Magnetic structure analysis of Mn_3CoSi with a hyperkagome lattice

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Intermetallic antiferromagnet Mn_3CoSi is one of the β–Mn-type family alloys of Mn_3TX (T; Co, Rh, Ir, X; Si, Ge). They have a three-dimensional hyperkagome lattice with corner-sharing triangular Mn-spin units in a noncentrosymmetric β–Mn-type structure. Original β–Mn is known as a spin-liquid candidate [1]. Non-Fermi-liquid behavior is also identified in β–Mn, based on the exponent of the temperature dependence of the resistivity and the scaling of the dynamical spin susceptibility [2]. The family compound Mn_3RhSi shows the high--temperature short-range order (SRO) as magnetic diffuse scattering up to 720 K above the N´eel temperature of 190 K, where the magnetic susceptibility deviates from the Curie-Weiss law. [3]. The temperature dependence of the magnetic susceptibility of Mn_3CoSi is convex above T_N. Recently, a similar magnetic SRO is also identified in a skyrmion alloy of $Co_7Zn_7Mn_6$ with the same β-Mn crystal structure [4]. The Q-position at about 1.7 A is the same as the observed magnetic diffuse scattering position in Mn_3CoSi, Mn_3RhSi,[3], and β-Mn [1].

Here, we measured the Mn_3CoSi single crystal at FONDER@JRR-3. The typical magnetic Bragg peak of (1 0 0) is shown in Fig. 1. The data were analyzed using the 'FullProf' software [5]. The magnetic structure at 4 K will be reported in the near future [6]. This work at FONDER was performed by the JRR-3 general user program managed by the Institute for Solid State Physics, the University of Tokyo under the proposal of 22812.

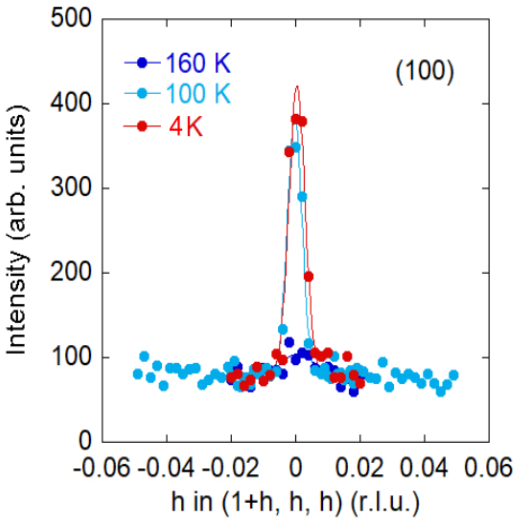

Fig. 1. Neutron diffraction patterns of (1 0 0) of Mn_3CoSi measured at FONDER@JRR-3. The peak developed below T_N = 140 K,

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