

## 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  $Z$  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  $Z$ : 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.