

Title: Critical phenomena and universality in some probability models

Abstract: Critical phenomena and universality are two important ideas in mathematical physics. I will give an introduction to these ideas in the context of several models from probability - random walks, self-avoiding random walks and percolation. These systems are all defined on a lattice, and we are interested in what happens as we let the lattice spacing go to zero - a process that is usually called the scaling limit. The randomness in these models is introduced at the scale of the lattice spacing. Critical phenomena is when this randomness manifests itself on a global scale after we take the scaling limit. Universality is the principle that the process we get in the scaling limit does not depend on the details of how the randomness was introduced at the lattice scale. I will end by describing a model in percolation whose scaling limit is yet to be determined.