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Photo induced spin-state change in itinerant correlated electron systems SUMIO ISHIHARA, YU KANAMORI, Tohoku University, HIROAKI MATSUEDA, Sendai National College of Technology — Recently developed ultrafast optical techniques open up a new frontier for research of the phase transition. This is the so-called photo-induced phase transition (PIPT). The spin-state transition between different magnitudes of the spin-angular moment is one of the targets. In particular, the photo-induced spin-state transition is seen in the cobalt oxides with a perovskite structure. The ultrafast optical measurements in the low-temperature low-spin insulators show transient metallic spectra which are completely different from the spectra in the high-temperature high-spin phase. We study theoretically the photo-induced spin-state change in itinerant correlated electron systems. We derive the model Hamiltonians where numbers of photo-excited electron-hole pair are fixed. A bound state of the photo-doped hole and the high-spin state are created inside of the low-spin sites. This bound state brings about a characteristic peak structure in the optical pump-probe spectra which are completely different from the spectra in thermally excited states. The present theory provides a possible scenario in recently observed photo-induced hidden state in perovskite cobaltites.

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