

Abstract Submitted
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Bond Disorder Induced Criticality of the Three-Color Ashkin-Teller Model¹ ARASH BELLAFARD, UCLA, HELMUT KATZGRABER, ETHZ, TAMU, MATTHIAS TROYER, ETHZ, SUDIP CHAKRAVARTY, UCLA — An intriguing result of statistical mechanics is that a first-order phase transition can be rounded by disorder coupled to energylike variables. In fact, even more intriguing is that the rounding may manifest itself as a critical point, quantum or classical. In general, it is not known, however, what universality classes, if any, such criticalities belong to. In order to shed light on this question we examine in detail the disordered three-color Ashkin-Teller model by Monte Carlo methods. Extensive analyses indicate that the critical exponents define a new universality class. We show that the rounding of the first-order transition of the pure model due to the impurities is manifested as criticality. However, the magnetization critical exponent, β' , and the correlation length critical exponent, ν , are found to vary with disorder and the four-spin coupling strength, and we conclusively rule out that the model belongs to the universality class of the two-dimensional Ising model.

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