Magnetic fluctuations of filled skutterudites emerging in the transition region between singlet and triplet states

TAKASHI HOTTA, Advanced Science Research Center, Japan Atomic Energy Research Institute — In order to clarify magnetic properties of filled skutterudites, we investigate the Anderson model including seven $f$ orbitals hybridized with $a_{u}$ conduction band. By using the numerical renormalization group method, we evaluate magnetic susceptibility and entropy of $f$ electron for $n=1$~$13$, where $n$ is local $f$-electron number. Then, we find that $f$-electron states are clearly distinguished as itinerant $\Gamma_{7}$ and localized $\Gamma_{8}$ in the filled skutterudite structure. For $n=2$ corresponding to Pr-based filled skutterudites, even if the ground state is $\Gamma_{1}$ singlet, there remain significant magnetic fluctuations from $\Gamma_{4}^{(2)}$ triplet state with small excitation energy. We envision a scenario that unconventional superconductivity is induced by such magnetic fluctuations in a limited region in which singlet and triplet states are interchanged.