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 $n=1\sim13$, 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.

Takashi Hotta
Advanced Science Research Center, Japan Atomic Energy Research Institute

Date submitted: 30 Nov 2004

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