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Photo excited state in spin-charge coupled correlated electron system SUMIO ISHIHARA, YU KANAMORI, Department of Physics, Tohoku University, HIROAKI MATSUEDA, Sendai National Colledge of Technokogy, JUN OHARA, Department of Physics, Tohoku University — Recent ultrafast optical techniques open up a new frontier for research of the phase transition. Photo-induced phase is transient and highly nonequilibrium. photo-induced phenomena in correlated electron systems offer large possibility of new hidden phases which do not realize in the thermal equilibrium state, and prompt several theoretical challenges. In this talk, I will talk about recent our theoretical results for the photo-induced phase transition in correlated electron systems. We study the photo-induced spin state change in itinerant correlated electron system, motivated from the experiments in perovskite cobaltites [1]. The effective models before and after photon-pumping are derived from the two-orbital Hubbard model and are analyzed by the exact diagonalization method. When a photon is introduced in the low-spin band insulator, we found a spin-polarized bound state of photo-excited hole and the high-spin state. This bound state directly reflects the optical pump-probe spectra. These results well explain the recent femtosecond spectroscopy experiments in perovskite cobaltites We also show the unusual double-exchange interaction in photo excited state.

[1] Y. Kanamori, H. Matsueda and S. Ishihara, Phys. Rev. Lett. 107, 167403-1-5 (2011)

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