Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

**Magnetic and magnetoelectric excitations in multiferroic $BiFeO_3$**
DIYAR TALBAYEV, Yale University, STUART A. TRUGMAN, ANTOINETTE J. TAYLOR, Los Alamos National Laboratory, SEONGSU LEE, SANG-WOOK CHEONG, Rutgers University — Ferroelectric antiferromagnet $BiFeO_3$ combines ferroelectricity with an antiferromagnetic order at room temperature. A control of its magnetic state by voltage has been demostrated both in bulk and in thin film $BiFeO_3$. The distortion of the cubic perovskite lattice leads to two effects through the Dzyaloshinski-Moriya magnetic interaction: the ferroelectric distortion results in the observed incommensurate spiral spin structure, and the rotation of oxygen octahedra with alternating sense on neighboring Fe ions results in a local canting of spins. We present a terahertz spectroscopic study of magnetic excitations in $BiFeO_3$. We interpret the observed spectrum of long-wavelength magnetic resonance modes in terms of the normal modes of the material's spiral antiferromagnetic structure. We find that the modulated Dzyaloshinski-Moriya interaction and the local spin canting lead to a splitting of the out-of-plane resonance modes. We also assign one of the observed absorption lines to an electromagnon excitation that results from the magnetoelectric coupling between the ferroelectric polarization and the spiral magnetic structure of $BiFeO_3$.

Diyar Talbayev
Yale University

Date submitted: 22 Nov 2010 Electronic form version 1.4