

## Combinatorics and Probability Seminar

### *Recovery Problems in Random Graphs*

Julia Gaudio (Northwestern)

**Abstract:** In the first part of this talk, I will present work on shotgun assembly of random graphs (joint work with Elchanan Mossel). Motivated by DNA shotgun assembly, graph shotgun assembly is the problem of reconstructing a graph from the collection of local neighborhoods. We study this question for Erdos-Renyi random graphs  $G(n,p)$ . We find conditions for  $p$  under which reconstruction is possible, given the collection of distance-1 or distance-2 neighborhoods of the vertices. Conversely, we find conditions under which no algorithm can reconstruct the graph given the collection of distance-1 or distance-2 neighborhoods.

In the second part of the talk, I will discuss community detection in the censored stochastic block model (joint work with Souvik Dhara, Elchanan Mossel, and Colin Sandon). The problem of community detection is an important question in network science since many networks exhibit community structure. That is, there are subsets of vertices that are more strongly connected internally than externally to the rest of the network. The stochastic block model (SBM) is a popular random graph model in the community detection literature. We consider a censored version of the SBM, where many edge observations are missing. We show that a simple spectral algorithm exactly recovers the communities, down to the information-theoretic threshold.

Monday, November 8 at 2:00 PM in 636 SEO