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Anomalous Ordering in Inhomogeneously Strained Materials: Surface Critical Behavior in the Bulk[1] KEVIN E. BASSLER, University of Houston, CHARO I. DEL GENIO, Max Plank Institute for Physics of Complex Systems, BO LI, University of Houston — We study a continuous quasi-two-dimensional order-disorder phase transition that occurs in a simple model of a material that is inhomogeneously strained due to the presence of dislocation lines. Performing Monte Carlo simulations of different system sizes and using finite size scaling, we measure critical exponents describing the transition of $\beta = 0.18 \pm 0.02$, $\gamma = 1.0 \pm 0.1$, and $\alpha = 0.10 \pm 0.02$. Comparable exponents have been reported in a variety of physical systems. These systems undergo a range of different types of phase transitions, including structural transitions, exciton percolation, and magnetic ordering. In particular, similar exponents have been found to describe the development of magnetic order at the onset of the pseudogap transition in hightemperature superconductors. Their common universal critical exponents suggest that the essential physics of the transition in all of these physical systems is the same as in our simple model. We argue that the nature of the transition in our model is related to surface transitions although our model has no free surface.

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