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Photo-induced Ultra-fast Carrier Dynamics in a Mott Insulator with Antiferromagnetic Long-range Order SUMIO ISHIHARA, Department of Physics, Tohoku University, EIKI IYODA, Department of Basic Science, The University of Tokyo — We study transient dynamics of hole carriers injected into a Mott insulator with antiferromagnetic long-range order, motivated from the recent optical pump-probe experiments in high-Tc superconductors. This is termed ?dynamical hole doping? in contrast to the chemical hole doping. The theoretical framework for the transient carrier dynamics is presented based on the two-dimensional t-J model [1]. The time dependencies of the optical conductivity spectra, as well as the one-particle excitation spectra, are calculated based on the Keldysh Green's function formalism, associated with the self-consistent Born approximation. In the early stage, the Drude component only appears, and then incoherent components originating from hole-magnon scattering start to grow. Fast oscillatory behavior owing to coherent magnon and slow relaxation dynamics are confirmed in the spectra. The time profiles are interpreted as doped bare holes being dressed by magnon clouds and relaxed into spin polaron quasiparticle states.. Implications for recent pump-probe experiments are discussed. [1] E. Iyoda, and S. Ishihara, Phys. Rev. B 89, 125126 (2014).

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