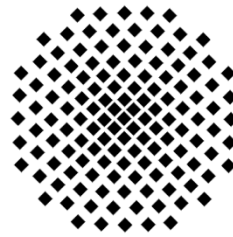


Stuttgarter Physikalisches Kolloquium

Fachbereich Physik, Universität Stuttgart
Max-Planck-Institut für Festkörperforschung
Max-Planck-Institut für Intelligente Systeme

Ansprechpartner: Prof. Harald Giessen
E-Mail: giessen@physik.uni-stuttgart.de
Telefon: 0711 - 685-65111



Dienstag, 6. Februar 2024

16:15 Uhr

V57.02

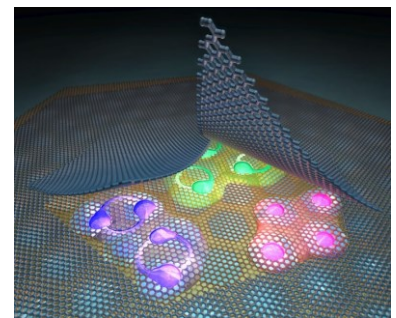
Universität Stuttgart, Pfaffenwaldring 57, 70569 Stuttgart-Vaihingen

Gastgeber: Prof. Dr. Mathias Scheurer, Universität Stuttgart, Telefon: 0711 - 685-61732

Plethora of Many-Body Ground States in Magic Angle Twisted Bilayer Graphene

Dmitri Efetov
LMU München

Abstract



Twist-angle engineering of 2D materials has led to the recent discoveries of novel many-body ground states in moiré systems such as correlated insulators, unconventional superconductivity, strange metals, orbital magnetism and topologically nontrivial phases. These systems are clean and tuneable, where all phases can coexist in a single device, which opens up enormous possibilities to address key questions about the nature of correlation induced superconductivity and topology, and allows to create entirely novel quantum phases with enhanced interactions. In this talk we will introduce some of the main concepts underlying these systems, concentrating on magic angle twisted bilayer graphene (MATBG) and show how symmetry-broken states emerge at all integer electron fillings [1]. We further will discuss recent experiments including screened interactions [2], Chern insulators [3], magnetic Josephson junctions [4], quantum criticality [5], re-entrant correlated insulators at high magnetic fields [6], Dirac spectroscopy of correlated states in magic angle trilayers and discuss some of the avenues for novel quantum sensing applications [8].

[1] Nature, 574, 653 (2019). [2] Nature, 583, 375–378 (2020). [3] Nature Physics, 17, 710 (2021). [4] arXiv:2110.01067 (2021). [5] Nature Physics, 18, 633 (2022). [6] PRL 128, 217701 (2022). [7] Nature Materials, in press (2022). [8] Nano Letters, 22, 6465(2022).