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**Response of Polar Nanoregions in the Relaxor Ferroelectric PZN-8%PT to an Electric Field** PETER GEHRING, National Institute of Standards and Technology, GUANGYONG XU, Brookhaven National Laboratory, GEN SHIRANE, Brookhaven National Laboratory — We report measurements of the neutron diffuse scattering from a single crystal of the relaxor ferroelectric $PbZn_{1/3}Nb_{2/3}O_3$ doped with 8% $PbTiO_3$ (PZN-8PT) for temperatures $100K \leq T \leq 550K$ and electric fields $0kV/cm \leq E \leq 10kV/cm$ oriented along [001]. The diffuse scattering near the (300) and (003) Bragg peaks, which is strong for this system, was measured in both zero field cooled and field cooled conditions [1]. In all cases we find the surprising result that the diffuse scattering is not eliminated by electric fields up to 10 kV/cm, but is instead approximately preserved. However the reciprocal space geometry, or "shape," of the diffuse scattering is modified. Thus field-cooling PZN-8%PT into the tetragonal (ferroelectric) phase does not produce a uniformly polarized state. Measurements were also made to confirm the interesting memory effect in PZN-8PT reported by Xu *et al.* under a [111]-oriented field [2]. [1] P.M. Gehring, K. Ohwada, and G. Shirane, Phys. Rev. B **70**, 014110 (2004). [2] Guangyong Xu, P.M. Gehring, and G. Shirane, submitted to Science.

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