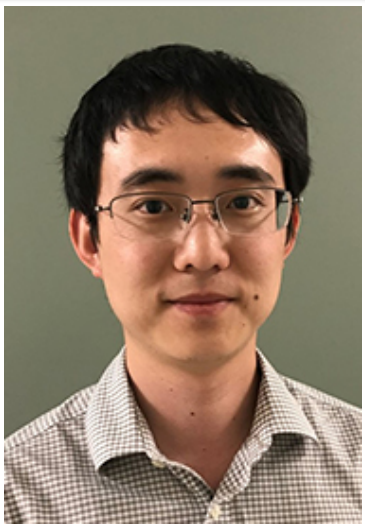
北京大学量子材料科学中心

International Center for Quantum Materials, PKU

Seminar

Probing Topological Valley Physics in Bilayer Graphene



Long Ju

Massachusetts Institute of Technology

Time: 14:00pm, Jan. 8, 2019 (Tuesday)

时间：2019年1月8日 （周二）下午14:00

Venue: Room W563, Physics building, Peking University

地点：北京大学物理楼，西563会议室

Abstract

Graphene has been a model solid state system where novel quantum phenomena emerge from the interplay between symmetry, band topology and reduced dimensionality. In particular, AB-stacked bilayer graphene has a unique bandstructure with an electrically tunable bandgap and a valley-dependent Berry phase. These features result in unusual electrical and optical properties, for which optical spectroscopy/microscopy are powerful characterization tools. In this talk, I will first show our experimental demonstration of the topological valley transport at AB/BA stacking domain walls in bilayer graphene. By combining near field infrared nanoscopy with low temperature electron transport, we showed that a 1D conducting channel exists at this structural domain wall, which can be attributed to the quantum valley Hall edge states in gapped bilayer graphene. Moreover, I will present our recent efforts on probing the excitons in bandgap-tuned bilayer graphene through advanced optical spectroscopy tools. I will show that due to the electron pseudospin and Berry curvature effects, these excitons obey distinct valley-dependent optical selection rules from that in conventional semiconductors and feature a large valley g-factor of 20 in magnetic field.

About the speaker

Professor Long Ju obtained his BSc degree in Physics from Tsinghua University, Beijing in 2009 and PhD degree in Physics from University of California, Berkeley in 2015. He was Kavli Fellow at Cornell University, Kavli Institute of Nano Science and Laboratory of Atomic and Solid States Physics during 2015-2018. In Jan 2019, Prof. Ju joined the Department of Physics at Massachusetts Institute of Technology as an assistant professor. Research in Prof. Ju's lab focuses on understanding light-matter interactions in novel quantum materials. Of particular interest are atomically thin materials and van der Waals hetero-structures of them. Prof. Ju received Kavli ENSI Thesis Prize Award at UC Berkeley, Pappalardo Fellowship at Massachusetts Institute of Technology and Kavli Fellowship at Cornell University.