Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Magnetic ground states and magnetodielectric effect of $R\mathbf{Cr(BO_3)_2}$ (R = Y and Ho)[1] RYAN SINCLAIR, University of Tennessee, Knoxville, HAIDONG ZHOU, University of Tennessee, Knoxville, National High Magnetic Field Laboratory, MINSEONG LEE, National High Magnetic Field Laboratory, Florida State University, EUN SANG CHOI, National High Magnetic Field Laboratory, TAO HONG, STUART CALDER, Quantum Condensed Matter Division, Oak Ridge National Laboratory — The magnetic, electric, and structural properties of polycrystalline $R\mathrm{Cr(BO_3)_2}$ (R = Y and Ho) samples were studied using AC/DC susceptibility measurements, dielectric constant measurements, and neutron scattering experiments. Both samples' Cr^{3+} ions order in a noncollinear antiferromagnetic ground state with a transition temperature T_N ~8 K while the Ho^{3+} ions do not order down to $T \sim$ 2K. When a critical magnetic field is applied below T_N, the Cr^{3+} and Ho^{3+} ions both adopt a canted ferromagnetic ground state. Using inelastic neutron scattering, we estimated the R = Y sample's intralayer and interlayer exchange strengths, J_{intra} = -4.80 meV and J_{inter} = 0.215 meV. The magnetodielectric effects in this system appear to depend on these exchanges. When the nonmagnetic $R = Y^{3+}$ ions are replaced by magnetic Ho^{3+} ions, the system exhibits stronger magnetodielectric responses near the critical field value. Our data suggests that this behavior results from an increased magnetostriction which is dependent on the Ho^{3+} ions' ordering.

[1]R.S. and H.D.Z. thank the support from NSF-DMR through Award DMR-1350002.

Ryan Sinclair
University of Tennessee, Knoxville

Date submitted: 07 Nov 2016 Electronic form version 1.4