Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Complex magnetic incommensurability and electronic charge transfer through the ferroelectric transition in multiferroic Co_3TeO_6 JEFFREY LYNN, NCNR, NIST, CHI-HUNG LEE, National Central University, Jhongli 32001, Taiwan, CHIN-WEI WANG, National Central University, YANG ZHAO, NCNR, NIST, WEN-HSIEN LI, National Central University, A. BROOKS HARRIS, U. Pennsylvania, Philadelphia, PA 19104 , KIRRILY RULE, Bragg Institute, Australia, HUNG-DUEN YHANG, National Sun Yat-Sen U., Taiwan, HELMUTH BERGER, EPFL, Lausanne, Switzerland — Polarized and unpolarized neutron diffraction has been carried out to investigate the nature of the magnetic structures and transitions in multiferroic Co_3TeO_6. Below T_{M1} =26 K long range order develops which is fully incommensurate in all three crystallographic directions. Below T_{M2} =19.5 K commensurate magnetic peaks develop in the Γ_4 irreducible representation, along with a splitting of the ICM peaks along the h direction. Below T_{M3} =18 K this additional magnetic incommensurability disappears, ferroelectricity develops, a commensurate Γ_3 irreducible representation appears, and the k component of the ICM wave vector disappears. Synchrotron x-ray data demonstrate a significant shift of the electronic charge distribution from the Te ions, which together with the unusually small electric polarization and its strong magnetic field dependence suggest this material is an antiferroelectric. Below T_{M4} =15 K the k component of the ICM structure reappears, along with second-order ICM Bragg peaks, which polarized neutron data demonstrate are magnetic in origin with a small net magnetization. See also PRB **85**, 094431 (2012); PRB **88**, 184427 (2013).

Jeffrey Lynn
NIST

Date submitted: 10 Nov 2016 Electronic form version 1.4