



Weekly Seminar

Majorana mode in the vortex core and single-layer FeSe on SrTiO₃ with a superconducting T_c above 100 K



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Time: 4:00pm, Sept. 3, 2014 (Wednesday)

时间: 2014年9月3日 (周三) 下午4:00

Venue: Room 607, Science Building 5

地点: 理科五号楼607会议室

Abstract

In the first part, I will talk about our efforts to identify Majorana fermions in the vortex core of superconducting topological insulators. We systematically investigated the spatial profile of the Majorana mode and the bound quasiparticle states within a vortex in Bi₂Te₃/NbSe₂. While the zero bias peak in local conductance splits right off the vortex center in conventional superconductors, it splits off at a finite distance ~20nm away from the vortex center in Bi₂Te₃/NbSe₂, primarily due to the Majorana fermion zero mode. While the Majorana mode is destroyed by reducing the distance between vortices, the zero bias peak splits as a conventional superconductor again. This work provides strong evidences of Majorana fermions and also suggests a possible route to manipulating them. In the second part, I will talk about a direct transport measurement of high T_c superconductivity in the FeSe/STO system. By *in situ* 4-point probe technique that can be conducted at an arbitrary position of the single-layer FeSe films on STO, we detected superconductivity transition at a temperature above 100 K.

About the Speaker

Dr. Jinfeng Jia graduated from Peking University in 1987. He received his Ph.D in condensed matter physics from the same university in 1992. From 1995 to 1996, he worked as a JSPS post-doc at Institute for Materials Research, Tohoku University, Japan. From 1996 to 2001, he worked as an associated professor at Department of Physics, Peking University. During the time, he worked as a visiting scientist in USA for 3 years. In 2001, he received the "100 Talents Project" of Chinese Academy of Sciences (CAS) and became a professor at Institute of Physics, CAS. From 2006 to 2009, he worked as a professor at Department of Physics, Tsinghua University. In 2009, he became a Cheung Kong Professor at Dept. of Physics, Shanghai Jiaotong University.

Prof. Jia's main research interests include topological insulators and new quantum materials, quantum phenomenon in low-dimensional nano-structures, thin film growth by molecular beam epitaxy. He authored more than 200 papers, including 4 in **Science**, 3 in **Nature Phys.**, 17 in **Physical Review Letters**. He received a number of recognitions, including the Scientific and Technological Progress Award of Chinese State Education Commission (first class, 1997), Chinese National Natural Science Funds for Distinguished Young Scholar (2003), Prize for Advancement in Science and Technology of Beijing (first class, 2003), National Prize for Advancement in Natural Science (second class, 2004), Outstanding Science and Technology Achievement Prize of CAS (2005), National Prize for Advancement in Natural Science (second class, 2011), Group Award for Outstanding Science and Technology Achievement from Qiu Shi Science & Technologies Foundation of Hong Kong, 2011 and Achievement in Asia Award (AAA) (Robert T. Poe Prize) by the International Organization of Chinese Physicists and Astronomers (OCPA, 2013).