Spring School 2018
Spin Systems: Discrete and Continuous
March 19 - 23, 2018
TU Darmstadt

Short Courses
Roland Bauerschmidt
Hugo Duminil-Copin

Invited Speakers
Margherita Disertori
Antti Knowles
Igor Kortchemski
Roman Kotecky
Aran Raoufi

Organization
Frank Aurzada
Volker Betz
Matthias Meiners

March 14, 2018

Contents

1 General Information

1.1 Accommodation

The participants are recommended to stay in one of the following hotels, located in walking distance (5 - 15 minutes) to the lecture venue.

- HOTEL BOCKSHAUT
  Kirchstraße 7-9, 64283 Darmstadt-Innenstadt
  Tel: +49-6151-99670
  Fax: +49-6151-99 67-29
- HOTEL ERNST LUDWIG
  Ernst Ludwig Straße 14, 64289 Darmstadt
  Tel: +49-6151-9266 or +49-6151-26011
- HOTEL ATLANTA
  Kasinostraße 129, 64293 Darmstadt
  Tel: +49-6151-1789-0
  Fax: +49-6151-1789-66

For directions please see the map on the back cover.

1.2 Registration

On Monday morning, starting from 8:00, registration is possible in the lobby of the lecture hall.

1.3 Lecture Hall

Location: Technische Universität Darmstadt. The registration and all lectures will take place in building S2|08, Hochschulstraße 4 | 64289 Darmstadt in lecture hall S2|08/171. In the lecture hall, there are 2 large blackboards and a projector.

1.4 Map & Points of Interest

The map can be found on the back cover.

1.5 Public Transportation

The closest bus and tram stops to the venue of the workshop are **Schloss** (trams: S2, S3, S9) and **Willy-Brandt-Platz** (trams: S4, S5, S6, S7, S8). Both stops are within 10 minutes walking distance to the lecture hall.

1.6 Food & Beverage

Cheap and plain food can be purchased at the TU Darmstadt Refectory-Canteen, Alexanderstr. 4, building S1|11, Monday to Friday 11:15 to 14:00. Additionally there are lots of good restaurants and bistros near TU Darmstadt. Please dial +49 6151 preceding the number given below.

Name	Address	Phone	Cuisine	Opening Hours
Ratskeller	Marktplatz 8	26444	German	10:00 - 01:00
Pizzeria da Nino	Alexanderstr. 29	24220	Italian	18:00 - 23:00
Haroun's	Friedensplatz 6	23487	Oriental	11:00 - 22:30
Vis à Vis	Fuhrmannstr. 2	9670806	Bistro	11:15 - 15:30
Cafe Extrablatt	Marktplatz 11	5998820	Bistro	08:30 - 23:30
Ristorante Sardegna	Kahlertstraße 1	23029	Italian	11:30 - 15:00

1.7 Conference Dinner

On Thursday, March 22^{th}, there will be a conference dinner at the Restaurant Sitte, Karlstraße 15, 64283 Darmstadt, Phone: +49 6151 22222, restaurant-sitte.de.

1.8 Free Afternoon

On Wednesday, March 21^{th}, there will be a free afternoon.

1.9 Contact Information

If you have any questions concerning the workshop, please feel free to contact one of the local organizers or the technical support:

- Prof. Dr. Volker Betz
  Office: S2-15, Room 340
  Phone: +49 6151 - 16 23370
- Prof. Dr. Frank Aurzada
  Office: S2-15, Room 341
  Phone: +49 6151 - 16 23375
- Office Department
  Office: S2-15, Room 339
  Phone:+49 6151 - 16 23380 and +49 6151 - 16 23378

Acknowledgements

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Programme

Time	Monday	Tuesday	Wednesday	Thursday	Friday
08:00	Registration				
09:00	Duminil-Copin	Duminil-Copin	Duminil-Copin	Duminil-Copin	Bauerschmidt
	Coffee break	*Coffee break*	*Coffee break*	*Coffee break*	*Coffee break*
11:00	Bauerschmidt	Bauerschmidt	Duminil-Copin	Bauerschmidt	Bauerschmidt
	Lunch	*Lunch*	*Coffee break*	*Lunch*	*Coffee break*
14:00	Invited Talk: Disertori	Invited Talk: Kortchemski	12:30 Inv. Talk: Kotecky	Invited Talk: Raoufi	12:30 Inv. Talk: Knowles
	Contributed talk: Ueltschi	Contributed talk: Okamura	*Lunch*	Contributed talk: Nardi	*Lunch*
	Coffee break	*Coffee break*		*Coffee break*	*End of Workshop*
16:00	Short talks: Lager, Weißmann, Taggi, Ott, Lübbers	Short talks: Hirsch, Lees, Lis, Friesen, Buck	*Free Afternoon Excursion*	Short talks: Mönch, Dahmani, Affolter, Hirscher, Günther, Baguley, Zaigler	
	Coffee break				
	Kettner, van Zuijlen, Schäfer, Schwinn, Ehlert				
	Reception			Dinner: Sitte	

Monday, 19. March 2018

Time	Speaker	*Title of Talk*
09:00-09:05	Welcome	
09:05-10:35	Hugo Duminil-Copin	*Mini course : Discrete spin systems*
10:35-11:00		–Coffee Break–
11:00-12:30	Roland Bauerschmidt	*Mini course: Continuous spin systems*
12:30-14:00		–Lunch Break–
14:00-15:00	*Invited talk* Margherita Disertori	*Ward identities as a tool to study equilibrium measures in statistical mechanics*
15:00-15:30	*Contributed talk* Daniel Ueltschi	*Loop soups and their universal behaviour in 3D*
15:30-16:00		–Coffee Break–
16:00-16:10	Short talk	Mareike Lager
16:10-16:20	Short talk	Philip Weißmann
16:20-16:30	Short talk	Lorenzo Taggi
16:30-16:40	Short talk	Sebastian Ott
16:40-16:50	Short talk	Jan-Erik Lübbers
16:50-17:10		–Coffee Break–
17:10-17:20	Short talk	Marvin Kettner
17:20-17:30	Short talk	Willem van Zuijlen
17:30-17:40	Short talk	Helge Schäfer
17:40-17:50	Short talk	Sebastian Schwinn
17:50-18:00	Short talk	Johannes Ehlert
18:00-24:00	Reception	–Cheese & Wine–

Tuesday, 20. March 2018

Time	Speaker	*Title of Talk*
09:00-10:30	Hugo Duminil-Copin	*Mini course: Discrete spin systems*
10:30-11:00		–Coffee Break–
11:00-12:30	Roland Bauerschmidt	*Mini course: Discrete spin systems*
12:30-14:00		–Lunch Break–
14:00-15:00	*Invited talk* Igor Kortchemski	*Looptrees*
15:00-15:30	*Contributed talk* Kazuki Okamura	*Some results for range of random walk on graph with spectral dimension two*
15:30-16:00		–Coffee Break–
16:00-16:10	Short talk	Christian Hirsch
16:10-16:20	Short talk	Benjamin Lees
16:20-16:30	Short talk	Marcin Lis
16:30-16:40	Short talk	Martin Friesen
16:40-16:50	Short talk	Micha Buck

Wednesday, 21. March 2018

Time	Speaker	*Title of Talk*
09:00-10:30	Hugo Duminil-Copin	*Mini course: Discrete spin systems*
10:30-10:45		–Coffee Break–
10:45-12:15	Hugo Duminil-Copin	*Mini course: Continuous spin systems*
12:15-12:30		–Coffee Break–
12:30-13:30	*Invited talk* Roman Kotecky	*Gradient models and nonlinear elasticity*
13:30-14:30		–Lunch Break–
		–Free Afternoon – Excursion–

Thursday, 22. March 2018

Time	Speaker	*Title of Talk*
09:00-10:30	Hugo Duminil-Copin	*Mini course: Discrete spin systems*
10:30-11:00		–Coffee Break–
11:00-12:30	Roland Bauerschmidt	*Mini course: Continuous spin systems*
12:30-14:00		–Lunch Break–
14:00-15:00	*Invited talk* Aran Raoufi	*Translation invarivant Gibbs states for the Ising and ϕ^4 models*
15:00-15:30	*Contributed talk* Francesca Nardi	*Metastability of interacting particle systems*
15:30-16:00		–Coffee Break–
16:00-16:10	Short talk	Christian Mönch
16:10-16:20	Short talk	Zoubir Dahmani
16:20-16:30	Short talk	Niklas Christoph Affolter
16:30-16:40	Short talk	Timo Hirscher
16:40-16:50	Short talk	Felix Günther
16:50-17:00	Short talk	Samuel Baguley
17:00-17:10	Short talk	Sebastian Zaigler
18:30-22:00	Conference Dinner	–Restaurant Sitte–

Friday, 23. March 2018

Time	Speaker	*Title of Talk*
09:00-10:30	Roland Bauerschmidt	*Mini course: Continuous spin systems*
10:30-11:00		–Coffee Break–
11:00-12:30	Roland Bauerschmidt	*Mini course: Continuous spin systems*
12:30-13:30	*Invited talk* Antti Knowles	*Gibbs measures of nonlinear Schrödinger equations and many-body quantum mechanics*
13:30-14:30		–Lunch Break, End of the Spring School–

2 List of Talks

2.1 Short Courses

Roland Bauerschmidt
University of Cambridge, United Kingdom
Hugo Duminil-Copin
Université de Genève, Switzerland
Mini course: Discrete & Continuous spin systems

This course will give an introduction to aspects of discrete and continuous spin systems, including Ising, Potts, $O(n), H^n$ models, and the Sine-Gordon model. Topics discussed include mean-field theory, the existence and order of a phase transitions, graphical representations of spin systems, the role of symmetry in their behaviour and their dependence on dimension, and a glimpse of renormalisation.

Monday: Introduction
- Introduction
- Free field, mean-field theory, Brascamp-Lieb inequality

Tuesday: Existence of ordering
- Peierls argument, random cluster, correlation inequalities
- Infrared bound for $O(n)$ models, symmetry breaking in H^n models

Wednesday: Random current study of the Ising model
- Random current representation
- Continuity and triviality

Thursday: More about two dimensions and random walks
- Critical point (duality) and order of the phase transition for the Potts model
- Random walk representations and the Mermin-Wagner theorem

Friday: Renormalisation
- More about Gaussian fields
- Hierarchical sine Gordon model

2.2 Invited Speakers

Margherita Disertori
Ward identities as a tool to study equilibrium measures in statistical mechanics
Universität Bonn, Germany

Abstract: The main problem in equilibrium statistical mechanics is to analyse the thermodynamic limit of certain probability measures. A powerful tool is the so-called renormalization group approach. Here we consider an alternative approach, based on a family of identitites generated by internal symmetries of the model.

Antti Knowles
Gibbs measures of nonlinear Schrödinger equations and many-body quantum mechanics
Université de Genève, Switzerland

Abstract: Many time-dependent nonlinear Schrödinger equations admit an invariant Gibbs measure, which is a probability measure on the space of distributions that is left invariant by the time evolution. Such measures have been extensively studied as tool to construct global solutions of time-dependent nonlinear Schrödinger equations with rough initial data. I review some recent progress on deriving these measures in dimensions 1,2,3 as high-temperature limits of many-body quantum mechanics. In one dimension, I also explain how time-dependent correlation functions of the nonlinear Schrödinger equation arise as limits of corresponding quantum many-body correlation functions.

Roman Kotecky
Gradient models and nonlinear elasticity
University Warwick, United Kingdom

Abstract: tba

Igor Kortchemski
Looptrees
ENS Paris, France

Abstract: We will study the geometry of cluster boundaries of site-percolation on random lattices, namely on large random triangulations. We will see that in the critical regime, their scaling limit for the Gromov-Hausdorff topology is a random compact metric space called a stable looptree, and which is roughly speaking made of a collection of random loops glued together along a random tree structure. Based on joint works with Nicolas Curien.

Aran Raoufi
Translation invariant Gibbs states for the Ising and ϕ^4 models
Université de Genève, Switzerland

Abstract: In this talk, we use random current representation to prove that for any amenable graph, for the ferromagnetic Ising model at any inverse temperature β, every automorphism invariant Gibbs state is a linear combination of the pure plus and minus states. Then, we discuss how to develop the random current representation for the ϕ^4 model in order to obtain similar results for this model.

2.3 Further Speakers

Niklas Christoph Affolter
Integrable Circle Patterns and the Spanning Tree Model
Technische Universität Berlin, Germany

Abstract: The aim of my current research focuses on finding common concepts in discrete statistical models and discrete conformal geometry. As a particular example I will present how to formulate a geometric version of the well known Y-Delta move for Integrable Circle Patterns. In fact, it is possible to derive a Spanning Tree model from any given Integrable Circle Pattern such that the geometric Y-Delta move corresponds to the purely combinatoric Y-Delta move of the Spanning Tree model. Open questions include relations to hyperbolic geometry and other statistical models such as the Dimer model.

Samuel Baguley
Stationarity in relation to self-similar Markov processes
Universität Mannheim, Germany

Abstract: The Lamperti-Kiu transform (see[1]) gives a one-to-one correspondence between Markov additive processes and real, self-similar Markov processes (rssMps) with initial starting value away from zero. Under certain conditions one can extend this to construct the law of the transient rssMp issued from the origin (see[2]). In any case the rssMp can be transformed once more into a broadly stationary process Y indexed by the real line via

$$Y_s = e^{-s/\alpha} X_{e^s}, \qquad s \in \mathbb{R},$$

and we explore some properties of this process.
References
[1] L. Chaumont, H. Pantí, and V. Rivero. The Lamperti representation of realvalued self-similar Markov processes. Bernoulli, 19 (5B): 2494 – 2523, Nov 2013.
[2] S. Dereich, L. Döring, and A. E. Kyprianou. Real self-similar processes started from the origin. The Annals of Probability, 45 (3): 1952 – 2003, May 2017.

Micha Buck
Negative excursions of fractional Gaussian sequences
Technische Universität Darmstadt, Germany

Abstract: In this talk we study the probability that a stochastic process has a long negative excursion. More precisely, we study the rate of decay of the so-called persistence probability

$$\mathbb{P}(Z_n \leq 0 : |n| \leq N), \quad \text{as} \quad N \to \infty,$$

for some two-sided Gaussian sequences $(Z_n)_{n\in\mathbb{Z}}$ that are discrete-time analogs of fractional Brownian motion and integrated fractional Brownian motion, respectively. Our results extend the corresponding ones in continuous time by Molchan (Commun. Math. Phys., 1999) and Molchan (J. Stat. Phys., 2017) to a wide class of discrete-time processes.

Zoubir Dahmani
Weighted Fractional Continuous Random Variables with Applications
UMAB, Univ. of Mostaganem, Algeria

Abstract: Using fractional calculus, some concepts on "weighted" continuous random variables are introduced and some fractional bounds estimating the expectations and variances are established. Also, some classical identities, that correspond to $\alpha = 1$; for covariances are generalised for any $\alpha > 0$. Some applications on Beta distribution are discussed

Johannes Ehlert
Existence of long loops on trees
Technische Universität Darmstadt, Germany

Abstract: Considering a model of random loops we are interested in determining the critical parameter above which – with positive probability – there is an infinite loop. By restricting ourselves to trees, the behavior of the loops becomes more predictable and we will discuss how to exploit this feature.

Martin Friesen
Absolute continuity and irreducibility for stochastic differential equations with jumps
Universität Wuppertal, Germany

Abstract: For a given (pure-jump) Levy process Z_t we study solutions to

$$dX_t = b(X_t)dt + \sigma(X_t)dZ_t, \;\; X_0 = x$$

where b and σ are only assumed to be Hölder continuous (not necessarily bounded). We show that if the noise Z_t has sufficiently many small jumps, then each solution X_t is absolutely continuous w.r.t. the Lebesgue measure. Moreover, if Z_t hits each set sufficiently fast, then the corresponding transition probabilities are irreducible with respect to the Lebesgue measure. Both results neither require that σ is invertible nor that the Levy measure of Z_t is comparable to the Levy measure of some α-stable process.

Felix Günther
Discrete complex analysis
Technische Universität Berlin, Germany

Abstract: We will briefly discuss a linear theory of discrete complex analysis on quad-graphs. We provide discrete counterparts of the most fundamental objects in complex analysis and consider discrete versions of fundamental integral formulae.

Christian Hirsch
Large deviations in quantum quasi-1D Coulomb systems
LMU München, Germany

Abstract: We prove a large deviation principle for a large system of interacting Brownian bridges in a toroidal region growing in one dimension. The particles repel each other according to Coulomb forces. A key mathematical challenge is the extension of the method applied by T. Leblé and S. Serfaty in the classical setting to the quantum context of interacting diffusions. Via the Feynman-Kac formula, this large deviation principle provides a variational formula for the free energy per unit volume associated with the Maxwell-Boltzmann statistics. This talk is based on joint work with A. Collevecchio, S. Jansen and P. Jung

Timo Hirscher
Water transport on infinite graphs
Stockholms Universitet, Sweden

Abstract: If the nodes of a graph are considered to be identical barrels Ű featuring different water levels Ű and the edges to be (locked) water-filled pipes in between the barrels, consider the optimization problem of how much the water level in a fixed barrel can be raised with no pumps available, i.e. by opening and closing the locks in an elaborate succession. We consider the initial water profile to be given by i.i.d. unif (0,1) random variables, investigate the supremum of achievable water levels at a given node Ű or to be more precise, the support of its distribution Ű and ask in which settings it becomes degenerate.

Marvin Kettner
Persistence Probabilities of Autoregressive Processes
Technische Universität Darmstadt, Germany

Abstract: In this talk we consider a certain class of autoregressive processes and study the probability that such a process remains positive up to time $N \in \mathbb{N}$, the so-called persistence probability. We are interested in the asymptotic behaviour of these probabilities. A recent result by Aurzada, Mukherjee and Zeitouni (2017) shows that under certain conditions this quantity decreases exponentially fast and that the rate of decay can be identified with the largest eigenvalue of some integral operator. We aim to determine this eigenvalue by using methods of Perturbation Theory.

Mareike Lager
Random Band Matrices and supersymmetry
Universität Bonn, Germany

Abstract: We consider a random band matrix ensemble in two and three dimensions, in the limit of infnite volume and fixed but large band width. For this model, we discuss rigorous results on the averaged density of states obtained in [2] and [1]. The main steps of the proof are a supersymmetric dual representation, a saddle point analysis and a suitable cluster expansion. We compare the results and proofs with respect to the dimension.
This is a joint work with M. Disertori.
[1] M. Disertori and M. Lager. Density of States for Random Band Matrices in Two Dimensions. Annales Henri Poincare, 18 (7): 2367-2413, 2017. [2] M. Disertori, H. Pinson, and T. Spencer. Density of states for random band matrices. Comm. Math. Phys., 232(1):83-124, 2002.

Benjamin Lees
Cyclic time random walks with direction switching on the complete graph
Technische Universität Darmstadt, Germany

Abstract: I consider a cyclic time random walk on the complete graph with direction switching. This model is closely related to quantum spin systems, which provide the motivation. In the case of pure random interchange it was shown by Schramm that after some critical time infinite cycles will emerge and that their sizes, normalised by the size of the infinite cluster of the underlying Erdös-Rényi random graph, have a Poisson Dirichlet structure. When direction changes are present we also expect a Poisson Dirichlet structure (with a different parameter). The proof relies on long cycles quickly losing their vertical orientation as they are explored. This seemingly obvious fact proves surprisingly difficult to rigorously show.

Marcin Lis
Critical Ising models on circle patterns
University of Cambridge, United Kingdom

Abstract: A circle pattern is a planar graph whose every face can be inscribed in a circle. In my talk I will define a critical Ising model on an arbitrary circle pattern with uniformly bounded faces.

Jan-Erik Lübbers
Displacement of biased random walk in a one-dimensional percolation model
Technische Universität Darmstadt, Germany

Abstract: We consider biased random walk in a one-dimensional percolation environment. Depending on the bias parameter λ of the walk, the linear speed converges almost surely towards a value $\bar{v}$ which exhibits a phase transition from positive value to zero at a critical value of λ. We investigate the typical order of fluctuations of the walk around $\bar{v}$ in the ballistic resp. the order of the displacement from the origin in the subballistic regime.

Christian Mönch
Persistence exponents for SSSI processes
Technische Universität Darmstadt, Germany

Abstract: By a classical result of Molchan, the persistence exponent of fractional Brownian motion with Hurst index H is equal by $1 - H$. I will present a theorem generalising this relation to a larger class of fractional processes and discuss some evidence in favour of the conjecture that this behaviour is universal for all H-self similar processes with stationary increments. The talk is based on joint work with Frank Aurzada.

Francesca R. Nardi
Metastability of interacting particle systems
Università degli Studi di Firenze, Italy

Abstract: The analysis of rare transitions of Markov chains is a fruitful mathematical way to approach the study of metastability phenomena, which are ubiquitous in first order phase transitions. In this talk I will present both theoretical model-independent frameworks and results, as well as model-dependent findings for various statistical physics models, such as Probabilistic Cellular Automata, Blume-Capel, and hard-core model.

Kazuki Okamura
Some results for range of random walk on graph with spectral dimension two
Kyoto University, Japan

Abstract: We consider the range of random walk on graphs with spectral dimension two, especially for graphs which are not vertex-transitive. We show that a certain weak law of large numbers hold if a recurrent graph satisfies a uniform condition. We show that the behavior of appropriately scaled expectations is stable with respect to every “finite modification" of the two-dimensional integer lattice. We construct a recurrent graph such that the uniform condition holds but appropriately scaled expectations fluctuate. As a result, the law of large numbers mentioned above is best in a sense. Our result is applicable to showing law of the iterated logarithms for lamplighter random walks in the case that the spectral dimension of the underlying graph is two.

Sebastien Ott
Behaviour of Covariances in High-Temperature Spin Systems
University of Geneva, Switzerland

Abstract: At high temperatures, spin systems (like the Ising or Potts models) are known to decorrelate fast: for any two local functions F and G, their covariance decays exponentially with the distance between their supports. The problem presented in this talk is the classification of the different behaviours that may appear for different classes of functions F,G: different rates of decay and different corrections to the exponential decay can appear depending on symmetries of F,G and of the Hamiltonian defining the system. I will briefly present the set-up (models, high temperature behaviour) and present the case of the Ising model. Open questions about generalisations will conclude the presentation.

Helge Schäfer
Random permutations without macroscopic cycles
Technische Universität Darmstadt, Germany

Abstract: We consider uniform random permutations conditioned to have no long cycles and study the asymptotic behaviour of the cycle structure. It is established that the small cycles exhibit classical behaviour, whereas long cycles are strongly influenced by the concrete choice of constraint. We also show that the process of cumulative cycle numbers not exceeding a given length has a limit shape and that the fluctuations about this limit shape obey a functional limit theorem. This is joint work with V. Betz and D. Zeindler.

Sebastian Schwinn
Reducing the queueing delay in polling models using forced idle times
Technische Universität Darmstadt, Fachbereich Mathematik and Graduate School CE, Germany

Abstract: Polling models are multiple-queue, cyclic-service systems where the jobs are served by a single server. In our case, the feature of the server is that it may be forced to wait idly for new jobs at an empty queue instead of switching to the next station. We propose different wait-and-see strategies that govern these waiting periods. We assume Poisson arrivals for new jobs and allow general service and switchover time distributions. The results are formulas for the mean average queueing delay and characterisations of the cases where the wait-and-see strategies yield a lower delay compared to the exhaustive strategy. This talk is based on a joint work with Frank Aurzada.

Lorenzo Taggi
Ensemble of self-avoiding polygons
Technische Universität Darmstadt, Germany

Abstract: We consider an ensemble of interacting random loops, with each loop γ_x being attached to a vertex $x \in \Lambda_L \subset \mathbb{Z}^d$ of a box of side length L. We draw each realization $\boldsymbol{\gamma} = (\gamma_x)_{x\in\Lambda_L}$ at random according to a Boltzmann weight $e^{-\mathscr{H}(\gamma)}$ with energy $\mathscr{H}(\boldsymbol{\gamma}) = \alpha\,\mathscr{C}(\boldsymbol{\gamma}) + \lambda\,\mathscr{I}(\boldsymbol{\gamma})$, where $\alpha, \lambda \in \mathbb{R}$ are two order parameters, $\mathscr{C}(\boldsymbol{\gamma})$ is the total length of the loops and $\mathscr{I}(\boldsymbol{\gamma})$ is the total number of intersections between the loops. When $\lambda = 0$ the polygons are drawn independently at random, while when $\lambda > 0$ (resp. $\lambda < 0$) their interaction is repulsive (resp. attractive) and in the limit $\lambda \to +\infty$ we obtain *random lattice permutations*, a model that was introduced by Feynman to understand the occurrence of Bose-Einstein condensation. We prove that for any $\alpha \in \mathbb{R}$ a phase transition occurs at a critical value $\lambda_c = \lambda_c(\alpha)$ separating a regime where the polygons are *weakly space filling*(λsmall), from a regime where the they are short(λ large). Moreover, we study the behaviour of the critical curve separating the two regimes and prove some monotonicity properties. This talk is based on a joint work with Volker Betz and Helge Schäfer.

Daniel Ueltschi
Loop soups and their universal behaviour in 3D
University of Warwick, United Kingdom

Abstract: Loop soups involve one-dimensional objects living in three-dimensional spaces. They occur as representations of classical and quantum models in statistical mechanics. The lengths of the loops form a random partition. As it turns out, these random partitions always satisfy rather simple distributions, Poisson-Dirichlet.

Willem van Zuijlen
Mean-field Gibbs-non-Gibbs transitions
HU & WIAS Berlin, Germany

Abstract: In this talk I will discuss the phenomenon Gibbs-non-Gibbs transitions for mean-field models, and relate Gibbsianness to uniqueness of minimizers of a related large deviation rate function. Moreover, for Glauber dynamics for the Curie-Weiss model and Brownian dynamics in a potential one can relate Gibbsianness to differentiability of the rate function, by considering Hamiltonian trajectories.

Philip Weißmann
Lévy processes conditioned to avoid a given set
Universität Mannheim, Germany

Abstract: We present a procedure of conditioning a Lévy process ξ to avoid a given set B, although it is possible that the first hitting time

$$T_B := \inf\{t \geq 0 : \xi_t \in B\}$$

is finite almost surely. Further known examples, like $B = (-\infty, 0]$ (see [1]) and $B = \{0\}$ (see [2]) will be introduced, as well as new examples, like $B = [a, b]$.

[1] L. Chaumont, R. A. Doney (2005). On Lévy processes conditioned to stay positive. *Electron. J. Probab.* 10(28), 948–961
[2] H. Panti (2016). On Lévy processes conditioned avoid zero. *ArXiv 1304. 3191v30*

Sebastian Zaigler
Regularity structures for the primitive equations
Technische Universität Darmstadt, Germany

Abstract: The new technique of regularity structures introduced by Martin Hairer is a method to find local solutions for subcritical SPDEs with rough data, which were formerly inaccessible. Regularity structures are spaces of abstract T̈aylor expansions, in which a solution of a SPDE can be found by solving fixed point equations. The sequence of these fixed points, which are renormalised solution of the SPDE, converges to a solution of the SPDE. We will give a short introduction how to modify them to solve the primitive equations with white noise.

3 Participants

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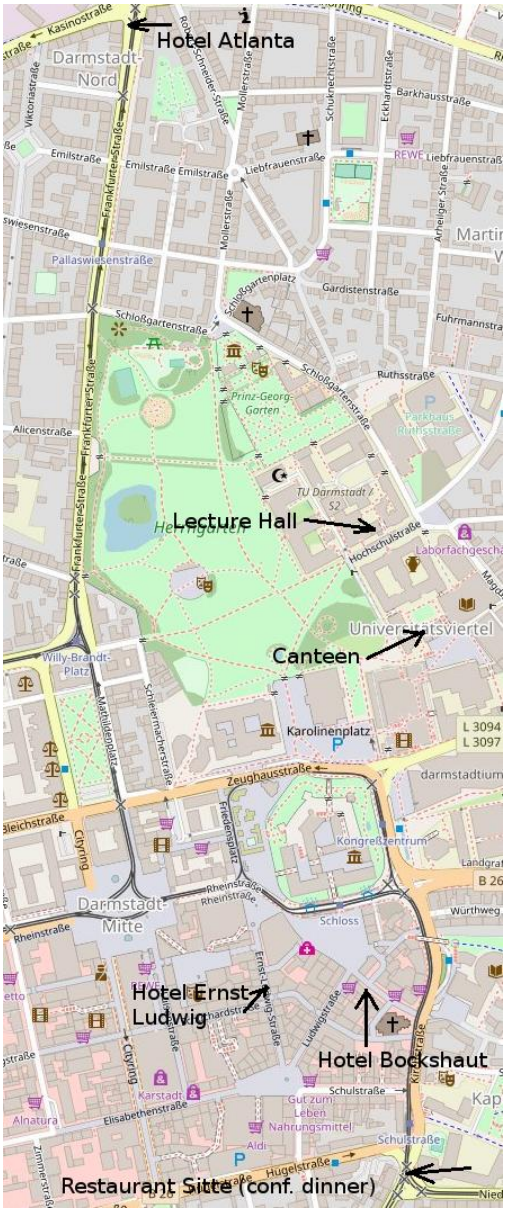
Hotel Atlanta
Lecture Hall
Canteen
Hotel Ernst-Ludwig
Hotel Bockshaut
Restaurant Sitte (conf. dinner)
Darmstadt-Nord
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Prinz-Georg-Garten
Universitätsviertel
Karolinenplatz
Kongreßzentrum
darmstadtium
Schloss
Hochschulstraße
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Schloßgartenplatz
Gardistenstraße
Ruthsstraße
Alicenstraße
Pallaswiesenstraße
Willy-Brandt-Platz
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