

Physics Colloquium

Monday 1st April 2020

at 4:00 pm

Campus Limpertsberg

Bâtiment des Sciences - Room BS 0.03

Talk by Prof. Thomas MICHELY

II. Physikalisches Institut, Universität zu Köln, 50937 Köln, Germany

invited by Associate Prof. Alex REDINGER

Tunable electronic structure and correlations in quasi-freestanding MBE grown MoS₂ and Ta₂

Two dimensional layers of transition metal dichalcogenides are a playground for electronic structure physics, as the latter displays a great material dependent variety, is tunable by layer thickness as well as environment, and last but not least because correlations are strong due to the weak screening in 2D dimensions.

A two-step molecular beam epitaxy synthesis using graphene on Ir(111) as a substrate and with elemental sulfur enables the in situ growth of mono- and multilayers of the transition metal disulfides MoS₂, TaS₂, WS₂, Nb₂, and VS₂ in excellent quality. The cleanness and marginal substrate interaction makes it possible to conduct spatially resolved spectroscopy of layers in their pristine state with the scanning tunneling microscope.

We access new phenomena, otherwise hidden through the interaction with their environment. These include the realization of a Tomonaga-Luttinger liquid hosted by straight one-dimensional cavities provided by mirror twin boundaries in MoS₂, quantization of the conduction band states due to band bending next to such mirror twin boundaries or near island edges, as well as a tuning of the charge density wave in TaS₂ layers through doping and substrate interaction.

Biography:

Since 2006 Thomas Michely is professor for experimental physics at the II. Physikalisches Institut of the University Cologne. He is born 1961, studied physics and philosophy at the University Bonn, has been working at the Research Center Jülich (until 1997) and at RWTH Aachen (until 2006). He investigates growth, structure, defects and electronic properties of surfaces, clusters, and 2D-materials mainly with STM and related spectroscopy.

