

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, 19 April 2017

“Spin and orbital fluctuations and pairing mechanisms of iron-based superconductors”

Speaker:

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Abstract:

Iron-based superconductors have been extensively studied as a complex multi-orbital system. Despite numerous efforts, the origin of pairing mechanism remains unknown.

Recently, angular resolved photoemission spectroscopy and quantum oscillation measurements [1] on FeSe reveal that the hole-pocket around Γ -point is pushed downward under the Fermi energy. To address this issue, we investigate the electronic state, the spin and orbital fluctuations, and the superconductivity in 16-band d - p model within the dynamical mean-field theory. We find that the dissipation of a shallow hole-pocket occurs by the orbital-dependent Coulomb interaction, which is corresponding to the recent experiment [1]. Furthermore, inter-site Coulomb interaction between iron d orbitals and selenium p orbitals drives an orbital order in absence of the low-energy spin response. We examine the superconducting gap structure in the orbital ordered phase by using the linearized Eliashberg equation, and find that the nodal-like s_{\pm} -wave pairing is realized owing to the d_{yz} orbital component of the spin fluctuation.

We also discuss the pressure-temperature phase diagram of FeSe.

References:

[1] M. D. Watson *et al.*, PRB **91**, 155106 (2015).