

Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Microscopic Model for the Spectroscopic Modes of Multiferroic BiFeO₃ in a Magnetic Field¹ RANDY FISHMAN, Oak Ridge National Laboratory — The zone-center modes measured by THz spectroscopy [1] provide the most detailed information available about the very small microscopic interactions responsible for the cycloid in multiferroic BiFeO₃. While a Dzaloshinskii-Moriya (DM) interaction perpendicular to the electric polarization \mathbf{P} produces the cycloidal period, a DM interaction along \mathbf{P} produces the small tilt in the cycloid, which leads to the weak ferromagnetic moment of the canted phase above a critical field of about 18 T. A microscopic model that includes both DM interactions as well as easy-axis anisotropy along \mathbf{P} quantitatively predicts the field dependence of the spectroscopic frequencies [2]. Comparison with the measured frequencies indicates that only one of the three cycloidal domains survives above about 6 T.

[1] U. Nagel, R.S. Fishman, T. Katuwal, H. Engelkamp, D. Talbayev, H.T. Yi, S.-W. Cheong, and T. Room, *Phys. Rev. Lett.* **110**, 257201 (2013)

[2] R.S. Fishman, *Phys. Rev. B* **87**, 224419 (2013).

¹Research sponsored by the U.S. Department of Energy, Office of Basic Energy Sciences, Division of Materials Sciences and Engineering.

Randy Fishman
Oak Ridge National Laboratory

Date submitted: 07 Nov 2013

Electronic form version 1.4