

# 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, 9 May 2012

### Diagonal composite order induced by Kondo effect in non-Kramers f-electron systems

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#### Abstract:

Localized f electrons with an even number per site can have a non-Kramers-doublet ground state as in Pr- or U-based compounds. This non-Kramers system is expected to show interesting behaviors different from ordinary Kramers system such as Ce-based compounds with one f electron per site. When the non-Kramers doublet couples with conduction electrons with orbital degeneracy, a two-channel Kondo system can be realized [1]. The two-channel Kondo impurity has residual entropy in the ground state. Then the two-channel Kondo lattice (2ch KL) should undergo some phase transitions. By combining the dynamical mean-field theory with continuous-time quantum Monte Carlo method, we report on a novel symmetry breaking between channels in the 2ch KL at half filling [2]. Even though the channel symmetry is broken in the ordered phase, the channel moment is zero. Instead, the ordered state is characterized by a composite quantity representing the channel selective Kondo effect. This composite order is the first explicit example of odd-frequency order other than off-diagonal order (superconductivity), and is a candidate of hidden order in f-electron systems.

#### Reference:

[1] D. L. Cox and A. Zawadowski: Adv. Phys. **47**, 599 (1998).

[2] S. Hoshino, J. Otsuki and Y. Kuramoto: Phys. Rev. Lett. **107**, 247202 (2011).