

Enhanced charge excitations in electron-doped cuprates by resonant inelastic X-ray scattering

Takami Tohyama^{*1}

¹Department of Applied Physics, Tokyo University of Science, Tokyo 125-8585, Japan

Resonant inelastic x-ray scattering (RIXS) tuned for Cu L edge is a possible tool to detect momentum-dependent intra-orbital charge excitations in cuprate superconductors [1,2]. We theoretically investigate the possibility for observing the low-energy charge excitation with the same energy scale as spin excitation by RIXS [3]. We find that the core-hole Coulomb potential enhances the spectral weight of the charge excitation in electron-doped systems. Furthermore, from a large scale density-matrix renormalization group calculation, we find that the 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 and superconductivity in electron-doped cuprates. This work has been done in collaboration with Kenji Tsutsui, Michiyasu Mori, Shigetoshi Sota, and Seiji Yunoki.

*Corresponding author: tohyama@rs.tus.ac.jp