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A novel random fixed point in diluted magnetic semiconductors DONALD PRIOUR JR, University of Missouri, Kansas City, SANKAR DAS SARMA, University of Maryland — We examine the critical behavior of strongly disordered Heisenberg models at the Curie Temperature T_c, where the disorder is manifest as missing magnetic ions (i.e. as in diluted magnetic semiconductors) with the aid of large-scale Monte Carlo. We calculate the magnetic susceptibility critical exponent, obtaining a value ($\gamma = 1.1 \pm 0.05$) lower than that of the corresponding pure model. We obtain the same reduced value for γ even for weak disorder. We find that both the amplitude and exponent of the first correction to leading order scaling are invariant with respect to the strength of the disorder, suggesting that critical behavior is controlled by a single random fixed point. Nevertheless, we show that for reduced temperature $t = (T - T_c)/T_c$ regimes accessible in experiment, one would actually measure an effective exponent γ_{eff} markedly higher than that of either the random fixed point or the pure Heisenberg model. We find self-averaging parameters to be non-monotonic in system size, initially increasing with the number of magnetic ions N, and ultimately decreasing beyond $N \sim 10^3$ as per the Harris Criterion. We acknowledge support from US-ONR and NRI-NSF.

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