

Possible Low-energy Excitations of Multipoles in Filled Skutterudite Compound $\text{SmRu}_4\text{P}_{12}$

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The filled skutterudite compound $\text{SmRu}_4\text{P}_{12}$ exhibits a metal-insulator (MI) transition at $T_{\text{MI}} \sim 16.5$ K. An entropy release $\sim R \ln 4$ below T_{MI} suggests that the crystalline-electric-field ground state is a Γ_{67} quartet with various multipole degrees of freedom. A spontaneous local field was detected below T_{MI} by zero field μSR [1,2], indicating that a magnetic multipole ordering occurs at T_{MI} . A possibility of magnetic octupole ordering has been intensively discussed to explain anomalous elastic properties, field-temperature phase diagram, and suppressed dipole moment [3,4].

We performed μSR measurements on single crystalline samples of $\text{SmRu}_4\text{P}_{12}$ to investigate the nature of the multipoles in the ordered state. We observed remarkable longitudinal relaxation in the ordered state, the magnitude of which was reduced below $T' \sim 3$ K [2]. We will discuss possible low-energy excitations of magnetic multipoles in the ordered state, as well as the symmetry of the order parameter from μSR results in high transverse fields applied along the [111] direction.

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[3] M. Yoshizawa *et al.* J. Phys. Soc. Jpn. **74** (2005) 2141.

[4] Y. Aoki *et al.* J. Phys. Soc. Jpn. **76** (2007) 113703.

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