



# Theory Lecture



Prof. T. Tohyama (Tokyo Univ of Science)

“Dynamical properties of strongly correlated electron systems studied by the density-matrix renormalization group (DMRG)”

Feb. 29 (Mon.) 13:30 ~

Meeting Room 5, 1st Bldg (研究1棟第5会議室)

The density-matrix renormalization group (DMRG) is known to be a powerful numerical technique to study the ground state of one-dimensional strongly correlated electron systems. We have been developing this technique into a useful tool for the study of dynamical properties not only in one dimension but also in two dimensions. We report recent two achievements obtained by performing DMRG calculations on K-computer. One is the topic of optical responses in one-dimensional Mott insulators coupled to phonon degrees of freedom [1]. We calculate the linear optical absorption and third-harmonic generation, and find that the spin degrees of freedom plays an important role in low-energy dynamics in optical response. The other is the momentum-resolved spin and charge dynamics in cuprate high-temperature superconductors. We find that an electron-doped system enhances small-momentum low-energy dynamical charge structure factor, whose energy is lower than that of spin excitation. This indicates a nontrivial mechanism of charge-spin coupling in electron-doped cuprate superconductors.

[1] S. Sota, T. Tohyama and S. Yunoki, J. Phys. Soc. Jpn. 84, 054403 (2015).

[2] T. Tohyama, K. Tsutsui, M. Mori, S. Sota, and S. Yunoki, Phys. Rev. B 92, 014515 (2015).

Contact: M. Mori (ext 3508)

