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Spin-glass behavior probed at the local level using information theoretic measures DEBRA A. KENNEWAY, SUSAN R. MCKAY, University of Maine, DAVID P. FELDMAN, College of the Atlantic — This study shows the equivalence of the entropy calculated using an information theoretic method and the thermodynamic entropy in two-dimensional quenched random systems. The information theoretic entropy is calculated via histograms of spin configuration occurrences in shapes planted in the lattice during a Monte Carlo simulation. This method yields a local entropy density, one for the region around each site. These local entropies differ markedly in value across the lattice, but their average coincides with the thermodynamic entropy. Thus, these calculations show how the entropy is spread unevenly across the lattice in glassy systems. We have also calculated the excess entropy in terms of local contributions, which provides a measure of spatial structure and memory in the spin glass. Results yield a way to examine the connections between frustration and the local entropy and excess entropy densities and also provide comparisons between the bimodal and Gaussian cases in two dimensions in terms of these local measures.

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