Senior Thesis

Ed Chien

Advisor: Peter Winkler

Evidence of Four Phases in Discrete Square Packing

Abstract:
We present computational evidence that four phases arise when 2x2 squares are packed into a plane grid at high density. This model is a discrete version of the "hard-core gas model," which is intended to show how crystals form under pressure. Evidence is provided by statistical analysis of configurations on the finite even by even lattice on a torus. Sampling is accomplished through a sped-up Glauber dynamics. Lastly, the combinatorial difficulties that arise in attempting to prove such a phase transition using a Peierls argument are discussed.