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The Free Energy Landscape of a Two-Dimensional Spin Glass from a Hard-Spin Mean-Field Treatment MICHAEL MIHALCO, SUSAN MCKAY, University of Maine — The two-dimensional Ising antiferromagnet on a triangular lattice shows no ordered phase at finite temperatures until frustration is relieved, often accomplished through dilution (Grest and Gabl PRL 43, Netz and Berker PRL 66) or by the addition of randomly placed ferromagnetic bonds. Using the second approach, we have created a two-dimensional spin-glass phase with tunable frustration and explored its free energy landscape using a hard-spin mean-field approach (Netz and Berker PRL 66). The Monte Carlo implementation of this method quickly provides a self-consistent solution of site magnetizations, and we have used the overlaps and internal energies of various solutions to explore the energy landscape as a function of temperature and the number of frustrated plaquettes. Results indicate a multiplicity of solutions and a rich structure of overlaps, which are sensitive to the temperature and level of frustration. This method shows clearly the distinctions between the spin-glass phase and the bordering ferromagnetic ordering that occurs once the ferromagnetic interactions dominate.

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