

# 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, 30 May 2012

### Study in the strong-coupling model on the coexistence of superconductivity and antiferromagnetism induced by paramagnetic pair-breaking

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#### Abstract:

In the high-field low-temperature phase (HFLT phase) of a heavy fermion superconductor CeCoIn<sub>5</sub>, where a long-sought FFLO state is thought to be realized, antiferromagnetic (AFM) order is observed, but not in a normal phase or a usual SC phase [1]. In our previous study in the weak-coupling BCS model [2-3], we found that AFM order is induced in a d-wave SC phase in high-field region by paramagnetic pair-breaking (PPB), and this mechanism explains this unusual AFM ordering within the HFLT phase. However, because strong-coupling superconductivity is realized in CeCoIn<sub>5</sub>, strong-coupling effects must be included in a realistic theory. In this talk, we report our recent result on the PPB-induced AFM ordering in a strong-coupling SC phase obtained by applying FLEX approximation to the Hubbard model including paramagnetic effect. We found that PPB-induced AFM ordering is realized in strong-coupling SC and the similar mechanism as the weak-coupling model is responsible for it. We also found that the region where AFM ordering is enhanced by SC order is expanded by strong-coupling effects.

#### Reference:

- [1] M. Kenzelmann et al., Science 321, 1652 (2008).
- [2] R. Ikeda, Y. Hatakeyama and K. Aoyama, Phys. Rev. B 82, 060510 (2010).
- [3] Y. Hatakeyama and R. Ikeda, Phys. Rev. B 83, 224518 (2011).