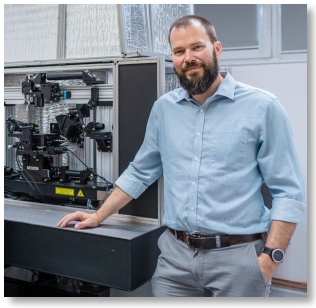
Universität Münster

Fachbereich Physik

# Allgemeines Physikalisches Kolloquium

## Donnerstag, 23.11.2023 - 16 Uhr c.t.

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### (Nano)spectroscopic signatures of intricate relations between 2D layers and their substrate


Common spectroscopic investigation of two-dimensional materials and their van der Waals (vdW) heterostructures mostly relies either on diffraction-limited microRaman or photoluminescence (PL). However, these methods do not properly capture local variations caused by, *e.g.*, nanometre-sized heterogeneities stemming from contamination trapped between the layers or complex strain and charge patterns formed by strong out-of-plane interactions.

Tip-enhanced spectroscopy methods enable the access to information on the local lattice deformation and also on the interaction between the individual layers composing the heterostructure. What may appear as peak splitting in micro-Raman or PL spectra of transition metal dichalcogenides (TMDC) on metal substrates or of vdW heterobilayers, can, in fact, often come from mixing up signals from various regions within the laser spot, including new or discretely shifted peaks. In other cases, however, peak splitting can indicate lifting the degeneracy of the phonon, due to, for example, uniaxial deformation. Spectroscopic fingerprints, both on micro- and nanoscale, of variously interacting vdW layers will be discussed, including TMDCs on metals [1-3] and TMDC heterobilayers [4-6].



References:

[1] Velicky et al. J. Phys. Chem. Lett. 11, 6112 (2020), [2] Velicky et al. Adv. Mater. Interfaces 7, 2001324 (2020), [3] Rodriguez et al. Phys. Rev. B 105, 195413 (2022), [4] Rodriguez et al. 2D Mater. 8, 025028 (2021), [5] Rodriguez et al. J. Phys. Chem. Lett. 13, 5854 (2022), [6] Rodriguez et al., ACS Nano 17, 7787 (2023


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Kolloquiums-Kaffee ab 16 Uhr vor dem Hörsaal

Institutsgruppe 1 – HS 2
Wilhelm-Klemm-Str. 10