

Mechanism of nematic order in multiorbital Hubbard models

Prof. Hiroshi Kontani

(University Nagoya, Japan)

Abstract:

Recently, nematic order states had been discovered in various strongly correlated metals such as iron-based superconductors and Sr₃Ru₂O₇. Interestingly, many of these materials exhibit unconventional superconductivity, suggesting that the fluctuations of the nematic order parameter would cause the superconductivity. Here, we study this issue beyond the mean-field approximation. We calculate the vertex correction (VC) for the irreducible susceptibility in various multiorbital Hubbard models [1,2,3]. Near the magnetic quantum critical point, it is found that strong ferro- and antiferro-orbital fluctuations are induced by the VC in both iron-based superconductors and Sr₃Ru₂O₇. The divergence of the ferro-orbital fluctuations gives the orbital nematic state in these materials.

[1] S. Onari and H. Kontani, Phys. Rev. Lett. 109, 137001 (2012).

[2] Y. Ohno, M. Tsuchiizu, S. Onari, and H. Kontani, arXiv:1209.3629.

[3] M. Tsuchiizu, S. Onari, and H. Kontani, arXiv:1209.3664.