Fachgruppe
Physik und Astronomie
Universität Bonn

Physikalisches Kolloquium

Fachgruppe Physik/Astronomie der Universität Bonn

UNIVERSITÄT BONN

Freitag, 24. Juni 2022, 15 Uhr c.t. im Hörsaal I des Physikalischen Instituts

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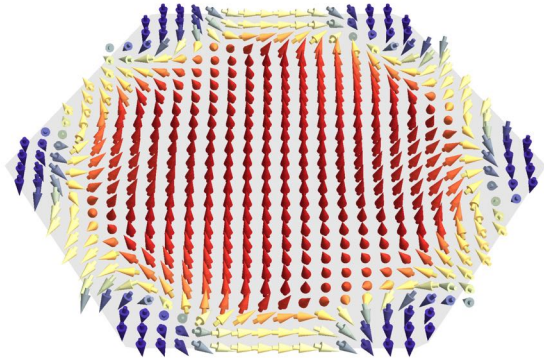
Ruhr-Universität Bochum

„Flatten the band: Novel quantum materials with a twist“



The exploration of novel materials exhibiting non-generic quantum effects continues to deliver many surprises. Recently, for example, two-dimensional moiré heterostructures have taken center stage - most prominently twisted bilayer graphene. Among the most exciting traits of twisted bilayer graphene is the observed emergence of strongly-correlated states, including Mott insulators, superconductivity, and more. In general, the stacking of two-dimensional materials offers an unprecedented level of targeted access to the manipulation of electronic properties merely via gate doping or tuning of the twist angle. Therefore, they enable the controlled engineering of unconventional quantum states of matter, which not only opens new perspectives on fundamental aspects of strongly-correlated systems, but also constitutes a very promising route towards the functionalization of novel materials. In my talk, I will provide an introduction to the physics and recent developments of twisted bilayer graphene and related moiré heterostructures. Further, I will explain the challenges that have to be met in theoretical descriptions of the complex many-body physics of such materials. I will discuss how modern functional methods provide a versatile toolkit to approach many universal and non-universal aspects of strongly-correlated moiré heterostructures, including the description of competing correlations, Fermi-surface instabilities, quantum critical behavior, and the possible emergence of Chern insulators and topological superconductivity.

Es gelten die Corona-Regelungen des Landes Nordrhein-Westfalen