PHYSICS

COLORADO STATE UNIVERSITY

CSU PHYSICS COLLOQUIUM

Spin helical transport in 3D topological insulators

Jifa Tian

University of Wyoming, Department of Physics & Astronomy

October 15, 2018 at 4 p.m.
120 Engineering (Hammond Auditorium)

Abstract

Silicon-based semiconductor technology has been perfectly following the Moore's Law scaling for decades. However, as the silicon transistors approach their fundamental physical limits, tremendous efforts have been prompted to explore transistors based on many "emerging" 2D materials that may replace or supplement Si in future electronics and computing devices. Recent years, 3D topological insulators have attracted strong interest, owing to their nontrivial spin-momentum locked topological surface states. On the surfaces of TI materials, electrons with real spin can behave as massless Dirac fermions that mimic ultra-relativistic quantum particles, leading to a host of interesting electronic properties and potential applications in nanoelectronic and spintronic devices. In this talk, I will describe a few experiments we performed on topological insulators that illustrate the key electronic properties of these "Dirac materials". In particular, I will focus on our recent progress on spin transport measurements in 3D topological insulator-based nanostructures.

Biography

Jifa Tian is an Assistant Professor of Physics and Astronomy at University of Wyoming. In 2009, he received his Ph. D. from the Institute of Physics & the University of Chinese Academy of Sciences (UCAS), CAS, China. He did his postdoc at Purdue University and worked as a guest researcher at the National Institute of Standards and Technology (NIST, Gaithersburg). He joined the University of Wyoming in 2018, and his research field is experimental condensed matter physics, nanophysics, and nanotechnology. His current research interest focuses on studying the novel electronic properties of quantum materials (including graphene, 3D topological insulators, and many other novel 2D materials and their heterostructures) and their potential applications in quantum engineering and nanotechnology.