Novel Properties in Strongly Correlated Electron System

Professor Ko-ichi Magishi

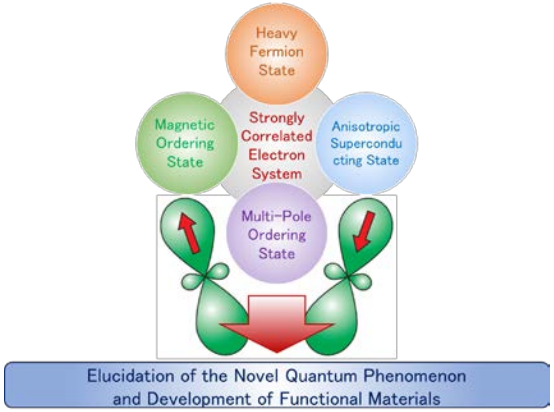

Fig.1 Various physical properties in strongly correlated electron system

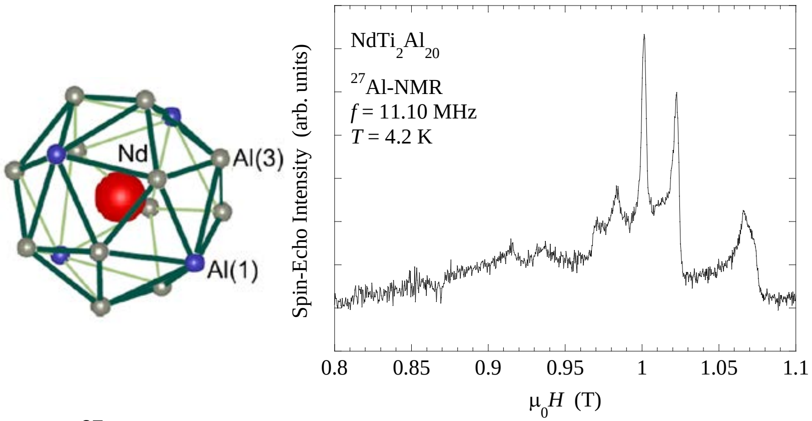

Fig.2 ^{27}Al-NMR spectrum of caged compound $NdTi_2Al_{20}$

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The materials show a variety of physical properties, and the intermetallic compound including rare earth elements is known to show specific quantum phenomena such as a heavy-fermion state or anisotropic superconductivity caused by strong repulsive force between 4f electrons, called a strongly correlated electron system (Fig.1). It is expected to discover novel properties of physical phenomena by understanding the details of microscopic electronic states.

For example, the various properties of the caged compound are caused by the interaction between the 4f electrons of the rare earth elements in the cage, and show specific quantum states such as a heavy-fermion state or multi-pole ordering state. It is important to clarify the microscopic electronic states using the nuclear magnetic resonance (NMR) method. The NMR spectrum reflects the microscopic electronic states (Fig.2), and we can obtain the information for each site. We make use of this characteristic and investigate the microscopic origin of the novel quantum states.

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E-mail: magishi@tokushima-u.ac.jp
Tel. +81-88-656-7230
Fax. +81-88-656-7230