Seminar

Dissipation in Quantum tunneling: A Platform for Quantum Phase Transitions and A Majorana Signature Filter

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Time: 4:00 pm, May.22, 2014 (Thursday)
时间: 2014年5月22日（周四）下午 4:00
Venue: Conference Room A (607), No. 5 Science Building
地点: 理科五号楼607会议室

Abstract

When a tunnel barrier is in contact with resistive leads, the electromagnetic excitations in the leads provide a bosonic bath. In Nano-electronic circuits, the quantum fluctuations couple to such a bath and induce quantum dissipation effects. We first study tunneling through a resonant level connected to dissipative baths. We show that several quantum phase transitions (QPT) occur in such a model, transitions which emulate those found in interacting systems such as Luttinger liquids. For strong dissipation, a BKT QPT separates strong-coupling and weak-coupling phases. In the source-drain symmetric case, all relevant backscattering processes disappear at strong coupling, leading to perfect transmission at zero temperature. We also find a second order QPT occurs as a function of the coupling asymmetry or energy of the resonant level. Inspired by the result above, I secondly consider the dissipative tunneling (by using resistive electrodes) into a Majorana fermion (FM) zero mode. I find that the ways that the dissipation effects renormalize the tunneling conductance is significantly different for MFs and other cases: 1) The Majorana zero-bias peak the topological
equilibrium stationary states, i.e. Floquet states. I will talk about the recent
oblems on this topic.

About the Speaker

Dong E. Liu
EDUCATION
Ph.D.in Condensed Matter Theory, Duke University 08/2006~05/2012
B.S.in Physics, Department of Physics, Peking University, China 09/2001~06/2005
RESEARCH EXPERIENCE
PostDoc Researcher: Microsoft Research Station Q, **prospective** 07/2014-07/2016
PostDoc Associate: Michigan State University, with Prof. M. Dykman and A. Levchenko 08/2012~05/2014
Research Assistant: Duke University, with Prof. H.U. Baranger 05/2007~05/2012
RESEARCH INTERESTS
Majorana Fermions and Topological Superconductors, One-Dimensional Interacting Electron Liquids, Non-Equilibrium (Floquet) Topological States, Thermalization and Relaxation in non-Equilibrium Interacting systems, Strongly Correlated Low-Dimensional Systems, Nano-Mechanical System.