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Field Dependence of Glassy Freezing in a Relaxor Ferroelectric[1]
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— Multi-frequency susceptibility measurements on the cubic relaxor ferroelectric $(PbMg_{1/3}Nb_{2/3}O_3)_{0.88}(PbTiO_3)_{0.12}$ were performed at various DC electric field strengths applied along the [111] direction. The temperature-frequency dependences fit the Vogel-Fulcher form, allowing the extraction of a frequency-independent glassy freezing temperature. These Vogel-Fulcher temperatures showed significant reductions in applied fields, following an empirical Gabay-Toulouse form, similar to vector spinglasses. The magnitude of the sensitivity indicates that the glassy state is formed by interactions among the same entities that account for the susceptibility, i.e. the polar nanoregions. This interpretation is supported by data on a powder sample of $PbMg_{1/3}Nb_{2/3}O_3$ (PMN), with grains too small to support large-scale inter-nanoregion cooperativity, in which the Vogel-Fulcher behavior is lost [1]. [1] J. Carreaud et. al., Appl. Phys. Lett. 92, 242902 (2008).

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