

# The lace expansion - combinatorial arguments in statistical physics

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We consider an  $n$ -step random walk on the hypercubic lattice  $Z^d$  that is conditioned to visit every site at most once. This is called a self-avoiding walk. Two basic questions are: How many  $n$ -step self-avoiding walks exist? Assuming a uniform distribution on the set of  $n$ -step self-avoiding walks, what is the average distance between the two endpoints?

Although answers given by physicists are widely believed, these questions are very hard to answer rigorously. The lace expansion is a technique to analyse self-avoiding walks, based on combinatorial arguments. During the talk, I want to explain how the lace expansion has been used for a mathematical analysis of self-avoiding walks in high dimensions.

If time allows, I will give an overview of other models that have been analysed using lace expansion methodology.