

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, 31 October 2018

“Interplay between Charge, Magnetic and Superconducting Order in a Kondo Lattice with an Attractive Hubbard Interaction”

Speaker:

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Abstract:

We investigate the competition between superconductivity, charge-ordering, magnetic-ordering, and the Kondo effect in a heavy fermion s-wave superconductor described by a Kondo lattice model with an attractive on-site Hubbard interaction. The model is solved using the real-space dynamical mean field theory (RDMFT). For this purpose we develop a numerical renormalization group (NRG) framework in Nambu space, which is used to solve the superconducting impurity problem. This extended NRG scheme also allows for SU(2) spin symmetry broken solutions, enabling us to examine the competition or cooperation between s-wave superconductivity and incommensurate spin density waves (SDWs). At half filling, we find a novel intriguing phase where the magnetic ordering of the f -electrons lifts the degeneracy between the charge density wave (CDW) state and the superconducting (SC) state, leading to a strong suppression of superconductivity. In addition, the system may also become a half metal in this parameter regime. Away from half filling, the CDWs vanish and are replaced by superconductivity combined with incommensurate SDWs up to moderate Kondo couplings to the f -electrons. We find that both CDWs as well as superconductivity enhance magnetic ordering due to the suppression of Kondo screening.