Magnetic order of the frustrated triangular antiferromagents $HCrO_2$ and $DCrO_2$

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Triangular lattice antiferromagets (TAL-AF) are typical frustrated magnets, which are expected to show many intriguing magnetic properties because of their highly degenerated ground state. One of the interesting theoretical expectations on the TAL-AF is the unconventional phase transition in which topological entities such as vortices play an important role. Kamamura and Misyashita [1] predicted Z_2 vortices (Z_2 is a mathematical symbol for two-element group) dominates the phase transition of the two dimensional Heisenberg (2DH) TAL-AF. Ajiro *el al.* [2] measured X-band EPR of $HCrO_2$, which is a good model substance for 2DH TAL-AF with $S = 3/2$, to study dynamical nature of 2DH TAL-AF. EPR linewidth of $HCrO_2$ was found to diverge at 20 K, which was discussed in terms of topological ordering associated with Z_2 vortex. No anomaly however was observed at around 20 K in the magnetic susceptibility of $HCrO_2$. $DCrO_2$ is also the model substance of 2DH TAL-AF and its Weiss temperature is reported to be larger than that of $HCrO_2$ [3]. In order to clarify the magnetic properties of $HCrO_2$ and $DCrO_2$, we measure μSR of these compounds at the RIKEN-RAL Muon Facility. For $HCrO_2$, muon polarization relaxes following the Kubo-Toyabe function in high temperature region. Below about 20 K, a fast relaxation develops rapidly, suggesting an occurrence of the magnetic order at around $T_N \approx 20$ K, where divergence of the EPR linewidth was observed. The results of LF-μSR measurements up to 3950 Oe at 0.5 K indicate that the magnetic order has static nature. No spin rotation however is observed down to 0.5 K, indicating that the magnetic ordered state below T_N is not a long-range but a short-ranged ordered state.

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