Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Spinodals of the Ising model on the order-4 pentagonal tiling of the hyperbolic plane[1] HOWARD L. RICHARDS, Physics, Marshall University — In the Euclidean plane, the Ising model on a regular lattice does not have a true spinodal – that is, there is no local minimum of the free energy that persists forever (in the limit of infinitely large systems) except for the global minimum, which characterizes the stable state. However, a local minimum can persist for a very long time, so the minimum can be referred to as a "metastable" state. The manner in which the metastable state decays depends on the strength of the magnetic field and the system size; the "thermodynamic spinodal" is the transition between systems large enough to contain a single critical droplet and systems that are too small to do so, and the "dynamic spinodal" marks the transition between decay as a Poisson process to decay that is "deterministic", meaning the standard deviation of the lifetime of the metastable state is small compared with its mean value. However, in the hyperbolic plane, true metastability exists, and evidence shows that the thermodynamic spinodal and dynamic spinodal are numerically close to the true spinodal, the field below which the metastable state cannot decay through the nucleation and growth of droplets.

Howard Richards
Physics, Marshall University

Date submitted: 06 Nov 2015   Electronic form version 1.4