

Abstract Submitted  
for the MAR15 Meeting of  
The American Physical Society

**Effective Hamiltonians of 2D Spin Glass Clusters** COLIN CLEMENT, Cornell University, DANILO LIARTE, University of Sao Paulo, ALAN MIDDLETON, Syracuse University, JAMES SETHNA, Cornell University — We have a method for directly identifying the clusters which are thought to dominate the dynamics of spin glasses. We also have a method for generating an effective Hamiltonian treating each cluster as an individual spin. We used these methods on a 2D Ising spin glass with Gaussian bonds. We study these systems by generating samples and correlation functions using a combination of Monte Carlo and high-performance numerically exact Pfaffian methods. With effective cluster Hamiltonians we can calculate the free energy asymmetry of the original clusters and perform a scaling analysis. The scaling exponents found are consistent with Domain-Wall Renormalization Group methods, and probe all length scales. We can also study the flow of these effective Hamiltonians by clustering the clustered spins, and we find that our hard spin Hamiltonians at high temperature retain accurate low-temperature fluctuations when compared to their parent models.

Colin Clement  
Cornell University

Date submitted: 14 Nov 2014

Electronic form version 1.4