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**A comparative study of the phase transitions near the critical concentration in the relaxor  $K_{1-x}Li_xTaO_3$**  LING CAI, JEAN TOULOUSE, Lehigh University, LELAND HARRIGER, GREG DOWNING, NIST Center for Neutron Research, LYNN BOATNER, Oak Ridge National Laboratory — Many characteristics of mixed relaxor ferroelectric systems are determined by the relative fractions and spatial distribution of the mixed ions. In this report, we illustrate this point with dielectric results that are shown to be remarkably different in crystals of the prototypical relaxor system  $K_{1-x}Li_xTaO_3$  (KLT) with only slightly different  $Li$  concentrations. The two KLT crystals studied both contain  $Li$  concentrations that are just above the critical value for which a structural phase transition can take place. We have used dielectric spectroscopy and neutron diffraction techniques to study the relaxational (dynamic) and structural (static) properties of these two crystals. We present frequency dependent dielectric constant results as a function of temperature across  $T_C$  and  $T_B$ , below which the characteristic polar nanodomains (PND) are formed. We also present Neutron diffraction measurements at the [100] Bragg reflection and elastic diffuse scattering near [110]. This comparative study sheds light on the the universality of the recently popularized random field theory. We conclude by showing that the random field theory, which has been used for heterovalent-substituted relaxor systems, can also satisfactorily describe the isovalently ones.

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