



Weekly Seminar

Fractional quantum anomalous Hall effect in twisted MoTe_2 : discovery and recent advances

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合肥国家实验室



Time: 3:00 pm, Sept.9, 2026 (Wednesday)

时间: 2026年9月9日 (周三) 下午3:00

Venue: Room w563, Physics building, Peking University

地点: 北京大学物理楼, 西563会议室

Abstract

Condensed matter physics seeks to understand the collective behavior of particles, which often manifest as quasiparticles. The principle of fractionalization, in particular, uncovers exotic particles with no Standard Model counterpart, such as anyons, which inspired the field of topological quantum computation. A seminal example is the fractional quantum Hall effect (FQHE), where electrons in a 2D gas form quasiparticles with fractional charge and anyonic statistics under an extreme magnetic field and low temperature. However, these stringent experimental conditions pose significant challenges for manipulating and probing these exotic states.

This talk will present the discovery and recent advances in the fractional quantum anomalous Hall effect (FQAHE), a lattice analog of the FQHE that emerges in the topological flat bands of twisted MoTe_2 at zero magnetic field and possibly at elevated temperatures using combined optical spectroscopy and transport measurement. The less stringent experimental conditions enable novel experimental probes. I will focus on recent progress using these techniques, including possible detection of mobile zero-field anyons using new device designs, which could provide new insights into anyonic physics in this strongly correlated platform.

About the speaker

蔡家麒, 合肥国家实验室研究员。2019年毕业于华中科技大学物理学院, 2024年于华盛顿大学取得博士学位后, 在MIT任Pappalardo Fellow。2026年8月加入合肥国家实验室。他专注于凝聚态物理实验研究, 利用光学与电学输运手段结合人工智能技术, 探索二维量子材料中的新奇物相, 尤其关注其在量子器件、量子计算与量子传感等领域的潜在应用。他因博士期间在分数量子反常霍尔效应上的开创性工作, 获得2025年William McMillan Award。