



清华大学高等研究院

Institute for Advanced Study, Tsinghua University

学术报告

Title: Spin Chern Pumping Effect in Topological Insulators

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Venue: Conference Hall 322, Science Building, Tsinghua University

Abstract

Topological insulators (TIs) are a new quantum state of matter discovered recently, which are characterized by unconventional bulk topological invariants: either the Z_2 index or spin Chern numbers. Unlike the first Chern number underlying the quantum Hall effect, up to now these topological invariants have not been directly measurable. Here we report the theoretical discovery of the spin Chern pumping effect, in a two-dimensional TI electrically modulated in adiabatic cycles. In each cycle an amount of spin proportional to the sample width can be pumped into a nonmagnetic electrode, driven by nonzero spin Chern numbers C_{\pm} . Especially, by using a half-metallic electrode, universal quantized charge pumping conductivities $-C_{\pm}e^2/h$ can be measured. This discovery paves the way for direct experimental study and utilization of the robust topological properties of the TIs.