Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Higher-order Ginzburg-Landau Model for Multiferroic Hexagonal Manganites KRIS DELANEY, UC Santa Barbara, SERGEY ARTYUKHIN, U Groningen, MANFRED FIEBIG, University of Bonn, NICOLA SPALDIN, UC Santa Barbara, MAXIM MOSTOVOY, U Groningen — Hexagonal manganites have been studied intensely as some of the few multiferroic materials with relatively high ordering temperatures. The recent experimental discovery of topological defects in the domain structure of YMnO3 has led to renewed interest in these materials [1, 2, 3]. Though a Landau free-energy model has already been parameterized at low order[4], we show the form of the parameterization with higher-order terms, including for the first time an angular dependence to the structural trimerization mode. Analysis of the resulting model explains clearly the origin of the topological defects in the domain structure, provides further theoretical insight into the contentious issue of the nature of the ferroelectric phase transition, and gives theoretical input into understanding the thickness of ferrelectric domain walls.

[1] Choi et al., Nature Mat. 9, 253 (2010)
[2] Mostovoy, Nature Mat. 9, 188 (2010)
[3] Jungk et al., Appl. Phys. Lett. 97, 012904 (2010)
[4] Fennie et al., Phys. Rev. B 72, 100103 (2005)

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Date submitted: 30 Dec 2010 Electronic form version 1.4