Discrete Mathematics Seminar

Time: Friday, 18 April 2014, 1:00 – 2:00 PM
Location: 238 Derrick Hall
Title: Random Walks in a Sparse Random Environment
Speaker: Dr. Youngsoo Seol, Mathematics Department

Abstract:

We introduce random walks in a sparse random environment on the integer lattice $\mathbb{Z}$ and investigate such fundamental asymptotic property of this model as recurrence-transience criteria, the existence of the asymptotic speed and a phase transition for its value, limit theorems in both transient and recurrent regimes. The new model combines features of several existing models of random motion in random media and admits a transparent physics interpretation. More specifically, the random walk in a sparse random environment can be characterized as a perturbation of the simple random walk by a random potential which is induced by rare “impurities” randomly distributed over the integer lattice. The “impurities” in the media are rigorously defined as a marked point process on $\mathbb{Z}$: The most interesting seems to be the critical (recurrent) case, where Sinai’s scaling $(\log n)^2$ for the location of the random walk after $n$ steps is generalized to basically $(\log n)^a$; with $a > 0$ being a parameter determined by the distribution of the distance between two successive impurities of the media.