



Weekly Seminar

Emergent platforms for exploring correlated physics in twisted 2D materials

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Time: 3:00 pm, Apr.2, 2025 (Wednesday)

时间: 2025年4月2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

Twisted two-dimensional (2D) materials have opened new avenues for studying correlated electron phenomena, offering unprecedented control over electronic structure and other material properties through twist angle and layer stacking. A well-known example is magic-angle twisted bilayer graphene, which has revealed a rich phase diagram of correlated states, superconductivity, and magnetism. However, beyond graphene-based systems, many other twisted 2D materials remain largely unexplored, offering exciting opportunities to realize new quantum states. In this talk, I will discuss how twisting different 2D materials can create novel platforms for studying strongly correlated physics and tuning material properties. I will present theoretical insights and first-principles calculations showing how carefully designed moiré superlattices can realize different correlated effective lattice models that exhibit Mott insulators, unconventional superconductors, and altermagnetic states. By tuning parameters such as twist angles and material composition, these systems provide a versatile setting to explore the interplay between topology, electron interactions, and emergent quantum phases.

About the speaker

洗乐德, 浙江钱塘基础科学研究院副教授。本科毕业于北京大学, 博士毕业于美国佐治亚理工学院。先后在西班牙巴斯克大学和德国马克斯普朗克物质结构与动力学研究所从事博士后研究。2020-2024年在松山湖材料实验室任特批研究员, 团队负责人。2024年加入浙江钱塘基础科学研究院。主要研究领域为低维量子材料的理论模拟与计算。研究内容涵盖新型低维材料的结构预测、生长动力学模拟以及量子物性的调控等方面, 致力于探索低维材料的新奇量子现象, 并设计具有潜在应用价值的新型量子材料体系。在包括Nature Physics, Nature Communications, Physical Review Letters 等期刊上发表论文60余篇, 受到引用超过7000余次。