

凝縮系物理学ゼミナール

Condensed Matter Seminar

Location: Room 413, School of Science Bldg. 5 (理学 5 号館 413 号室)

Date: 13:30-15:00, Wednesday, 13 June 2012

A spin-selective Kondo-insulator – The ferromagnetic state in the Kondo lattice model

Speaker: **Dr. Robert Peters** (Kyoto University)

Abstract:

The Kondo lattice model has been intensively studied for the last thirty years as a fundamental model for heavy fermions, Kondo insulators, and transition metals, e.g. the manganites. Yet, the understanding is far from complete.

In this talk I will analyze in detail the ferromagnetic state in the Kondo lattice model. We found that even in the ferromagnetic state for low fillings, Kondo screening plays an essential role in stabilizing the ferromagnetic state at zero temperature leading to very interesting properties: while the majority-spin electrons are metallic, the minority-spin electrons form an insulating state. The gap in the spectral function can be traced back to the existence of a commensurate situation for the minority electrons, which is produced by a cooperation between the conduction electrons and the localized spins.

I will examine the properties of this ferromagnetic state in infinite dimensions using dynamical mean field theory as well as in one dimension using the density matrix renormalization group. Establishing the properties of this ferromagnetic state in infinite and one dimension, we believe that this intriguing state is ubiquitous for the antiferromagnetic coupled Kondo lattice model.

Reference:

R. Peters, N. Kawakami, and T. Pruschke: Phys. Rev. Lett. 108, 086402 (2012).