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## SEMINAR aus Halbleiterphysik und Nanotechnologie

Mo, 26.04.2021, 11:15 Uhr, (Seminar via Zoom)

### “Many body states and strong light matter interaction in vdW structures and 2D polar metals”

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Central to all optical technologies is the manipulation of the light-matter interaction to achieve a high level of control, particularly in technologically relevant solid-state nanomaterials. Atomically thin two-dimensional layered materials receive great interest because of their unique properties. A novel class of atomically thin materials, 2D polar metals such as 2D gallium or 2D indium exhibit fascinating properties like superconductivity [1] strong nonlinear optical properties emerging by giant second harmonic generation [2] and epsilon near zero behavior in the visible and NIR range [3]. In contrast, monolayers of semiconducting transition metal dichalcogenides (SC-TMDCs) excel due to their strong exciton dominated light matter interaction [4]. vdW heterobilayers prepared from SC-TMDCs are ideal systems for the realization of exciton condensation because of large exciton binding energies [5], long lifetimes [6] and a permanent dipole allowing for the manipulation of the exciton ensembles via electric fields [7]. We will discuss recent developments of multi-valley physics and condensation signatures in TMDC hetero-bilayers [8-10]. Furthermore, we will introduce a rather new class of 2D materials, 2D polar metals and focus on their linear optical response measured by spectroscopic ellipsometry.

#### References

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