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The Peculiar Phase Transitions of the Ising Model on a Small-World Network[1] TRENT BRUNSON, STEFAN BOETTCHER[2], Physics Dept., Emory University — To describe many collective phenomena on networks, the Ising model again plays a fundamental role. Here, we study a new network with small-world properties that can be studied exactly with the renormalization group. The network is non-planar and has a recursive design combining a one-dimensional backbone with a hierarchy of long-range bonds. Varying the relative strength between nearest-neighbor and long-range bonds, we can define a one-parameter family of models that exhibits a rich variety of critical phenomena, quite distinct from those on lattice models. Exact results and numerical simulations reveal this behavior in great detail.

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