

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Three-dimensional distribution of ferroelectric vortices in multiferroic hexagonal YMnO₃ MANFRED FIEBIG, HISKP, University of Bonn, Germany, ELISABETH SOERGEL, TOBIAS JUNGK, IAP, University of Bonn, Germany, NICOLA A. SPALDIN, Dept. Materials, ETH Zurich, Switzerland, KRIS DELANEY, MRL, UC Santa Barbara, USA — Multiferroics are a rich source for “unusual” forms of ferroelectric order. The spontaneous polarizations is induced by magnetism, charge order, geometric effects, etc., and may lead to novel domain states and functionalities. Recently it was shown that ferroelectric domains in hexagonal multiferroic YMnO₃ form vortex-like structures around the direction of polarization [1]. It was assumed that the sixfold character of the domain vortices reflects the uniaxial hexagonal structure. Here we show by piezoresponse force microscopy that high densities of sixfold vortices are also present *perpendicular* to the direction of the spontaneous polarization in spite of the merely twofold rotation-inversion symmetry in this direction [2]. We present a simple geometric explanation for this unexpected result and discuss the principal difference between the present case and vortex formation in discommensurate systems.

[1] T. Choi et al., Nature Mater. **9**, 253 (2010)

[2] T. Jungk et al., Appl. Phys. Lett. **97**, 012904 (2010)

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Date submitted: 27 Nov 2010

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