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Electronic state of $PrFe_4P_{12}$ under the [111] magnetic field studied by ^{31}P NMR

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We have measured ^{31}P NMR in $PrFe_4P_{12}$ down to 400 mK in order to clarify the nature of the ground state under magnetic fields applied along [111], for which a new high-field ordered phase was found recently [1]. The ^{31}P-NMR lines start to broaden below the transition temperature $T_B \approx 600$ mK at the field $H = 11.8$ T. This is attributed to the anomaly in the uniform magnetization [1] and/or possible line splitting accompanied by the phase transition at T_B. The ^{31}P nuclear spin-lattice relaxation rate divided by temperature, $1/T_1T$, exhibits a rounded maximum around $T \sim 1$ K, indicating crossover from a non fermi-liquid state with almost T-independent $1/T_1$ at higher T to a pseudo-gap state just above T_B. We also found a small drop of $1/T_1T$ at T_B on decreasing temperature which suggests suppression of low-energy magnetic excitations in the ordered phase.

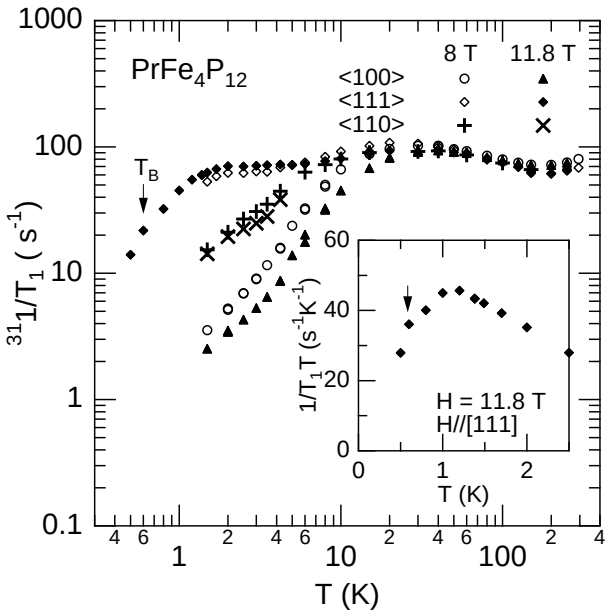

Figure 1: Temperature dependence of the ^{31}P nuclear spin-lattice relaxation rate in $PrFe_4P_{12}$. The inset shows $1/T_1T$ for the [111] field at low temperatures. Arrows indicate the transition temperature T_B.

[1] T. Tayama *et al.*: J. Phys. Soc. Jpn. **73** (2004) 3258.