



中心系列讲座 ICQM Weekly Seminar Series

“Exploring and tuning the transport properties of topological insulators”



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Time: 4:00pm, May. 25, 2011 (Wednesday)

时间: 2011年5月25日 (周三) 下午4:00

Venue: Conference Room 607, Science Building 5

地点: 理科五号楼607会议室

Abstract

Topological insulators (TIs) are novel quantum materials with insulating bulk and topologically protected metallic surfaces with Dirac-like band structures. Many of the exotic properties of the topological surface states have been revealed by surface sensitive probes such as ARPES and STM, but the transport properties are complicated by the contribution from bulk states. Molecular beam epitaxy (MBE) is a powerful approach for growing high quality TI films due to its accurate and flexible control of film thickness and chemical composition. In this talk I will present our recent transport studies of few-QL TI films grown by MBE. In the ultrathin limit we found an insulating ground state of the TIs in the presence of weak antilocalization. We propose that this unusual insulating state is induced by the electron interaction effect in disordered TI films. When magnetic impurities are doped into the TI thin film, a crossover between weak localization and weak antilocalization is observed and can be explained by the competition between time-reversal-symmetry (TRS) breaking and topological protection. These results demonstrate the rich physics induced by the interplay between topological protection, electron interaction, and breaking TRS in the topological insulators.

About the Speaker

B.S. in physics from USTC (1998), Ph.D. in physics from Princeton University (2004), Miller fellow at UC Berkeley (2004 to 2007), Professor of physics at Tsinghua University since Dec. 2007. Main research interests include the transport and STM studies of novel low dimensional electronic materials exemplified by the high T_c superconductors and topological insulators. Awards and prizes include the Charlotte Elizabeth Procter Honorific Fellowship from Princeton (2003), Miller fellowship from Berkeley (2004), William L. McMillan Award (2006), Changjiang professorship (2007), Li foundation Heritage award (2008), Outstanding young researcher award from NSFC (2009).