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**Magnetic Order and Spin Correlations in the Multiferroic $\mathbf{Sr_{0.56}Ba_{0.44}MnO_3}$** JEFFREY LYNN, NIST Center for Neutron Research, Gaithersburg, MD 20899-6102, JAMES MAIS, OMAR CHMAISSEM, BOGDAN DABROWSKI, Department of Physics, Northern Illinois University, De Kalb, IL 60115 — Neutron diffraction and inelastic scattering measurements have been carried out on a polycrystalline sample of Ferroelectric $Sr_{0.56}Ba_{0.44}MnO_3$ ($T_F$ =400 K) using the BT-7 and SPINS triple-axis spectrometers. The system orders antiferromagnetically at 190 K with an order parameter that varies smoothly with temperature. Inelastic measurements at base temperature reveal an energy gap of 1.7 meV, with a continuous distribution of magnetic scattering above the gap that exhibits a weak peak at 7.5 meV. The inelastic scattering is strongly peaked at the magnetic reciprocal lattice position up to the highest energy of 15 meV measured so far, indicating strong spin correlations. With increasing temperature the magnetic scattering increases in intensity as expected according to the Bose-Einstein thermal population factor for spin waves. Above Tn strong correlations persist, but the scattering does noticeably broaden.

Jeffrey Lynn
NIST Center for Neutron Research, Gaithersburg, MD 20899-6102

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