



Weekly Seminar

Quantum transport for non-equilibrium states and topological phases under microwave irradiation and/or high magnetic fields

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Time: 4:00pm, June 14, 2017 (Wednesday)

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4:00

Venue: Room W563, Physics building, Peking University

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Abstract

In high quality two-dimensional electron (or hole) systems, novel electron states and phenomena can be revealed by microwave (MW) techniques: (1) In the study of the quantum capacitances of the microwave induced resistance oscillations (MIRO) and related zero resistance states (ZRS), anomalies at ZRS may emerge from the current domains or inhomogeneity under MW. (2) Robust multi-photon process induced oscillations and Shubnikov-de Haas (SdH)-like oscillations (ac-HIRO) are observed under low frequency MW ($f < 10$ GHz). The oscillations of MIRO, dc-HIRO and ac-HIRO can be explained in the frame of tunneling junction model. (3) B -periodic edge-magneto-plasmon (EMP) oscillations and extra-large effective mass exist in a high density hole system.

When topological matters are studied under high magnetic fields or MW, (1) the coexistence of two sets of quantum oscillations from surface states and one set of oscillations from bulk state in Bi_2Se_3 provides a method to study the topological surface states in topological insulator; (2) in Weyl semimetals, a novel phase transition occurs at the quantum limit; (3) research on the weakly pinned Wigner crystal (WC) in a 2D hole system solved the long-sought question concerning the WC domain size; (4) spin injection and inverse Edelstein effect are observed in our collaborative study on SmB_6 .

About the speaker

Chi Zhang received his Bachelor Degree of Physics from the University of Science and Technology of China (USTC) in 2004. In 2010, he received his Ph. D. of Physics from Rice University. Dr. Zhang worked as a post-doctoral researcher at Department of Electric Engineering at Princeton University from 2010 to the fall of 2011. He is currently an assistant professor at International Center for Quantum Materials (ICQM) at Peking University. His research interests are focused on the quantum transport of two-dimensional electron (and hole) gas, the topological matters, and the non-equilibrium states under microwave (radio-frequency).