Sonderforschungsbereich 1277

Emergent Relativistic Effects in Condensed Matter -
From Fundamental Aspects to Electronic Functionality

SFB – Colloquium

Speaker: **Dr. Carolin Gold**

Columbia University, New York

Date: Tuesday, 14 November 2023, 14:15, H34

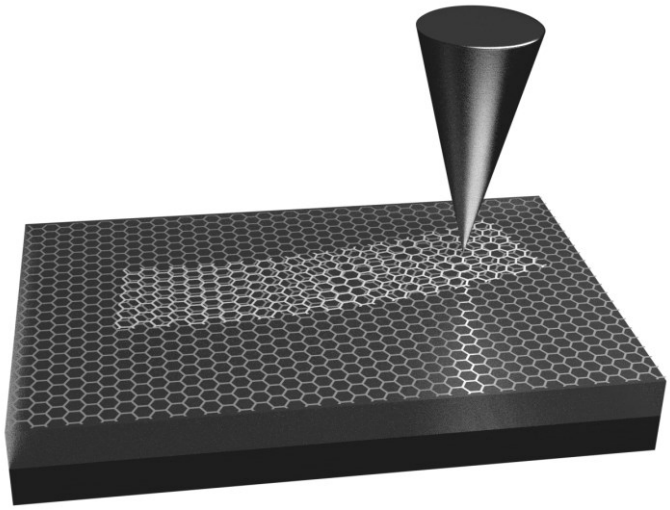
Topic: From microscopic properties to macroscopic electronic transport: Bridging different length scales in van der Waals materials

Abstract:

As we push the boundaries of novel materials and technologies, it becomes more important than ever to understand the intricate interplay of the materials' microscopic properties with the emergent quantum phenomena that manifest at larger scales. Bridging these two length scales has, however, remained a notable challenge, despite extensive theoretical and experimental efforts over the last decades.

In this talk, we discuss two techniques that not only allow us to study, but also to control and engineer the microscopic and macroscopic properties of van der Waals materials on a local scale. In the first part of the talk, we demonstrate the realization of valley-polarized electronic jets behind a gate-defined constriction in bilayer graphene. In the second part, we explore the realization of twist angle and strain control in van der Waals ribbons bent by an atomic force microscopy tip, and discuss how this allows for unprecedented control and engineering of the material's microscopic properties.

Host: Dr. Angelika Knothe



Moiré heterostructure with curved graphene ribbon (bright grey), imaged by a scanning probe microscopy tip.