(P2-8)

Field-angle dependence of magnetization of $PrFe_4P_{12}$

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One of the important issues in the filled skuttrudite $PrFe_4P_{12}$ is the order parameter of the phase transition (A phase) at $T_A = 6.5$ K. The A phase is suggested to be an O_2^0-type antiferro-quadrupole ordered state in neutron diffraction studies. However, the angular dependence of the field-induced staggered moments is not yet well explained by the AFQ order model. In order to investigate the nature of the order parameter in the A phase, we have performed angle-resolved magnetization measurements on $PrFe_4P_{12}$.

Figure 1 shows field-angle dependence of the magnetization $M(\theta)$ at a temperature of 0.3 K ($< T_A$) in fields of 0.5 T and 3.0 T rotated within the $(1\bar{1}0)$ plane. Here θ is the field angle with respect to the [001] axis. The $M(\theta)$ curve changes smoothly over the entire angle range. We also found that $M(\theta)$ data within the (100) plane also exhibit the similar angular variation. In the O_2^0-type AFQ order scenario, we can expect that a v-shape minimum due to a switch between the equivalent order parameters occurs at a certain angle in $M(\theta)$, as previously found in the O_2^0-type AFQ compound $PrPb_3$[1]. Consequently, out data suggests that the A phase transition is not due to an O_2^0-type AFQ order.

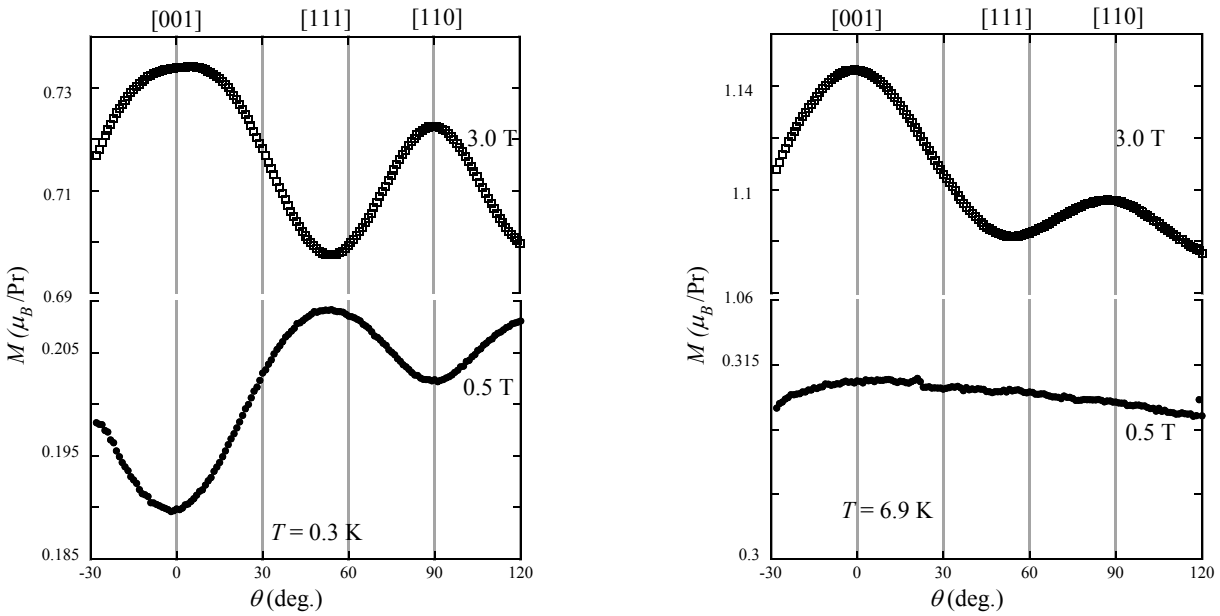

Figure 1: Field-angle variation of the magnetization for $PrFe_4P_{12}$ at temperatures of 0.3 K (left-hand) and 6.9 K (right-hand) in the $(1\bar{1}0)$ plane.

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