



EINLADUNG zum IFP-SEMINAR

Orbital Chern insulators at integer and half-integer fillings of a moiré superlattice

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Host: Silke Bühler-Paschen

Termin: Mittwoch, 25. Oktober 2023, 16:00 Uhr

Ort: TU Wien, Freihausgebäude

Wiedner Hauptstraße 8-10, 1040 Wien

Seminarraum DC rot 07 (roter Bereich, 7. OG)

Oder via ZOOM

<https://tuwien.zoom.us/j/63020566887?pwd=RmYvRmVwOGU5YVBrOHpodWRKaHFWQT09>

Vor dem Vortrag gibt es ab 15:30 Kaffee und Kekse

Abstract:

Realizing topological phases at zero magnetic field has been a longstanding goal since Haldane's theoretical proposal of the quantum anomalous Hall (QAH) state. Recent advances in fabrication techniques have made van der Waals heterostructures one of the most active platforms for pursuing this quest. In particular, moiré superlattices, which arise from small rotational misalignment between layers in van der Waals heterostructures, provide a powerful new way to control the interactions and topology of electronic bands. My talk will focus on QAH states that emerge in twisted graphene multilayers. In contrast to magnetically doped topological insulators, the QAH states in these moiré systems are driven by intrinsic strong interactions, which polarize the electrons into a single moiré miniband with non-zero Chern number. Remarkably, the magnetization of these "orbital Chern insulators" (OCI) arises predominantly from the orbital motion of the electrons rather than the electron spin. I will discuss a novel effect originating from the curious magnetic properties of OCIs that enables non-volatile electrical switching of the magnetic and topological orders. Finally, I will also discuss how narrow moiré bands can stabilize even more exotic topological states.

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