Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Magnetic field effects on the multiferroic phases and the ferroelectric polarization of $Mn_{1-x}Co_xWO_4$ B. LORENZ, K.-C. LIANG, Y.Q. WANG, Y.Y. SUN, TCSUH, University of Houston, F. YE, J.A. FERNANDEZ-BACA, Neutron Scattering Science Division, ORNL, Oak Ridge, C.W. CHU, TCSUH, University of Houston — $MnWO_4$ is a classical multiferroic where ferroelectricity is induced by an inversion symmetry breaking helical spin order. The origin of the helical order is found in competing magnetic exchange interactions with strong uniaxial anisotropy, resulting in magnetic frustration. The extreme sensitivity of the multiferroic state with respect to chemical substitution of Fe, Zn, or Co for Mn was recently shown and $Mn_{1-x}Co_xWO_4$ ($0 < x < 0.3$) has the most complex phase diagram with multiple polarization flops upon increasing Co content. We report the effects of external magnetic fields on the multiferroic phases in $Mn_{1-x}Co_xWO_4$ and show that, depending on the Co content, magnitude and orientation of the ferroelectric polarization can be continuously controlled and even complete reversals of the polarization as function of temperature or field are observed. The experimental results are discussed in terms of the external field tuning of the helical or conical spin structures giving rise to the multiferroic state.

Bernd Lorenz
University of Houston

Date submitted: 09 Nov 2012 Electronic form version 1.4