Phase Transition and Critical Phenomena in Random Walks:

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1 Project Description

It is well known that the mean root square displacement of random walks defined on integer lattice \( Z^d \) follows the power law \( Cn^{1/2} \) in all dimensions. Moreover such random walks are recurrent in \( d = 1, 2 \) and transient in \( d \geq 3 \). In this project we investigate the behavior of random walks defined on other graphs. More specifically we determine the mean root square displacement of random walks defined on \( Z_2 \times Z_2 \), the Sierpinski carpet, and generalized comb lattice as well as their recurrence/transience behavior. We will also study long jump random walks defined on the integer lattice. Analytical and simulation results will be presented.