Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

**Magnetically-induced ferroelectric polarization in a molecule-based quantum magnet** VIVIEN ZAPF, FREDERIK FABRIS, National High Magnetic Field Lab, Los Alamos National Lab, MICHEL KENZELMANN, Laboratory for Solid State Physics, ETH Hönggerberg, Zurich, FEDOR BALAKIREV, NHMFL-LANL, YING CHEN, COLIN BROHOLM, Dept of Physics and Astronomy, Johns Hopkins University — Ferroelectricity coupled to antiferromagnetic (AFM) order has been observed in the organic S=1/2 chain compound CDC ($CuCl_2$ $2(CH_3)_2SO$). For magnetic fields along the orthorhombic c-axis, AFM order occurs below $T_N = 0.93$ K and H $\sim$ 4 T. A spin-flop transition above $H_{sf} = 0.35$ T leads to a magnetically ordered state that breaks inversion symmetry along the b-axis for 0.35 T $<$ H $<$ 4 T. Measurements of the pyroelectric effect and the dielectric constant along b indicate ferroelectricity occurring in this same region of HT phase space with the spin polarization closely tracking the magnetic order parameter. The ferroelectric polarization is observed without electrically poling the material, and polarization switching can be observed by consecutive field sweeps in the same direction. While the magnetically-induced ferroelectricity in CDC is far from practical temperatures and fields, it nevertheless demonstrates that this phenomena can occur in a whole new class of compounds.

Vivien Zapf
Los Alamos National Lab

Date submitted: 12 Dec 2007 Electronic form version 1.4