Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

p-Orbital Density Wave with d Symmetry in High-Tc Cuprate Superconductors MASAHISA TSUCHIIZU, YOUICHI YAMAKAWA, HIROSHI KONTANI, Nagoya University — Emergence of the nematic density wave is a fundamental unsolved problem in cuprate superconductors. To understand the origin of the nematicity, we employ the recently-developed functional renormalization-group method with high numerical accuracy, and discover the critical development of the p-orbital-density-wave (p-ODW) instability in the strong-spin-fluctuation region [1]. The obtained p-ODW state possesses the key characteristics of the charge ordering pattern in Bi- and Y-based superconductors, such as the wavevector parallel to the nearest Cu-Cu direction, and the d-symmetry form factor with the antiphase correlation between p_x and p_y orbitals in the same unit cell. From the beautiful scaling relation between the spin susceptibility and the p-ODW susceptibility, we conclude that the p-ODW is driven by the strong interference between spin and charge fluctuations. It is clarified that the strong charge-spin interference, which is the origin of the nematicity, is the hidden but significant characteristics of the electronic states in cuprate superconductors.
[1] M. Tsuchiizu, Y. Yamakawa, and H. Kontani, arXiv:1508.07218.

Masahisa Tsuchiizu
Nagoya University

Date submitted: 06 Nov 2015 Electronic form version 1.4