北京大学量子材料科学中心

International Center for Quantum Materials, PKU

Seminar

Quantized signature of chiral Majorana fermions

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Time: 16:00am, November 7, 2017 (Tuesday)

时间：2017年11月7日 （周二）下午 16:00

Venue: Room W563, Physics Building, Peking University

地点：北京大学物理楼 西563

Abstract

In a quantum anomalous Hall insulator coupled to an s-wave superconductor, the surface Dirac fermion at the interface forms a px+ipy type of superconductor, which can accommodate one-dimensional chiral Majorana fermion modes propagating along the edges when the topological order is carefully controlled. Experimental signatures of this mode is captured by the magneto-electric transport measurements in a hybrid system of a quantum anomalous Hall insulator [Cr-doped $(Bi,Sb)_2Te_3$] thin film partially capped by a superconductor layer (Nb). The external magnetic field serves as a "knob" to tune the system into different topological regimes that allow the degenerate and non-degenerate propagation of Majorana edge modes. This tuning was signified as quantized conductance transitions among e^2/h, $0.5e^2/h$, and 0 as the external magnetic field was swept, during which the conductance quantized at $0.5e^2/h$ is the hallmark of the single chiral Majorana fermion phase. This transport signature is reproducible over many magnetic field sweeps and appears at different temperatures, providing a solid signature of the chiral Majorana fermion modes. My recent works regarding the topological antiferromagnetic spintronics using (magnetic) topological insulator will be also discussed.

About the Speaker

Dr. Qing Lin He received his Bachelor's degree from Sun Yat-sen University in 2011, and his Ph.D. degree from Hong Kong University of Science and Technology in 2015. He is now working at University of California, Los Angeles, as a postdoctoral researcher. His main research interests lie in the studies of molecular beam epitaxial growth and characterization of topological (crystalline) insulators, magnetic materials, and superconductor. He also devotes to the optoelectronic and magnetoelectric studies of metallic and semiconductor thin films and nanostructures, including quantum dots, nanowires and nanoribbons, as well as structural and chemical analysis of hetero-interfaces.