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Hysteresis and Noise from Electronic Nematicity ERICA CARLSON, Purdue University, KARIN DAHMEN, EDUARDO FRADKIN, University of Illinois at Urbana-Champaign, STEVEN KIVELSON, Stanford University — An electron nematic is a translationally invariant state which spontaneously breaks the discrete rotational symmetry of a host crystal. In a clean square lattice, the electron nematic has two preferred orientations, while dopant disorder favors one or the other orientations locally. In this way, the electron nematic in a host crystal maps to the random field Ising model (RFIM). Since the electron nematic has anisotropic conductivity, we associate each Ising configuration with a resistor network, and use what is known about the RFIM to predict new ways to test for electron nematicity using noise and hysteresis. In particular, we have uncovered a remarkably robust linear relation between the orientational order and the resistance anisotropy which holds over a wide range of circumstances. We discuss the consequences of this for noise and hysteresis in transport anisotropy, as well as possible extensions to other experimental probes such as neutron scattering and STM.

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