

Determination of the Magnetic Structure of the Noncentrosymmetric Heavy-Electron Metamagnet CePdSi_3

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The influence of antisymmetric spin-orbital interaction (ASOI) caused by the lack of inversion symmetry has attracted much attention since the discovery of the first heavy electron superconductor CePt_3Si . Recently, we have reported that the non-centrosymmetric BaNiSn_3 -type compound CePdSi_3 exhibits successive magnetic transitions, weak ferromagnetism (canted antiferromagnetism) and metamagnetic transitions, yielding an unusually complex $H - T$ phase diagram (D. Ueta et al., *J. Phys. Soc. Jpn.*, 85, 104703 (2016)). Although CePdSi_3 is one of the most promising candidates to clarify the influence of ASOI upon physical properties due to a possibility that this complex $H - T$ phase diagram may result from the ASOI effect, magnetic structures in all phases has not been undetermined yet.

In order to determine magnetic structures at zero field in CePdSi_3 , we performed elastic neutron scattering experiments at BL-09 (CORELLI), SNS in Oak Ridge National Laboratory. A single crystalline sample of CePdSi_3 was grown by flux method in the Institute for Solid State Physics. The sample was mounted on an Al pin such that both a and c axes are set into the equator plane and installed in the orange cryostat. Temperature range was from ~ 1.45 K to 10 K.

Figure(a) shows a part of the $(H, -1, L)$ contour map around $(0, -1, 1)$ reflection at based temperature. We have observed clear magnetic satellite peaks around nuclear Bragg reflections and found the magnetic propagation vector at base temperature is $q \sim (0.3, 0, 0)$. Subsequently, we measured temperature dependence of several nuclear reflections and satellite peaks. As one example, we show the temperature dependence of integrated intensity of sum

of the magnetic satellite peaks $Q = (\pm 0.3, -1, 1)$ in Figure(b). The slope changes two phase boundary between the phase I and II determined by our preceding study.

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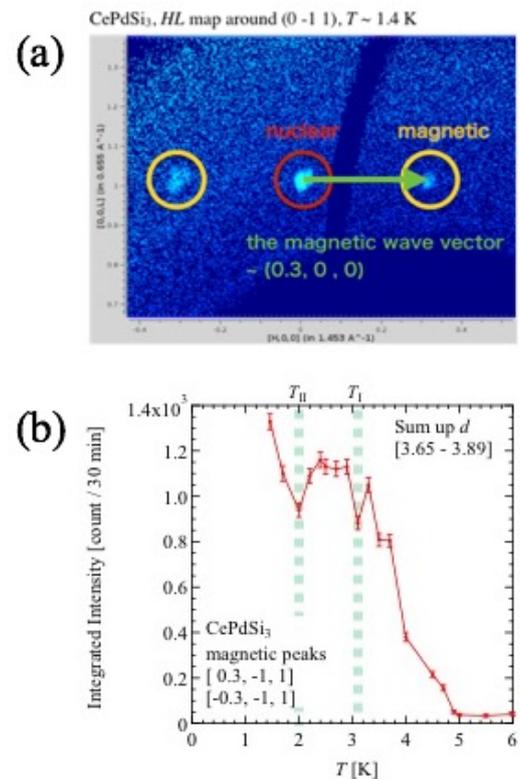


Fig. 1. (a) A part of the $(H, -1, L)$ contour map around $(0, -1, 1)$ reflection at based temperature. (b) The temperature dependence of integrated intensity of sum of the magnetic peaks $Q = (\pm 0.3, -1, 1)$.