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The Compressible Ising Spin Glass: Simulation Results ADAM MARSHALL, University of Chicago, BULBUL CHAKRABORTY, Brandeis University, SIDNEY NAGEL, University of Chicago — We have studied the compressible Ising spin glass using the Edwards-Anderson model with $\pm J$ interactions, primarily in two dimensions. Compressibility is introduced by the addition to the standard spin-glass Hamiltonian of a term which couples the spin-spin interactions to the distance between neighboring particles. A dimensionless parameter μ relates the strength of the coupling term to the original spin-glass energy. In the simulations, the spin dynamics are modeled via single-spinflip Monte Carlo, while the lattice is relaxed using conjugate-gradient minimization with respect to the particle positions. We find that the total energy of a given spin configuration is shifted from its incompressible value, E^0, by an amount which is proportional to μ and quadratic in E^0. Furthermore, the previously discrete energy levels broaden into bands that overlap for sufficiently large μ; in the thermodynamic limit, even an infinitesimal coupling renders the spectrum continuous. Using these results, we have constructed a simple analytic model and investigated the effects of the compressibility on the original spin-glass transition.

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