

## **Critical fluctuations and isotropic-nematic transition in polydomain elastomers**

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We carry out a detailed deuterium NMR study of local nematic ordering in polydomain nematic elastomers, the system with a close analogy to the random-anisotropy spin glass. We find that, in spite of the quadrupolar nematic symmetry in 3-dimensions requiring a first-order transition, the order parameter in the quenched 'nematic glass' emerges via a continuous phase transition. In addition to this remarkable effect, by a careful analysis of the NMR line shape we deduce that the local director fluctuations grow in a critical manner around the transition point. This may be the first experimental evidence for the quenched disorder changing the order of discontinuous transition. At the same time, the background polymer dynamics exhibited by the backbone similar in the nematic and the analogous isotropic elastomers, compatible with a Vogel-Fulcher glassy dynamics.