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Functional-Renormalization-Group Analysis on Electron Nematic State in Cuprate Superconductors MASAHISA TSUCHIIZU, KOUKI KAWAGUCHI, YOUICHI YAMAKAWA, HIROSHI KONTANI, Department of Physics, Nagoya University, Japan — To elucidate the nematic phase transition recently observed at the pseudogap temperature T^* in cuprate superconductors, we study the charge susceptibilities by utilizing the improved functional-renormalization-group method [1] to the d-p Hubbard model. We reveal that the most dominant charge fluctuation is the uniform ($q = 0$) charge modulation on the p_x and p_y orbitals with antiphase (d-symmetry) form factor. The spontaneous symmetry breaking with respect to the occupation of p_x and p_y orbitals with the wavevector $q = 0$ accounts for the electronic nematic phase transition at T^* in cuprates. In addition, we find that the p-orbital density wave instability at the wavevector $Q_{\rm a} \approx (0.3\pi, 0)$ is further enhanced by the presence of the $q = 0$ nematic ordering, consistently with experimental observations of the density-wave states inside the pseudogap region.
[1] M. Tsuchiizu, Y. Yamakawa, H. Kontani, Phys. Rev. B **93**, 155148 (2016).

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