Young Women in Probability
Conference program

Bonn, 26-28 May 2014

Website : http://www.iam.uni-bonn.de/ywip2014/

1 Schedule

Time	Monday 26	Tuesday 27	Wednesday 28
08:30	*Registration*		
09:00	Gantert	de Tilière	Winter
09:30			
10:00			
10:30	*Coffee break*	*Coffee break*	*Coffee break*
11:00	Blancas Benitez	Wu	Pachon
11:40	Banna	Andreis	Trinajstic
12:00	Sobolieva	Hernandez-Hernandez	
12:20	*Lunch break*	*Lunch break*	*Closing and Lunch*
13:00			
13:30			
14:00	Nota	Simon	*Free afternoon*
14:40	Deshayes	Agoritsas	
15:20	Santiago	Dumitrescu	
15:40	Leoff	Zhang	
16:00	*Coffee break*	*Coffee break*	
16:30	Putan	Wang	
17:10	Lang	Blondel	
17:50	Strokorb	Wilke Berenguer	
18:10	Mazzucchi	Pricop-Jeckstadt	
18:30		Di Girolami	
18:50	POSTER SESSION	*Group picture*	
19:00			
19:30	*Reception*	*Workshop dinner*	

2 Program

Monday 26 May

8:30–9:00	*Registration*	
9:00–10:30	Nina Gantert (TU München, Germany)	*Einstein relation and homogenization of random media (90min lecture)*
10:30–11:00	*Coffee break*	
11:00–11:30	Airam Aseret Blancas Benítez (Paris VI, France)	*On branching process with rare neutral mutations (30min talk)*
11:40–11:55	Marwa Banna (UPEM Paris, France)	*Limiting spectral distribution of large sample covariance matrices (15min talk)*
12:00–12:15	Daryna Sobolieva (University of Kyiv, Ukraine)	*Large deviations for SDE's with discontinuous coefficients (15min talk)*
12:20–14:00	*Lunch break*	
14:00–14:30	Alessia Nota (University of Rome, Italy)	*Derivation of the Fick's law for the Lorentz model in a low density regime (30min talk)*
14:40–15:10	Aurelia Deshayes (Université de Lorraine, France)	*The contact process with aging (30min talk)*
15:20–15:35	Dialid Santiago (University of Warwick, UK)	*A brief introduction to McKean-Vlasov processes and their properties (15min talk)*
15:40–15:55	Elisabeth Leoff (TU Kaiserslautern, Germany)	*Continuous Time Regime switching Models in Finance (15min talk)*
16:00–16:30	*Coffee break*	

16:30–17:00	Diana PUTAN (University of Bielefeld, Germany)	*A General Uniqueness Criterion for Gibbs Measures with Non-compact Spins and Some Applications (30min talk)*
17:10–17:40	Eva LANG (TU Berlin, Germany)	*Traveling waves in stochastic neural field equations (30min talk)*
17:50–18:05	Kirstin STROKORB (Universität Mannheim, Germany)	*A sharp lower bound for the distribution of a max-stable process in terms of its extremal coefficients (15min talk)*
18:10–18:40	Sonia MAZZUCCHI (University of Trento, Italy)	*Projective systems of funtionals and applications to high order heat-type equations (30min talk)*

18:50–19:30 *Poster session:*

	Roberta ALBUQUERQUE (University of Warwick, UK)	*Exchangeable random partitions and coalescent theory*
	Andrea MEIRELES RODRIGUES (University of Edinburgh, UK)	*Continuous-Time Portfolio Optimisation for a Behavioural Investor*
	Gamze OZEL KADILAR (Hacettepe University, Turkey)	*The Kumaraswamy-generalized exponential-Weibull distribution*
	Jia Wei LIM (London School of Economics, UK)	*Analytical solution and asymptotic result for Parisian stopping time densities*
	Katerina PAPAGIANNOULI (TU Athens, Greece)	*The problem of diffusion exit from a bounded domain*
	Mouna HADDADI (Cadi Ayyad, Morocco)	*Option Volatility and Pricing*
	Natasa PAUNKOSKA (Skopje, Republic of Macedonia)	*Cooperative Jamming Method used for Increasing Secrecy Capacity of Wireless Channels*
	Adja Mbarka FALL (Gaston Berger University, Sénégal)	*A supermartingale argument for characterizing the functional Hill Process weak law for small parameters*

from 19:30 *Reception*

Tuesday 27 May

9:00–10:30	Béatrice de Tilière (Paris VI, France)	*Aspects of the dimer model, spanning trees and the Ising model (90min lecture)*

10:30–11.00 *Coffee break*

11:00–11:30	Hao Wu (MIT, USA)	*Intersection of SLE paths (30min talk)*
11:40–11:55	Luisa Andreis (Università di Padova, Italy)	*Construction and Properties of Continuous-state Branching Processes with Memory (15min talk)*
12:00–12:15	Ma Elena Hernández-Hernández (University of Warwick, UK)	*Controlled Fractional Dynamic of Particle Systems (15min talk)*

12:20–14:00 *Lunch break*

14:00–14:30	Marielle Simon (ENS Lyon, France)	*Energy fluctuations in the disordered harmonic chain (30min talk)*
14:40–15:10	Elisabeth Agoritsas (University of Grenoble, France)	*Static fluctuations of a thick 1D interface in the 1+1 Directed Polymer formulation (30min talk)*
15:20–15:35	Roxana Dumitrescu (Paris IX, France)	*Double reflected BSDEs with jumps and generalized Dynkin games (15min talk)*
15:40–15:55	You You Zhang (London School of Economics, UK)	*Joint Law of Excursion and Hitting time for Brownian motion with Application to Parisian Option Pricing (15min talk)*

16:00–16:30 *Coffee break*

16:30–17:00	Minmin Wang (Paris VI, France)	*Decomposition along the diameter of the Brownian CRT (30min talk)*
17:10–17:40	Oriane Blondel (Paris VII, France)	*Walkers in glass formers (30min talk)*
17:50–18:05	Maite Wilke Berenguer (TU Berlin, Germany)	*On the stability of a dynamical system arising in a telecommunication network (15min talk)*
18:10–18:25	Mihaela Pricop-Jeckstadt (University of Bonn, Germany)	*Convergence analysis for nonlinear Tikhonov regularization in Hilbert scales with adaptive choice of the regularization parameter (15min talk)*
18:30–18:45	Cristina Di Girolami (Università di Pescara, Italy)	*Stochastic calculus for non-semimartingales in Banach spaces, an infinite dimensional PDE and some stability results (15min talk)*
18:50–19:00	*Group picture*	
from 19:30	*Workshop dinner at Bierhaus Machold*	`http://www.bierhaus-machold.com/`

Wednesday 28 May

9:00–10:30	Anita Winter (Universität Duisburg-Essen, Germany)	*Invariance principle for variable speed random walks on trees (90min lecture)*
10:30–11:00	*Coffee break*	
11:00–11:30	Angelica Pachon (University of Torino, Italy)	*Reconstruction of a many-dimensional scenery with branching random walk (30min talk)*
11:40–12:10	Katja Trinajstic (Uppsala University, Sweden)	*Directed random graphs and convergence to the Tracy-Widom distribution (30min talk)*
12:20	*Closure and lunch break*	

3 Abstracts

3.1 Main lectures

- **Nina Gantert, (TU München, Germany)**

  Einstein relation and homogenization of random media

  We give an introduction to the topic of homogenization of random media, explain the Einstein relation, survey some results and present several open questions.

  Many applications, such as porous media or composite materials, involve heterogeneous media which are modeled by random fields. These media are locally irregular but are "statistically homogeneous" in the sense that their *law* has homogeneity properties. Considering random motions (random walks or diffusions) in such a random medium, it turns out often that they can be described by their *effective* behaviour. This means that there is a deterministic medium, the *effective* medium, whose properties are close to the random medium, when measured on long space-time scales. In other words, the local irregularities of the random medium average out over large space-time scales, and the random motion is characterized by the "macroscopic" parameters of the effective medium. How do the macroscopic parameters depend on the law of the random medium?
  As an example, we consider the effective diffusivity (i.e. the covariance matrix in the central limit theorem) of a random walk among random conductances. It is interesting and non-trivial to describe this diffusivity in terms of the law of the conductances. The *Einstein relation* gives a different interpretation of the effective diffusivity as *mobility*. The mobility measures the response of the diffusing particle to a constant exterior force: Consider the perturbed process obtained by imposing a constant drift of strength λ in some fixed direction. The perturbed motion satisfies (as one can show in many examples) a law of large numbers with effective velocity $v(\lambda)$. The mobility is the derivative of $v(\lambda)$ as λ goes to 0. The Einstein relation says that the mobility and the diffusivity of a particle coincide.
  The Einstein relation is conjectured to hold for a variety of models, but it is proved insofar only for particular cases.

  The (results part of the) talk is based on joint work with Pierre Mathieu and Andrey Piatnitski, and on work in progress with Noam Berger, Matthias Meiners, Sebastian Müller, Jan Nagel and Xiaoqin Guo.

- **Béatrice de Tilière, (Paris VI, France)**

  Aspects of the dimer model, spanning trees and the Ising model

  The goal of this lecture is introduce these three models of statistical mechanics, with an emphasis on the dimer model. We will present some useful relations between the dimer model and the other two models, allowing to use dimer techniques to solve questions on spanning trees and the Ising model.

- **Anita Winter, (Universität Duisburg-Essen, Germany)**

  Invariance principle for variable speed random walks on trees

  One of the most classic results in probability theory and statistics is the functional central limit theorem which states that suitably rescaled paths of random walks converge weakly towards the paths of Brownian motion. Around fifty years ago Stone generalized this to a class of $\mathbb{R}$-valued Markov processes which have in common that their state space is a closed subset of $\mathbb{R}$ and that their paths "do not jump over points". If such a process has a discrete state space, then it is a random walk. If the state space is an interval, the process has continuous paths. When put in their "natural scale" these processes are determined by their so-called speed measure. Stone argues that in some sense the processes depend continuously on the speed measure.

In this talk we want to extend this result from $\mathbb{R}$-valued Markov processes to Markov processes which take values in tree-like metric spaces. We will establish a one-to-one correspondence between metric measure trees (T, r, ν) and strong Markov processes $X = (X_t)_{t \geq 0}$ with values in the tree (T, r) whose speed measure can be identified as ν. We will show that a family of ν_n-speed motions on (T_n, r_n) converges in path space to the ν-speed motion provided that the underlying metric measure spaces converge in the Gromov-Hausdorff-vague topology. The topology will be introduced during the talk as well.

We will relate our invariance principle to several examples from the literature.

(This is joint work with Siva Athreya and Wolfgang Löhr)

3.2 Contributed talks and posters

- **Elisabeth Agoritsas, (University Joseph-Fourier of Grenoble, France)**

  Static fluctuations of a thick 1D interface in the 1+1 Directed Polymer formulation

  The one-dimensional Kardar-Parisi-Zhang (KPZ) equation is at the crossroad between a wide range of theoretical models and experimental systems such as roughening phenomena and stochastic growth, the Burgers equation in hydrodynamics or the 1+1 Directed Polymer, and the very definition and implications of the KPZ universality class have been expanding since the 1980', both in physicists and mathematicians communities. In this universality class, we have tackled the specific issue of the interplay between thermal fluctuations and a correlated disordered energy landscape, from the vantage point of static one-dimensional (1D) elastic interfaces, whose experimental realisations always exhibit a finite microscopic width and/or a disorder correlation length. We have studied analytically and numerically the geometrical fluctuations of a static 1D interface with a short-range elasticity, submitted to a quenched random-bond Gaussian disorder of finite disorder correlation length, and a finite temperature. Using the exact mapping from the static 1D interface to the 1+1 Directed Polymer, growing in a continuous space, we predict the existence of a two temperature regimes: the influence of the disorder correlation length is erased by the thermal fluctuations at sufficiently high temperature, but turns out to be crucial ingredient for the description of the interface fluctuations below a characteristic temperature $T_c > 0$.

- **Roberta Albuquerque, (University of Warwick, UK)**

  Exchangeable random partitions and coalescent theory

  In theoretical population genetics, coalescent models describe the ancestral lineages of samples of genes. This talk is divided into three parts: First, as an introduction to exchangeable random partitions, the well-known Gibbs random partition is presented. After that, we consider the Λ-coalescent processes discovered independently by Pitman and Sagitov in 1999. Finally, we investigate Möhle's recursion formula for sampling probabilities of an exchangeable random order allele configuration.

- **Luisa Andreis, (Università degli studi di Padova, Italy)**

  Construction and Properties of Continuous-state Branching Processes with Memory

  Markov property is tipically introduced in the study of branching models to obtain mathematically tractable processes. Specifically, often the waiting times between successive generations are modelled through exponential distributions and mathematical simplifications follow from the absence of memory. However, many modelling instances request more flexible models. To avoid the introduction of the Markov property we make use of a random change of time, obtaining a mathematically tractable non-Markov branching model. In this framework we first study a generalized Galton–Watson process for which the random waiting times between generations are not exponential but have a distribution characterized by infinite mean. Starting from the well-known result that links sequences of rescaled Galton– Watson processes with a limiting continuous-state branching process (CSBP), we show that it is possible to obtain an analogous of this limit in our generalized case. Our proof mimic that for random walks in the presence of our kind of waiting times. In that case it is possible to prove that a sequence of rescaled random walks converges to a stable process time-changed with the hitting time process of a stable subordinator (M. Meerschaert, H. Scheffler, J. Appl. Prob., 41(3), 623–638). The application of that technique to our case requests the introduction of some technical hypotheses. We discuss the general case, analyzing the limiting process and its properties, giving an explicit expression for its first and second moments. Comparison with the classical model are illustrated. Finally, we consider the action of the random time change on a specific CSBP, the Feller branching diffusion, focusing on its governing equation and stressing a relationship involving fractional derivatives. Joint work with Federico Polito and Laura Sacerdote Dept. of Matematics "G. Peano", University of Torino Italy.

- **Marwa Banna, (Université Paris-Est Marne-La-Vallée, France)**

  Limiting spectral distribution of large sample covariance Matrices

  In this talk, we start by giving an introduction to random matrix theory. Then, we discuss the Marcenko-Pastur Theorem in the i.i.d. case and give an outline of its proof based on the Stieltjes transform via the Lindeberg method. Finally, we derive an extension of the above theorem to a large class of weak dependent sequences of real random variables having only moments of order 2.

- **Airam Aseret Blancas Benítez, (Université Pierre et Marie Curie, France)**

  On branching process with rare neutral mutations

  In this talk we study the genealogical structure of a Galton-Watson process with neutral mutations, where the initial population is large and mutation rate is small. Namely, we extend in two directions the results obtained by Bertoin in 2010.

  Assuming that the reproduction law is critical and has finite variance, we ensure that conditionally to non-extinction there exists a measure under which the process of the sizes of allelic sub-populations converges towards a continuous state branching processes with immigration in discrete time. In adittion, we establish this convergence in the situation where the reproduction law is in the domain of attraction of an α-stable distribution.

  KEYWORDS. Branching process; Neutral mutations; Q-processes; Regular variation; Domain of attraction of α-stable laws.

- **Oriane Blondel, (Paris VII, France)**

  Walkers in glass formers

  I will give some results on the behaviour of random walkers evolving in a dynamic random environment. The environment will mostly be chosen as a Kinetically Constrained Spin Model (KCSM), a class of systems introduced in physics to model glassy systems. The results presented here are relevant from a theoretical point of view, but also provide rigorous answers to questions raised in the physics literature. Partially joint work with Luca Avena (WIAS, Berlin) and Alessandra Faggionato (La Sapienza, Roma).

- **Aurelia Deshayes, (Université de Lorraine, France)**

  The contact process with aging

  The contact process was introduced in 1974 by Harris. It is an interacting particles system modeling the spread of a population on the site of $\mathbb{Z}^d$. It is a continuous-time Markov process taking its values in $\{0,1\}^{\mathbb{Z}^d}$. In 1999, Krone made a generalization where the sites can be in three states. I will present the contact process with aging which is a generalization of the two previous processes: the state of a site is his age in $\mathbb{N}$. I will discuss about survival and mention the difficulties of the nonpermanent models. For our process, the construction of Bezuidenhout and Grimmett is still working and we can establish useful exponential decays. Then we can show an almost subadditivity to obtain an asymptotic shape theorem like Garet and Marchand for the classical contact process in random environment.

- **Cristina Di Girolami, (Università di Pescara, Italy)**

  Stochastic calculus for non-semimartingales in Banach spaces, an infinite dimensional PDE and some stability results

  This talk develops some aspects of stochastic calculus via regularization for processes with values in a general Banach space B. A new concept of quadratic variation which depends on a particular subspace is introduced. An Itô formula and stability results for processes admitting this kind of quadratic variation are presented. Particular interest is devoted to the case when B is the space of real continuous functions defined on $[-T, 0]$, $T > 0$ and the process is the window process $X(\cdot)$ associated with a continuous real process X which, at time t, it takes into account the past of the process. If X is a finite quadratic variation process (for instance Dirichlet, weak Dirichlet), it is possible to represent a large class of path-dependent random variable h as a real number plus a real forward integral in a semiexplicite form. This representation result of h makes use of a functional solving an infinite dimensional partial differential equation. This decomposition generalizes, in some cases, the Clark-Ocone formula which is true when X is the standard Brownian motion W. Some stability results will be given explicitly. This is a joint work with Francesco Russo (ENSTA ParisTech Paris).

- **Roxana Dumitrescu, (Paris Dauphine, France)**

  Double reflected BSDEs with jumps and generalized Dynkin games

  We study DBBSDEs with jumps and RCLL barriers, and their links with generalized Dynkin games. We provide existence and uniqueness results and prove that for any Lipschitz driver, the solution of the DBBSDE coincides with the value function of a game problem, which can be seen as a generalization of the classical Dynkin problem to the case of g-conditional expectations. Using this characterization, we prove some new results on DBBSDEs with jumps, such as comparison theorems and a priori estimates. We then study DBBSDEs with jumps and RCLL obstacles in the Markovian case and their links with parabolic partial integro-differential variational inequalities (PIDVI) with two obstacles.

- **Adja Mbarka Fall, (Gaston Berger University, Sénégal)**

  A supermartingale argument for characterizing the functional Hill Process weak law for small parameters

  The law of the functional Hill process is guided by sums of independant random variables when the distribution function of the data is in the Frechet or Weibull extremal domain of attraction and the Kolmogorov Theorem for centered random variables. But for distribution functions in the Weibull domain the limiting laws are sums of dependent random variables. We use martingale results to characterize the asymptotic law of a process where the limiting laws are derived and next apply the findings to determinate the asymptotic behavior of the functional Hill process for small parameters within the Extreme Value Theory.

- **Mouna Haddadi, (Cadi Ayyad, Morocco)**

  Option Volatility and Pricing

  This poster discusses the three types of volatility: the historical volatility, implied and stochastic, and the concept of local volatility. Finally the pricing formula of Vanilla options with stochastic volatility model as the model of HESTON.

- **Ma Elena Hernández-Hernández, (University of Warwick, UK)**

  Controlled Fractional Dynamic of Particle Systems

  Non-Markovian Interacting Particle Systems and its link with fractional operators are introduced in a stochastic control setting. The fractional evolution equation for an associated process is heuristically derived.

- **Eva Lang, (TU Berlin, Germany)**

  Traveling waves in stochastic neural field equations

  The propagation of activity in a neural network consisting of a large number of neurons with nonlocal interactions is in the continuum limit described by an integro-differential equation, the so called neural field equation. Assuming that there are two stable states of the system, "active" and "inactive", it can be shown that there exists a traveling wave solution connecting the two states. Taking random influences into account, we realise the one-dimensional neural field equation as a function valued stochastic evolution equation and use a geometric approach to analyse the stability and the speed of the traveling wave.

- **Elisabeth Leoff, (TU Kaiserslautern, Germany)**

  Continuous Time Regimeswitching Models in Finance

  A continous time regime switching model, where the observations are given as a diffusion with parameters depending on a continuous time Markov chain, can explain some stylized facts of asset returns. Our aim is to provide a continuous time regime switching model which has good econometric properties and allows for explicit computations in finance.

  If the volatility is not allowed to jump with the Markov chain, we are in the context of a hidden Markov model (HMM) where one has to filter and thus estimate the current state of the chain. The discretized filters are the same as the filters of the discretized models. Therefore, the discrete time HMM provides a good approximation of the continuous time model. This is a desirable property, since the continuous time model allows for quite explicit calculations e.g. in portfolio optimization. But assuming the volatility to be constant reduces the good econometric properties of the model.

  This leads to the Markov switching model (MSM) where the volatility jumps with the same Markov chain as the drift. Due to the switching volatility, in continuous time the underlying

Markov chain could (theoretically) be observed. This is not the case for the corresponding discrete model, where one needs to estimate the current state of the chain. Thus, on a fixed time scale, in the MSM there is a considerable gap between discrete and continuous time models which is not present in the HMM.

To solve this problem we introduce a continuous time model, where the drift parameter still jumps and the volatility depends on an observable quantity e.g. the filter for the state of the chain. In this model one can still obtain quite explicit calculations while the Markov chain is still unobservable as in the HMM

We analyze the relation of this model to the continuous time MSM and obtain a choice of volatility process that minimizes the expected squared distance between the returns in both models. We discuss stylized facts, model properties and their relevance for finance e.g. in portfolio optimization.

- **Jia Wei Lim, (London School of Economics, UK)**

  Analytical solution and asymptotic result for Parisian stopping time densities

  We obtain a recursive formula for the densities of the one and two-sided Parisian stopping time. The advantage of this new method is that the recursions are easy to perform and no numerical inversion of Laplace transforms is required. We also studied the tails of the distributions and found that the two-sided stopping time has an exponential tail, while the one-sided stopping time has a heavier tail. We derive an asymptotic result for the tail of the two-sided stopping time distribution and propose an alternative method of approximating the price of the two-sided Parisian option.

- **Sonia Mazzucchi, (University of Trento, Italy)**

  Projective systems of funtionals and applications to high order heat-type equations

  The connection between the solution of parabolic equations associated to second-order elliptic operators and the theory of stochastic processes is a largely studied topic. The main instance is the *Feynman-Kac formula* (2), providing a representation of the solution of the heat equation

  $$\frac{\partial}{\partial t}u(t,x) = \frac{1}{2}\Delta u(t,x) - V(x)u(t,x), \qquad t \in \mathbb{R}^+, x \in \mathbb{R}^d \tag{1}$$

  in terms of an integral with respect to the Wiener measure:

  $$u(t,x) = \mathbb{E}^x[e^{-\int_0^t V(\omega(s))ds}u_0(\omega(t))]. \tag{2}$$

  On the other hand, if we consider different PDEs, such as for instance the Schrödinger equation:

  $$i\frac{\partial}{\partial t}u(t,x) = -\frac{1}{2}\Delta u(t,x) + V(x)u(t,x), \qquad t \in \mathbb{R}, x \in \mathbb{R}^d \tag{3}$$

  or an high order heat-type equation such as:

  $$\frac{\partial}{\partial t}u(t,x) = (-1)^{N+1}\Delta^N u(t,x), \quad t \in \mathbb{R}^+, x \in \mathbb{R}, \tag{4}$$

  then a formula analogous to (2), giving the solution in terms of the expectation with respect to the measure associated to a Markov process, cannot be proved.
  In this talk we shall show that the problem can be solved by replacing the concept of integral with the more general concept of linear continuous functional on a suitable algebra of "integrable" functions. We shall show how this idea can be implemented in the construction of generalized Feynman-Kac formulae, providing functional integral representations of the solutions of equations (3) and (4).

- **Andrea Meireles Rodrigues, (University of Edinburgh, Scotland, UK)**

  Continuous-Time Portfolio Optimisation for a Behavioural Investor

  Our aim is to examine an optimal investment problem in a continuous- time and (essentially) complete financial market with a finite horizon, where asset prices are modelled by semi-martingales. We deal with an investor who behaves in accordance with Kahneman and Tversky's Cumulative Prospect Theory, and we begin by analysing the well-posedness of the optimisation problem. In the case where the investor's utility function is not bounded above, we derive necessary conditions for well-posedness, which are related only to the behaviour of the distortion functions near the origin and to that of the utility function as wealth becomes arbitrarily large (both positive and negative). Next, we focus on an investor whose utility is bounded above. The problem's well-posedness is trivial, and a necessary condition for the existence of an optimal trading strategy is obtained. This condition requires that the investor's probability distortion function on losses does not tend to zero faster than a given rate, which is determined by the utility function. Provided that certain additional assumptions are satisfied, we show that this condition is indeed the borderline for attainability, in the sense that, for slower convergence of the distortion function, there does exist an optimal portfolio. Finally, we turn to the case of an investor with a piecewise-power utility function and with power distortion functions. Then, the easily verifiable necessary conditions for well-posedness are found to be sufficient as well, and the existence of an optimal strategy is further demonstrated.

- **Alessia Nota, (Sapienza, University of Rome, Italy)**

  Derivation of the Fick's law for the Lorentz model in a low density regime

  We consider the Lorentz model in a slab with two mass reservoirs at the boundaries. We show that in a low density regime, the stationary solution for the microscopic dynamics converges to the stationary solution of the heat equation, namely to the linear profile of the density. In the same regime the macroscopic current in the stationary state is given by the Fick's law, with the diffusion coefficient determined by the Green-Kubo formula. (This is a joint work with G. Basile, F. Pezzotti and M. Pulvirenti)

- **Gamze Ozel Kadilar, (Hacettepe University, Turkey)**

  The Kumaraswamy-generalized exponential-Weibull distribution

  The Weibull distribution is perhaps the most widely applied statistical distribution for the modelling of the natural hazards. In this article we introduce Kumaraswamy-generalized exponential-Weibull (KGEW) distribution that generalizes the exponential Weibull (EW) distribution. The beauty and importance of this distribution lies in its ability to model monotone and non-monotone failure rate functions, which are quite common in the environmental studies. The new distribution has a number of well-known lifetime special sub-models such as exponential, Weibull, Rayleigh distributions. The density function and study some properties of the new distribution are obtained by deriving survival and hazard function. The parameter estimation is implemented by using the maximum likelihood approaches. Then, we obtain the Fisher information matrix for the new model.

  KEY WORDS: Kumaraswamy distribution; Weibull distribution; survival function; natural hazard.

- **Angelica Pachon, (University of Torino, Italy)**

  Reconstruction of a many-dimensional scenery with branching random walk

  In this paper we consider a d-dimensional scenery seen along a simple symmetric branching random walk, where at each time each particle gives the color record it is seeing. We show that we can a.s. reconstruct the scenery up to equivalence from the color record of all the particles. For this we assume that the scenery has at least 2d + 1 colors which are i.i.d. with uniform probability.

- **Katerina Papagiannouli, (National Technical University of Athens, Greece)**

  THE PROBLEM OF DIFFUSION EXIT FROM A BOUNDED DOMAIN

  Consider the system

  $$dX_t^\epsilon = b(X_t^\epsilon)dt + \sqrt{\epsilon}\sigma(X_t^\epsilon)dW_t, \quad X_t^\epsilon \in \mathbb{R}^d, \quad X_0^\epsilon = x$$

  in the open bounded domain $G \subset \mathbb{R}^d$, where $b()$ and $\sigma(\cdot)$ are uniformly Lipschitz con- tinuous functions and W is a standard Brownian motion. When ϵ tends to 0 the trajec- tories of the above diffusion converge to the trajectories of the O.D.E. in the limit, which asymptotically converges within G only at one point, the equilibrium point. In the limit the deterministic trajectories doesn't exit at all from the set G. We present a solution through Freidlin-Wentzel theory. Therefore, we connect this problem with an optimal control problem and a viscosity solution approach.

- **Natasa Paunkoska, (Ss. Cyril and Methodius University in Skopje, Republic of Macedonia)**

  COOPERATIVE JAMMING METHOD USED FOR INCREASING SECRECY CAPACITY OF WIRELESS CHANNELS

  The aim of this research is to be analyzed cooperative jamming method on multiple network configurations in order to be increase the region with information-theoretic secrecy. Wireless networks, especially decentralized networks such as ad-hoc and sensor networks, are use tremendously these days. Because of these properties and broadcast nature of the wireless medium they are very sensitive to passive and active attacks from unwanted parties, which mean that any node i.e. eavesdropper close to the legitimate transmitter can potentially receive sensitive information. Introduction of additional nodes in the network, so called 'unfriendly' nodes or jammers that provide intentional noise in the communication between the two legitimate entities contributes in hiding the real information from the observer, and thus in increasing the capacity and reliability of the data transfer. Establishment of positive secrecy capacity in this research is investigated for cases with single eavesdropper and single jammer according to unknown locations.

- **Mihaela Pricop-Jeckstadt, (University of Bonn, Germany)**

  CONVERGENCE ANALYSIS FOR NONLINEAR TIKHONOV REGULARIZATION IN HILBERT SCALES WITH ADAPTIVE CHOICE OF THE REGULARIZATION PARAMETER

  Results regarding inverse problems described by nonlinear operator equations both in a deterministic and statistical framework are going to be reviewed in this talk, and similarities and differences related to the nature of the setting are emphasized. Moreover, a convergence analysis leading to order optimal rates in the deterministic case and order-optimal rates up to a log-factor in the stochastic case for the Lepskii choice of the regularization parameter for a range of smoothness classes and with a milder smallness assumptions is presented. This method can be applied to a Volterra-Hammerstein non-linear integral equation that fulfills our assumptions and has several applications as population growth model in the population dynamics.

- **Diana Putan, (University of Bielefeld, Germany)**

  A General Uniqueness Criterion for Gibbs Measures with Non-compact Spins and Some Applications

  An improved version of the Dobrushin-Pechersky uniqueness criterion for Gibbs measures will be presented. This result was so far poorly recognized, however we are able not only to give a clear proof for it, but also to present its applicability for certain models of interacting particle systems where the classical Dobrushin criterion does not work.

- **Dialid Santiago, (University of Warwick, UK)**

  A brief introduction to McKean-Vlasov processes and their properties

  Roughly speaking a McKean-Vlasov process is a process which can be described by an SDE where the coefficients of the diffusion part depend on the law of the solution itself. This class of processes was introduced by H.P. McKean in two seminal papers in the late 60's. In these papers he made the fruitful observation that the familiar connection between linear parabolic equations and Markov processes with constant transition mechanisms could be extended to nonlinear parabolic equations and a wider class of Markov processes. Afterwards, this kind of processes have been studied using different approaches and applied in several contexts. In this talk I will provide a brief introduction to this class of processes. General properties as well as different approaches to prove existence of this processes will be discussed.

- **Marielle Simon, (ENS Lyon, France)**

  Energy fluctuations in the disordered harmonic chain

  We study the energy diffusion in the disordered harmonic chain of oscillators: the usual Hamiltonian dynamics is provided with random masses and perturbed by a degenerate energy conserving noise. After rescaling space and time diffusively, energy fluctuations evolve following an infinite dimensional linear stochastic differential equation driven by the linearized heat equation.

- **Daryna Sobolieva, (Taras Shevchenko National University of Kyiv, Ukraine)**

  Large deviations for SDE's with discontinuous coefficients

  We will discuss large deviations for one-dimensional SDE's with discontinuous coefficients. It will be shown that discontinuity of coefficients leads, in general, to LDP asymptotics with rate function which differs from the rate function in the standard Wentzel and Freydlin theorem.

- **Kirstin Strokorb, (Universität Mannheim, Germany)**

  A sharp lower bound for the distribution of a max-stable process in terms of its extremal coefficients

  Max-stable processes provide a natural framework to model spatial extremal scenarios. An appropriate summary statistic for such processes is, for instance, the extremal coefficient function (ECF). We introduce the class of Tawn-Molchanov processes that is in a 1:1 correspondence with the class of ECFs. It turns out that these processes provide a sharp lower bound for the finite dimensional distributions of a max-stable process in terms of its ECF.

- **Katja Trinajstic, (Uppsala University, Sweden)**

  Directed random graphs and convergence to the Tracy-Widom distribution

  In 1994 Tracy and Widom found the limiting distribution function of the largest eigenvalue of a random matrix from the Gaussian unitary ensemble when the size of the matrix goes to infinity. Later several results have been proved relating last passage percolation to this limiting distribution. We consider a directed random graph on the 2-dimensional integer lattice, placing independently, with probability p, a directed edge between any pair of distinct vertices (i_1, i_2) and (j_1, j_2), such that $i_1 \leq j_1$ and $i_2 \leq j_2$. Let $L_{n,m}$ denote the maximum length of all paths contained in an $n \times m$ rectangle. In this talk I will motivate why we can assume that $L_{n,m}$ properly centered/scaled converges to the Tracy-Widom distribution and we will see that, with a sequence of transformations, we can exhibit a resemblance of our model to a last passage percolation model.

- **Minmin Wang, (Paris VI, France)**

  Decomposition along the diameter of the Brownian CRT

  The Brownian CRT (abbreviation for continuum random tree), introduced by Aldous in 1991, is a random (compact) metric space which is "encoded" by the normalized Brownian excursion. Aldous has determined the distribution of the diameter D of the Brownian CRT, using weak convergence arguments and a previous combinatorial result of Szekeres. In this talk, we present a direct calculation of the law of D based on the Williams' path decomposition of a Brownian excursion. Moreover, we give a description of the Brownian CRT conditioned on its diameter by slitting it along the path of maximal length. We show that such a decomposition can be viewed as some conditioned Poisson point process. Our method can be extended to the more general case of a Lévy tree.

- **Maite Wilke Berenguer, (Technische Universität Berlin, Germany)**

  On the stability of a dynamical system arising in a telecommunication network

  We consider the stability behaviour of a Markov Chain whose dynamics describe a specific optical network. This simple model exhibits surprising behaviour as it falls into a pattern thus raising the critical stability threshold and inducing the existence of what appear to be meta-stable sets depending on the parameter of the system. We will consider the instability of the model when this parameter exceeds the named threshold.

- **Hao Wu, (MIT, USA)**

  Intersection of SLE paths

  SLE curves are introduced by Oded Schramm as the candidate of the scaling limit of discrete models. In this talk, we first describe basic properties of SLE curves and their relation with discrete models. Then we summarize the Hausdorff dimension results related to SLE curves, in particular the new results about the dimension of cut points and double points. Third we introduce Imaginary Geometry, and from there give the idea of the proof of the dimension results.

- **You You Zhang, (London School of Economics, Great Britain)**

  Joint Law of Excursion and Hitting time for Brownian motion with Application to Parisian Option Pricing

  We study the joint law of the excursion time and hitting time of a drifted Brownian motion by using a three states semi-Markov model obtained through perturbation. This perturbed Brownian motion has the same behavior as a drifted Brownian motion, except it moves toward the other side of the barrier by a jump of size ϵ each time it hits the barrier, disposing of the difficulty of the origin being regular. We obtain martingales to which we can apply the optional sampling theorem and get the double Laplace transform. These general results are applied to address problems in option pricing. We introduce a new option related to Parisian options being triggered when the age of an excursion exceeds a certain time or/and a barrier is hit. We obtain an explicit expression for the Laplace transform of its price.

4 List of participants

1. Maria Fernanda AGOITIA HURTADO, Technische Universität Chemnitz, Germany
2. Elisabeth AGORITSAS, University Joseph-Fourier of Grenoble, France
3. Roberta ALBUQUERQUE, University of Warwick, UK
4. Duygu ALTINOK, University of Bonn, Germany
5. Luisa ANDREIS, Università degli studi di Padova, Italy
6. Martina BAAR, Bonn, Germany
7. Salwa BAJJA, Cadi Ayyad, Morocco
8. Marwa BANNA, Université Paris-Est Marne-La-Vallée, France
9. Giada BASILE, La Sapienza, Rome, Italy
10. Airam Aseret BLANCAS BENÍTEZ, Université Pierre et Marie Curie, France
11. Oriane BLONDEL, Paris Diderot, France
12. Alessandra CARACENI, Scuola Normale Superiore di Pisa, Italy
13. Loren COQUILLE, Bonn, Germany
14. Aurelia DESHAYES, Lorraine, France
15. Béatrice DE TILIÈRE, Paris VI, France
16. Cristina DI GIROLAMI, Università di Pescara, Italy
17. Ioanna DIMITRIOU, Universität Bonn, Germany
18. Roxana DUMITRESCU, Paris Dauphine, France
19. Adja Mbarka FALL, Gaston Berger University, Sénégal
20. Nina GANTERT, TU München, Germany
21. Mouna HADDADI, Cadi Ayyad, Morocco
22. Lisa HARTUNG, Universität Bonn, Germany
23. Ma Elena HERNÁNDEZ-HERNÁNDEZ, University of Warwick, United Kingdom
24. Watthanan JATUVIRIYAPORNCHAI, University of Warwick, UK
25. Eva KOPFER, University of Bonn, Germany
26. Eva LANG, TU Berlin, Germany
27. Thi Huyen LE, Marseille University, France
28. Elisabeth LEOFF, TU Kaiserslautern, Germany
29. Janna LIERL, Bonn, Germany
30. Jia Wei LIM, London School of Economics, United Kingdom

31. Sonia Mazzucchi, University of Trento, Italy
32. Hannah Mayer, Bonn, Germany
33. Andrea Meireles Rodrigues, University of Edinburgh, Scotland, United Kingdom
34. Katja Miller, TU München, Deutschland
35. Rebecca Neukirch, Universität Bonn, Germany
36. Alessia Nota, Sapienza, University of Rome, Italy
37. Gamze Ozel Kadilar, Hacettepe University, Turkey
38. Angelica Pachon, University of Torino, Italy
39. Katerina Papagiannouli, National Technical University of Athens, Greece
40. Natasa Paunkoska, Ss. Cyril and Methodius University in Skopje, Rep. of Macedonia
41. Sarah Penington, Oxford, United Kingdom
42. Mihaela Pricop-Jeckstadt, University of Bonn, Germany
43. Diana Putan, University of Bielefeld, Germany
44. Dialid Santiago, University of Warwick, UK
45. Marielle Simon, ENS Lyon, France
46. Daria Smirnova, University of Geneva, Switzerland
47. Daryna Sobolieva, Taras Shevchenko National University of Kyiv, Ukraine
48. Kirstin Strokorb, Universität Mannheim, Germany
49. Katja Trinajstic, Uppsala University, Sweden
50. Minmin Wang, Paris VI, France
51. Felizitas Weidner, TU München, Deutschland
52. Maite Wilke Berenguer, Technische Universität Berlin, Germany
53. Anita Winter, Universität Duisburg-Essen, Germany
54. Hao Wu, MIT, USA
55. Yuxin Yang, Imperial College, UK
56. You You Zhang, London School of Economics, Great Britain

5 Organizers

- Loren Coquille (University of Bonn)
- Janna Lierl (University of Bonn)