Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Magnetic field switching of ferroelectricity in spiral magnet $CuCrO_2$ E.-D. MUN, V. ZAPF, NHMFL, LANL, Los Alamos, NM 87545, A. PODLESNYAK, G. EHLERS, R. FISHMAN, Neutron Scattering Science Division, ORNL, Oak Ridge, TN 37831, S. SHIRYAEV, S. BARILO, Institute of Solid State and Semiconductor Physics, Minsk 220 072, Belarus, M. FRONTZEK, LNS, Paul Scherrer Institute, 5232 Villigen-PSI, Switzerland — The triangular lattice antiferromagnet $CuCrO_2$ show ferroelectricity induced by a proper-screw spiral magnetic structure, where spins in form 120° angles with neighboring spins due to frustration. $CuCrO_2$ is thought to be a rare example of the Arima mechanism for multiferroic behavior. In addition, it has been shown that the magnetoelectric coupling can be tuned by both an electric and a magnetic field along **ab-**plane. We test a prediction for the magnetic field-evolution of the physical properties of $CuCrO_2$ via magnetization and electric polarization measurements up to 65 T. We explore the complicated $H - T$ phase diagram along different crystalline directions. In zero field, a spontaneous electric polarization in $CuCrO_2$ is coupled to antiferromagnetic ordering below 24 K without an accompanying structural phase transition. In high fields, we observe electric polarization flops for magnetic fields applied along both the **ab-**plane and the **c**-axis, although at different magnetic fields than predicted. By contrast no noticeable anomaly is detected in magnetization isotherms, which are linear in fields up to 65 T. The electric polarization reversal is highly sensitive to the external magnetic field for both the **ab**-plane and **c**-axis due to a 3-dimensional proper-screw structure. We find that additional interactions may be necessary to explain our observed results.

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Date submitted: 27 Nov 2012 Electronic form version 1.4