



Weekly Seminar

Correlated and topological states in graphene-based heterostructures

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Time: 3:00 pm, Mar. 6, 2024(Wednesday)

时间: 2024年3月6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

直播链接: <https://www.koushare.com/lives/room/302317>

Abstract

In this talk, we discuss two examples of correlated and topological states in graphene-based heterostructure systems. First, motivated by the experimental discovery of a series of fractional quantum anomalous Hall effects in a pentalayer graphene moire superlattice, we theoretically study the correlated and topological states in this system. Combining renormalization group, Hartree-Fock, and exact diagonalization calculations, we will show that our theoretical results exhibit quantitative consistency with experiments within a self-consistent theoretical framework [1]. Second, we consider Coulomb-coupled 2D graphene-insulator heterostructures, and we will illustrate how moire-like correlated and topological physics would emerge in a synergistic manner in such non-moire heterostructure systems by virtue of interfacial Coulomb couplings [2]-[3].

[1] Z. Guo et al., arXiv:2311.14368

[2] X. Lu et al. Nat. Commun. 14, 5550 (2023)

[3] Y. Wang et al., Nat. Nanotechnol. 17, 1272 (2022)

About the speaker

刘健鹏目前就职于上海科技大学物质学院, 担任长聘副教授、研究员、博士生导师。刘健鹏的研究方向为理论和计算凝聚态物理学, 具体包括: 摩尔二维超晶格和异质结体系的非平庸拓扑性质、库伦相互作用效应、声子和电声耦合效应、输运和光学性质等方面的理论研究, 以及关联金属、磁性拓扑材料等体系的理论研究和第一性原理计算研究等等。刘健鹏在PRL/PRX/PRB、Nature、Science、Nature 子刊、Nat. Rev. Phys. 等期刊发表论文约60篇, 入选中组部国家级青年人才计划, 并主持、参与基金委面上项目、科技部重点研发计划等多个科研项目。

