

Abstract Submitted  
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**Scattering of the Transverse Acoustic Phonon by Polar Nanodomains in the Relaxor Ferroelectric  $\text{KTa}_{1-x}\text{Nb}_x\text{O}_3$  (KTN)**<sup>1</sup> JEAN TOULOUSE, EUGENE IOLIN, Lehigh University, Physics Department and Center for Advanced Materials, BERNARD HENNION, DANIEL PETITGRAND, LLB,CEA, Saclay France, ROSS ERWIN, NCNR, NIST — We show that, in relaxors, the transverse acoustic (TA) mode displays a particularly original behavior, due its coupling to the transverse optic (TO) mode as well as to the polarization  $\mathbf{P}$  of the Polar Nano-Domains (PND) that are ubiquitous in these special ferroelectrics. A neutron scattering study of the TA phonon frequency and damping, and especially of their  $\mathbf{q}$  dependence, reveals that the PNDs condense in the form of platelets. In the relaxor range of temperatures, in which elastic diffuse scattering is also observed, the TA mode is strongly scattered by the PNDs. We compare our results with those from thermal conductivity studies of inhomogenous solids and similar neutron results obtained in other perovskite systems. We also present a theoretical model that describes the scattering mechanism specific to relaxors, the TA- $\mathbf{P}$ -TO interaction, is shown to fit the acoustic data well and also provides an estimate of the TO mode frequency and damping.

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