December 12th

9:10-10:00 Anish Sarkar
Oriented Random Tree

Abstract

Consider the d-dimensional lattice $\mathbb{Z}^d$ where each vertex is 'open' or 'closed' with probability p or $1-p$ respectively. An open vertex v is connected by an edge to the closest open vertex w such that the dth co-ordinates of v and w satisfy $w(d) = v(d) - 1$. In case of non-uniqueness of such a vertex w, we choose any one of the closest vertices with equal probability and independently of the other random mechanisms. It is shown that this random graph is a tree almost surely for $d = 2$ and 3 and it is an infinite collection of distinct trees for $d \geq 4$. In addition, for any dimension, we show that there is no bi-infinite path in the tree and we also obtain central limit theorems of (a) the number of vertices of a fixed degree ν and (b) of the number of edges of a fixed length l.

10:10-11:00 Alain-Sol Sznitman
On random walks in random environment

Abstract

Random walks in random environment constitute one of the basic models of random motions in a random medium. Yet in dimension bigger than one their asymptotic behavior remains to this day poorly understood. During this talk we will review some recent developments on these questions.

11:00-11:30 Coffee/Tea Break

11:30-12:20 Amine Asselah
Hitting times for a system of independent random walks

Abstract

We consider asymmetric independent random walks on $\mathbb{Z}^d$. We study the asymptotic distribution of the first time one sees many particles in a finite domain, starting with a measure close to the stationary measure with a homogeneous (small) density of particles.

12:20-14:10 Lunch Break

14:10-15:00 Ellen Saada

Abelian sandpile models in infinite volume

Abstract

Since its introduction by Bak,Tang and Wiesenfeld, the abelian sandpile dynamics has been studied extensively in finite volume. In a joint collaboration with C. Maes, F. Redig, A. van Moffaert, we have investigated the existence of a sandpile dynamics in infinite volume, whose invariant distribution should be the thermodynamic limit (we also have to prove its existence) of the invariant measure for the finite volume dynamics. The crucial difficulty is the fact that the interaction is long range, so that no use of the Hille-Yosida theorem is possible. After a review of the involved results in finite volume, I will speak of the cases where we have completed this program: in dimension 1, on the infinite tree, and for dissipative systems.

15:00-15:30 Coffee/Tea Break

15:30-16:20 Claudio Landim

Hydrodynamic limit of asymmetric exclusion processes under diffusive scaling in $d > 2$

Abstract

We consider the asymmetric exclusion process. We start from a profile which is constant along the drift direction and prove that the density profile, under a diffusive rescaling of time, converges to the solution of a parabolic equation.

December 13th

9:00-9:50 Luiz Renato G. Fontes

Convergence to the Brownian web

Abstract

The Brownian web is a family of 1D coalescing Brownian paths starting at every space-time point in the plane. It comes up as the scaling limit of coalescing random walks, as well as in other contexts. In this talk we will describe this object and present criteria for weak convergence to it, which are then shown to be met by coalescing random walks and other coalescing families of random paths, like the Poisson web.

10:00-10:50 Anita Winter

Geometry of R-trees and the tree-valued Markov process with root growth and re-grafting

Abstract

The real trees form a class of metric spaces that extends the class of trees with edge lengths by allowing behavior such as infinite total edge length and vertices with infinite branching degree. A well-known example for an R-tree is David Aldous's Brownian continuum random tree (CRT), i.e. the tree inside a standard Brownian excursion. The CRT arises as the scaling limit as $N \to \infty$ of a critical finite variance Galton-Watson tree conditioned to have total population size N. We construct and study a Markov process on the space of all rooted compact real trees that has the CRT as its stationary distribution and arises as the scaling limit as $N \to \infty$ of the Aldous–Broder Markov chain with N vertices that has the uniform tree as its stationary distribution.

10:50-11:20 Coffee/Tea Break

11:20-12:10 V.S. Borkar

A stochastic control approach to channel capacity

Abstract

This talk will describe some recent work (joint with Arzad Alam Kherani and Vinod Sharma) on channel capacity of finite state Markov channels. It is shown that this capacity equals the value of a dynamic programme corresponding to the ergodic control problem for a certain nonlinear filter.

12:20-13:10 Rami Atar

On the Lyapunov exponent of a controlled diffusion for parallel server stations in heavy traffic

Abstract

In optimal stochastic control of a diffusion with cumulative discounted cost on an infinite time horizon, when the domain, drift and running cost are all unbounded, the existence and uniqueness theory for the corresponding dynamic programming PDE (of HJB type) requires an estimate on the moment Lyapunov exponent of the controlled diffusion. We describe several different approaches to obtain such an estimate for a diffusion representing the heavy traffic limit of a parallel server station model.

13:10-14:10 Lunch Break

14:10-15:00 Fabio Machado

On a epidemic model on finite and infinite graphs

Abstract

We study a system of simple random walks on graphs, known as *frog model*. This model can be described as follows: There are active and sleeping particles living on some graph. Each active particle performs a simple random walk with discrete time during its lifetime. When an active particle hits a sleeping particle, the latter becomes active. We present phase transition results and asymptotic values for critical parameters for $\mathbb{Z}^d$ and regular trees, for the case when the lifetime has a geometric distribution with parameter p. We also show that, despite the fact that the frog model is a percolation model, its critical probability is not a monotonic function of the graph. We also present very recent result for the model on finite graphs for a non-random lifetime depending on the geometry and the number of vertices of the graph.

15:00-15:30 Coffee/Tea Break

15:30-16:20 Mathew Penrose

Random sequential deposition onto graphs

Abstract

Suppose G is a finite graph, and particles arrive at the vertices of G, in random order. A particle is accepted at a vertex if no particle has previously been accepted there or at any adjacent vertex; otherwise it is discarded. This is a model for chemical adsorption. Graphs of interest include trees and lattices. We describe some qualitative and quantitatitive results, new and not so new.

December 14th

9:00-9:50 E. Pardoux

Malliavin calculus and the stochastic Navier Stokes equation

Abstract

We consider the 2 dimensional Navier Stokes equation, perturbed by a degenerated four dimensional additive white noise. We prove that the projection on any finite dimensional subspace of the solution at time t has a smooth density.

10:00-10:50 Richard F. Bass

Systems of equations driven by stable processes

Abstract

Let Z_t^j, $j = 1, \ldots, d$, be independent one-dimensional symmetric stable processes of index $\alpha \in (0, 2)$. We consider the system of stochastic differential equations

$$dX_t^i = \sum_{j=1}^{d} A_{ij}(X_{t-})dZ_t^j, \quad i = 1, \ldots, d,$$

where the matrix $A(x) = (A_{ij}(x))_{1 \le i,j \le d}$ is continuous in x and nondegenerate for each x. We prove existence and uniqueness of a weak solution to this system. The approach of this paper uses the martingale problem method. For this, we establish some estimates for pseudodifferential operators with singular state-dependent symbols. Let $\lambda_2 > \lambda_1 > 0$. We show that for any two vectors $a, b \in \mathbb{R}^d$ with $|a|, |b| \in (\lambda_1, \lambda_2)$ and p sufficiently large, the L^p-norm of the operator whose Fourier multiplier is $(|u \cdot a|^\alpha - |u \cdot b|^\alpha)/\sum_{j=1}^d |u_i|^\alpha$ is bounded by a constant multiple of $|a - b|^\theta$ for some $\theta > 0$, where $u = (u_1, \ldots, u_d) \in \mathbb{R}^d$. We deduce from this the L^p-boundedness of pseudodifferential operators with symbols of the form $\psi(x, u) = |u \cdot a(x)|^\alpha \sum_{j=1}^d |u_i|^\alpha$, where $u = (u_1, \ldots, u_d)$ and a is a continuous function on $\mathbb{R}^d$ with $|a(x)| \in (\lambda_1, \lambda_2)$ for all $x \in \mathbb{R}^d$.

10:50-11:20 Coffee Break

11:20-12:10 Abhay Bhatt

Characterization of Markov Processes via Martingale Problems

Abstract

It is well-known that well-posedness of a martingale problem in the class of continuous (or r.c.l.l.) solutions implies measurability of the transition probability functions and hence Markovian property of the solution. We extend this result to the case when the martingale problem is well-posed in the class of solutions which are continuous in probability. This extension is used to improve on a criterion for a probability measure to be invariant for the semigroup associated with the Markov process.

12:20-13:10 Thomas G. Kurtz

Applications of a Markov mapping theorem

Abstract

Conditions in terms of generators are given under which the image of a solution of a martingale problem with values in one metric space gives a solution of a martingale problem with values in the image space. Applications of the general result will be discussed including particle representations for measure-valued processes, the equivalence between martingale problems and stochastic differential equations, and uniqueness for stochastic partial differential equations