Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Weak ferromagnetism and short range polar order in NaMnF$_3$
thin films$^1$ AMIT KC, University of California Santa Cruz, PAVEL BORISOV,
West Virginia University, VLADIMIR SHVARTSMAN, University Duisburg-Essen,
DAVID LEDERMAN, University of California Santa Cruz — The orthorhombically
distorted perovskite NaMnF$_3$ has been predicted to become ferroelectric if an $a = c$
distortion of the bulk $Pnma$ structure is imposed. In order to test this prediction,
NaMnF$_3$ thin films were grown on SrTiO$_3$ (100) single crystal substrates via
molecular beam epitaxy. The best films were smooth and single phase with four
different twin domains. In-plane magnetization measurements revealed the presence
of antiferromagnetic ordering with weak ferromagnetism below the Néel tempera-
ture $T_N = 66$ K. For the dielectric studies, NaMnF$_3$ films were grown on a 30 nm
SrRuO$_3$ (100) layer used as a bottom electrode grown via pulsed laser deposition.
The complex permittivity as a function of frequency indicated a strong Debye-like
relaxation contribution characterized by a distribution of relaxation times. A power-
law divergence of the characteristic relaxation time revealed an order-disorder phase
transition at 8 K. The slow relaxation dynamics indicated the formation of super-
dipoles (superparaelectric moments) that extend over several unit cells, similar to
polar nanoregions of relaxor ferroelectrics.

$^1$This work was supported by the National Science Foundation (grant 1434897) and
the WVU Shared Research Facilities at West Virginia University.

Amit KC
University of California Santa Cruz

Date submitted: 10 Nov 2016

Electronic form version 1.4