北京大学量子材料科学中心

International Center for Quantum Materials, PKU

Special Seminar

Charge and spin diffusion on the metallic side of the metal-insulator transition: a self-consistent approach

Prof. Rodolfo A. Jalabert

Strasbourg University

Time: 10:00am, July 17, 2018 (Tuesday)

时间：2018年07月17日 （周二）上午10:00

Venue: Room W563, Physics building, Peking University

地点：北京大学物理楼，西563会议室

Abstract

A self-consistent theory, describing the spin and spatial electron diffusion in the impurity band of doped semiconductors under the effect of a weak spin-orbit coupling, is presented. The low-temperature spin-relaxation time and diffusion coefficient are calculated within different schemes of the self-consistent framework. It is shown that, for the case of the electron conductance in the impurity band, the Dresselhaus spin-orbit coupling provides the dominant spin relaxation mechanism in a wide class of zinc-blende semiconductors. The results are then universal and account for the measured spin-relaxation times of materials with very different physical parameters. The Dresselhaus coupling is shown to also play a key role in the spin-relaxation of wurtzite materials, yielding values that compare favorably with existing experiments and that are tunable through an external potential. Furthermore, the Dresselhaus coupling determines the electronic states and spin-relaxation rates in nanowire-based wurtzite semiconductor quantum dots.

About the speaker

Prof. Rodolfo A. Jalabert obtained his Ph.D. in Condensed Matter Physics from the University of Maryland (College Park, USA) in 1989. He performed post-doctoral work between 1989 and 1994 at Yale University, the French Atomic Energy Commission and the Nuclear Physics Institute (Orsay, France). In 1994 he joined Strasbourg University, where he is now Distinguished Professor of Physics and Deputy Director of the Institut de Physique et Chimie des Matériaux de Strasbourg. He has worked on quantum mesosocopic transport, conductance through strongly correlated systems, optical properties and collective excitations of nano-objects, spin relaxation in semiconductors, quantum chaos and random matrix theories, as well as decoherence and reversibility in small quantum systems.