect orbitals, forming a new hybrid state that inherits the properties of the constituent species. We compare our model to photoluminescence measurements of these fragile many-body states on pristine suspended WSe₂ kept at cryogenic temperatures [2]. The characteristics of the hybridized state, including an order-of-magnitude enhanced light/matter coupling, avoided-crossing energy shifts, and strain tunability of many-body interactions, all fit to our simulation. Our results suggest such hybridized excitons may play a critical role in the operation of single quantum emitters based on WSe₂. Furthermore, the techniques we developed may be used to fingerprint unidentified excitonic states.

[1] L. Linhart et al., Phys. Rev. Lett. 123, 146401 (2019)

[2] H. Hernandez Lopez et al., Nature Comm. 13, 7691 (2022)