

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, 16 October 2013

“Disorder induced charge-density-wave/superfluid transition in multicomponent Fermi systems”

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Abstract:

In cold atomic systems, multicomponent Fermi systems are realized.[1,2] The interaction between the particles which compose such systems are isotropic, and thus these systems are expected to play a role as a quantum simulator of $SU(N)$ -symmetric systems. Also, optical lattices with disorder have been experimentally realized.[3] By loading multicomponent fermions into a disordered optical lattice, one can experimentally investigate $SU(N)$ -symmetric systems with disorder.

In this research, we investigate multicomponent Fermi systems with disorder using the Bogoliubov-de Gennes approach. The charge correlation function and the distribution function of the superfluid order parameter are calculated. From the disorder average of these quantities, we find that disorder triggers the charge-density-wave/superfluid transition and makes a superfluid stable. We discuss the properties of this transition from the disorder-averaged density of states and the distribution function of the local particle number density.

References:

[1] E. R. I. Abraham, *et al.* : Phys. Rev. A **55**(1997)R3299.

[2] S. Taie, *et al.* : Nat. Phys. **8**(2012)825.

[3] J. Billy *et al.* : Nature **453**(2008)891.