Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Critical Behavior of the Ising Model on Small-world Hanoi Networks[1] TRENT BRUNSON, STEFAN BOETTCHER, Emory University — The addition of small-world bonds on hierarchical lattices changes a typical Ising model ferromagnetic phase transition to one of infinite order, referred to as the inverted-Berezinski-Kosterlitz-Thouless transition. We study this shift in phase behavior on Hanoi networks, which are one-dimensional Ising chains connected by small-world bonds that are self-similar and hierarchical in structure [1]. The phase behavior of the Ising model near T_c on Hanoi networks is studied using an exact renormalization group and Monte Carlo techniques. We show that compared to the Migdal-Kadanoff hierarchical lattice, Hanoi networks possess characteristics in their thermodynamic densities that are more physical. These densities are studied in detail and the behavior of their critical exponents near T_c is described. By introducing a continuous parameter which regulates the strength of small-world bonds in the Hanoi networks, we begin to uncover the essential small-world properties that dictate this change in phase behavior from second- to infinite-order.

[1] S. Boettcher and C.T. Brunson, Phys. Rev. E, **83**, 021103 (2011)

[1]Funded under NSF grant #0812204.

Trent Brunson
Emory University

Date submitted: 13 Nov 2011 Electronic form version 1.4