Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Rare region effects on the Ising-nematic quantum phase transition[1] TIANBAI CUI, Univ of Minnesota - Twin Cities, RAFAEL FERNANDES, University of Minnesota — The phase diagrams of several correlated electronic systems display an unusual type of electronic liquid-crystalline order, called Ising-nematic, in which the electronic degrees of freedom spontaneously break the tetragonal symmetry of the system. Here, we investigate theoretically the impact of rare regions, characteristic of disordered systems with random dilution, on the Ising-nematic quantum phase transition promoted by the partial melting of a density-wave phase. Although long-range Ising-nematic order takes place in droplets of all sizes, the onset of the transition and the character of the transition (i.e. second-order or first-order) depend on the size of the droplet. After averaging over the droplets, we find that the first-order quantum Ising-nematic transition of the clean system is smeared and behaves essentially as a second-order transition. We attribute this behavior to an effective dimensional crossover, and discuss the experimental implications of our findings.

[1]This work was supported by the U.S. Department of Energy, Office of Science, Basic Energy Sciences, under Award number de-sc0012336.

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Date submitted: 10 Jan 2017 Electronic form version 1.4