北京大学量子材料科学中心

International Center for Quantum Materials, PKU

# 中心系列讲座 ICQM Weekly Seminar Series

## Electrical control of Dirac electron in topological insulators

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**Time: 4:00pm, Apr. 25, 2012 (Wednesday)**

**时间：2012年4月25日 （周三）下午4:00**

**Venue: Room 607, Conference Room A , Science Building 5**

**地点：理科五号楼607会议室**

## Abstract

All-electrical manipulation of electron spin in solids becomes a central issue of quantum information processing and quantum computing. Topological insulator, a strong spin-orbit coupling system, perhaps make it more easy to control the spin transport electrically. In this talk, I will present: (i), Dynamical origin of edge states in topological insulators; (ii) Dirac electron optics [1,2]; (iii) The RKKY interaction mediated by the helical Dirac electrons [3]; (iv) Topological insulator quantum dots [4]; (v) Driving conventional semiconductors into topological insulating phase. [5]

**1**, L. B. Zhang, Kai Chang, X. C. Xie, H. Buhmann and L. W. Molenkamp, New J. Phys. **12**, 083058 (2010).

**2**, L. B. Zhang, F. Cheng, F. Zhai and Kai Chang, Phys. Rev. B **83** 081402(R) (2011); Z. H. Wu, F. Zhai, F. M. Peeters, H. Q. Xu and Kai Chang, Phys, Rev. Lett. **106**, 176802 (2011).

**3**, J. J. Zhu, D. X. Yao, S. C. Zhang, and Kai Chang, Phys. Rev. Lett. **106**, 097201 (2011).

**4**, Kai Chang, and Wen-Kai Lou, Phys. Rev. Lett. **106**, 206802 (2011).

**5**, M. S. Miao, Q. Yan, C. G. Van de Walle, W. K. Lou, L. L. Li, and K. Chang, (unpublished).

## About the speaker

常凯研究员1996年博士毕业于北京师范大学物理系，2000年从比利时回国任中科院半导体所超晶格室百人计划研究员；是国家杰出青年基金获得者。获得2004年国家自然科学二等奖（排名第三）。一直从事半导体基础物理及其器件物理研究，近年来主要研究兴趣集中在拓扑绝缘体和石墨烯方面。