Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Spin Dynamics and Spin-flop transition in Magnetoelectric Effect $LiMnPO_4$ J. LI, NCNR, National Institute of Standards and Technology; Dept. Material Science and Engineering, University of Maryland, W. TIAN, Ames laboratory and Dept. of Physics and Astronomy, Iowa State University, Y. CHEN, NCNR, National Institute of Standards and Technology; Dept. Material Science and Engineering, University of Maryland, J.L. ZARESTKY, D. VAKNIN, Ames laboratory and Dept. of Physics and Astronomy, Iowa State University, J.W. LYNN, NCNR, National Institute of Standards and Technology — Neutron scattering techniques were used to study the magnetic phase transition and spin dynamics in single crystal $LiMnPO_4$ both with and without magnetic field. Elastic scattering confirmed that $LiMnPO_4$ has a collinear antiferromagnetic ground state with moments along a-axis in zero-field. The temperature dependent order parameter, calculated from the integrated intensity of the (010) magnetic reflection, was fit to a power law equation, yielding a transition temperature $T_N = 33.8$ K. By applying magnetic field along the a-axis, the moments rotate from a-axis to the c-axis at a critical field of 3.5 Tesla at 5 K. The field dependent (100) and (001) intensities indicate a complicated intermediate state between the ground state and the spin-flop state. The critical field increased from 3.5 Tesla at 5 K to 4.5 Tesla near the transition T_N. Spin-wave dispersion curves along the three principal axes were measured in the antiferromagnetic state at 4.5 K in zero magnetic field and were analyzed using a 3D Heisenberg model.

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Date submitted: 21 Nov 2007 Electronic form version 1.4