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Possible non-coplanar spin structure and large Hall effect in Na_xCoO_2 J.W. KIM, E.D. MUN, R.D. MCDONALD, V. ZAPF, NHMFL/MPA-CMMS, LANL, J.D. THOMPSON, MPA-CMMS, LANL, L. BALICAS, NHMFL, I. MARTING, T4/CNLS,LANL, D. ARGYRIOU, Hahn-Meitner-Institut — We present magnetotransport studies of Na_xCoO_2 (x =0.46) and its relation to possible non-coplanar spin texture. This compound exhibits a unique insulating state below temperature (T) of 53 K related to charge-order which is different from other composition with metallic behavior. It also has frustrated local spin texture owing to its hexagonal structure. Previous works report a very large Hall signal for composition x =0.5 (M. Foo *et al.*, Phys. Rev. Lett. 92, 247001 (2004)) at low magnetic field (B) and prior high-field studies (L. Balicas *et al.*, Phys. Rev. Lett. 94, 236402 (2005)) have found the existence of a small Fermi surface in the system and a two-fold angular magnetoresistance. Using pulse and hybrid magnets at NHMFL, we mapped out a detailed T-B phase diagram up to 65 T which is strong enough to suppress the charge-order. When B is applied along the c-axis, the charge-ordered state is suppressed at $B \sim 41$ T with highly non-monotonic shape in ρ_{xy}. We found that this Hall signal reaches a maximum around $T \sim 30$ K and $B \sim 27$ T and on further cooling the absolute change of ρ_{xy} decreases significantly. Interestingly, we found no significant changes in field-dependent magnetization which suggests that this behavior does not come from the ordinary anomalous Hall effect. We discuss the origin of this unique Hall signal by existence of a non-coplanar spin structure that may exist in this compound (I. Martin, C. D. Batista, Phys. Rev. Lett. 101, 156402 (2008)).

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