9th International Conference on Stochastic Analysis and its Applications

3.–7. September 2018

Bielefeld University

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Taming uncertainty and profiting from randomness and low regularity in analysis, stochastics and their applications

at Bielefeld University

Organiser: Michael Röckner

https://www.math.uni-bielefeld.de/icsaa/

Lunch

Mensa (Canteen) ("Building X") offers menus and a buffet, open Mo-Fr 11:30-14:30. Look out for "Barzahlung" checkout in order to pay cash.

Westend ("Main Building") offers grill, pasta, main courses, salads, snacks and beverages, open Mo-Fr 8:00-18:00, Sat 9:00-14:30.

Cafeteria ("Building X") offers warm and cold snacks, beverages, open Mo-Fr 8:00-16:00.

Univarza Restaurant ("Main Building"), open Mo-Fr 10:00-21:00.

Cash machines are located in the large hall of the main building (Sparkasse).

	Monday		Tuesday		Wednesday	
08:45	Registration					
09:00	Opening					
09:15	**Alexander Veretennikov** ZiF		**Jian Ding** ZiF		**Noam Berger** ZiF	
09:55	Break		Break		Break	
10:00	**Krzysztof Burdzy** ZiF		**Nicolai Krylov** ZiF		**Jan Maas** ZiF	
10:40	Coffee break		Coffee break		Coffee break	
11:15	**David Croydon** ZiF		**Peter Mörters** ZiF		**James Norris** ZiF	
11:55	Break		Break		Break	
12:00	**Sandra Cerrai** ZiF		**Michael Röckner** ZiF		**Denis Talay** ZiF	
12:40	Lunch		Lunch		Lunch	
14:15	**Xin Chen** H14	**Wei Qian** H13	**Alexandre Boritchev** H14	**Dario Trevisan** H13	**Janos Englander** H14	**Oleksandr Kutovyi** H13
14:40	Break		Break		Break	
14:45	**Ryoki Fukushima** H14	**Matthew Roberts** H13	**Dejun Luo** H14	**Gerald Trutnau** H13	**Michał Ryznar** H14	**Deng Zhang** H13
15:10	Break		Break		Break	
15:15	**Panki Kim** H14	**Martin Grothaus** H13	**Zoran Vondracek** H14	**Hirofumi Osada** H13	**Guohuan Zhao** H14	**Mathav Murugan** H13
15:40	Break		Break		Break	
15:45	**Moritz Kassmann** H14	**Sebastian Andres** H13	**Michael Hinz** H14	**Karen Habermann** H13	**Krzysztof Bogdan** H14	**Minoru W. Yoshida** H13
16:10	Coffee break		Coffee break		Coffee break	
16:45	**Yana Butko** H14	**Iulian Cimpean** H13	**Ludwig Streit** H14	**Kohei Suzuki** H13	**Alexandra Neamtu** H14	**Karol Szczypkowski** H13
17:10	Break		Break		Break	
17:15	**Jacek Malecki** H14	**Jonas Tölle** H13	**Konstantinos Dareiotis** H14	**Philippe Blanchard** H13	**Yuri Kondratiev** H14	**Xicheng Zhang** H13
17:40	Break		Break		Break	
17:45	**George Andriopoulos** H14	**Pawel Sztonyk** H13	**Gianni Pagnini** H14	**André De Oliveira Gomes** H13	**Grzegorz Serafin** H14	**Thomas Bernhardt** H13
18:10	Break		Break		Break	
18:15	Reception		**Ifan Johnston** H14	**Milica Tomasevic** H13	**Francys Souza** H14	**Tanja Pasurek** H13

	Thursday	Friday	
09:15	**Karl-Theodor Sturm** ZiF	**Pascal Maillard** ZiF	
09:55	Break	Break	
10:00	**Mateusz Kwaśnicki** ZiF	**Jean-Christophe Mourrat** ZiF	
10:40	Coffee break	Coffee break	
11:15	**Istvan Gyöngy** ZiF	**Soumik Pal** ZiF	
11:55	Lunch	Lunch	
13:30	Excursion	**Naotaka Kajino** H14	**Amanda Turner** H13
13:55		Break	
14:00		**Máté Gerencsér** H14	**Seiichiro Kusuoka** H13
14:25		Break	
14:30		**Gourab Ray** H14	**Oleg Butkovsky** H13
15:00		Coffee break	
15:30		**Lorenzo Toniazzi** H14	**Nikola Sandric** H13
15:55		Break	
16:00		**Thi Thanh Diu Tran** H14	**Hani Kabajah** H13
18:00			
19:00	Conference dinner		

Schedule: Monday, September 3

Lecture Room: **ZiF Plenary Room**

08:45 – 9:00	**Registration**
09:00 – 09:15	**Opening** (By the rector Prof. Gerhard Sagerer and Prof. Michael Röckner)
09:15 – 09:55	**Alexander Veretennikov** (University of Leeds) On Poisson equations
10:00 – 10:40	**Krzysztof Burdzy** (University of Washington) On Knudsen reflections and stirring coffee
10:40 – 11:15	**Coffee Break**
11:15 – 11:55	**David Croydon** (Kyoto University) Random walks on fractals and critical random graphs: Scaling limits, time-changes and heat kernel estimates
12:00 – 12:40	**Sandra Cerrai** (University of Maryland) On the small mass limit for fast transport stochastic RDEs with boundary noise
12:40 – 14:15	**Lunch Break**
14:15 – 16:10	**Parallel Sessions** (in lecture halls H13 & H14 in the main university building. For details see the next pages.)
16:10 – 16:45	**Coffee Break**
16:45 – 18:10	**Parallel Sessions** (in lecture halls H13 & H14 in the main university building. For details see the next pages.)
18:15 – 19:30	**Reception**

Schedule: Monday, September 3

Parallel afternoon session. Part 1 of 2

Lecture Room: **H14 in the main university building**

14:15 – 14:40	**Xin Chen** (Shanghai Jiao Tong University) Random conductance models with stable-like jumps
14:45 – 15:10	**Ryoki Fukushima** (Kyoto University) Zero temperature limit for the Brownian directed polymer in Poissonian disasters
15:15 – 15:40	**Panki Kim** (Seoul National University) Heat kernel estimates for symmetric jump processes with general mixed polynomial growths
15:45 – 16:10	**Moritz Kassmann** (Bielefeld University) Homogenization of Lévy-type operators with oscillating coefficients
16:10 – 16:45	**Coffee Break**
16:45 – 17:10	**Yana Butko** (Saarland University) Chernoff approximation for transition kernels of Markov processes and its applications to fractional diffusion
17:15 – 17:40	**Jacek Małecki** (Wrocław University of Science and Technology) Particle systems, empirical measures and free diffusions
17:45 – 18:10	**George Andriopoulos** (University of Warwick) Invariance principles for random walks in random environment on trees
18:15 – 19:30	**Reception**

Schedule: Monday, September 3

Parallel afternoon session. Part 2 of 2

Lecture Room: **H13 in the main university building**

14:15 – 14:40	**Wei Qian** (University of Cambridge) Conoformal restriction: The trichordal case
14:45 – 15:10	**Matthew Roberts** (University of Bath) Intermittency for branching random walk in random environment
15:15 – 15:40	**Martin Grothaus** (TU Kaiserslautern) Integration by parts on the law of the modulus of the Brownian bridge
15:45 – 16:10	**Sebastian Andres** (University of Cambridge) Green kernel asymptotics for two-dimensional random walks under random conductances
16:10 – 16:45	**Coffee Break**
16:45 – 17:10	**Iulian Cimpean** (Simion Stoilow Institute of Mathematics of the Romanian Academy) On the nonlinear Schrodinger equation with white noise dispersion on quantum graphs
17:15 – 17:40	**Jonas Tölle** (University of Augsburg) Gradient flows for the stochastic Amari neural field model
17:45 – 18:10	**Pawel Sztonyk** (Wrocław University of Science and Technology) Schroedinger perturbations of tempered semigroups
18:15 – 19:30	**Reception**

Schedule: Tuesday, September 4

Lecture Room: **ZiF Plenary Room**

09:15 – 09:55	**Jian Ding** (University of Pennsylvania) Random walk among Bernoulli obstacles
10:00 – 10:40	**Nicolai Krylov** (University of Minnesota) On singularity as a function of time of a conditional distribution of an exit time
10:40 – 11:15	**Coffee Break**
11:15 – 11:55	**Peter Mörters** (University of Cologne) Emergence of condensation in stochastic systems
12:00 – 12:40	**Michael Röckner** (Bielefeld University) Nonlinear Fokker-Planck-Kolmogorov Equations and Distribution Dependent SDE
12:40 – 14:15	**Lunch Break**
14:15 – 16:10	**Parallel Sessions** (in lecture halls H13 & H14 in the main university building. For details see the next pages.)
16:10 – 16:45	**Coffee Break**
16:45 – 18:40	**Parallel Sessions** (in lecture halls H13 & H14 in the main university building. For details see the next pages.)

Schedule: Tuesday, September 4

Parallel afternoon session. Part 1 of 2

Lecture Room: **H14 in the main university building**

14:15 – 14:40	**Alexandre Boritchev** (University Lyon 1) Multidimensional Burgers turbulence
14:45 – 15:10	**Dejun Luo** (Academy of Mathematics and Systems Science, CAS) Convergence of transport noise to Ornstein-Uhlenbeck for 2D Euler equations under the enstrophy measure
15:15 – 15:40	**Zoran Vondracek** (University of Zagreb) Perturbations of non-local operators with critical potentials
15:45 – 16:10	**Michael Hinz** (Bielefeld University) Canonical diffusions on the pattern spaces of aperiodic Delone sets
16:10 – 16:45	**Coffee Break**
16:45 – 17:10	**Ludwig Streit** (Bielefeld University) Local Dirichlet Forms for the Fractional Edwards Model
17:15 – 17:40	**Konstantinos Dareiotis** (Max Planck Institute, MiS, Leipzig) Entropy solutions for stochastic porous-medium equations
17:45 – 18:10	**Gianni Pagnini** (Basque Center for Applied Mathematics) Centre-of-mass like superposition of Ornstein–Uhlenbeck processes: a pathway to non-autonomous stochastic differential equations
18:15 – 18:40	**Ifan Johnston** (University of Warwick) Heat kernel estimates for fractional evolution equations

Schedule: Tuesday, September 4

Parallel afternoon session. Part 2 of 2

Lecture Room: **H13 in the main university building**

14:15 – 14:40	**Dario Trevisan** (University of Pisa) On Lusin-type approximation of Sobolev by Lipschitz functions in Gaussian spaces
14:45 – 15:10	**Gerald Trutnau** (Seoul National University) Existence, uniqueness and ergodic properties for time-homogeneous Itô-SDEs with locally integrable drifts and Sobolev diffusion coefficients
15:15 – 15:40	**Hirofumi Osada** (Kyushu University) Dynamical universality for random matrices
15:45 – 16:10	**Karen Habermann** (Hausdorff Center for Mathematics, University of Bonn) Small-time fluctuations for a model class of hypoelliptic diffusion bridges
16:10 – 16:45	**Coffee Break**
16:45 – 17:10	**Kohei Suzuki** (Bonn University) Stability of Invariant Measures Under Synthetic Lower Ricci Curvature Bounds
17:15 – 17:40	**Philippe Blanchard** (Bielefeld University) ETH-Approach to Quantum Theory
17:45 – 18:10	**André De Oliveira Gomes** (Institute of Mathematics, Potsdam) The first exit time problem in the small noise limit for exponentially light jump diffusions
18:15 – 18:40	**Milica Tomasevic** (Tosca, Inria Sophia Antipolis/University of Côte d'Azur) A new McKean-Vlasov stochastic interpretation of the parabolic-parabolic Keller-Segel model

Schedule: Wednesday, September 5

Lecture Room: **ZiF Plenary Room**

09:15 – 09:55	**Noam Berger** (Technical University of Munich) A probabilistic approach to quantitative homogenization
10:00 – 10:40	**Jan Maas** (IST Austria) Gromov-Hausdorff convergence of discrete optimal transport
10:40 – 11:15	**Coffee Break**
11:15 – 11:55	**James Norris** (University of Cambridge) Scaling limits for planar aggregation with subcritical fluctuations
12:00 – 12:40	**Denis Talay** (INRIA) On an hypothesis test to detect divergent stochastic simulations
12:40 – 14:15	**Lunch Break**
14:15 – 16:10	**Parallel Sessions** (in lecture halls H13 & H14 in the main university building. For details see the next pages.)
16:10 – 16:45	**Coffee Break**
16:45 – 18:40	**Parallel Sessions** (in lecture halls H13 & H14 in the main university building. For details see the next pages.)

Schedule: Wednesday, September 5

Parallel afternoon session. Part 1 of 2

Lecture Room: **H14 in the main university building**

14:15 – 14:40	**Janos Englander** (University of Colorado at Boulder) The coin turning walk and its scaling limit
14:45 – 15:10	**Michał Ryznar** (Wrocław University of Science and Technology) Heat kernel estimates for unimodal Lévy processes with slowly varying symbols
15:15 – 15:40	**Guohuan Zhao** (Institute of Applied Mathematics, Academia Sinica) Dirichlet Heat kernel estimates for cylindrical stable process
15:45 – 16:10	**Krzysztof Bogdan** (Wrocław University of Science and Technology) Dirichlet problem for nonlocal operators
16:10 – 16:45	**Coffee Break**
16:45 – 17:10	**Alexandra Neamtu** (Technical University of Munich) Pathwise mild solutions for quasilinear stochastic partial differential equations
17:15 – 17:40	**Yuri Kondratiev** (Bielefeld University) From random time to fractional kinetics
17:45 – 18:10	**Grzegorz Serafin** (Wrocław University of Science and Technology) Number of isomorphic copies of a given graph in a random graph
18:15 – 18:40	**Francys Souza** (Imecc - Unicamp) Method to Find a -Optimal Control Non-Markovian Systems

Schedule: Wednesday, September 5

Parallel afternoon session. Part 2 of 2

Lecture Room: **H13 in the main university building**

14:15 – 14:40	**Oleksandr Kutovyi** (Bielefeld University) Nonlinear perturbations of evolution systems in scales of Banach spaces
14:45 – 15:10	**Deng Zhang** (Shanghai Jiao Tong University) Scattering for stochastic nonlinear Schroedinger equations
15:15 – 15:40	**Mathav Murugan** (University of British Columbia) Heat kernel and resistance estimates
15:45 – 16:10	**Minoru W. Yoshida** (Kanagawa University) Non-local Dirichlet forms on infinite dimensional topological vector spaces
16:10 – 16:45	**Coffee Break**
16:45 – 17:10	**Karol Szczypkowski** (Wrocław University of Science and Technology) Fundamental solution for super-critical non-symmetric Lévy-type operators
17:15 – 17:40	**Xicheng Zhang** (Wuhan University) Singular Brownian diffusion processes
17:45 – 18:10	**Thomas Bernhardt** (Heriot-Watt University) Ito semi-diffusions, an alternative approach to Levy models
18:15 – 18:40	**Tanja Pasurek** (Bielefeld University) Markov random fields: existence, uniqueness and mixing properties

Schedule: Thursday, September 6

Lecture Room: **ZiF Plenary Room**

09:15 – 09:55	**Karl-Theodor Sturm** (Hausdorff Center for Mathematics) Optimal transport and heat flow on metric measure spaces with lower bounded Ricci curvature – and beyond
10:00 – 10:40	**Mateusz Kwaśnicki** (Wrocław University of Science and Technology) The ℓ^p norm of the discrete Hilbert transform
10:40 – 11:15	**Coffee Break**
11:15 – 11:55	**Istvan Gyöngy** (University of Edinburgh) On integro-differential equations
11:55 – 13:30	**Lunch Break**
13:30 – 19:00	**Excursion**
19:00 – 22:00	**Conference dinner** (at Wirtshaus 1802, `www.wirtshaus1802.de`, Address: Kurt-Schumacher-Straße 17a, 33615 Bielefeld)

Schedule: Friday, September 7

Lecture Room: **ZiF Plenary Room**

09:15 – 09:55	**Pascal Maillard** (Université Paris-Sud) 1-stable fluctuations of branching Brownian motion at critical temperature
10:00 – 10:40	**Jean-Christophe Mourrat** (ENS Paris) Quantitative stochastic homogenization
11:15 – 11:55	**Soumik Pal** (University of Washington) The Aldous diffusion on continuum trees
11:55 – 13:30	**Lunch Break**
13:30 – 15:00	**Parallel Sessions** (in lecture hall H13 & H14 in the main university building)
15:00 – 15:30	**Coffee Break**
15:30 – 16:25	**Parallel Sessions** (in lecture hall H13 & H14 in the main university building)

Schedule: Friday, September 7

Parallel afternoon session. Part 1 of 2

Lecture Room: **H14 in the main university building**

13:30 – 13:55	**Naotaka Kajino** (Kobe University) The Laplacian on some round Sierpiński carpets and Weyl's asymptotics for its eigenvalues
14:00 – 14:25	**Máté Gerencsér** (IST Austria) Quasilinear singular SPDEs within regularity structures
14:30 – 14:55	**Gourab Ray** (University of Victoria) Roughness of height function of square ice
15:00 – 15:30	**Coffee Break**
15:30 – 15:55	**Lorenzo Toniazzi** (University of Warwick) Extension of Caputo evolution equations with nonlocal initial condition
16:00 – 16:25	**Thi Thanh Diu Tran** (University of Jyvaskyla) Statistical inference for Vasicek-type model driven by Hermite processes

Schedule: Friday, September 7

Parallel afternoon session. Part 2 of 2

Lecture Room: **H13 in the main university building**

13:30 – 13:55	**Amanda Turner** (Lancaster University) Fluctuation results for a planar random growth model
14:00 – 14:25	**Seiichiro Kusuoka** (Okayama University) The invariant measure and flow associated to the Phi4-quantum field model on the three-dimensional torus
14:30 – 14:55	**Oleg Butkovsky** (Technical University of Berlin) Regularization by noise and path-by-path uniqueness for SDEs and SPDEs
15:00 – 15:30	**Coffee Break**
15:30 – 15:55	**Nikola Sandric** (University of Zagreb) Ergodicity of piecewise Ornstein-Uhlenbeck processes with jumps
16:00 – 16:25	**Hani Kabajah** (Birzeit University) M-Smoothing, Sigma-Filters, and Regularization

Abstracts

Sebastian Andres (University of Cambridge)

Green kernel asymptotics for two-dimensional random walks under random conductances
The random conductance model is a well-established model for a random walk in random environment. In recent years the behaviour of the associated heat kernel and Green function has been intensively studied, and in dimension $d \geq 3$ the asymptotics of the Green kernel are meanwhile quite well-understood. In this talk we present precise asymptotics of the potential kernel and the Green function of the walk killed upon exiting balls in dimension $d = 2$. This result holds, for instance, in the case of strictly elliptic conductances, random walks on supercritical percolation clusters or ergodic degenerate conductances satisfying a moment condition. This talk is based on a joint work with Jean-Dominique Deuschel and Martin Slowik (TU Berlin).

George Andriopoulos (University of Warwick)

Invariance principles for random walks in random environment on trees
Consider the nearest-neighbor random walk in random environment (RWRE) on a (locally finite) rooted ordered tree. For a fixed environment, it is a crucial fact that this model is reversible, and therefore it can be described as an electical network with conductances that are given in terms of the potential of the RWRE. In Sinai's model, in which the potential converges to a Brownian motion, the study of the potential is of particular importance since it determines the behavior of the walk. Under an assumption that is reminiscent to Sinai's regime, we suppose that the collection of rooted plane trees equipped with the unique invariant measure of the RWRE, and its potential, converges with respect to the spatial Gromov-Hausdorff-vague topology, and moreover that a certain condition for the non-explosion of the resistances, first introduced by Croydon (2017), is satisfied. Proving that these two conditions are valid, and using recent results of Croydon's on the convergence of processes associated with resistance forms, we are able to deduce scaling limits for the RWRE in various settings. Our first application gives us as a corollary Seignourel's result on the convergence of a random walk on a random environment with diffusive time scaling to the Brox diffusion. Our second example includes a scaling limit for the biased random walk on the range of large critical branching random walk in high dimensions.

Noam Berger (Technical University of Munich)

A probabilistic approach to quantitative homogenization
In this talk I'll present an approach for quantitative homogenization which is based on direct random walk calculations. This approach yields results in balanced (or non-divergence form) cases, often without ellipticity assumptions. Based on joint work with D. Criens and J.-D. Deuschel

Thomas Bernhardt (Heriot-Watt University)

Ito semi-diffusions, an alternative approach to Levy models

In reality, asset prices are observed on a discrete time grid rather than observed continuously. Modelling this aspect, we consider a new class of continuous processes, whose local evolution in time is modelled by an Ito diffusion, and whose increments between consecutive grid points form a sequence of independent random variables, each having a prescribed distribution. This class of processes, which we call Ito semi-diffusions, could provide an alternative to modelling asset returns by means of Levy processes that is associated with a simpler calculus as well as with market completeness.

Given a Levy process, we construct a sequence of Ito semi-diffusions whose finite-dimensional distributions converge to the ones of the Levy process. Furthermore, we establish conditions under which a martingale measure exists for asset prices modelled by a class of Ito semi-diffusions.

(Joint work with Mihail Zervos)

Philippe Blanchard (Bielefeld University)

ETH-Approach to Quantum Theory

A new interpretation is sketched where E stands for Events, T for Trees and H for Histories. We introduce a precise notion of events and exhibit the stochastic dynamics of states which hints a stochastic quantum branching process. The ETH-Approach does not require any extension of QM in order to solve the measurement problem. It adds to the standard theory a simple but fundamental axiom, the Principle of Loss of Access to potential Information (LAI).

Krzysztof Bogdan (Wrocław University of Science and Technology)

Dirichlet problem for nonlocal operators

This is about a joint work [2] with Tomasz Grzywny (Wrocław), Katarzyna Pietruska-Pałuba (Warsaw) and Artur Rutkowski (Wrocław). We solve the extension problem in Sobolev spaces for nonlocal operators such as the fractional Laplacian under minimal regularity of the external values. The extension with the smallest Sobolev norm is given by the Poisson integral and coincides with the variational solution of the corresponding Dirichlet problem. The Sobolev norm of the Poisson extension is expressed by a weighted Sobolev norm of the external data as follows: If $u = P_D[g]$ is finite, then

$$\iint_{\mathbb{R}^d\times\mathbb{R}^d\setminus D^c\times D^c} (u(x)-u(y))^2\nu(x,y)dxdy = \iint_{D^c\times D^c} (g(w)-g(z))^2\gamma_D(w,z)dwdz.$$

Here $D \subset \mathbb{R}^d$ is open, bounded and Lipschitz, $\nu(x,y) = \nu(|x-y|) > 0$ is a unimodal Lévy measure satisfying certain mild conditions, and

$$P_D[g](x) = \int_{D^c} g(y)P_D(x,y)dy \quad \text{for} \quad x \in D, \tag{1}$$

$$P_D(x,z) = \int_D G_D(x,y)\nu(y,z)\mathrm{d}y, \quad x \in D,\ z \in D^c, \tag{2}$$

G_D is the corresponding Green function, and

$$\gamma_D(w,z) = \int_D \int_D \nu(w,x) G_D(x,y) \nu(y,z)\, dxdy$$

is the so-called intensity of interaction via D for $w, z \in D^c$.

[1] K. Bogdan, B. Dyda, and T. Luks, On Hardy spaces of local and nonlocal operators, *Hiroshima Math. J.*, **44(2)**(2014), 193–215.
[2] K. Bogdan, T. Grzywny, K. Pietruska-Pałuba and A. Rutkowski, Extension theorem for nonlocal operators, 2017, arXiv:1710.05880.
[3] B. Dyda and M. Kassmann, Function spaces and extension results for nonlocal Dirichlet problems, 2016, arXiv:1612.01628.
[4] T. Grzywny and M. Kwaśnicki, Potential kernels, probabilities of hitting a ball, harmonic functions and the boundary Harnack inequality for unimodal Lévy processes, *Stochastic Process. Appl.*, **128(1)**(2018),1–38.
[5] X. Ros-Oton, Nonlocal elliptic equations in bounded domains: a survey, *Publ. Mat.*, **60(1)**(2016), 3–26.
[6] A. Rutkowski, The Dirichlet problem for nonlocal Lévy-type operators, *Publ. Mat.*, **62(1)**(2018), 213–251.

Alexandre Boritchev (University Lyon 1)

Multidimensional Burgers turbulence

We consider the multidimensional Burgers equation on a torus with a smooth in space and white in time additive noise in the case where the solution is a gradient. This case has been considered in the astrophysical setting by Zeldovich and al. In this setting, we prove that almost all the results which we obtained previously in 1d hold. Namely, we get sharp viscosity-uniform bounds for Sobolev norms of the solutions. We also get such bounds for small-scale quantities such as the Fourier coefficients in the inertial range, which quantify the turbulent behaviour of the solutions.

Krzysztof Burdzy (University of Washington)

On Knudsen reflections and stirring coffee

The Lambertian distribution, also known as Knudsen's Law, is a model for random reflections of light or gas particles from rough surfaces. I will present a mathematical "justification" of the Lambertian distribution. Then I will discuss a deterministic model inspired by stirring coffee. The analysis of the model will be partly deterministic, and partly based on Knudsen reflections.

Joint work with O. Angel, M. Duarte, C.-E. Gauthier. J. San Martin, and S. Sheffield.

Yana Butko (Saarland University)

Chernoff approximation for transition kernels of Markov processes and its applications to fractional diffusion

First, we discuss approximations of evolution semigroups generated by Markov processes, and hence approximations of transition kernels of these processes. The presented method of approximation is based on the Chernoff theorem. The so-called *Chernoff approximations* are constructed, e.g., for Feller processes (in particular, for Feller diffusions) in $\mathbb{R}^d$. We present the techniques to construct Chernoff approximations for semigroups corresponding to Markov processes which are obtained from other Markov processes by different operations (or, equivalently, for semigroups whose generators are obtained from other generators by different procedures): a random time-change of processes which is equivalent to a multiplicative perturbation of generators, subordination of processes (or semigroups), killing of a process upon leaving a domain, additive perturbations of generators (what allows, in particular, to add a drift and a potential term). The developed techniques can be combined to approximate semigroups generated by processes obtained via several iterative procedures listed above. This allows, e.g., to obtain Chernoff approximations for some subordinate Feller diffusions on a star graph and in a Riemannian manifold.

Many Chernoff approximations lead to representations of solutions of corresponding evolution equations in the form of limits of n-fold iterated integrals of elementary functions when n tends to infinity. Such representations are called *Feynman formulae.* They can be used for direct computations, modelling of the related dynamics, simulation of stochastic processes. Furthermore, the limits in Feynman formulae sometimes coincide with path integrals with respect to probability measures (such path integrals are usually called *Feynman-Kac formulae*) or with respect to Feynman type pseudomeasures (such integrals are *Feynman path integrals*). Therefore, the constructed Feynman formulae can be used to approximate (or even sometimes to define) the corresponding path integrals; different Feynman formulae for the same semigroup allow to establish connections between different path integrals. Moreover, in some cases, Feynman formulae provide Euler–Maruyama schemes for SDEs; some Chernoff approximations can be understood as a version of the operator splitting method (known in the numerics of PDEs).

Finally, the developed technique of Chernoff approximation can be applied to construct approximations for probability density functions of some non-Markovian processes. Such probability density functions arise as fundamental solutions of some time-fractional evolution equations, describing anomalous (fractional) diffusion.

1. Ya. A. Butko. Chernoff approximation for semigroups generated by killed Feller processes and Feynman formulae for time-fractional Fokker–Planck–Kolmogorov equations. Preprint. 2017. `URL: https://arxiv.org/pdf/1708.02503.pdf`.

2. Ya. A. Butko. Chernoff approximation of subordinate semigroups. *Stoch. Dyn.* 1850021 (2017),19 p., DOI: 10.1142/S0219493718500211.

3. Ya. A. Butko, M. Grothaus and O.G. Smolyanov. Feynman formulae and phase space Feynman path integrals for tau-quantization of some Lévy-Khintchine type Hamilton functions. *J. Math. Phys.* **57** 023508 (2016), 22 p.

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Oleg Butkovsky (Technical University of Berlin)

Regularization by noise and path-by-path uniqueness for SDEs and SPDEs
(Joint work with Siva Athreya & Leonid Mytnik). It is well known from the literature that ordinary differential equations (ODEs) regularize in the presence of noise. Even if an ODE is "very bad" and has no solutions (or has multiple solutions), then the addition of a random noise leads almost surely to a "nice" ODE with a unique solution. The first part of the talk will be devoted to SDEs with distributional drift driven by alpha-stable noise. These equations are not well-posed in the classical sense. We define a natural notion of a solution to this equation and show its existence and uniqueness whenever the drift belongs to a certain negative Besov space. This generalizes results of E. Priola (2012) and extends to the context of stable processes the classical results of A. Zvonkin (1974) as well as the more recent results of R. Bass and Z.-Q. Chen (2001). In the second part of the talk we investigate the same phenomenon for a 1D heat equation with an irregular drift. We prove existence and uniqueness of the flow of solutions and, as a byproduct of our proof, we also establish path-by-path uniqueness. This extends recent results of A. Davie (2007) to the context of stochastic partial differential equations. [1] O. Butkovsky, L. Mytnik (2016). Regularization by noise and flows of solutions for a stochastic heat equation. arXiv 1610.02553. To appear in Annal. Probab. [2] S. Athreya, O. Butkovsky, L. Mytnik (2018). Strong existence and uniqueness for stable stochastic differential equations with distributional drift. arXiv 1801.03473

Sandra Cerrai (University of Maryland)

On the small mass limit for fast transport stochastic RDEs with boundary noise

Xin Chen (Shanghai Jiao Tong University)

Random conductance models with stable-like jumps
We study the quenched invariance principle and two-sided heat kernel estimates for random conductance models with long range jumps on $\mathbb{Z}^d$, where the transition probability from x to y is in average comparable to $|x-y|^{-(d+\alpha)}$ with $\alpha \in (0,2)$ and the associated conductances are not uniformly elliptic. Under some moment conditions on the conductance, we prove that the scaling limit of the Markov process is a symmetric α-stable Lévy process on $\mathbb{R}^d$. We also prove that (elliptic) Harnack inequalities do not hold in the present setting. Our results could be applied to general discrete metric measure space. The talk is based on a joint paper with Takashi Kumagai and Jian Wang.

Iulian Cimpean (Simion Stoilow Institute of Mathematics of the Romanian Academy)

On the nonlinear Schrodinger equation with white noise dispersion on quantum graphs

The following nonlinear Schrodinger equation has been investigated as a model for the signal propagation in fiber optics with white noise dispersion, first by R. Marty in 2006 for a truncated nonlinearity and then by A. de Bouard and A. Debussche in 2010 for full nonlinearity:

$$Xdt = i\Delta X \circ d\beta + |u|^2 udt, \quad x \in \mathbb{R}, t > 0$$

subject to initial data $X(0) = X_0$.
We shall present a study of the above equation on quantum graphs.

David Croydon (Kyoto University)

Random walks on fractals and critical random graphs: Scaling limits, time-changes and heat kernel estimates

The connections between random walks and electrical networks are well-known. I will describe work in this direction that demonstrates that if a sequence of spaces equipped with "resistance metrics" and measures converge with respect to the Gromov-Hausdorff-vague topology, and a certain non-explosion condition is satisfied, then the associated stochastic processes also converge. This result generalises previous work on fractals and various models of random graphs in critical regimes. I will also discuss associated time-changes and heat kernel estimates. This is partly joint work with Ben Hambly (Oxford) and Takashi Kumagai (Kyoto).

Konstantinos Dareiotis (Max Planck Institute, MiS, Leipzig)

Entropy solutions for stochastic porous-medium equations

We provide an entropy formulation for porous-medium equations with a stochastic, non-linear, spatially inhomogeneous forcing. Under the entropy conditions we prove an L_1-contraction principle, obtaining in particular uniqueness. Moreover, we prove existence of entropy solutions. This is a joint work with Mate Gerencser and Benjamin Gess.

André De Oliveira Gomes (Institute of Mathematics, Potsdam)

The first exit time problem in the small noise limit for exponentially light jump diffusions

It is a well known fact that, under certain conditions, the solution trajectories of a dynamical system given by a differential equation written in a gradient form never leave the domain of attraction of its stable states. The perturbation of such systems, in low intensity, by a Brownian Motion, is a very well developed field of study and it is known as *Freidlin-Wentzell theory*. Informally, with Gaussian perturbations with small intensity, it is possible that the trajectories of the stochastic perturbed equations leave the domain of attraction of the stable state and such exit happens to occur with small probabilities but exponentially large in the intensity parameter that tunes the noise. Outside the realm of Gaussian perturbations, in the vanishing noise regime, other studies were conducted and it was observed different regimes of deviations, polynomially large in the noise parameter. We present a certain class of perturbations by Lévy noises in such a way that it is possible to characterize the exit rates of the domains of attraction using large deviations principles. Our stochastic processes are jump processes that have an exponentially light integrability property in the tails and we characterize the problem of the first exit time in terms of the parameter of lightness of such tails observing a phase transition. When the jump processes are super-exponentially light the first exit time is studied in a large deviations regime and when the jump measure is sub-exponentially light such study is conducted by means of moderate deviations principles. This talk is based on joint work with Peter Imkeller (Humboldt-Universität zu Berlin) and Michael Högele (U. de los Andes, Bogotá Colombia).

Jian Ding (University of Pennsylvania)

Random walk among Bernoulli obstacles

Consider a discrete time simple random walk on $\mathbb{Z}^d$, $d \geq 2$ with random Bernoulli obstacles, where the random walk will be killed when it hits an obstacle. We show that the following holds for a typical environment: conditioned on survival up to time n, the random walk will be localized in a single island. In addition, the limiting shape of the island is a ball and the asymptotic volume is also determined. This is based on joint works with Changji Xu. Time permitting, I will also describe a recent result in the annealed case, which is a joint work with Ryoki Fukushima, Rongfeng Sun and Changji Xu.

Janos Englander (University of Colorado at Boulder)

The coin turning walk and its scaling limit

Given a sequence of numbers $p_n \in [0, 1]$, consider the following experiment. First, we flip a fair coin and then, at step n, we turn the coin over to the other side with probability $p_n, n > 1$, independently of the sequence of the previous terms. What can we say about the distribution of the empirical frequency of heads as $n \to \infty$? We show that a number of phase transitions take place as the turning gets slower (i.e. p_n is getting smaller), leading first to the breakdown of the Central Limit Theorem and then to that of the Law of Large Numbers. It turns out that the critical regime is $p_n = const/n$. Among the scaling limits, we obtain Uniform, Gaussian, Semicircle and Arcsine laws. The critical regime is particularly interesting: when the corresponding random walk is considered, an interesting process emerges as the scaling limit; also, a connection with Polya urns will be mentioned. This is joint work with S. Volkov (Lund) and Z. Wang (Boulder). See also the paper `https://drive.google.com/file/d/0B4ZkCm_J6qB8NXNRcUFPM0hqRUU/view`

Ryoki Fukushima (Kyoto University)

Zero temperature limit for the Brownian directed polymer in Poissonian disasters

We consider the Brownian directed polymer in Poissonian environment introduced by Comets and Yoshida. We focus on the case where the polymer is repelled by Poisson point process. The free energy for this model can be regarded as the survival probability of the Brownian motion among Poissonian disasters. Although the model makes perfect sense at zero temperature, the existence of the free energy does not follow from standard sub-additivity arguments, due to lack of integrability of the finite volume free energy. We prove that the free energy exists and is continuous at zero temperature. This is a joint work with Stefan Junk of TU Munich.

Mátě Gerencsér (IST Austria)

Quasilinear singular SPDEs within regularity structures

We present an approach for quasilinear singular SPDEs that enables one to fit them into the theory of regularity structures. This way many general results available can be leveraged, and in particular a solution theory can be obtained for an essentially optimal class of equations. Joint work with Martin Hairer.

Martin Grothaus (TU Kaiserslautern)

Integration by parts on the law of the modulus of the Brownian bridge

We prove an infinite dimensional integration by parts formula on the law of the modulus of the Brownian bridge from 0 to 0. The main motivation for all this is the construction of an SPDE whose invariant measure would be the law of the reflecting Brownian bridge, a problem which is still open despite the recent fantastic advances in very difficult SPDEs, thanks to regularity structures and, or paraproducts. It seems that the SPDE which motivates this integration by parts formula is even more difficult than KPZ, since it contains a local time which is not covered by the new theories yet.

Istvan Gyöngy (University of Edinburgh)

On integro-differential equations

A class of deterministic and stochastic integro-differential equations of parabolic type is considered, and existence and uniqueness theorems in L_p spaces are presented. The talk is based on a joint work with Marta De Leon-Contreras and Sizhou Wu.

Karen Habermann (Hausdorff Center for Mathematics, University of Bonn)

Small-time fluctuations for a model class of hypoelliptic diffusion bridges

We study the small-time asymptotics for hypoelliptic diffusion processes conditioned by their initial and final positions. After giving an overview of work on small-time asymptotics for sub-Riemannian diffusion bridges, we present recent results on small-time fluctuations for the bridge in a model class of diffusions satisfying a weak Hörmander condition, where the diffusivity is constant and the drift is linear. We show that, while the diffusion bridge can exhibit a blow-up behaviour in the small time limit, we can still make sense of suitably rescaled fluctuations which converge weakly.

Michael Hinz (Bielefeld University)

Canonical diffusions on the pattern spaces of aperiodic Delone sets

We discuss diffusion processes on certain foliated spaces, namely pattern spaces of aperiodic and repetitive Delone sets of finite local complexity. These spaces arise in aperiodic mathematics, for instance from quasicrystals or tilings, and diffusions may be seen as tools to explore more details of their structure. Although it is simple to define (leafwise) diffusions on pattern spaces, these processes have a number of exotic properties such as for instance the non-existence of heat kernels with respect to natural uniquely ergodic measures. We will mention regularity properties, Sobolev spaces, spectral results, Liouville theorems and Hodge decompositions. The results are joint with P. Alonso-Ruiz, R. Trevino and A. Teplyaev.

Ifan Johnston (University of Warwick)

Heat kernel estimates for fractional evolution equations

In 1967 Aronson showed that the fundamental solution of the heat equation for a second order uniformly elliptic operator in divergence form satisfies two-sided Gaussian estimates. Using this celebrated result, we investigate two-sided estimates for the fundamental solution of the fractional analogues of the heat equation, where one replaces the time derivative with a Caputo fractional derivative of order $\beta \in (0,1)$ and also replace the second order elliptic operator with a homogeneous pseudo-differential operator. Probabilistically speaking, the solution of such fractional evolution equations is typically some time-changed Brownian motion, or time-changed stable process.

Hani Kabajah (Birzeit University)

M-Smoothing, Sigma-Filters, and Regularization

The goal of the talk is to propose asymptotic results for M-smoothers in signal and image denoising with and without sigma filters and Regularization.

Naotaka Kajino (Kobe University)

The Laplacian on some round Sierpiński carpets and Weyl's asymptotics for its eigenvalues

The purpose of this talk is to present the speaker's recent research in progress on the construction of a "canonical" Laplacian on round Sierpiński carpets invariant with respect to certain Kleinian groups (i.e., discrete groups of Möbius transformations on $\widehat{\mathbb{C}} := \mathbb{C} \cup \{\infty\}$) and on Weyl's asymptotics for its eigenvalues. Here a *round Sierpiński carpet* refers to a subset of $\widehat{\mathbb{C}}$ homeomorphic to the standard Sierpiński carpet, such that its complement in $\widehat{\mathbb{C}}$ consists of disjoint open disks in $\widehat{\mathbb{C}}$. The construction of the Laplacian is based on the speaker's preceding study of the simplest case of the *Apollonian gasket*, the compact fractal subset of $\mathbb{C}$ obtained from an ideal triangle (a triangle formed by mutually tangent three circles) by repeating indefinitely the process of removing the interior of the inner tangent circles of the ideal triangles. On this fractal, Teplyaev (2004) had constructed a canonical Dirichlet form as one with respect to which the coordinate functions on the gasket are harmonic, and the author later proved its uniqueness and discovered an explicit expression of it in terms of the circle packing structure of the gasket. The expression of the Dirichlet form obtained for the Apollonian gasket in fact makes sense on general circle packing fractals, including round Sierpiński carpets, and defines (a candidate of) a "canonical" Laplacian on such fractals. When the circle packing fractal is the limit set (i.e., the minimum invariant non-empty compact set) of a certain class of Kleinian groups, some explicit combinatorial structure of the fractal is known and makes it possible to prove Weyl's asymptotic formula for the eigenvalues of this Laplacian, which is of the same form as the circle-counting asymptotic formula by Oh and Shah [Invent. Math. **187** (2012), 1–35]. The overall structure of the proof of Weyl's asymptotic formula is the same as in the case of the Apollonian gasket and is based on a serious application of Kesten's renewal theorem [Ann. Probab. **2** (1974), 355–386] to a certain Markov chain on the *"space of all possible Euclidean shapes"* of the fractal. There is, however, a crucial difficulty in the case of a round Sierpiński carpet; since it is *infinitely ramified*, i.e., the cells in its cellular decomposition intersect on infinite sets, it is highly non-trivial to show that the principal order term of the eigenvalue asymptotics is not affected by the cellular decomposition, namely by assigning the Dirichlet boundary condition on the boundary of the cells. This is achieved by utilizing (1) an upper bound on the heat kernel obtained from a version of the Nash inequality, and (2) the geometric property, noted by Bonk in [Invent. Math. **186** (2011), 559–665], that the circles $\{C_k\}_{k=1}^{\infty}$ in the round carpet are *uniformly relatively separated*: there exists $\delta \in (0, \infty)$ such that

$$\operatorname{dist}(C_j, C_k) \geq \delta \min\{\operatorname{rad}(C_j), \operatorname{rad}(C_k)\} \qquad \text{for any } j, k \geq 1 \text{ with } j \neq k.$$

Moritz Kassmann (Bielefeld University)

Homogenization of Lévy-type operators with oscillating coefficients

We present results on the homogenization of Lévy-type operators with rapidly oscillating coefficients. We consider cases of periodic and random statistically homogeneous micro-structures and show that in the limit, a Lévy-operator is obtained. In the periodic case we allow for symmetric and non-symmetric kernels, whereas in the random case we only investigate symmetric kernels. We also address nonlinear versions of the homogenization problem. The talk is based on a recent preprint together with Andrey Piatnitski and Elena Zhizhina, see arXiv:1807.04371

Panki Kim (Seoul National University)

Heat kernel estimates for symmetric jump processes with general mixed polynomial growths

In this talk, we discuss transition densities of pure jump symmetric Markov processes in R^d, whose jumping kernels are comparable to radially symmetric functions with general mixed polynomial growths. Under some mild assumptions on their scale functions, we establish sharp two-sided estimates of transition densities (heat kernel estimates) for such processes. This is a joint work with Joohak Bae, Jaehoon Kang and Jaehun Lee.

Yuri Kondratiev (Bielefeld University)

From random time to fractional kinetics

We consider a random time change in Markov dynamics given by an inverse subordinator. The dynamics of states in such dynamics described by an evolution equation with a generalized fractional time derivative. In the kinetic scaling for continuous interacting particle systems there appear a fractional kinetic hierarchy for correlation functions. We show that this hierarchy posses an intermittency property contrary to the usual kinetic hierarchy in the deterministic time. Other effects of the random time change are related with a modification of the traveling waves speed and the front propagation for the density of the system.

Nicolai Krylov (University of Minnesota)

On singularity as a function of time of a conditional distribution of an exit time

We establish the singularity with respect to Lebesgue measure as a function of time of the conditional probability distribution that the sum of two one-dimensional Brownian motions will exit from the unit interval before time t, given the trajectory of the second

Brownian motion up to the same time. On the way of doing so we show that if one solves the one-dimensional heat equation with zero condition on a trajectory of a one-dimensional Brownian motion, which is the lateral boundary, then for each moment of time with probability one the normal derivative of the solution is zero, provided that the diffusion of the Brownian motion is sufficiently large.

Seiichiro Kusuoka (Okayama University)
The invariant measure and flow associated to the Phi4-quantum field model on the three-dimensional torus
We consider the invariant measure and flow of the Phi4 model on the three-dimensional torus, which appears in the quantum field theory. By virtue of Hairer's breakthrough, such a nonlinear stochastic partial differential equation became solvable and is studied as a hot topic. In the talk, we also apply Hairer's reconstruction of equations and directly construct the global solution and the invariant measure by using the invariant measures of approximation equations and the technique of solving the nonlinear dissipative parabolic equations.

Oleksandr Kutovyi (Bielefeld University)
Nonlinear perturbations of evolution systems in scales of Banach spaces
A variant of the abstract Cauchy-Kovalevskaya theorem is considered. We prove existence and uniqueness of classical solutions to the nonlinear, non-autonomous initial value problem

$$\frac{\mathrm{d}u(t)}{\mathrm{d}t} = A(t)u(t) + B(u(t), t), \quad u(0) = x$$

in a scale of Banach spaces. Here $A(t)$ is the generator of an evolution system acting in a scale of Banach spaces and $B(u, t)$ obeys an Ovcyannikov-type bound. Continuous dependence of the solution with respect to $A(t)$, $B(u, t)$ and x is proved. The results are applied to the Kimura-Maruyama equation for the mutation-selection balance model. This yields a new insight in the construction and uniqueness question for nonlinear Fokker-Planck equations related with interacting particle systems in the continuum.

Mateusz Kwaśnicki (Wrocław University of Science and Technology)
The ℓ^p norm of the discrete Hilbert transform
The discrete Hilbert transform is the convolution operator $\mathcal{H}$ with convolution kernel $1/(\pi n)$ for $n \neq 0$, acting on the space of doubly infinite sequences $(a_n : n \in \mathbb{Z})$. This operator is one of a number of discrete analogues of the continuous Hilbert transform H, which is the convolution operator with singular kernel $1/(\pi x)$, acting on the space of real functions. In the early 20th century D. Hilbert, M. Riesz and E.C. Titchmarsh conjectured that the norm of the discrete Hilbert transform on ℓ^p is equal to the norm of the continuous Hilbert transform on L^p for every $p \in (1, \infty)$. It is well-known, and in fact relatively easy to prove, that $\|\mathcal{H}\|_{p\to p} \geqslant \|H\|_{p\to p}$. In my joint work with Rodrigo Bañuelos we prove the reverse inequality and thus resolve the above-mentioned conjecture. Our proof involves an appropriate martingale transform and an application of Burkholder's ineqaulity for orthogonal martingales (due to Bañuelos and Wang). In my talk I will review the history of the problem, sketch the idea of the proof and discuss a few open problems.

Dejun Luo (Academy of Mathematics and Systems Science, CAS)

Convergence of transport noise to Ornstein-Uhlenbeck for 2D Euler equations under the enstrophy measure

We consider the vorticity form of the 2D Euler equations which is perturbed by a suitable transport type noise and has white noise initial condition. It is shown that the equation converges to the 2D Navier-Stokes equation driven by the space-time white noise.

Jan Maas (IST Austria)

Gromov-Hausdorff convergence of discrete optimal transport

For a natural class of discretisations of a convex domain in $\mathbb{R}^n$, we consider the dynamical optimal transport metric for probability measures on the discrete mesh. Although the associated discrete heat flow converges to the continuous heat flow as the mesh size tends to 0, we show that the transport metric may fail to converge to the 2-Kantorovich metric. Under a strong additional symmetry condition on the mesh, we show that Gromov–Hausdorff convergence to the 2-Kantorovich metric holds. This is joint work with Peter Gladbach (Leipzig) and Eva Kopfer (Bonn).

Pascal Maillard (Université Paris-Sud)

1-stable fluctuations of branching Brownian motion at critical temperature

Branching Brownian motion is a prototype of a disordered system and a toy model for spin glasses and log-correlated fields. It also has an exact duality relation with the FKPP equation, a well-known reaction diffusion equation. In this talk, I will present recent results (obtained with Michel Pain) on fluctuations of certain functionals of branching Brownian motion including the additive martingale with critical parameter and the derivative martingale. We prove non-standard central limit theorems for these quantities, with the possible limits being 1-stable laws with and asymmetry parameter depending on the functional. In particular, the derivative martingale and the additive martingale satisfy such a non-standard central limit theorem with, respectively, a totally asymmetric and a Cauchy distribution.

Jacek Małecki (Wrocław University of Science and Technology)

Particle systems, empirical measures and free diffusions

We prove the convergence of the empirical measure-valued process for eigenvalues of solutions of general matrix-valued stochastic differential equations. We characterize the limit as a free diffusion solving free SDE. It generalize well-known examples of Dyson Brownian motion and squared Bessel particle systems converging through empirical measure-valued processes to free Brownian motion and free Poisson process respectively. The approach based on symmetric polynomials allows to study SDEs with mild regularity assumptions on their coefficients and allows to consider solutions with colliding eigenvalues.

Jean-Christophe Mourrat (ENS Paris)

Quantitative stochastic homogenization
Over large scales, many disordered systems behave similarly to an equivalent "homogenized" system of simpler nature. A fundamental example of this phenomenon is that of reversible diffusion operators with random coefficients. The homogenization of these operators has been well-known since the late 70's. In this talk, I will give a broad overview of recent results that go much beyond this qualitative statement, reaching optimal rates of convergence and a precise description of the next-order fluctuations. The approach is based on a renormalization argument and the idea of linearizing around the homogenized limit.

Mathav Murugan (University of British Columbia)

Heat kernel and resistance estimates
Sub-Gaussian heat kernel estimates are typical of fractal graphs. We show that sub-Gaussian estimates on graphs follow from a Poincaré inequality, a capacity upper bound, and a slow volume growth condition. An important feature of this work is that we do not assume elliptic Harnack inequality, cutoff Sobolev inequality, or exit time bounds.

Peter Mörters (University of Cologne)

Emergence of condensation in stochastic systems
A complex system undergoes condensation if a positive fraction of an observed continuous quantity concentrates in a single state, asymptotically as time goes to infinity. The aim of my project is to understand the dynamics of condensation, ie. how a condensate can build up, or emerge, in a stochastic system. I will report on some recent progress in collaboration with Volker Betz (Darmstadt), Steffen Dereich (Münster) and Cécile Mailler (Bath).

Alexandra Neamtu (Technical University of Munich)

Pathwise mild solutions for quasilinear stochastic partial differential equations
Stochastic partial differential equations (SPDEs) have become a key modelling tool in applications. Yet, there are many classes of SPDEs, where the existence and regularity theory for solutions is not completely developed. Here we contribute to this aspect and provide mild solutions for a broad class of quasilinear Cauchy problems, including - among others - cross-diffusion systems as a key application. Our solutions are local-in-time and are derived via a fixed point argument in suitable function spaces. The key idea is to combine the classical theory of deterministic quasilinear parabolic partial differential equations (PDEs) with recent theory of evolution semigroups. We also show, how to apply our theory to the Shigesada-Kawasaki-Teramoto model. This talk is based on a joint work with Christian Kuehn (TU Munich).

James Norris (University of Cambridge)

Scaling limits for planar aggregation with subcritical fluctuations

A two-dimensional cluster, growing by aggregation of a sequence of particles, may be encoded as a composition of conformal maps. This offers a means to formulate and analyse models for planar random growth. I will focus on scaling limits in the case where there are many small particles, first for the case where the conformal maps are chosen to be independent, and then for a variant model which takes the fluctuations of the process towards a critical point, which is a limit of stability. Joint work with Vittoria Silvestri and Amanda Turner.

Hirofumi Osada (Kyushu University)

Dynamical universality for random matrices

The universality of random matrices and log gases have been studied by many authors. Less is known for their dynamical counterparts. In this talk, we present a universality result for stochastic dynamics related to point processes appearing in random matrix theory such as sine, Airy and Ginibre point processes. Under a mild condition, we shall prove the natural N-particle dynamics converge to the solution of the limit infinite-dimensional stochastic differential equations.

Gianni Pagnini (Basque Center for Applied Mathematics)

Centre-of-mass like superposition of Ornstein–Uhlenbeck processes: a pathway to non-autonomous stochastic differential equations

We consider an ensemble of Ornstein-Uhlenbeck processes featuring a population of timescales and a population of noise amplitudes that characterize the heterogeneity of the ensemble. We show that the centre-of-mass like variable corresponding to this ensemble is statistically equivalent to a process driven by a stochastic differential equation with time-dependent drift and a white noise. In particular, the time scaling and the density function of such variable are driven by the population of timescales and of noise amplitudes, respectively. Moreover, we show that this variable is equivalent in distribution to a process build by the product of a Gaussian process times a non-negative independent random variable. This last result establishes a connection with the so-called generalized gray Brownian motion and suggests application to modelling fractional anomalous diffusion.

Soumik Pal (University of Washington)

The Aldous diffusion on continuum trees

Consider a binary tree with n labeled leaves. Randomly select a leaf for removal and then reinsert it back on an edge selected at random from the remaining structure. This produces a Markov chain on the space of n-leaved binary trees whose invariant distribution is the uniform distribution. David Aldous, who introduced and analyzed this Markov chain, conjectured the existence of a continuum limit of this process if we remove labels from leaves, scale edge-length and time appropriately with n, and let n go to infinity. The conjectured diffusion will have an invariant distribution given by the so-called Brownian Continuum Random Tree. In a series of papers, co-authored with N. Forman, D. Rizzolo, and M. Winkel, we construct this continuum limit. This talk will be an overview of our construction and describe the path behavior of this limiting object.

Tanja Pasurek (Bielefeld University)

Markov random fields: existence, uniqueness and mixing properties
We consider Markov random fields on general graphs and with possibly unbounded interactions. In such setting we establish new existence and uniqueness results going beyond classical Dobrushin's criteria. The applicability of the theory will be shown for several classes of particle systems which cannot be covered by previous methods. Based on joint work with Yuri Kondratiev and Michael Röckner.

Wei Qian (University of Cambridge)

Conoformal restriction: The trichordal case
The study of conformal restriction properties in two-dimensions has been initiated by Lawler, Schramm and Werner who focused on the natural and important chordal case: They characterized and constructed all random subsets of a given simply connected domain that join two marked boundary points and that satisfy the additional restriction property. The radial case (sets joining an inside point to a boundary point) has then been investigated by Wu. In the present talk, we study the third natural instance of such restriction properties, namely the "trichordal case", where one looks at random sets that join three marked boundary points. This case involves somewhat more technicalities than the other two, as the construction of this family of random sets relies on special variants of $\mathrm{SLE}_{8/3}$ processes with a drift term in the driving function that involves hypergeometric functions. It turns out that such a random set can not be a simple curve simultaneously in the neighborhood of all three marked points, and that the exponent $\alpha = 20/27$ shows up in the description of the law of the skinniest possible symmetric random set with this trichordal restriction property.

Gourab Ray (University of Victoria)

Roughness of height function of square ice
We prove that fluctuation of height function of uniform homomorphisms (a special case of the square ice model or the 6 vertex model) from $\mathbb{Z}^2$ to $\mathbb{Z}$ has logarithmic fluctuations (which we call roughness). The result follows from a uniform Russo Seymour Welsh property of the level lines which we establish in this work. Joint with Hugo Duminil–Copin, Matan Harel, Benoit Laslier and Aran Raoufi.

Matthew Roberts (University of Bath)

Intermittency for branching random walk in random environment
We consider a branching random walk in random environment, motivated by the parabolic Anderson model (PAM) in discrete space. We show that the branching random walk behaves in a strikingly different way from the PAM, although still shows many of the same properties, including strong intermittency. This is joint work with Marcel Ortgiese.

Michał Ryznar (Wrocław University of Science and Technology)

Heat kernel estimates for unimodal Lévy processes with slowly varying symbols
Let $X(t)$ be an isotropic and unimodal Lévy process on $\mathbb{R}^d$. That is, its transition density (*heat kernel*) $p_t(x)$ is assumed to be radial and decreasing function of the space variable, which is equivalent to the fact that its Lévy measure has radial and unimodal density. In this talk we consider isotropic unimodal Lévy processes which do not satisfy weak type scaling properties of index $0 < \alpha < 2$. These scaling properties are usually expressed in terms of the characteristic exponent ψ of the process and in some sense exhibit power type growth of the ψ at infinity. Our aim will be to present estimates of a transition density of the process with slowly varying symbol, which can be treated as a symbol with scaling of index equal to 0. The main examples of such processes are geometric α - stable processes, with $0 < \alpha \leq 2$, with the symbol

$$\psi = \log(1 + |x|^\alpha), x \in \mathbb{R}^d.$$

Under some additional assumptions on ψ we provide sharp estimates of the transition density local in time and space. We also present some exact asymptotics of the transition density, Green functions and Lévy measures. The talk is based on results obtained jointly with Tomasz Grzywny (Wrocław University of Science and Technology) and Bartosz Trojan (Polish Academy of Science).

Michael Röckner (Bielefeld University)

Nonlinear Fokker-Planck-Kolmogorov Equations and Distribution Dependent SDE
By Ito's formula the time marginals of a solution to a distribution dependent SDE solve a nonlinear Fokker-Planck-Kolmogorov equation. This talk is about the converse: we present a general technique how to identify a solution to a nonlinear Fokker-Planck-Kolmogorov equation consisting of probability densities as the time marginals of a solution to a distribution dependent SDE. We apply this to the special case of a porous media equation perturbed by the divergence of a vector field depending nonlinearly on the solution. More precisely, we construct a generalized entropic solution u to this equation and apply the above general technique to find the corresponding distribution dependent SDE which has a weak solution with marginals given by u. We thus gain a probabilistic representation of u. The final aim is to develop a general theory relating distribution dependent SDE and nonlinear Fokker-Planck-Kolmogorov equations analogous to the classical linear case. This is joint work with Viorel Barbu (Romanian Academy, Iasi) Reference: "Probabilistic representation of solutions to Fokker-Planck equations", SIAM J. Math. Analysis 50 (2018), no. 4, 4246-4260 and arXiv:1801.10510

Nikola Sandric (University of Zagreb)

Ergodicity of piecewise Ornstein-Uhlenbeck processes with jumps
In this talk, I will discuss ergodic properties of a class of piecewise Ornstein-Uhlenbeck processes with jumps, which contains the processes arising in multiclass many-server queueing models with heavy-tailed arrivals and/or asymptotically negligible service interruptions in the Halfin-Whitt regime as special cases. I will present conditions on the parameters in the drift, the Levy measure and/or covariance function which result in (sub)exponential

ergodicity. Moreover, I will show that these assumptions, as well as the obtained quantitative rates of convergence, are sharp.

Grzegorz Serafin (Wrocław University of Science and Technology)

Number of isomorphic copies of a given graph in a random graph

Let $\mathbb{G}_n(p)$ denote the binomial Erdös-Rényi random graph constructed by independently retaining any edge in the complete graph K_n on n vertices, with probability $p \in (0,1)$. For a fixed graph G we denote by N_n^G the number of graphs in $\mathbb{G}_n(p)$ that are isomorphic to a fixed graph G and by

$$\tilde{N}_n^G := \frac{N_n^G - \mathbf{E}[N_n^G]}{\sqrt{Var[N_n^G]}}$$

its normalization. Our aim is to estimate rate of convergence of $\tilde{N}_n^G$ to the standard normal distribution $\mathcal{N}(0,1)$. In [1] it is shown that

$$d_W\left(\tilde{N}_n^G, \mathcal{N}(0,1)\right) \lesssim \left((1-p_n) \min_{\substack{H \subset G \\ e_K \geq 1}} \{n^{v_H} p_n^{e_H}\}\right)^{-1/2}, \tag{1}$$

where d_W denotes the Wasserstein distance given by

$$d_W(X,Y) := \sup_{h \in \mathrm{Lip}(1)} |\mathbb{E}[h(X)] - \mathbb{E}[h(Y)]|,$$

for two random variables X and Y. However, the more natural is the Kolmogorov distance d_K defined as

$$d_K(X,Y) \sup_{a \in \mathbb{R}} \left|\mathbf{P}\left(X \leq a\right) - \mathbf{P}\left(Y \leq a\right)\right|.$$

During the talk, we will show that the Kolmogorov distance may be estimated by the same bound as in (1). So far, it was only proved for triangles. Generalization of (1) for graphs with weights will be also presented. Additionally, we will provide explicit bounds for some important classes of graphs. Those result have been obtained in cooperation with N. Privault. The methods are based on Stein-Chen method and Malliavin calculus on some special processes.

Francys Souza (Imecc - Unicamp)

Method to Find a -Optimal Control Non-Markovian Systems

We present a general solution for finding the epsilon-optimal controls for non-Markovian stochastic systems as stochastic differential equations driven by Brownian motion. Our theory provides a concrete description of a rather general class, among the principals, we can highlight financial problems such as portfolio control, hedging, super-hedging, pairs-trading and others. The pathwise analysis was made through a discretization structure proposed by Leão e Ohashi(2013) jointly with measurable selection arguments, has provided us with a structure to transform an infinite dimensional problem into a finite dimensional. The theory is applied to stochastic control problems based on path-dependent SDEs where both drift and diffusion components are controlled. We are able to explicitly show optimal control with our method.

Ludwig Streit (Bielefeld University)

Local Dirichlet Forms for the Fractional Edwards Model
After a short review of the background we present an extension of the work by Roeckner et al. to the fractional case, indicating the essential points of the proofs and some further extensions to fractional loops and trees.

Karl-Theodor Sturm (Hausdorff Center for Mathematics)

Optimal transport and heat flow on metric measure spaces with lower bounded Ricci curvature – and beyond
We introduce the fundamental concept of synthetic lower Ricci bounds for metric measure spaces, illustrated by striking consequences for optimal transports and for heat flows. New approaches will be presented for the heat flow with Neumann boundary conditions on non-convex domains as well as for the heat flow with Dirichlet boundary conditions. Moreover, we study the heat flow on time-dependent metric measure spaces and its dual as gradient flows for the energy and for the Boltzmann entropy, resp. Monotonicity estimates for transportation distances and for squared gradients will be shown to be equivalent to the so-called dynamical convexity of the Boltzmann entropy on the Wasserstein space which is the defining property of super-Ricci flows. Moreover, we show the equivalence with the monotone coupling property for pairs of backward Brownian motions as well as with log Sobolev, local Poincare and dimension free Harnack inequalities.

Kohei Suzuki (Bonn University)

Stability of Invariant Measures Under Synthetic Lower Ricci Curvature Bounds
The aim of this talk is to show the stability of invariant measures for non-symmetric diffusions under synthetic lower Ricci bounds. After explaining the existence, uniqueness and the Sobolev/Hölder regularity of invariant measures, we show the stability of invariant measures under the Gromov convergence of the underlying spaces and convergences of drifts.

Karol Szczypkowski (Wrocław University of Science and Technology)

Fundamental solution for super-critical non-symmetric Lévy-type operators
In the talk I will present the results of the paper [4], which is a sequel to [2]. The aim is to construct the fundamental solution p^κ to the equation $\partial_t = \mathcal{L}^\kappa$, where under certain assumptions the operator $\mathcal{L}^\kappa$ takes the form,

$$\mathcal{L}^\kappa f(x) := \int_{\mathbb{R}^d} (f(x+z) - f(x) - 1_{|z|<1} \langle z, \nabla f(x) \rangle) \kappa(x,z) J(z)\, dz\,.$$

In particular, $J\colon \mathbb{R}^d \to [0,\infty]$ is a Lévy density, i.e., $\int_{\mathbb{R}^d}(1 \wedge |x|^2) J(x) dx < \infty$. The function $\kappa(x,z)$ is assumed to be Borel measurable on $\mathbb{R}^d \times \mathbb{R}^d$ satisfying $0 < \kappa_0 \le \kappa(x,z) \le \kappa_1$, and $|\kappa(x,z) - \kappa(y,z)| \le \kappa_2 |x-y|^\beta$ for some $\beta \in (0,1)$. We concentrate on the case when the order of the operator is positive and smaller or equal 1 (without excluding higher orders up to 2). The lack of the symmetry of the Lévy density $\kappa(x,z)J(z)$ in z

variable may cause a non-zero *internal drift*, which reveals itself as a gradient term in the decomposition

$$\mathcal{L}^{\kappa} f(x) = \int_{\mathbb{R}^d} \left(f(x+z) - f(x) - 1_{|z|<r} \langle z, \nabla f(x)\rangle\right) \kappa(x,z) J(z) dz \\ + \left(\int_{\mathbb{R}^d} z \left(1_{|z|<r} - 1_{|z|<1}\right) \kappa(x,z) J(z) dz \right) \cdot \nabla f(x)\,.$$

Our approach rests on imposing conditions on the expression

$$\int_{r \le |z| < 1} z\, \kappa(x,z) J(z) dz.$$

We prove the uniqueness, estimates, regularity and other qualitative properties of p^{κ}. The result is new even for 1-stable Lévy measure $J(z) = |z|^{-d-1}$, cf. [3] and [1].

[1] Zhen-Qing Chen and Xicheng Zhang, *Heat kernels for time-dependent non-symmetric stable-like operators*, preprint 2017, arXiv:1709.04614.
[2]Tomasz Grzywny and Karol Szczypkowski, *Heat kernels of non-symmetric Lévy-type operators*, preprint 2018, arXiv:1804.01313.
[3] P. Jin, *Heat kernel estimates for non-symmetric stable-like processes*, preprint 2017, arXiv:1709.02836.
[4] Karol Szczypkowski, *Fundamental solution for super-critical non-symmetric Lévy-type operators*, preprint 2018, arXiv:1807.04257.

Pawel Sztonyk (Wrocław University of Science and Technology)

Schroedinger perturbations of tempered semigroups

A perturbation is an addition of an operator of multiplication to a given operator. On the level of inverse operators, the addition results in a resolvent or Duhamel's or a perturbation formula, and under certain conditions it yields von Neumann or perturbation series for the inverse of the perturbation. We will prove the 4G inequality for the kernel p which is the transition density of the Levy process with tempered jumps. This will yield the convergence of the perturbation series for potentials from a wide Kato class of functions. In particular our results hold for relativistic stable processes.

Denis Talay (INRIA)

On an hypothesis test to detect divergent stochastic simulations

In this joint work with Hector Olivero (University of Valparaiso, Chile) we construct and analyse an hypothesis test which helps to detect when the probability distribution of complex stochastic simulations has an heavy tail and thus possibly an infinite variance. This issue is notably important when simulating particle systems with complex and singular McKean-Vlasov interaction kernels whick make it extremely difficult to get a priori estimates on the probability laws of the mean-field limit, the related particle system, and their numerical approximations. We will exhibit examples of such situations and explain why the standard limit theorems do not lead to effective tests.

Even in the simple case of iid sequences our procedure and its convergence analysis are based on deep tools coming from the statistics of semimartingales.

Milica Tomasevic (Tosca, Inria Sophia Antipolis/University of Côte d'Azur)

A new McKean-Vlasov stochastic interpretation of the parabolic-parabolic Keller-Segel model

The Keller Segel (KS) model for chemotaxis is a system of parabolic or elliptic PDEs describing the time evolution of the density of a cell population and of the concentration of a chemical attractant.

Motivated by the study of the fully parabolic model using probabilistic methods, we give rise to a non linear SDE of McKean-Vlasov type with a highly non standard and singular interaction which involves all the past time marginals of the probability distribution of the solution.

In this talk, after a brief introduction about the biological phenomena and the KS equations, we will analyze our probabilistic model. This will include the results on the level of the McKean-Vlasov SDE and as well on the level of the corresponding interacting particle system where at each time each particle interacts in a singular way with the past of all the other particles.

This is a joint work with D. Talay and J.-F. Jabir.

Lorenzo Toniazzi (University of Warwick)

Extension of Caputo evolution equations with nonlocal initial condition

Consider the Caputo evolution equation (EE) $\partial_t^\beta u = \Delta u$ with initial condition ϕ on $\{0\} \times \mathbb{R}^d$. As it is well known, the solution reads $u(t,x) = \mathbf{E}_x[\phi(B_{E_t})]$. Here B_t is a Brownian motion and the independent time change E_t is an inverse β-stable subordinator. The fractional kinetic B_{E_t} is a popular model for subdiffusion [1], with remarkable universality properties [2,3].

We substitute the Caputo derivative ∂_t^β with the Marchaud derivative. This results in a natural extension of the Caputo EE featuring a time-nonlocal initial condition ϕ on $(-\infty, 0] \times \mathbb{R}^d$. We derive the new stochastic representation for the solution, namely $u(t,x) = \mathbf{E}_x[\phi(-W_t, B_{E_t})]$. This stochastic representation has a pleasing interpretation due to the non-obvious presence of W_t. Here W_t denotes the waiting/trapping time of the subdiffusion B_{E_t}. We discuss classical-wellposedness [4]. Time permitting, we discuss weak-wellposedness [5,6] for the respective extensions of Caputo-type EEs (such as in [7,8]).

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Thi Thanh Diu Tran (University of Jyvaskyla)

Statistical inference for Vasicek-type model driven by Hermite processes

Let $(Z_t^{q,H})_{t\geq 0}$ denote a Hermite process of order $q \geq 1$ and self-similarity parameter $H \in (\frac{1}{2}, 1)$. This process is H-self-similar, has stationary increments and exhibits long-range dependence. When $q = 1$, it corresponds to the fractional Brownian motion, whereas it is not Gaussian as soon as $q \geq 2$. In this presentation, we deal with the following Vasicek-type model driven by $Z^{q,H}$:

$$X_0 = 0, \quad dX_t = a(b - X_t)dt + dZ_t^{q,H}, \qquad t \geq 0,$$

where $a > 0$ and $b \in \mathbb{R}$ are considered as unknown drift parameters. We provide estimators for a and b based on continuous-time observations. For all possible values of H and q, we prove strong consistency and we analyze the asymptotic fluctuations. Joint work with Ivan Nourdin.

Dario Trevisan (University of Pisa)

On Lusin-type approximation of Sobolev by Lipschitz functions in Gaussian spaces

We describe some new approximation results, in the sense of Lusin, of Sobolev functions by Lipschitz ones in Gaussian spaces, obtained in collaboration with L. Ambrosio and E. Brué. Our proof technique relies upon estimates for heat semigroups and applies as well to other abstract metric measure spaces, such as $RCD(K, \infty)$ spaces. As an application of our results, we describe how they lead to quantitative stability for Lagrangian flows.

Gerald Trutnau (Seoul National University)

Existence, uniqueness and ergodic properties for time-homogeneous Itô-SDEs with locally integrable drifts and Sobolev diffusion coefficients

Using elliptic and parabolic regularity results for strongly continuous sub-Markovian contraction resolvents and semigroups in L^p-spaces and generalized Dirichlet form theory, we construct for every starting point weak solutions to SDEs in d-dimensional Euclidean space up to their explosion times including the following conditions. For arbitrary but fixed $p > d$ the diffusion coefficient $A = (a_{ij})$ is supposed to be locally uniformly strictly elliptic with functions $a_{ij} \in H^{1,p}_{loc}(\mathbb{R}^d)$ and for the drift coefficient $\mathbf{G} = (g_1, \ldots, g_d)$, we assume $g_i \in L^p_{loc}(\mathbb{R}^d)$. The solution is by construction a Hunt process with continuous sample paths on the one-point compactification of $\mathbb{R}^d$ and by a local well-posedness result from [X. Zhang, *Stochastic homeomorphism flows of SDEs with singular drifts and Sobolev* *diffusion coefficients*, EJP 2011] we know that it is pathwise unique and strong up to its explosion time. Moreover, just under the given assumptions we show irreducibility and the $L^{[1,\infty]}(\mathbb{R}^d, m)$-strong Feller property of its transition function, and the $L^{[q,\infty]}(\mathbb{R}^d, m)$-strong Feller property, $q = \frac{dp}{d+p} \in (d/2, p/2)$, of its resolvent, which both include the classical strong Feller property. We present moment inequalities for the solution, and non-explosion criteria which allow at the same time for linear growth, singularities of the drift coefficient inside an arbitrarily large compact set, an interplay between the drift and the diffusion coefficient and superlinear growth. This leads to pathwise uniqueness results up to infinity under presumably optimal general non-explosion conditions. We further present explicit conditions for recurrence, ergodicity and existence as well as uniqueness of invariant measures. Our work complements and improves substantially existing literature on time-homogeneous Itô-SDEs with merely locally integrable drifts and Sobolev diffusion coefficients. This is joint work with Haesung Lee (Seoul National University).

Amanda Turner (Lancaster University)

Fluctuation results for a planar random growth model
Planar random growth processes occur widely in the physical world. Examples include diffusion-limited aggregation (DLA) for mineral deposition and the Eden model for biological cell growth. One approach to mathematically modelling such processes is to represent the randomly growing clusters as compositions of conformal mappings. In 1998, Hastings and Levitov proposed one such family of models, which includes versions of the physical processes described above. In earlier work, Norris and I showed that the scaling limit of the simplest of the Hastings-Levitov models is a growing disk. More recently, Silvestri showed that the fluctuations can be described in terms of the solution to a stochastic fractional heat equation. In this talk, I will discuss on-going work with Norris and Silvestri in which we establish scaling limits and fluctuation results for a natural generalisation of the Hastings-Levitov family.

Jonas Tölle (University of Augsburg)

Gradient flows for the stochastic Amari neural field model
We shall discuss aspects of a nonlocal SPDE with applications to the so-called Amari-type neural field model, which are mean-field models for neural activity in the cortex. In particular, under suitable assumptions on the coupling kernel, we show that via an infinite dimensional change of coordinates the equation admits a gradient flow structure, which has consequences for regularity, long-time behavior and uniqueness of invariant distributions.
Joint work with Christian Kuehn, TU Munich.
See https://arxiv.org/abs/1807.02575 for the preprint.

Alexander Veretennikov (University of Leeds)

On Poisson equations
This is a review of results on Poisson equations "in the whole space" without and with a potential for generators of ergodic Markov processes.

Zoran Vondracek (University of Zagreb)

Perturbations of non-local operators with critical potentials

In this talk, I will discuss factorizations and estimates of Dirichlet heat kernels for non-local operators with critical killings. (Joint work with Soobin Cho, Panki Kim, and Renming Song)

Minoru W. Yoshida (Kanagawa University)

Non-local Dirichlet forms on infinite dimensional topological vector spaces

Joint work with Sergio Albeverio (Inst. Angewandte Mathematik and HCM, Univ. Bonn, Germany), Toshinao Kagawa (Dept. Information Systems Kanagawa Univ., Yokohama, Japan), Yumi Yahagi (Dept. Mathematical information Tokyo Univ. of Information, Chiba, Japan) and Minoru W. Yoshida (Dept. Information Systems Kanagawa Univ., Yokohama, Japan) General theorems on the closabilities and quasi-regulalities of non-local Markovian symmetric forms on probability spaces $(S, \mathcal{B}(S), \mu)$, with S, Fréchet spaces such that $S \subset \mathbb{R}^{\mathbb{N}}$, $\mathcal{B}(S)$, the Borel σ-field of S, and μ a Borel probability measures on S, are introduced. Firstly, a family of non-local Markovian symmetric forms $\mathcal{E}_\alpha$, $0 < \alpha < 1$, acting in each given $L^2(S;\mu)$ is defined, the index α characterizes the order of the non-locality. Then, it is shown that the forms defined on $\bigcup_{n\in\mathbb{N}} C_0^\infty(\mathbb{R}^n)$ are closable in $L^2(S;\mu)$. Moreover, sufficient conditions, under which the closure of the closable forms, the Dirichlet forms, become quasi-regular, are given. Finally, an existence theorem of Markov processes associated to the Dirichlet forms is given as an application of [MR]. A standard procedure of the application of the above theorems to the problem of stochastic quantizations of Euclidean fields is introduced.

Deng Zhang (Shanghai Jiao Tong University)

Scattering for stochastic nonlinear Schroedinger equations

In this talk I will present our recent work on scattering for stochastic nonlinear Schroedinger equations with linear multiplicative noise. In the defocusing case with appropriate range of energy-(sub)critical exponents of nonlinearity, we prove that the stochastic solutions scatter at infinity in the pseudo-conformal space and in the energy space respectively, under suitable conditions of noises. Moreover, by inputting a large non-conservative noise, we show that the solutions scatter at infinity with high probability for the full energy-subcritical exponents, which indicates a regularization effect of noise on scattering. This talk is based on joint work with Sebastian Herr and Michael Roeckner.

Xicheng Zhang (Wuhan University)

Singular Brownian diffusion processes

In this talk I will report some recent progress about the SDEs with distributional drifts and generalize some well-known results about the Brownian motion with singular measure-valued drifts. In particular, we show the well-posedness of martingale problem or the existence and uniqueness of weak solutions, and obtain sharp two-sided and gradient estimates of the heat kernel associated to the above SDE. Moreover, we also study the ergodicity and global regularity of the invariant measures of the associated semigroup under some dissipative assumptions. (This is a joint work with Guohuan Zhao).

Guohuan Zhao (Institute of Applied Mathematics, Academia Sinica)

Dirichlet Heat kernel estimates for cylindrical stable process

Let $L := \sum_{k=1}^{d} \Delta_k^{\alpha/2}$ on R^d, where $\alpha \in (0,2)$ and $\Delta_k^{\alpha/2}$ is the 1-dimensional fractional Laplacian along the k^{th} axis. We are concerned with two-sided Dirichlet heat kernel estimates of L on $C^{1,1}$ domains. This is a joint work with Zhen-Qing Chen and Eryan Hu.

List of participants

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Sebastian Andres (University of Cambridge)
George Andriopoulos (University of Warwick)
Akbar Asgharzadeh (University of Mazandaran)
Viorel Barbu (Romanian Academy)
Martin Barlow (University of British Columbia)
Anja Baum (Bielefeld University)
Noam Berger (Technical University of Munich)
Thomas Bernhardt (Heriot-Watt University)
Ivan Biočić (University of Zagreb)
Philippe Blanchard (Bielefeld University)
Krzysztof Bogdan (Wrocław University of Science and Technology)
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Filip Bosnic (Bielefeld University)
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Sung-Soo Byun (Seoul National University)
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Zhenqing Chen (University of Washington)
Joe Chen (Colgate University)
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Melissa Meinert (Bielefeld University)
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Jean-Christophe Mourrat (ENS Paris)
Ronald Reagan Moussitou (Montanuniversität Leoben)
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Nora Müller (Bielefeld University)
Muhammad Naeem (University of Central Punjab)
Makoto Nakashima (Nagoya University)
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Alexandra Neamtu (Technical University of Munich)
Marius Neuß (Max Planck Institute, MiS, Leipzig)
Tsz Hin Ng (University of Hong Kong)
James Norris (University of Cambridge)
Hirofumi Osada (Kyushu University)
Gianni Pagnini (Basque Center for Applied Mathematics)
Soumik Pal (University of Washington)

Tanja Pasurek (Bielefeld University)
Xue Peng (Sichuan University)
Wei Qian (University of Cambridge)
Tsiry Avisoa Randrianasolo (Bielefeld University)
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Matthew Roberts (University of Bath)
Tim Rolfsmeier (Bielefeld University)
Artur Rutkowski (Wrocław University of Science and Technology)
Michał Ryznar (Wrocław University of Science and Technology)
Michael Röckner (Bielefeld University)
Nikola Sandric (University of Zagreb)
Stjepan Šebek (University of Zagreb)
Grzegorz Serafin (Wrocław University of Science and Technology)
Helmand Shayan (Bielefeld University)
Anna Soos (Babes Bolyai University, Cluj Napoca)
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Ana Staneva (Sofia University)
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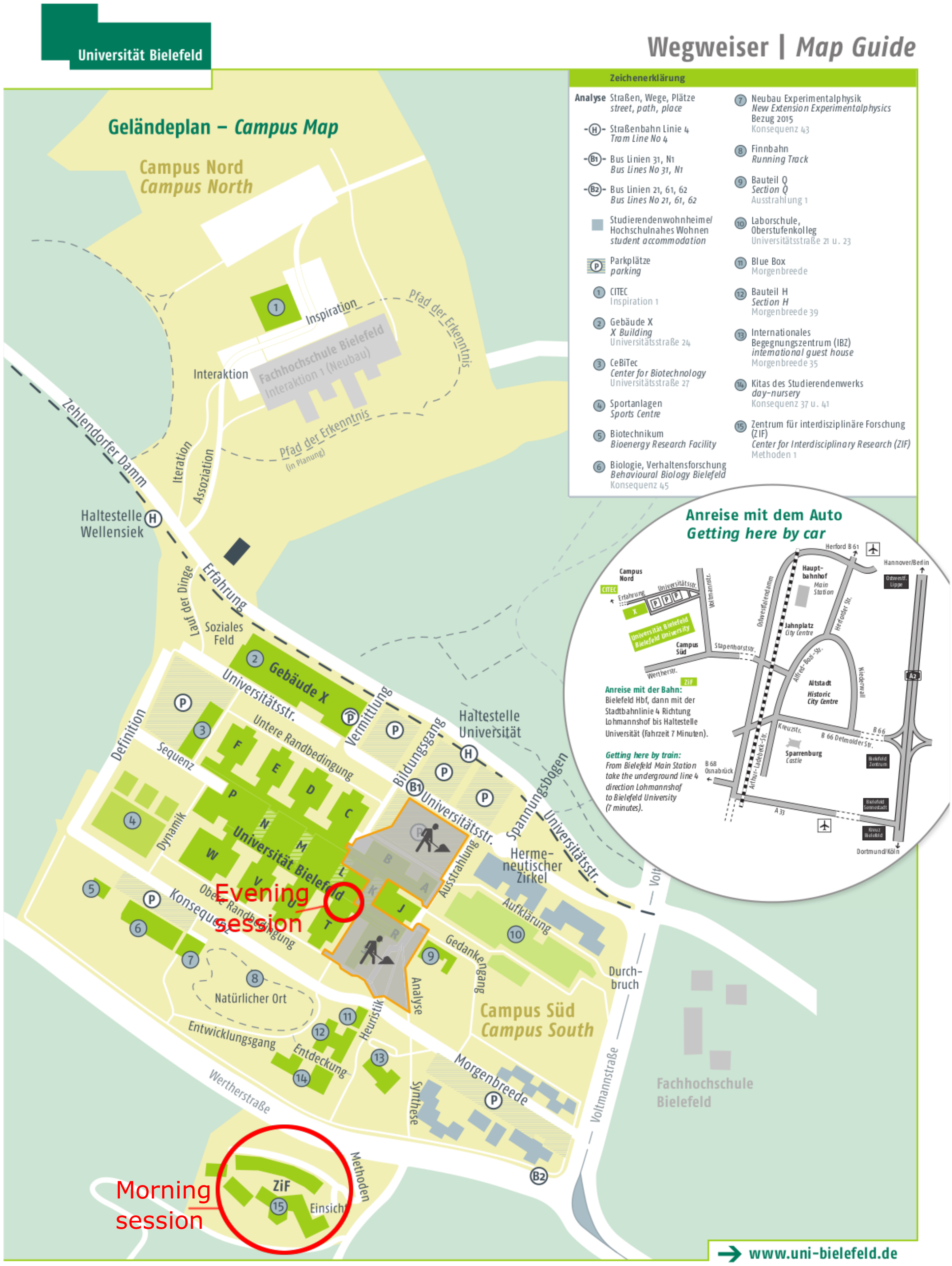

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Geländeplan – Campus Map
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Campus North
Campus Süd
Campus South
Zeichenerklärung
Anreise mit dem Auto
Getting here by car
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Haltestelle Universität
Gebäude X
Universitätsstr.
Zehlendorfer Damm
Morgenbreede
Wertherstraße
Voltmannstraße
Fachhochschule Bielefeld
Natürlicher Ort
ZiF
Evening session
Morning session
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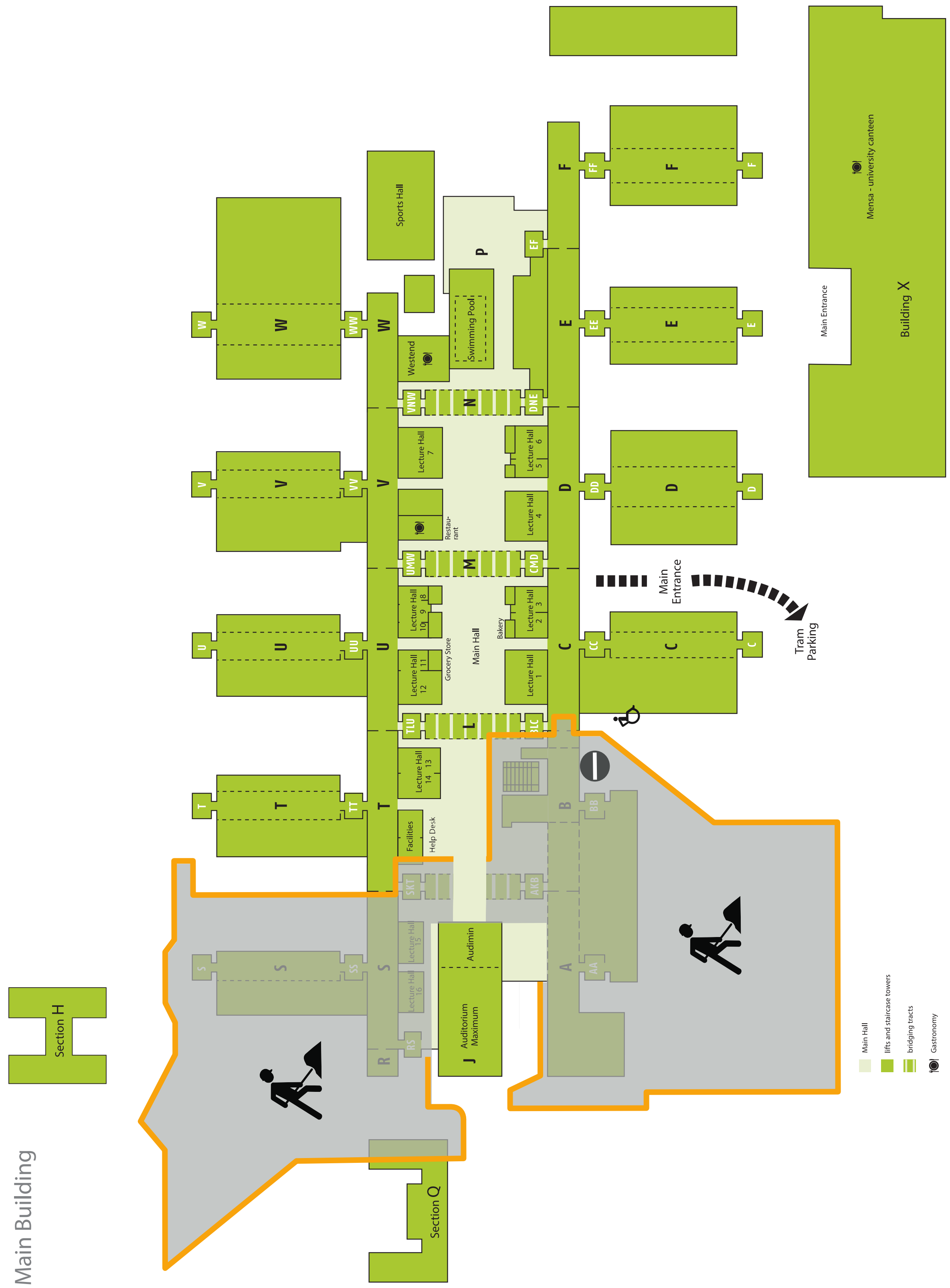
Campus map


Main Building
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Section Q
Building X
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Main Entrance
Main Entrance
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Sports Hall
Swimming Pool
Westend
Restau-rant
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Bakery
Facilities
Help Desk
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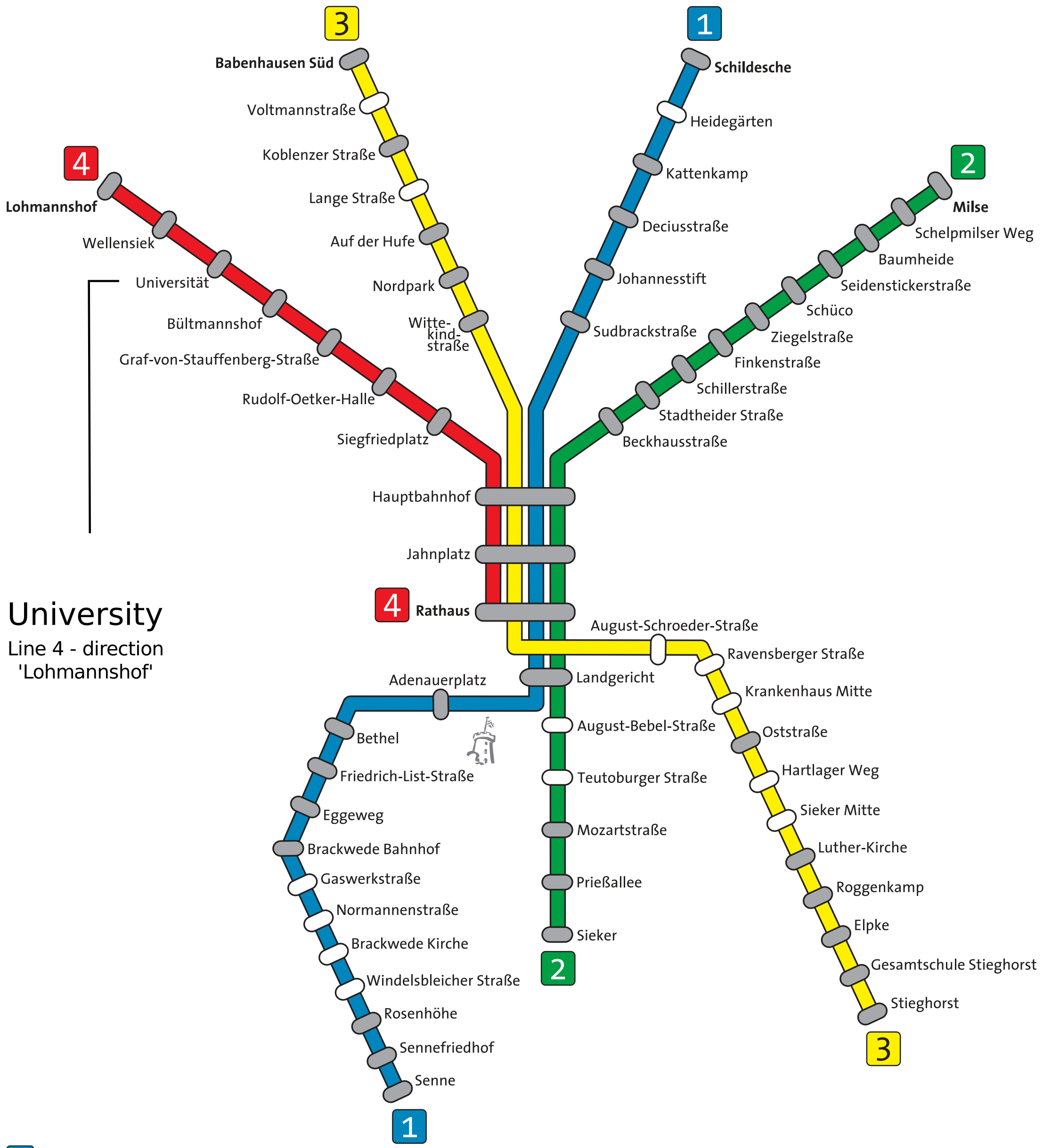
bridging tracts
Gastronomy

Tram map



1 Senne – Jahnplatz – Schildesche

2 Sieker – Jahnplatz – Milse

3 Stieghorst – Jahnplatz – Babenhausen Süd

4 Rathaus – Jahnplatz – Universität – Lohmannshof