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Diffuse Scattering from $\mathbf{PbZr_{1-x}Ti_xO_3}$[1] MATTHEW KROGSTAD, Northern Illinois Univ, STEPHAN ROSENKRANZ, RAYMOND OSBORN, Argonne Nat'l Lab, OMAR CHMAISSEM, Northern Illinois Univ, FENG YE, Oak Ridge Nat'l Lab, JACOB RUFF, CHESS, PETER GEHRING, NIST, ZUO-GUANG YE, Simon Fraser Univ, DANIEL PHELAN, Argonne Nat'l Lab — Alloying the ferroelectric $PbTiO_3$ with the anti-ferroelectric $PbZrO_3$ produces $PbZr_{1-x}Ti_xO_3$, a system featuring a morphotropic phase boundary around x=0.48. Near this phase boundary, the piezoelectric properties of the system are greatly enhanced. It is thought that this behavior may be related to the addition of some short-range order phenomena arising from competition between the differing long-range orders of the parent systems. To investigate possible short-range ordering, diffuse scattering measurements were performed on a single crystal of $PbZr_{0.54}Ti_{0.46}O_3$ producing large volumes of reciprocal space intensities from both neutron and x-ray diffraction. Our experiments evidence significant short-range correlations that provide an interesting contrast to related relaxor and ferroelectric systems.

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