Partial Disorder in the Periodic Anderson Model on a Triangular Lattice

S. Hayami, M. Udagawa, and Y. Motome

Department of Applied Physics, University of Tokyo, Tokyo, Japan

Rare-earth compounds exhibit many fascinating behaviors, such as heavy quasi-particle formation, superconductivity, and non-Fermi liquid behavior. In these systems, two competing interactions originating from the interplay between localized electrons and conduction electrons play an important role, i.e., the Ruderman-Kittel-Kasuya-Yosida(RKKY) interaction and the Kondo coupling. The former tends to stabilize magnetic ordering and the latter leads to screening of the localized moments by spin-singlet formation. Their competition gives rise to a quantum critical point(QCP), and enhanced fluctuations near QCP are the source of the interesting behaviors. In the present study, as a new paradigm for the QCP-related phenomena, we investigate the effect of geometrical frustration in the competing region. We study the ground-state phase diagram for the periodic Anderson model at half-filling on a triangular lattice within the Hartree-Fock approximation, and find a partial-disordered(PD) state between a RKKY-driven non-collinear antiferromagnetic metal and a Kondo insulator[1]. The PD state is stabilized by releasing the frustration with self-organizing the system into the coexistence of collinear antiferromagnetic order on an unfrustrated honeycomb subnetwork and nonmagnetic state at the remaining sites. We discuss the nature of the PD state in detail, in comparison with the previous result for the Kondo lattice model[2].

[1]S. Hayami, M. Udagawa, and Y. Motome, preprint.
[2]Y. Motome, K. Nakamikawa, Y. Yamaji, and M. Udagawa, Phys. Rev. Lett. **105**, 036403 (2010).