北京大学量子材料科学中心

International Center for Quantum Materials, PKU

Seminar

Quantum Hall Ferromagnetism in Bilayer Graphene

Prof. Jun Zhu

Penn State University

Time: 10: 00 Am, July 17, 2019 (Wednesday)

时间：2019年7月17日 （周三）上午10:00

Venue: Room W563, Physics building, Peking University

地点：北京大学物理楼，西563会议室

Abstract

In a simple single-particle picture, the Landau levels of Bernal stacked bilayer graphene in a magnetic field carry an eight-fold degeneracy at the charge neutrality point E=0. This large degeneracy originates from its spin, layer/valley and orbital indices and forms a rich playground where anisotropy energies born out of electron-electron interactions and controlled by external experimental knobs compete to form many-body ground states ordered in different degrees of freedom. I will describe the rich phase diagram of filling factor n=0, highlighting a new metallic phase we observed recently [1] and a phenomenological energy diagram inspired by experiments [2]. The ultra-thinness of the two-dimensional electron gas hosted in bilayer graphene, together with our ability to make complex gating structures on the nanometer scale, offers a promising platform to tackle outstanding questions in quantum Hall physics of 2D systems. I will describe our effort in pursuing electron interferometry, starting with a demonstration of gate-controlled transmission of integer quantum Hall edge states [3] followed by more recent progress in quantum point contact interferometry.

[1] J. Li, et al, "Metallic Phase and Temperature Dependence of the nu=0 Quantum Hall State in Bilayer Graphene", *PRL* 122, 097701 (2019)

[2] J. Li et al, “Effective Landau level diagram of bilayer graphene”, *PRL* 120, 047701 (2018)

[3] J. Li et al, “Gate-controlled transmission of quantum Hall edge states in bilayer graphene”, *PRL* 120, 057701 (2018)

About the speaker

Professor Jun Zhu received her PhD from Columbia University in 2003. She was a postdoc fellow in Cornell University from 2003-2005 before joining Penn State University in 2006. She is currently a Professor of Physics at Penn State. Her research interest focuses on the understanding of new physics and device functionalities arising from reduced dimensionality, many-body interactions and the control of new electronic degrees of freedom in nanoscale materials and devices. Her recent research projects explore the electronic properties of van der Waals materials and interferences, with a particular emphasis on valleytronic, topological, and quantum Hall phenomena.