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Cubic ground state of field-cooled $PbMg_{1/3}Nb_{2/3}O_3$[1] PETER GEHRING, National Institute of Standards and Technology, CHRIS STOCK, Johns Hopkins University, GUANGYONG XU, Brookhaven National Laboratory, HAOSU LUO, Chinese Academy of Sciences, HU CAO, JIEFANG LI, DWIGHT VIEHLAND, Virginia Tech, GEN SHIRANE[2], Brookhaven National Laboratory
— Neutron and x-ray diffraction techniques have been used to study the competing long and short-range polar order in the relaxor $PbMg_{1/3}Nb_{2/3}O_3$ (PMN) under the influence of an external [111]-oriented electric field. While the bulk unit cell remains cubic for electric fields up to 8 kV/cm, a suppression of the diffuse scattering and a concomitant enhancement of the Bragg peak intensity is observed below $T_c = 210$ K, indicating a more ordered structure with increasing electric field yet an absence of a long-range ferroelectric ground state. The electric field strength has little effect on the diffuse scattering above T_c. The absence of hysteresis suggests that the ground state of PMN may not be a frozen glassy phase, but may be better understood in terms of random fields introduced through the presence of structural disorder.

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