Critical Behavior of the Ising Model on Small-world Hanoi Networks\textsuperscript{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.


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