Shankar Bhamidi

Title: Limited choice and randomness in evolution of networks

Abstract: The last few years have seen an explosion in network models describing the evolution of real world networks. In the context of math probability, one aspect which has seen an intense focus is the interplay between randomness and limited choice in the evolution of networks, ranging from the description of the emergence of the giant component, the new phenomenon of "explosive percolation" and power of two choices. We will describe on going work in understanding such dynamic network models, their connections to classical constructs such as the standard multiplicative coalescent and applications of these simple models in fitting Retweet networks in Twitter.

Christian Gromoll

Title: Phase transitions in heterogeneous random intersection graphs

Random intersection graphs are constructed from random bipartite graphs by projecting onto one of the bipartite vertex sets according to the following rule: connect two vertices if they share a neighbor in the bipartite graph. Such graphs can model a variety of socially induced relationships. I'll describe phase transitions for these graphs that are analogous to the phase transitions seen in the classical Erdos-Renyi model.

ShiShi Luo

Title: Multiscale evolutionary dynamics: a measure-valued process perspective

Jim Nolen

Title: Reactive trajectories and transition path processes

Abstract: Consider the sample paths of a solution X(t) to an SDE, as they cross between two disjoint subsets in the state space. Those portions of the path which bridge the two states are called transition paths. Understanding the behavior of transition paths is important for applications in chemistry, for example, where they represent reactive trajectories between reactant and product states. I will identify the probability law of these paths in terms of an auxiliary SDE with singular drift, and I will explain how empirical sampling of the original process X(t) is related to solutions of this auxiliary SDE. Using these ideas, one can prove various representation formulas for statistics of the transition paths, such as reaction rates, mean crossover time, and reactive current. This is joint work with Jianfeng Lu.

Lea Popovic

Title: Stochastically induced bistability in interacting population systems

Abstract: We study a stochastic two-species interacting population system, in which species interact within each compartment according to some nonlinear dynamics. In addition we have another mechanism (e.g. migration between compartments, or splitting of compartments) which yield unbiased perturbative changes to species amounts. If each compartment has a large but bounded capacity, then certain combination of these two mechanisms can lead to stochastically induced bistability. In fact, depending on the relative rates between the mechanisms, there are two ways in which bistability can occur, with distinct signatures. This problem is motivated by dynamics of certain biochemical processes such as gene expression, where the numbers of species interacting are small enough that the randomness inherent in chemical reaction processes can no longer be ignored.

David Sivakoff

Title: Deterministic percolation from random seeds: Bootstrap and jigsaw percolation.

Xiaoming Song

Title: Malliavin calculus for backward stochastic differential equations and application to numerical solutions

Abstract: In this paper we study backward stochastic differential equations with general terminal value and general random generator. In particular, we don't require the terminal value be given by a forward diffusion equation. The randomness of the generator does not need to be from a forward equation neither. Motivated from applications to numerical simulations, first we obtain the L^p H\"older continuity of the solution. Then, we construct several numerical approximation schemes for backward stochastic differential equations and obtain their rates of convergence. The main tool is the Malliavin calculus.