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Structural Phase Transitions Coupled with Magnetic Order in the Geometrically Frustrated Triangular Lattice Antiferromagnet $CuFeO_2$. Q. Huang,[1] F. Ye,[2] Y. Ren,[3] J.A. Fernandez-Baca,[2, 4] Pengcheng Dai,[4, 2] J.W. Lynn,[1], T. Kimura[5, [1]NIST Center for Neutron Research, NIST, Gaithersburg, MD 20899, [2]Center for Neutron Scattering, ORNL, Oak Ridge, TN 37831, [3]X-ray Science Division, ANL, Argonne, IL 60439, [4]Dept. of Physics and Astronomy, The Univ. of Tennessee, Knoxville, TN 37996, [5]Los Alamos National Laboratory, Los Alamos, NM 87545.

Neutron and synchrotron X-ray diffraction were used to study the geometrically frustrated triangular lattice antiferromagnet $CuFeO_2$. The compound exhibits an incommensurate and a commensurate magnetic order at $T_{N1} \sim$ 13 K and $T_{N2} \sim$ 11 K, respectively, accompanied by a second- and a first-order structural phase transitions from hexagonal to monoclinic structure. Application of magnetic field from 0 T to 7 T lowers the transition temperatures by 1 K, to $T_{N1} \sim$ 12 K and $T_{N2} \sim$ 10 K, respectively, and induces an additional structural modulation in the temperature region where the field-driven ferroelectricity occurs. This suggests a strong magneto-elastic coupling that is intimately related to the multiferroic effect.