北京大学量子材料科学中心

International Center for Quantum Materials, PKU

Seminar

Optical study of Dirac fermions in graphene heterostructures and topological crystalline insulators

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Time: 2:00pm, October 14, 2015 (Wednesday)

时间：2015年10月14日 （周三）下午2:00

Venue: Room W563, Physics Building, Peking University

地点：北京大学物理学院，西楼563会议室

Abstract

Graphene/boron-nitride (BN) heterostructures have emerged as a very promising system for band engineering and exploring new physics in graphene. Our magneto-optical study of Landau levels in graphene/BN heterostructures revealed an intrinsic bandgap of ~ 38 meV (440 K) that is significantly larger than those found in previous experiments and single-particle theories. We also found that the inter-Landau-level transitions of massive Dirac fermions in this system are strongly renormalized by interaction effects. The surface states of topological crystalline insulators (TCI) arise from the topology of the bulk bands and are protected by crystalline symmetries. We investigated the infrared reflectance spectrum of a TCI Pb1-xSnxSe in zero and high magnetic field with alloy compositions in both the trivial and TCI phases. Analysis of the interband Landau level transitions of the TCI phase shows that their bulk bands can be well described by massive Dirac fermions. Moreover, our optical data have revealed several signatures of the surface states in the TCI phase. I will discuss the implications of our results for fundamental studies of Dirac fermions in graphene and topological insulators.

About the Speaker

Dr. Zhiqiang Li received his bachelor's degree in physics from Peking University in 2002, and his Ph.D. in physics from University of California, San Diego in 2008. After working as a postdoctoral researcher in Columbia University for nearly three years, he joined the National High Magnetic Field Lab (USA) as a research faculty in 2011. His recent research focuses on the physics of graphene and topological insulators.