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**Theory of Cu K-edge Resonant Inelastic X-ray Scattering in Cuprates.** KENJI TSUTSUI, TAKAMI TOHYAMA, SADAMICHI MAEKAWA, IMR, Tohoku Univ., Sendai 980-8577, Japan — Resonant inelastic x-ray scattering (RIXS) has received much attention as a powerful technique to investigate elementary excitations in strongly correlated electron systems. In particular, the momentum-dependent spectra of Cu K-edge RIXS in high-Tc cuprates have been obtained by several experimental groups. The knowledge of these excitations across the gap as well as single-particle excitations is of importance for understanding the electronic properties in cuprates. We demonstrate theoretically momentum dependences of the RIXS in insulating and doped cuprates. The RIXS spectra are calculated by using the exact diagonalization techniques on small clusters in two-dimensional Hubbard models with 1s-core bands. In the insulating case, we find the anisotropic momentum dependence in the RIXS spectrum. The dependence is explained by the particle-hole excitations in which the antiferromagnetic correlation of the ground state plays a crucial role. Upon hole-doping, the spectrum from the lower Hubbard band to the upper Hubbard band becomes broad and less momentum dependent. This is in contrast to the case of electron-doping, where the momentum dependence of the spectrum in the undoped system remains, except that along the <1,0> direction. The difference in the spectra between hole- and electron-doped systems follows the carrier-dependence of short-range AF spin correlations.

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