

Abstract Submitted  
for the OSF14 Meeting of  
The American Physical Society

**Spinodal Field and Surface Free Energy of the Ising Model on the {5,4} Tiling of the Hyperbolic Plane**<sup>1</sup> HOWARD L. RICHARDS, Physics, Marshall University — Consider the ferromagnetic Ising model on a two-dimensional lattice, with all the spins initially *up* but with a weak *down* magnetic field, evolving under a single-spin-flip Metropolis dynamic. If the lattice lies in the Euclidean plane – for example, if it is the square lattice — a droplet of *down* spins (appearing as a thermal excitation) can decrease the free energy of the system by growing if it is larger than a finite critical size. In the hyperbolic plane, however, beneath a **spinodal field**  $H_{sp}$  it is impossible to nucleate a critical droplet. Monte Carlo simulations for finite regions of the {5,4} tiling with mean-field boundary conditions show that  $H_{sp}^{2/3}$  is approximately a linear function of temperature, which should be expected at least in the neighborhood of the critical temperature. Assuming that the droplets are circular, a first estimate of the surface free energy can be made.

<sup>1</sup>This research was supported by NSF grant OCI-1005117.

Howard L. Richards  
Physics, Marshall University

Date submitted: 27 Aug 2014

Electronic form version 1.4