



清华大学高等研究院

Institute for Advanced Study, Tsinghua University

物理学学术报告

Physics Seminars (biweekly)

Title: Quantum Impurities - A Challenge for Quantum Simulation with Ultracold Atoms

Speaker: Richard Schmidt
*Institute for Theoretical Atomic, Molecular and Optical Physics,
Harvard-Smithsonian Center for Astrophysics
Harvard University*

Time: 4:00pm, Wednesday, Oct 29, 2014
(3:30~4:00pm, Tea, Coffee, and Cookie)

Venue: Conference Hall 322, Science Building, Tsinghua University

Abstract

In this talk we review our recent work on quantum impurities. In particular I will focus on the Bose polaron, an impurity strongly interacting with a Bose-Einstein condensate. In our work we make predictions for the Bose polaron's spectral function and its various quasiparticle properties using a field-theoretic approach that can be tested in experiment. We find that most of the spectral weight is contained in a coherent attractive and a metastable repulsive polaron branch. Additionally we show that the qualitative behavior of the Bose polaron is well described by a non-selfconsistent T-matrix approximation by comparing analytical results to numerical data obtained from a fully self-consistent T-matrix approach. The latter takes into account an infinite number of bosons excited from the condensate. Also we discuss how our results can be tested in experiment using radio frequency spectroscopy. Finally we comment on the implications of our results for an attempted quantum simulation of the Froehlich Hamiltonian using ultracold atoms.