TECHNISCHE UNIVERSITÄT WIEN

INSTITUT FÜR FESTKÖRPERPHYSIK
Institute of Solid State Physics

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EINLADUNG zum IFP-SEMINAR

Correlated flat bands in a pristine solid and the cluster Mott insulating state

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Host: Karsten Held

Termin: Freitag, 21. Juli 2023, 14:00 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/68248172677?pwd=Y2loMSthckRaajRoNGI2VktkNEtEQT09

Vor dem Vortrag gibt es ab 13:30 Kaffee und Kekse

Abstract:

Flat bands are rare in pristine solid systems and are unstable against electronic correlations or other types of order. Compared to the atomic scale Hubbard systems and the Moiré materials, where the electronic correlations are confined to the lattice sites in the former and operate in a long-range fashion in the latter, flat band systems with short-range interactions that are free of spontaneous symmetry breaking are severely lacking. Such systems would nicely interpolate the atomic Mott insulator and the Moiré correlated insulators, providing a platform for understanding the connection of the two phases. With elegant analytical analysis and further verified by advanced numerical calculations, we convincingly reveal that monolayer Nb_3Cl_8 is a novel pristine flat band system with short-range nonlocal interactions. We provide strong evidence for it being a cluster Mott insulator and argue that it may constitute a rare candidate for molecular quantum spin liquid with flat bands. Furthermore, based on the cluster Mott insulator picture, we nicely solved the discrepancy recently observed in angle-resolved photoemission spectroscopy and density-functional theory calculations.

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Q-M&S Correlated Quantum Materials & Solid State Quantum Systems