

Joint CQSE and CASTS Seminar

Weekly Seminar
Oct. 14, 2016 (Friday)

TIME Oct. 14, 2016, 14:30 ~ 15:30
TITLE Spin transport manipulation in Dirac materials
SPEAKER Dr. Ioannis Kleftogiannis
Department of Physics, National Taiwan University
PLACE Rm716, CCMS & New Physics Building, NTU

Abstract

Dirac materials, two dimensional graphene-like crystal structures, are currently at the forefront of research in condensed matter physics due to their unique and unconventional properties. Several confined structures are possible like long stripes known as nanoribbons, resembling quantum wires, or nano-flakes which resemble quantum dots. The confinement effects in these systems are crucial for their electronic properties and result in topological effects like the edge states according to their detailed boundary morphology. I will present two ways of possible manipulation of the spin-dependent quantum transport in Dirac materials by using either nanoribbons or flakes, in combination with external electric and magnetic fields and intrinsic spin-orbit coupling. Particularly, I will show a way to realize a spin-switch via evanescent scattering through quasi-bound states residing at the band edges of Dirac nanoribbons, via spin-flip and spin-nonflip band transitions. Also, I will show that a geometrical manipulation of the spin transport is possible in Dirac flakes based on their shape, via helical edge states.

