Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Neutron Investigations of Multiferroic LuFe1-xMnxO3 WILLIAM RATCLIFF, STEVEN DISSELER, NIST Center for Neutron Research, NIST, ALEXANDER ZHANG, Montgomery Blair, DYLAN QUINTANA, Carnegie Mellon University, YOON SEOK OH, Department of Physics, Rutgers University, JEFFREY LYNN, NIST Center for Neutron Research, NIST, SANG W. CHEONG, Department of Physics, Rutgers University — While many new multiferroic materials have surfaced, only $BiFeO_3$ has been shown to evince coupling of both order parameters at room temperature. Materials in which the application of an electric field can directly switch the magnetization by 180 degrees have also been elusive. New theoretical predictions suggest that this will be possible in hexagonal $LuFeO_3$. Recent measurements of $LuFeO_3$ are promising. Bulk $LuFeO_3$ crystallizes in the Pbnm space group. However, it can be stabilized in the $P6_3cm$ space group in thin films. Films are found to be ferroelectric at room temperature with a remanent polarization of 6.5 $\frac{\mu C}{cm^2}$ along the c-axis and is of a respectable magnitude, evincing long range magnetic order with spins in the plane forming the familiar 120 degree structure. At lower temperatures, it was found that the moments begin to cant. Theoretical predictions suggest that this canted moment can be switched with an electric field. Unfortunately, this canting occurs at 130 K. While the recent work in films is exciting, it is important to understand what is intrinsic to the material. Recently, we have been able to stabilize ceramic samples of $LuFeO_3$ in the hexagonal form. During this talk we will discuss the magnetic structure of this compound in the bulk. We will also discuss our inelastic neutron scattering results.

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Date submitted: 13 Nov 2013 Electronic form version 1.4