2008 Disentis Summer school: participants talks.

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Monday 21

Speaker : **David Windisch**
Title : **Random walk on a discrete torus and random interlacements.**
Abstract : The talk will focus on properties of the set of points visited on the discrete torus $(\mathbb{Z}/N\mathbb{Z})^d$ by a simple random walk of length uN^d in high dimension d as N tends to infinity. For small values of $u > 0$, the set of unvisited, *i.e.* vacant, sites is known to contain a unique giant component containing segments of length $c \log N$ for some constant $c > 0$. Although other components of the vacant set are expected to be much smaller, it turns out that small components of diameter at least $c' \log N$ do occur for some constant $0 < c' < c$. We will also see the connection with the model of random interlacements recently introduced by Sznitman.

Speaker : **Augusto Teixeira**
Title : **Random walk trajectories and Random Interlacements.**
Abstract : If one considers a random walk on a large torus $(\mathbb{Z}/N\mathbb{Z})^d$ $(d > 2)$, a natural question appears: What does the local picture of the set of visited sites look like for large N ? By "local picture" we mean: the set of visited sites inside a box of fixed diameter. The correct time scale one should run the random walk (to avoid degenerate limits as N goes to infinity) is uN^d, $u > 0$, and the limiting law inside the box is the so called random interlacement at level u. This can be extended to a translation invariant law on $\mathbb{Z}^d$ and that is the main interest of this talk. More specifically, we want to study the percolative properties of the set of vacant sites, *i.e.* the complement of the interlacement, for the various values of u

Speaker : **Martin Borecki**
Title : **Localization/delocalization for certain $(1+1)$-dimensional models.**
Abstract : We consider a $(1+1)$-dimensional model, *i.e.* a directed model for a linear chain which is described by its configurations $\{(n, \phi_n)\}_{0 \le n \le N}$. The chain is randomly distributed in space and undergoes an interaction with the environment and itself. Thus, it can be seen as a so called random polymer and we want to study its spatial distribution as a function of its length and its interaction parameters. The self-interaction of our chain $\varphi : \{1, \dots, N\} \to \mathbb{R}$ is given by

$$\sum_i V_1(\nabla \varphi_i) + V_2(\Delta \varphi_i)$$

where ∇ and Δ are the discrete gradient and Laplacian respectively. We want to study the quadratic potentials

$$V_1(\eta) = \frac{\alpha}{2}\eta^2 \quad , V_2(\eta) = \frac{\beta}{2}\eta^2.$$

The interaction with the environment will be reduced to a δ-pinning, *i.e.* the chain gets a reward $\varepsilon \ge 0$ each time it touches the x-axis. We discuss the localization behaviour of the model, which is substantially different, depending on the parameters α, β and $\varepsilon \ge 0$. Furthermore we consider what changes, if we additionally introduce an impermeable wall.

Speaker : **Felix Rubin**
Title : **Gap Probabilities for Random Matrix Ensembles.**
Abstract : The eigenvalues of a random matrix determine a determinantal point process. A natural question to ask is: Given a fixed set, what is the probability that no eigenvalue lies inside that set? We give the Gaussian Unitary Ensemble (GUE) as an example and look at the distribution of its largest eigenvalue and at scaling limits for that distribution. We also introduce a finite dimensional matrix ensemble with a Cauchy type weight and formulate the distribution of its largest eigenvalue in terms of the solution of a Painlevé-VI differential equation.

Speaker : **Anne Feidt**
Title : **Asymptotics of joint maxima of discrete random variables.**
Abstract : The joint extreme-value behaviour of discrete random variables is shown to be characterized by the weak limit of the (appropriately normalized) componentwise maxima and the convergence of their associated copula, in similarity to the continuous case. We also consider an extension to the case of triangular arrays.

Tuesday 22

Speaker : **Joseph Najnudel**
Title : **T.B.A**
Abstract : T.B.A

Speaker : **Samuel Drapeau**
Title : **Conditional Robust Utility Representation and Dynamic Risk Measures**
Abstract : Many problems arise when looking at dynamic risk measures or utility optimization concerning the intertemporal consistency behavior. We will first look at some results enlightening this problematic. Then, in order to get a better insight, we will come back to the axiomatic level of preference orders and their related robust representation in a dynamic setting.

Speaker : **Delia Coculescu**
Title : **Random times and no-arbitrage conditions in default models.**
Abstract : The aim of this talk will be to study the random times which can be used for modeling the default time, in the framework of the so-called reduced form approach (or hazard rate approach) that relies on the technique of the enlargement of a reference filtration. Recently, random times which are not stopping times have received an increasing attention, and some classes of random times with remarkable properties have been introduced and studied (honest times, pseudo-stopping times, initial times). In this work, we begin by justifying on economic grounds the default models which rely on the technique of the enlargement of the filtration, and explain the reasons why such an approach should be used. We then provide sufficient conditions for a market to be arbitrage-free in presence of default risk. Finally, these conditions are studied in order to characterize the random times which satisfy them.

Speaker : **Anja Richter**
Title : **Differentiability of reflected BSDEs with quadratic growth.**

Abstract : In this talk we consider reflected backward stochastic differential equations (RBSDEs) with generators that have quadratic growth in the control variable. Since the solution of such an equation is forced to stay above a given stochastic process RBSDEs are a useful tool for pricing American options. In a more abstract setting we allow the terminal condition to depend on a vector parameter x. We provide sufficient conditions for the solution of the quadratic RBSDE to be differentiable in x.

Speaker : **Holger Van Bargen**
Title : **Isotropic Ornstein Uhlenbeck Flows.**
Abstract : The talk is concerned with the introduction of the model of an Isotropic Ornstein-Uhlenbeck Flow (IOUF). For the IOUFs are constructed from a given Isotropic Brownian Flow, I will briefly rewiew the link between stochstic flows and stochastic differential equations driven by Kunita-type spatial semimartingale fields and then indicate the construction of IOUFs. As an application I will (sketch a) proof (of) a simple lemma concerning the spatial regularity of an IOUFs unitstep discretisation.

Thursday 24

Speaker : **Hanna Döring**
Title : **Moderate deviations via Laplace transforms.**
Abstract : The objects of this talk are non-degenerated U-statistics with bounded kernel functions. The main idea to prove a moderate deviation principle for these statistics is to use an inequality derived by Olivier Catoni estimating the log-Laplace transform and to apply the Gärtner-Ellis theorem. We utilise this method to prove a moderate deviation principle for subgraph count statistics of Erdos-Rényi random graphs.

Speaker : **Giacomo Di Gesu**
Title : **Spectral asymptotics for metastable Glauber dynamics on the lattice via a discrete Witten complex.**
Abstract : The so-called Witten complex approach to the analysis of metastability of reversible diffusion processes provides a method, alternative to the potential theoretical one, to obtain sharp asymptotics of the low lying spectrum of the generator. I will present the main ideas and tools involved and then discuss a possible extension of these techniques to a discrete setting: the case of Glauber dynamics (that is Markov processes reversible with respect to some Gibbs measure) on the scaled integer lattice. These dynamics arise naturally in the context of (disordered) mean field models, like the Random field Curie - Weiss model.

Speaker : **Matthias Rafler**
Title : **Random Integer Partitions and the Bose Gas.**
Abstract : A partition of an integer N is a collection of positive integers $\lambda_1, \ldots, \lambda_{k_0}$ such that $\lambda_1 + \ldots + \lambda_{k_0} = N$; random λ_k's lead to random partitions. They arise naturally in population models, where λ_k represents the size of the k-th family of a population of total size N; or in physics in models of bosonic particle systems, where N particles subdivide into groups and the k-th group has size λ_k.

Here we consider a bosonic particle system and extract from that model particular random partitions. We are interested in the limiting shape as N tends to infinity. We show that, under certain conditions, a phase transition called Bose-Einstein Condensation occurs.

Speaker : **Philipp Thomann**
Title : **Quenched vs. Annealed.**
Abstract : The simplest treatment of the high temperature SK-Model with zero external field is by using "quenched = annealed". Is it possible to apply this type of argument also if there is an external field? We studied this question in a generalization of Talagrand's SK-Model with d-Components Spins.

Speaker : **T.B.A**
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