

Joint CQSE and CASTS Seminar

Weekly Seminar
Nov. 2, 2012 (Friday)

TIME Nov. 2, 14:30 ~ 15:30
TITLE Valley-orbit interaction based valleytronics in graphene:
Applications in quantum computing / communications / FETs
SPEAKER Prof. Yu-Shu Wu
Department of Electrical Engineering, National Tsing Hua
University
PLACE Rm716, CCMS & New Physics Building, NTU

Abstract

We review the recent theoretical development in valley-orbit interaction based quantum devices in graphene, with emphasis on the principles underlying the devices. The unique physical mechanism of valley-orbit interaction in gapped graphene is discussed. Being strong and valley-conserving, this mechanism is well suited to electrical manipulation of the valley degree of freedom in electrons. We discuss two important applications based on this mechanism, namely, 1) valley pair qubits in coupled graphene quantum dots, to build quantum networks consisting primarily of graphene and photons, and 2) valley FETs consisting of graphene quantum wires (channels) and armchair graphene nanoribbons (sources and drains), to build graphene-based, low-power FET circuits.

G. Y. Wu,[1,2,*] N.-Y. Lue,[1] M.-K. Lee,[1] and L. Chang[3]

1. Department of Physics, National Tsing-Hua University, Hsin-Chu, Taiwan 30013

2. Department of Electrical Engineering, National Tsing-Hua University, Hsin-Chu, Taiwan 30013

3. Department of Electrophysics, National Chiao-Tung University, Hsin-Chu, Taiwan 30013

