Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Study of the de Almeida-Thouless line using power-law diluted one-dimensional Ising spin glasses HELMUT G. KATZGRABER, Theoretische Physik, ETH Zurich, 8093 Zurich, Switzerland; Department of Physics, Texas A&M University, College Station, TX 77843-4242, USA, DEREK A. LARSON, A.P. YOUNG, Department of Physics, University of California, Santa Cruz, CA 95064, USA — We test the existence of a spin-glass state in an externally-applied (random) magnetic field via Monte Carlo simulations of a power-law diluted one-dimensional Ising spin glass. The model has the advantage over conventional short-range models in that by tuning the exponent of the power-law interactions we are able to scan the full range of possible behaviors from the infinite-range to the non-mean-field regime. Furthermore, due to the average fixed connectivity very large linear system sizes can be studied. An analysis of the two-point correlation length shows that the system in the non-mean-field universality class does not order in a field. This suggests that there is no de Almeida-Thouless line for short-range Ising spin glasses below the upper critical dimension.

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Date submitted: 17 Nov 2008 Electronic form version 1.4