UNIVERSITÄT BIELEFELD
Faculty of Mathematics

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Open Japanese-German Conference on Stochastic Analysis and Applications

14 – 18 September 2026

Bielefeld University

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Matthias Erbar and Moritz Kaßmann

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This workshop is funded by DFG and University of Bielefeld.

Schedule

	Mo 14.09.	**Tue 15.09.**	**Wed 16.09.**	**Thu 17.09.**	**Fr 18.09.**
09:15 – 9:45	Registration + Opening	Kumagai	Sturm	Kühn	Hartung
09:50 – 10:20	Hoshino	Andres	Dello Schiavo	Nakashima	Prevost
10:20 – 10:50	Tea & Coffee	Tea & Coffee	Tea & Coffee	Tea & Coffee	Tea & Coffee
10:50 – 11:20	Konarovskyi	Shiraishi	Bormann	Shiozawa	Kusuoka
11:25 – 11:55	Hamaguchi	Watanabe	Schrott	Klimsiak	Closing
12:00 – 12:30	Veraar	Takatsu	Mytnik	Wagner	
12:30 – 14:00	Lunch break	Lunch break	Lunch break	Lunch break	
14:00 – 14:30	Croydon	Perkowski	**Excursion**	Junk	
14:35 – 15:05	Kuwae	Sauerbrey		Suzuki	
15:10 – 15:40	Shimizu	Röckner		Butkovsky	
15:40 – 16:10	Tea & Coffee	Tea & Coffee		Tea & Coffee	
16:10 – 16:40	Pitch talks				
16:45 – 17:45	Poster session				

Schedule: Monday September 14

Lecture Room: **X-E0-001**

09:15 – 09:45 **Registration** (Room X-E0-204)

09:45 – 09.50 **Opening**

09:50 – 10:20 **Masato Hoshino**
Fernique-type bounds for BPHZ models and their applications

10:20 – 10:50 **Tee and Coffee** (Room X-E0-204)

10:50 – 11:20 **Vitalii Konarovskyi**
Higher-Order Gaussian approximations on path space for the simple symmetric exclusion process

11:25 – 11:55 **Yushi Hamaguchi**
Ergodicity for Markovian lifts of stochastic Volterra equations

12:00 – 12:30 **Mark Veraar**
Stochastic reaction diffusion equations with non-trace class noise

12:30 – 14:00 **Lunch break**

14:00 – 14:30 **David Croydon**
Zeroes of Gaussian fields on fractals

14:35 – 15:05 **Kazuhiro Kuwae**
A remark on subharmonicity for symmetric Dirichlet forms

15:10 – 15:40 **Ryosuke Shimizu**
Singularity of Sobolev spaces on Laakso-type fractal spaces

15:40 – 16:10 **Tee and Coffee** (Room X-E0-204)

16:10 – 16:40 **Pitch talks**
Ehsan Abedi, Yoshiyuki Endo, Jacopo Peroni, Tomoko Takemura, Jonas Tölle

16:45 – 18:00 **Poster session**

Schedule: Tuesday September 15

Lecture Room: **X-E0-001**

09:15 – 09:45 **Takashi Kumagai**
High-order convergence rates of periodic homogenization for symmetric Lévy type operators

09:50 – 10:20 **Sebastian Andres**
Heat kernel bounds for Liouville Brownian motion

10:20 – 10:50 **Tee and Coffee** (Room X-E0-204)

10:50 – 11:20 **Daisuke Shiraishi**
Graph distance and effective resistance of random walk trace in four dimensions

11:25 – 11:55 **Satomi Watanabe**
Collisions of simple random walks on the range of a four-dimensional simple random walk

12:00 – 12:30 **Asuka Takatsu**
Law of large numbers and deformed exponential family

12:30 – 14:00 **Lunch break**

14:00 – 14:30 **Nicolas Perkowski**
Hydrodynamic limit of the stochastic Burgers equation

14:35 – 15:05 **Max Sauerbrey**
Dirichlet form approach to stochastic thin-film equations

15:10 – 15:40 **Michael Röckner**
Probabilistic representation of solutions to the parabolic p-Laplace equation

15:40 – 16:10 **Tee and Coffee** (Room X-E0-204)

Schedule: Wednesday September 16

Lecture Room: **X-E0-001**

09:15 – 09:45	**Karl-Theodor Sturm** Section curvature for Kantorovich-Wasserstein and Hellinger-Kantorovich geometries
09:50 – 10:20	**Lorenzo Dello Schiavo** Massive particle systems, Wasserstein Brownian motions, and the Dean–Kawasaki SPDE
10:20 – 10:50	**Tee and Coffee** (Room X-E0-204)
10:50 – 11:20	**Marie Bormann** A Dynkin condition for manifolds with boundary
11:25 – 11:55	**Stefan Schrott** Brenier's theorem for nested Wasserstein spaces
12:00 – 12:30	**Leonid Mytnik** Super-Brownian motion with irregular drift
12:30 – 13:30	**Lunch break**
From 13:30	**Excursion and conference dinner** Visit of Hermannsdenkmal Guided tour and dinner at the beer brewery "Privatbrauerei Strate" in Detmold Chartered bus departs at 13:30 near building X and brings us back to Bielefeld in the evening.

Schedule: Thursday September 17

Lecture Room: **X-E0-001**

09:15 – 09:45 **Christian Kühn**
Stochastic spatial patterns: From fundamental waves to complex structures

09:50 – 10:20 **Makoto Nakashima**
A multiscale approach to the positivity of self-intersection

10:20 – 10:50 **Tee and Coffee** (Room X-E0-204)

10:50 – 11:20 **Yuichi Shiozawa**
Conservativeness of time changed processes and Liouville property for Schrödinger operators

11:25 – 11:55 **Tomasz Klimsiak**
A Brézis–Oswald theorem for positive solutions in an abstract semigroup setting

12:00 – 12:30 **Vanja Wagner**
Boundary traces and blow-up for spectral non-local operators

12:30 – 14:00 **Lunch break**

14:00 – 14:30 **Stefan Junk**
Regularity of the phase transition for directed polymers in dimensions $d > 2$

14:35 – 15:05 **Kohei Suzuki**
Brownian motion in Minkowski normed spaces

15:10 – 15:40 **Oleg Butkuvsky**
First proof project: AI and humans prove unique ergodicity for the skew stochastic heat equation

15:40 – 16:10 **Tee and Coffee** (Room X-E0-204)

Schedule: Friday September 18

Lecture Room: **X-E0-001**

09:15 – 09:45 **Lisa Hartung**
tba

09:50 – 10:20 **Alexis Prevost**
Hausdorff dimension of the critical clusters for the metric graph Gaussian free field

10:20 – 10:50 **Tee and Coffee** (Room X-E0-204)

10:50 – 11:20 **Seiichiro Kusuoka**
A quantitative replica-symmetric bound of Sherrington-Kirkpatrick model in the entire de Almeida-Thouless region

11:25 – 11:30 **Closing**

Abstracts

Talks

Sebastian Andres (Universität Braunschweig)

Heat kernel bounds for Liouville Brownian motion

In two-dimensional Liouville quantum gravity the main object of study is a random geometry on a domain D, which can be formally described by a Riemannian metric tensor of the form $e^{\gamma h(x)}dx^2$ where h is a Gaussian free field on D and $\gamma \in (0,2)$ is a parameter. The natural diffusion process in this random geometry, called Liouville Brownian motion (LBM), can be constructed as a time-change of the planar Brownian motion on D. In this talk, we discuss sub-Gaussian heat kernel estimates for the LBM when $\gamma = 8/3$, which are sharp up to a polylogarithmic factor in the exponential. This value of γ is special because $\gamma = 8/3$-Liouville quantum gravity is equivalent to the Brownian map.
This talk is based on a joint work with Naotaka Kajino (RIMS, Kyoto University), Konstantinos Kavvadias (Massachusetts Institute of Technology), and Jason Miller (University of Cambridge).

Marie Bormann (Universität Bonn)

A Dynkin condition for manifolds with boundary

We propose a Dynkin-type condition for smooth Riemannian manifolds with boundary. We show that this condition implies bi-Lipschitz equivalence with a Bakry-Émery weighted Riemannian manifold via a time change. As a consequence, we obtain various results, including a local doubling property as well as lower bounds on the Neumann spectral gap and logarithmic Sobolev constant. The local doubling property also yields a new precompactness theorem for manifolds with boundary. The talk is based on joint work with David Tewodrose.

Oleg Butkovsky (WIAS Berlin)

First Proof project: AI and humans prove unique ergodicity for the skew stochastic heat equation

I will discuss unique ergodicity for the skew stochastic heat equation

$$\partial_t u = \Delta u + \delta_0(u) + \xi,$$

where δ_0 is the Dirac delta and ξ is space-time white noise. Since the drift of this SPDE is so singular, the standard methods for obtaining ergodicity do not work and strong Feller property is not clear. This problem was submitted to the second batch of the First Proof project, which tests AI systems on unpublished research problems. The human proof is based on asymptotic strong Feller and coupling arguments. To our great surprise, AI systems also solved this problem and found two proofs which are different from ours. One uses a novel "fake" Girsanov entropy estimate, and the other uses the order-preservation property in a very tricky way. I will explain the main ideas behind all three approaches. This is joint work with Lorenzo Zambotti and Jonathan Mattingly.

David Croydon (Kyoto University)

Zeroes of Gaussian fields on fractals

I will present some results from an ongoing joint work with Naomi and Ohad Feldheim. In particular, we study the zero set of fractional Gaussian fields on spaces equipped with a suitable resistance form and a measure that satisfies a polynomial volume growth condition. Our framework covers various examples of deterministic self-similar fractals, such as the Sierpinski gasket, and

also random ones, such as the Brownian continuum random tree. For a range of parameters that includes the case of the Gaussian free field, we obtain the Hausdorff dimension of the zero set.

Lorenzo Dello Schiavo (University of Rome Tor Vergata)

Massive Particle Systems, Wasserstein Brownian motions, and the Dean–Kawasaki SPDE

Let W be a conservative, ergodic Markov diffusion on some arbitrary state space M, converging exponentially fast to equilibrium. We consider:

(1) Systems of up to countably many massive particles in M, with finite total mass. Each particle is subject to an independent instance of the noise W, with volatility the inverse mass carried by the particle. We prove that the corresponding infinite system of SDEs has a unique solution, for every starting configuration and every distribution of the masses in the infinite simplex.

(2) Solutions to the Dean–Kawasaki SPDE with singular drift, driven by the generator L ofW. We prove that the equation may be given rigorous meaning on M, and that it has a unique 'distributional' solution. This extends Konarovskyi–Lehmann–von Renesse's 'ill-posedness vs. triviality' to the case of infinitely many massive particles.

(3) Diffusions with values in the space P of all probability measures on M, driven by the geometry induced by L.

(4) In the case when M is a manifold, differential-geometric and metric-measure Brownian motions on P induced by the geometry of optimal transportation and reversible for a normalized completely random measure.

We show that all these objects coincide. Based on arXiv:2411.14936

Yushi Hamaguchi (Kyoto University)

Ergodicity for Markovian lifts of stochastic Volterra equations

We investigate the long-time asymptotics and the existence of stationary solutions for a class of stochastic Volterra equations (SVEs). To address the non-Markovian nature of SVEs, we employ a Markovian lifting technique, formulating a Markovian lift as the solution to a stochastic evolution equation (SEE) on a Gelfand triplet. Our main objective is to establish the ergodicity of this Markovian lift via the generalized Harris' theorem, which in turn yields the asymptotic results for the original SVE. Furthermore, we prove that the invariant probability measure for the SEE can be weakly approximated by those of finite-dimensional SDEs.

Lisa Hartung (Universität Mainz)

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Masato Hoshino (Institute of Science Tokio)

Fernique-type bounds for BPHZ models and their applications

For general locally subcritical parabolic singular SPDEs without variance blow-up, we prove that the BPHZ model satisfies a Fernique-type theorem, namely exponential square integrability, whenever the driving noise is stationary and satisfies a suitable transportation cost inequality. As applications, we obtain two consequences. First, if the SPDE admits appropriate a priori estimates, then its solution satisfies a corresponding concentration inequality. Second, we show that the BPHZ model satisfies a Schilder-type large deviation principle, and that the solution to the SPDE satisfies a Freidlin-Wentzell-type large deviation principle, extending the result of Hairer and Weber (2015). This talk is based on a joint work with Ismael Bailleul (Université de Bretagne Occidentale) and Ryoji Takano (Tokyo Metropolitan University).

Stefan Junk (Gakushuin University)

Regularity of the phase transition for directed polymers in dimensions $d>2$

I will review recent results about the phase transition of the directed polymer model in spatial dimensions $d\geq 3$. This model describes a random path (called polymer in this context) affected by a random environment of i.i.d. weights and has received much attention recently because of its (partly conjectural) relationship to the KPZ universality class. It is known that in dimensions $d\geq 3$, the model undergoes a phase transition from a weak disorder, high temperature phase (where the polymer converge to Brownian motion under the usual scaling) to a strong disorder, low temperature phase where the polymer localize into small, favorable regions and is expected to scale superdiffusively. There are several notions to characterize this phase transition, and in recent work with Hubert Lacoin (IMPA) we proved that they are all equivalent. I will also discuss ongoing work about the regularity of the phase transition.

Tomasz Klimsiak (Torun University)

A Brézis–Oswald theorem for positive solutions in an abstract semigroup setting

We present a Brézis–Oswald type existence theorem for positive solutions of semilinear equations in an abstract operator-theoretic setting. More precisely, we study positive solutions on a Lusin measure space $(E,\mathcal{B},m)$ to

$$-Lu=f(x,u) \quad \text{in } E,$$

where L is the generator of a strongly continuous positive semigroup on $L^p(E;m)$, $p\geq 1$, whose resolvent is compact and positivity improving, and f is a Carathéodory nonlinearity satisfying one-sided sublinear-type assumption. The existence criterion is formulated in terms of principal spectral thresholds associated with the asymptotic behavior of $f(x,r)/r$ at zero and at infinity. We show that the classical Brézis–Oswald criterion extends to this setting, which is no longer tied to a concrete symmetric elliptic differential operator, a smooth domain, or pointwise boundary arguments. In particular, no additional regularizing properties of the resolvent, such as ultracontractivity or smoothing, are required. The proof combines the method of sub- and supersolutions with Krein–Rutman type spectral arguments. A key step is a probabilistic realization of the resolvent by a right Markov process, which makes stochastic representation and Itô–Meyer-type arguments available in the abstract L^p-setting; the general positivity-improving case is then recovered by a Doob transform.

Vitalii Konarovskyi (Universität Hamburg)

Higher-Order Gaussian Approximations on Path Space for the Simple Symmetric Exclusion Process

We study higher-order Gaussian approximations for the fluctuation field of the simple symmetric exclusion process on the discrete d-dimensional torus under diffusive scaling. In contrast to fixed-time quantitative central limit theorems, our estimates are formulated on path space and apply to smooth functionals of the entire trajectory. We approximate the fluctuation process by a suitable Ornstein–Uhlenbeck process and obtain quantitative bounds for the corresponding weak approximation on path space. The expansion contains an explicit second-order correction term which captures the spatial correlations generated by the exclusion dynamics. By introducing higher-order continuous approximations of the discrete operators, we obtain quantitative estimates whose accuracy reflects the order of these approximations. We further show that, for nonconstant initial profiles, the correlation correction can be of order n^{-2}. Thus, in dimensions $d>4$, correlations may produce a contribution larger than the central-limit scale $n^{-d/2}$, revealing a change in the dominant approximation error at dimension four. This is joint work with Banjamin Gess.

Christian Kühn (TU München)

Stochastic Spatial Patterns: From fundamental waves to complex structures

Many natural and technological systems generate coherent spatial patterns while simultaneously being subject to substantial random fluctuations. Examples range from neural and cardiac dynamics to biological invasion fronts and material systems. This talk surveys recent progress in the mathematical theory of stochastic reaction-diffusion equations, with a focus on how noise affects traveling and rotating wave patterns. I will discuss four recent developments: robustness of stochastic traveling fronts, multiscale phase-tracking techniques for stochastic FitzHugh-Nagumo waves, noise-induced synchronization of propagating pulses, and a new framework for stochastic spiral waves in two spatial dimensions. These results combine methods from SPDEs, spectral theory, stochastic analysis, and dynamical systems to quantify the persistence, diffusion, and synchronization of coherent structures under random perturbations. The presentation highlights how randomness can both destabilize and organize spatial dynamics, opening a pathway toward a broader theory of stochastic pattern formation in complex systems.

Takashi Kumagai (Waseda University)

High-order convergence rates of periodic homogenization for symmetric Lévy type operators

We discuss higher-order convergence rates of the periodic homogenization for symmetric Lévy-type operators. We develop a systematic framework to decompose the contributions of the underlying jumping kernel across small, intermediate, and large spatial scales. To the best of our knowledge, this is the first comprehensive study of higher-order convergence rates in the homogenization of non-local operators. This talk is based on joint work with X. Chen (Shanghai), Z.-Q. Chen (Seattle) and J. Wang (Fuzhou).

Seiichiro Kusuoka (Kyoto University)

A quantitative replica-symmetric bound of Sherrington-Kirkpatrick model in the entire de Almeida-Thouless region

We consider the Sherrington-Kirkpatrick model (SK-model) with a non-zero deterministic external field. The SK-model is introduced as a mean-field model of spin glasses in 1975, and has been a hot topic since then, because the model is simple and many objects can be calculated explicitly. In this talk, we give a quantitative replica-symmetric bound in the entire de Almeida-Touless region.

The replica-symmetry in the region has been remained as an open problem for many years, and was obtained very recently by Lopatto. Our approach is different from his work, and the advantage of our approach is that we obtain the quantitative bound of the overlap concentration and the proof is self-contained. As an implication of our result, we obtain the quantitative error estimate of the replica-symmetric free energy. This talk is based on joint work with Shuta Nakajima.

Kazuhiro Kuwae (Fukuoka University)

A remark on subharmonicity for symmetric Dirichlet forms

We remove the local boundedness for $\mathscr{E}_\alpha$-subharmonicity in the framework of (not necessarily strongly local) regular symmetric Dirichlet form $(\mathscr{E},D(\mathscr{E}))$ with $\alpha \geq 0$ and establish the stochastic characterization for $\mathscr{E}$-subharmonic functions without assuming the local boundedness.

Leonid Mytnik (Technion)

Super-Brownian motion with irregular drift

We consider a stochastic partial differential equation (SPDE) in dimension $d=1$, whose solution X represents the density of a super-Brownian motion with drift b. We establish weak existence and uniqueness of solutions to this SPDE for a class of drifts $b(X)$ that may be irregular at points where $X=0$. This is joint work with Johanna Weinberger.

Makoto Nakashima (Nagoya University)

A multiscale approach to the positivity of self-intersection

In joint work with S. Kusuoka and D. Shiraishi, we revisit the positivity of self-intersection local times for Brownian motion. We present an alternative proof of a positivity theorem previously established by Klenke and Mörters, based on a multiscale description of path intersections. The method is motivated by questions arising from Edwards models and may provide a useful framework for treating more general stochastic processes.

Nicolas Perkowski (FU Berlin)

Hydrodynamic limit of the stochastic Burgers equation

We study the singular stochastic Burgers equation on a large torus, at stationarity perturbed by a slowly varying deterministic function. On large space-time scales, the solution is given by a stochastic Burgers equation with vanishing Laplacian and vanishing noise, which is a challenge for pathwise methods relying on the regularization of the Laplacian. By a combination of the entropy and relative entropy methods, we show that the hydrodynamic limit is the inviscid Burgers equation, up to its shock time. We can also slightly increase the strength of the noise, which leads to a lower bound $L^{4/3-}$ on the mixing time of the stochastic Burgers equation on a torus of size L. This is joint work with Abdulwahab Mohamed.

Alexis Prevost (Universität Bonn)

Hausdorff dimension of the critical clusters for the metric graph Gaussian free field

I will review recent results concerning the phase transition for a strongly correlated percolation model called the metric graph Gaussian free field. In particular, I will focus on the Hausdorff dimension of the critical connected components, as well as on the critical exponents which describe the volume of these components on graphs of intermediate dimension.

Michael Röckner (Bielefeld University)

Probabilistic representation of solutions to the parabolic p-Laplace equation

This talk is about the probabilistic representation of solutions to the p-Laplace evolution equation $\frac{\partial u}{\partial t} = \mathrm{div}(|\nabla u|^{p-2}\nabla u)$ in $(0,\infty)\times\mathbb{R}^d$, $u(0,x)=u_0(x)$, $x\in\mathbb{R}^d$. The main result states that, if $p\geq 4$, and if u_0 is a probability density with compact support and $u_0\in L^2$, $|\nabla u_0|\in L^\infty$, then u can be represented as $u(t,x)dx=\mathcal{L}_{X(t)}(dx)$, where $\mathcal{L}_{X(t)}$ denotes the time marginal law of X at time t with X being a probabilistically weak solution to a corresponding McKean–Vlasov stochastic differential equation. This result is based on a new second order global regularity result for the weak solutions to the parabolic p-Laplace equation. Joint work with Viorel Barbu.

Max Sauerbrey (MPIS Leipzig)

Dirichlet form approach to stochastic thin-film equations

The stochastic thin-film equation is a singular quasi-linear PDE of fourth order arising in fluctuating hydrodynamics. In one spatial dimension, in which the equation is subcritical, we use Dirichlet form methods to gain insight into its well-posedness, regularity of its solutions and to single out converging approximate problems. This talk is based on joint work with Benjamin Gess and Felix Otto.

Stefan Schrott (Universität Münster)

Brenier's theorem for nested Wasserstein spaces

We establish a Brenier theorem for iterated Wasserstein spaces. Specifically, for a separable Hilbert space H and $N\geq 1$, we construct a full-support probability $\Lambda\in\mathcal{P}_2^N(H)=\mathcal{P}_2(...\mathcal{P}_2(H)...)$ that is transport regular: for all $P,Q\in\mathcal{P}_2^N(H)$ with $P\ll\Lambda$, the W_2^2-optimal transport from P to Q is unique and of Monge type. In the first non-classical case $N=2$ we show that optimal transports are given as the push-forward by the W_2-gradient (or Lions' derivative) of an L-convex function. To establish the result for general N we develop new adapted notions of Lions' lift, L-convexity and Lions' derivative. A key idea is a new identification between optimal-transport c-conjugation (with c given by maximal covariance) and classical convex conjugation on the lift. A primary motivation comes from the adapted Wasserstein distance AW_2: our results yield a first Brenier theorem for AW_2 and characterize AW_2^2-optimal couplings through convex functionals on the space of L_2-processes. This is based on joint work with Mathias Beiglböck and Gudmund Pammer.

Ryosuke Shimizu (Kyoto University)

Singularity of Sobolev spaces on Laakso-type fractal spaces

Recent studies in analysis on fractals revealed that the value called p-walk dimension is deeply connected to the $(1,p)$-Sobolev spaces on fractals, where the exponent p is between 1 and ∞. Some singularity phenomenon on fractals are expected due to the anomalous behavior of the p-walk dimension. However, even on the Sierpinski gasket, it is not easy to prove such a new singularity result so that many problems remain open. In this talk, I would like to introduce a class of self-similar sets, self-similar Laakso-type spaces, for which p-energy forms and p-energy measures (of a nice potential function) can be understood in a transparent way. Moreover, I will explain the first example on which the new singularity phenomena, which we call singularity of Sobolev spaces meaning that Sobolev spaces for distinct exponents intersect only at constant functions, can be verified. This is based on joint work with Riku Anttila (University of Jyväskylä) and Sylvester Eriksson-Bique (University of Jyväskylä).

Yuichi Shiozawa (Doshisha University)

Conservativeness of time changed processes and Liouville property for Schrödinger operators

This talk is based on a joint work with Masayoshi Takeda (Kansai University). We are concerned with the Liouville property for a Schrödinger operator of the form $-\mathcal{L}+\mu$, where $\mathcal{L}$ is a Markov generator without killing term and μ is a non-negative measure. The Liouville property means that any bounded solution h to the equation $(-\mathcal{L}+\mu)h=0$ must be zero. In this talk, we establish a criterion for the Liouville property via the conservativeness of the μ-time changed process. Using this criterion, we further obtain necessary and sufficient conditions for the Liouville property for some Schrödinger operators in terms of the decay rates of the potentials at infinity/boundary.

Daisuke Shiraishi (Kyoto University)

Graph distance and effective resistance of random walk trace in four dimensions

We study geometric and electrical properties of the trace of a simple random walk in four dimensions. Viewing the random walk path as a graph, we focus on the graph distance and the effective resistance between the starting point and the current location. Compared to related models such as loop-erased random walk, much less is known about these quantities. We present results describing their typical growth and fluctuation behavior. In particular, we identify their growth rates and establish a non-Gaussian limiting fluctuation. A key idea in the analysis is a connection between the graph formed by self-intersections of the random walk and a long-range percolation model. The talk is based on two joint works: one with Satomi Watanabe, and the other with Arka Adhikari and Izumi Okada.

Karl-Theodor Sturm (Universität Bonn)

Section curvature for Kantorovich-Wasserstein and Hellinger-Kantorovich geometries

We derive an explicit formula for the sectional curvature of the space $M_0(X)$ of finite measures on a Riemannian manifold X. The space $M_0(X)$ is equipped with the Hellinger-Kantorovich metric HK. Even in the case $X=\mathbb{R}^n$, the curvature is comprised of two parts: the 'lifted part' is negative, and the 'twisted part' is positive. It will be analyzed in detail for the multidimensional torus. Our general approach to sectional curvature in geodesic spaces also leads to new insights into the curvature of the space $P_2(X)$ of probability measures on X equipped with the Kantorovich-Wasserstein metric W_2.

Kohei Suzuki (Durham University)

Brownian motion in Minkowski normed spaces

A Minkowski normed space is the Euclidean space equipped with a (possibly asymmetric) uniformly convex and smooth norm, forming a particular class of Finsler manifolds. We construct a stochastic process with one-dimensional time marginal densities given by the fundamental solution to the nonlinear Finsler heat equation in Minkowski normed spaces. This process is constructed as a solution to a singular McKean–Vlasov stochastic differential equation and constitutes a nonlinear Markov process in the sense of McKean. Furthermore, we show that solutions to this stochastic differential equation are pathwise unique, and thus probabilistically strong solutions, though the equation has singular coefficients beyond the subcritical regime. Since our construction is a natural extension of the construction of standard Brownian motion from the standard heat kernel, we call this process Brownian motion in Minkowski normed spaces. To the best of our knowledge, this is the first construction of stochastic processes associated with nonlinear heat equation in Finslerian spaces. This talk is based on the joint work with Shin-ichi Ohta and Marco Rehmeier.

Asuka Takatsu (Tokyo University)

Law of large numbers and deformed exponential family

A deformed exponential family is a manifold of probability densities on a measure space equipped with a linear structure. A typical example is the family of normal distributions, as well as certain families of power-law distributions, including the family of Cauchy distributions. In this talk, I use the notion of deformed exponential family to define dependent and identically distributed random variables. Then I demonstrate a kind of law of large number for these dependent and identically distributed random variables according to a power-law distribution. This is joint work with Hiroshi Matsuzoe (Nagoya Institute of Technology).

Mark Veraar (TU Delft)

Stochastic reaction diffusion equations with non-trace class noise

In this talk, I will give an overview of recent results on stochastic reaction-diffusion equations driven by non-trace class noise. Specifically, I will highlight new developments regarding: -Critical spaces of initial values, -Novel regularization phenomena, -Improved linear estimates for stochastic convolutions. Based on joint work with Antonio Agresti and Fabian Germ

Vanja Wagner (University of Zagreb)

Boundary traces and blow-up for spectral non-local operators

Let $D \subset \mathbf{R}^d$ be an open set, with sufficiently regular boundary. We discuss nonhomogeneous boundary conditions for spectral non-local operators of the form $\mathcal{A} = \psi(-L_{|D})$, where $L_{|D}$ is the generator of a killed Lévy process. This class includes the interpolated fractional Laplacian $\left((-\Delta)^{\beta/2}_{|D}\right)^{\alpha/2}$, $\alpha, \beta \in (0,2)$, and allows the boundary decay of the jumping density and its singularity near the diagonal to vary independently. We explain how to prescribe boundary data when solutions may blow up at the boundary, focusing on problems of the form

$$\begin{aligned} \mathcal{A}u &= f(x,u) \quad \text{in } D, \\ \frac{u}{P^{\psi}_{D}\sigma} &= \zeta \qquad \text{on } \partial D. \end{aligned}$$

Here $P^{\psi}_{D}\sigma$ is the Poisson potential of the surface measure σ, which provides the natural normalization for the boundary behaviour. We discuss this condition both as a pointwise boundary limit and as a weak trace, and outline applications to semilinear elliptic problems. This is joint work with Ivan Biočić.

Satomi Watanabe (Kyoto University)

Collisions of simple random walks on the range of a four-dimensional simple random walk

We discuss collisions of multiple independent simple random walks on a graph. Whether the number of collisions is finite or infinite serves as an indicator of the structure of the underlying graph. It is easy to prove that two independent simple random walks collide infinitely many times almost surely on transitive recurrent graphs, while some intransitive recurrent graphs lack this property. In this talk, we investigate the number of collisions of three random walks on a graph,inspired by the recent article by Croydon and De Ambroggio. The graph of interest is the random graph given as the trajectory of a four-dimensional simple random walk. We will see that, with probability one, a realization of the random graph has the infinite triple collision property. This talk is based on joint work with David Croydon and Daisuke Shiraishi.

Posters

Ehsan Abedi (TU Berlin)

Non-uniqueness of nonlinear Markov processes in the sense of McKean associated with parabolic PDEs

We derive a general scheme to construct infinitely many probabilistic counterparts for solutions to nonlinear PDEs by recasting the latter as different nonlinear Fokker–Planck equations and by constructing, for each of these equations, a solution to the associated McKean–Vlasov SDE with one-dimensional time marginal densities given by the PDE solution. We utilize this scheme to prove that nonlinear Markov processes in the sense of McKean as introduced by Rehmeier–Röckner (J. Theor. Probab. 38, 60 (2025)) are *not* uniquely determined by their one-dimensional time marginals. This is in sharp contrast to the case of classical Markov processes, which *are* uniquely determined by their one-dimensional time marginals. We demonstrate our results by constructing a continuum of nonlinear Markov processes with one-dimensional time marginal densities given by the Barenblatt solutions to the porous medium and p-Laplace equations, as well as by the fundamental solution to the heat equation. This includes a martingale representation for the p-Laplace Barenblatt solutions. We also prove that a nonlinear Markov process is uniquely determined by its *two*-dimensional time marginals. Moreover, for the porous medium equation, we show that the different McKean–Vlasov SDEs we investigate are consistent with corresponding gradient flow interpretations of the equation in the sense of Otto calculus. (Joint work with Marco Rehmeier and Florian Bechtold.)

Endo Yoshiyuki (Nagoya University)

Cooperation principle for random systems with complete connections

A cooperation principle for random complex dynamical systems is discussed. Here, a cooperation principle refers to the phenomenon that, under suitable assumptions, a certain kind of stability emerges when one observes the averaged system, so that chaotic behavior disappears. Such a phenomenon has previously been studied in the independent and identically distributed (i.i.d.) setting and in the framework of graph directed Markov systems (GDMSs). The cooperation principle is considered here in the more general framework of random systems with complete connections (RSCCs). In an RSCC, the probabilities of selecting maps at each iteration may, in general, depend on the entire past history.

Jacopo Peroni (Universität Münster)

Quasi shift invariance of Φ^4 measures

We establish necessary and sufficient conditions under which the non-Gaussian measures, arising as the marginal distributions of solutions to the fractional Φ^4 model on the d-dimensional torus, are quasi-invariant under translations by smooth functions. In the regime of mutual singularity we leverage the need for a further level of renormalization beyond Wick renormalization, while in the regime of absolute continuity, by introducing an auxiliary family of SPDEs, we employ a variation of Girsanov's theorem. In particular we show that the Φ^4_3 measure is singular with respect to any of its smooth translations and that, unlike for the property of equivalence/singularity with respect to the free field measure, it lies on the boundary of the corresponding parameter region. This is a joint work with Martin Hairer.

Tomoko Takemura (Nara Women's University)

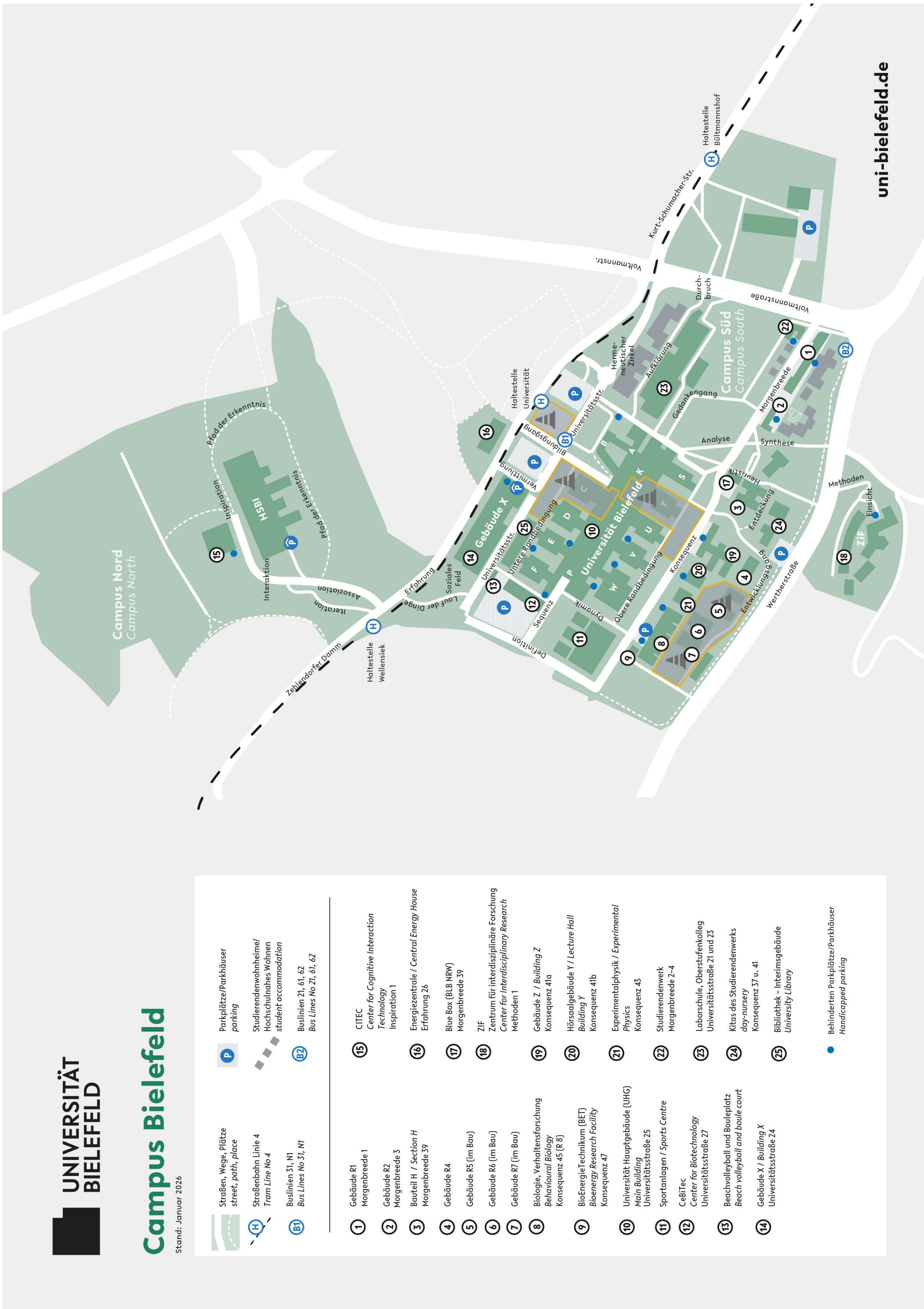
Diffusion processes in a tube with a variable pipe diameter - Feller property and convergence theorem

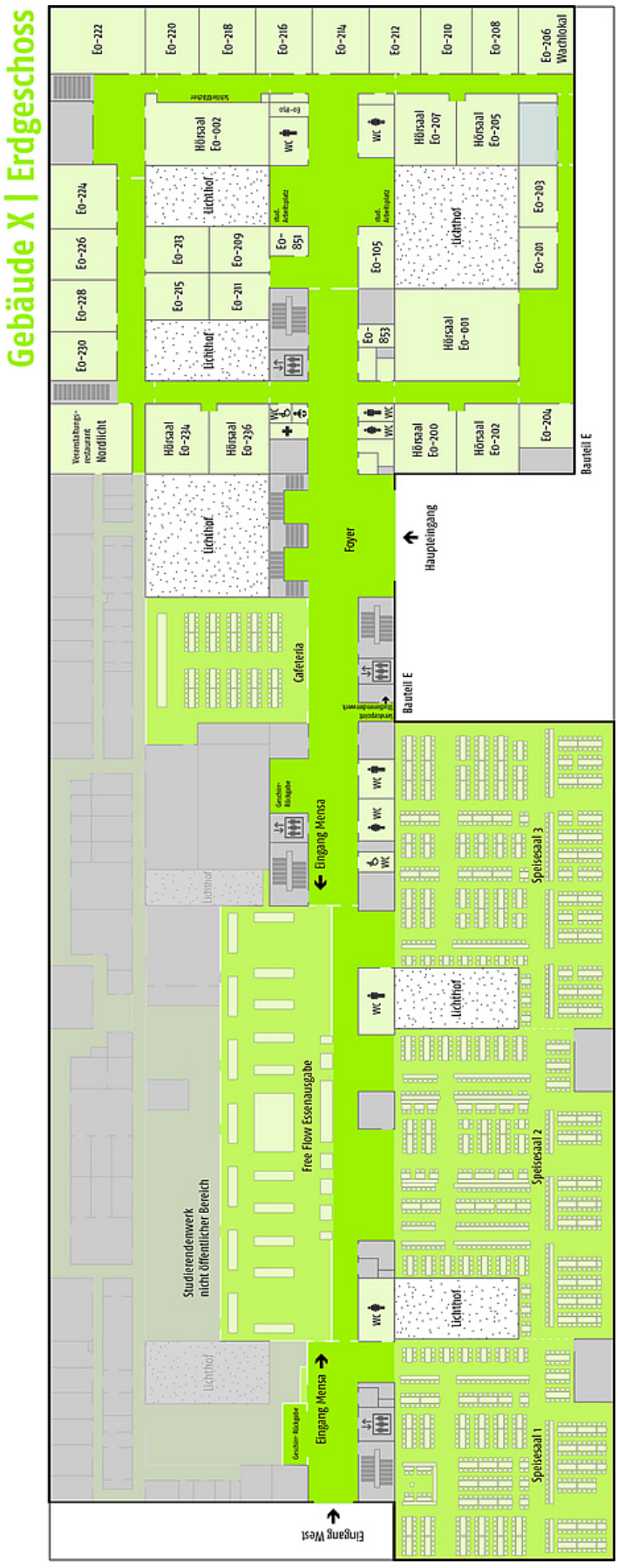
Tube diffusion processes are defined as direct products of a skew product diffusion and another one-dimensional diffusion process. The skew product diffusion consists of a one-dimensional diffusion process and a spherical Brownian motion. More precisely, diffusion processes in a tube are given by the direct product diffusion process $\mathbb{Y}$ of skew product diffusions Ξ and one dimensional diffusion processes $\mathrm{X}^{(2)}$, and the time changed process $\mathbb{X}$ which is based on a positive continuous additive functional $\Phi(t)$. The skew product Ξ is constructed from a one dimensional diffusion processes $\mathrm{X}^{(1)}$ and a spherical Brownian motion Θ by means of positive continuous additive functional $\mathbf{f}(t)$. We establish the strong Feller property for tube diffusion processes and their time changes. We also investigate the convergence of diffusion processes in tubes with varying pipe diameters. In particular, we prove a limit theorem for a sequence of time changed processes $\mathbb{X}_n$ under some assumptions for $\mathrm{X}_{\mathrm{n}}^{(1)}$, Y_n which is Revuz measure of $\mathbf{f}_n(t)$, and underlying measures.

Jonas Tölle (Aalto University)

Quantitative mixing for locally monotone stochastic evolution equations

We establish general quantitative conditions for stochastic evolution equations with locally monotone drift and degenerate additive Wiener noise in variational formulation resulting in the existence of a unique invariant probability measure for the associated ergodic Markovian Feller semigroup. We prove improved moment estimates for the solutions and the e-property of the semigroup. Furthermore, we provide quantitative upper bounds for the 2-Wasserstein ε-mixing times. Examples on possibly unbounded domains include the stochastic incompressible 2D Navier-Stokes equations, shear thickening stochastic power-law fluid equations, the stochastic p-Laplace equation, the stochastic heat equation, as well as, stochastic semilinear equations such as the 1D stochastic Burgers equation. The main novelties are the quantitative nature of the mixing rate and the assumptions, as well as the existence of invariant probability measures without the need for compact energy embeddings or conditions on the dimension of the range of the covariance operator. Joint works with Gerardo Barrera (IST Lisboa), https://arxiv.org/abs/2412.01381 and https://arxiv.org/abs/2602.00853.


UNIVERSITÄT BIELEFELD
Campus Bielefeld
Stand: Januar 2026
Straßen, Wege, Plätze / street, path, place
Straßenbahn Linie 4 / Tram Line No 4
Buslinien 31, N1 / Bus Lines No 31, N1
Parkplätze/Parkhäuser / parking
Studierendenwohnheime/ Hochschulnahes Wohnen / student accommodation
Buslinien 21, 61, 62 / Bus Lines No 21, 61, 62
1 Gebäude R1 Morgenbreede 1
2 Gebäude R2 Morgenbreede 3
3 Bauteil H / Section H Morgenbreede 39
4 Gebäude R4
5 Gebäude R5 (im Bau)
6 Gebäude R6 (im Bau)
7 Gebäude R7 (im Bau)
8 Biologie, Verhaltensforschung Behavioural Biology Konsequenz 45 (R 8)
9 BioEnergieTechnikum (BET) Bioenergy Research Facility Konsequenz 47
10 Universität Hauptgebäude (UHG) Main Building Universitätsstraße 25
11 Sportanlagen / Sports Centre
12 CeBiTec Center for Biotechnology Universitätsstraße 27
13 Beachvolleyball und Bouleplatz Beach volleyball and boule court
14 Gebäude X / Building X Universitätsstraße 24
15 CITEC Center for Cognitive Interaction Technology Inspiration 1
16 Energiezentrale / Central Energy House Erfahrung 26
17 Blue Box (BLB NRW) Morgenbreede 39
18 ZiF Zentrum für interdisziplinäre Forschung Center for Interdisciplinary Research Methoden 1
19 Gebäude Z / Building Z Konsequenz 41a
20 Hörsaalgebäude Y / Lecture Hall Building Y Konsequenz 41b
21 Experimentalphysik / Experimental Physics Konsequenz 43
22 Studierendenwerk Morgenbreede 2-4
23 Laborschule, Oberstufenkolleg Universitätsstraße 21 und 23
24 Kitas des Studierendenwerks day-nursery Konsequenz 37 u. 41
25 Bibliothek – Interimsgebäude University Library
Behinderten Parkplätze/Parkhäuser Handicapped parking
Campus Nord Campus North
Campus Süd Campus South
Universität Bielefeld
Gebäude X
HSBI
ZiF
Haltestelle Universität
Haltestelle Wellensiek
Haltestelle Bültmannshof
Zehlendorfer Damm
Kurt-Schumacher-Str.
Voltmannstr.
Voltmannstraße
Wertherstraße
Universitätsstr.
uni-bielefeld.de


Gebäude X | Erdgeschoss
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Eo-208
Eo-206 Wachlokal
Eo-224
Eo-226
Eo-228
Eo-230
Hörsaal Eo-002
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Lichthof
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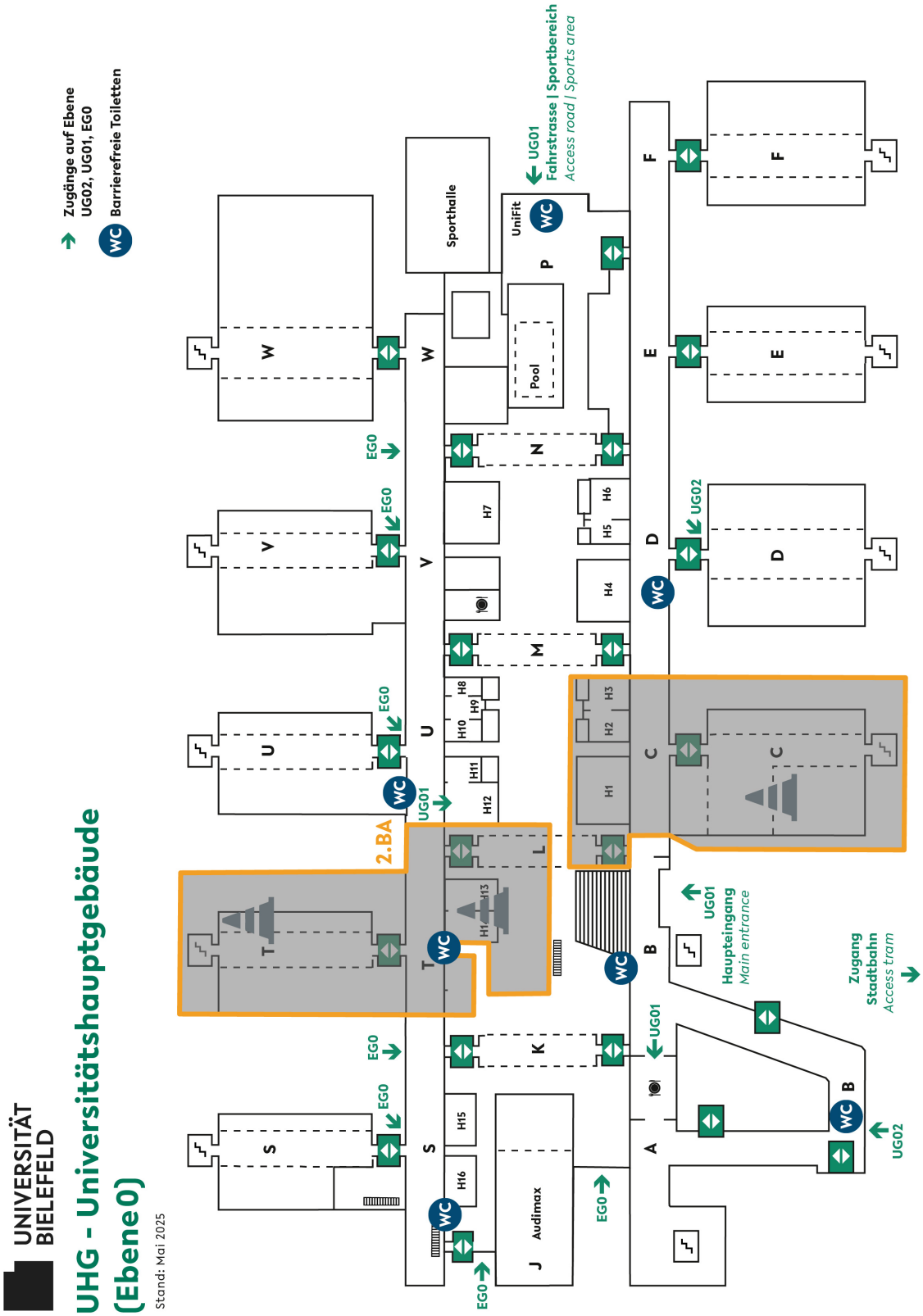
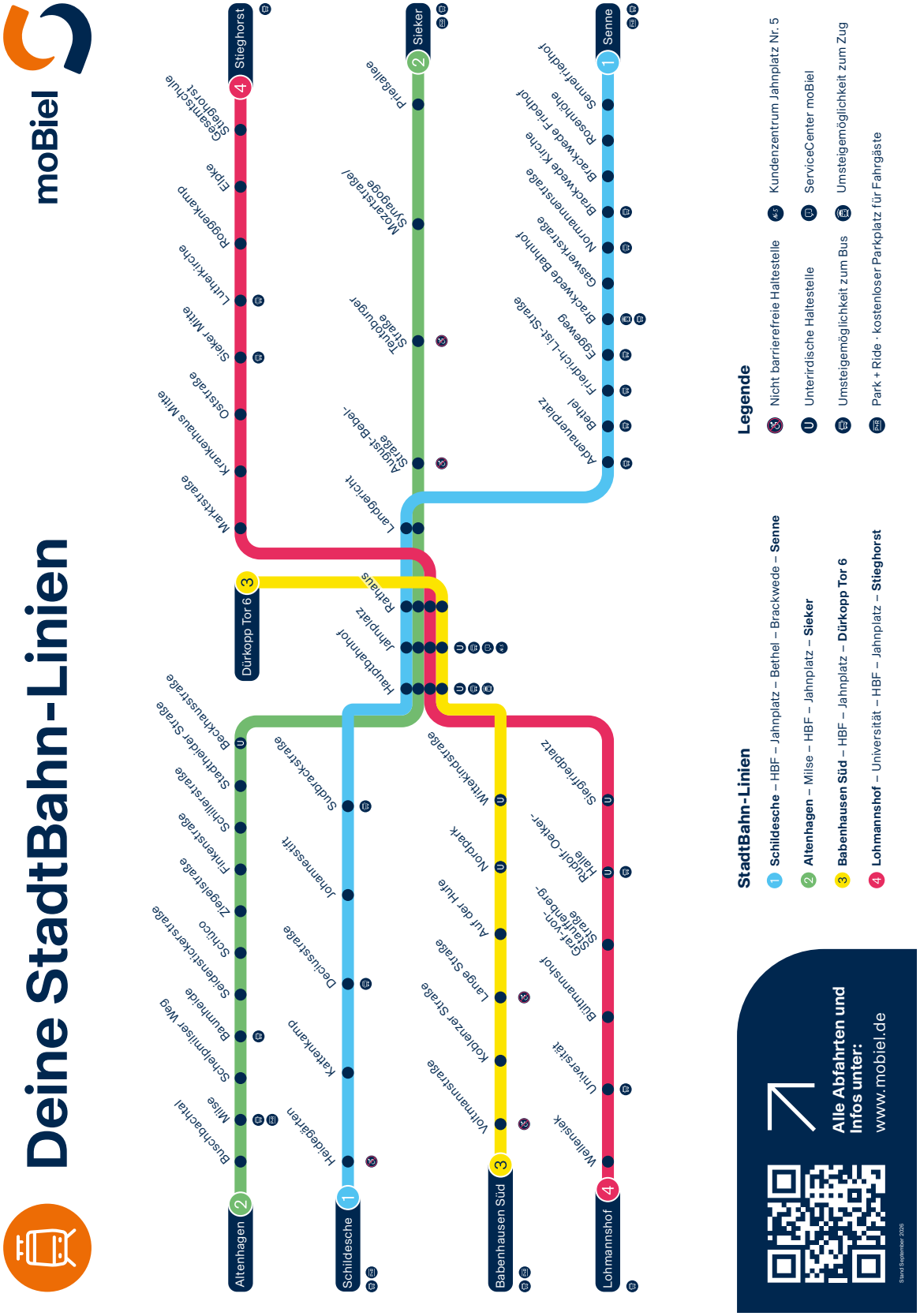
Eo-851
Eo-105
Eo-853
Hörsaal Eo-207
Hörsaal Eo-205
Eo-203
Eo-201
Hörsaal Eo-001
Verein Studierendenwerk Nordlicht
Hörsaal Eo-234
Hörsaal Eo-236
Hörsaal Eo-200
Hörsaal Eo-202
Eo-204
Bauteil E
Foyer
Haupteingang
Cafeteria
Eingang Mensa
Speisesaal 3
Speisesaal 2
Speisesaal 1
Free Flow Essenausgabe
Studierendenwerk nicht öffentlicher Bereich
Eingang West


UNIVERSITÄT BIELEFELD
UHG - Universitätshauptgebäude (Ebene 0)
Stand: Mai 2025
Zugänge auf Ebene UG02, UG01, EG0
Barrierefreie Toiletten
UG01 Fahrstrasse | Sportbereich
Access road | Sports area
Sporthalle
UniFit
Pool
2.BA
UG01 Haupteingang
Main entrance
Zugang Stadtbahn
Access tram
Audimax
UG02
EG0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1 Schildesche – HBF – Jahnplatz – Bethel – Brackwede – Senne
2 Altenhagen – Milse – HBF – Jahnplatz – Sieker
3 Babenhausen Süd – HBF – Jahnplatz – Dürkopp Tor 6
4 Lohmannshof – Universität – HBF – Jahnplatz – Stieghorst
Legende
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Kundenzentrum Jahnplatz Nr. 5
Unterirdische Haltestelle
ServiceCenter moBiel
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Umsteigemöglichkeit zum Zug
Park + Ride · kostenloser Parkplatz für Fahrgäste

Line 4: Jahnplatz ⟶ University

4 Lohmannshof

moBiel

Haltestelle: **Jahnplatz, Gleis 2**

gültig ab: 20. Juli 2026

Std.	Montag - Freitag	Samstag	Sonn- u. Feiertag
4	43 58		
5	13 28 43 52 58		
6	03 12 22 32 42 52	13 28 43 58	
7	02 12 13 ⓤU 22 23 ⓤU 32 33 ⓤU 42 52	13 28 43 58	
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10	02 12 22 32 42 52	13 28 43 52 58	13 28 43 58
11	02 12 22 32 42 52	06 12 22 32 42 52	13 28 43 58
12	02 12 22 32 42 52	02 12 22 32 42 52	13 28 43 58
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20	13 28 43 58	02 13 28 43 58	13 28 43 58
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22	13 28 43 58	13 28 43 58	13 28 43 58
23	13 28 43 58	13 28 43 58	13 28 43 58
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H : fährt nur bis Hauptbahnhof, Gleis 3
U : fährt nur bis Universität
Ⓢ : fährt nur an Schultagen, Änderungen möglich
ⓤ : fährt nur an Vorlesungstagen der Uni Bielefeld, Änderungen möglich

Aktuelle Abfahrten der Haltestelle

Am 24. und 31. Dezember gelten Sonderfahrpläne.
Weitere Infos unter (0521) 51-45 45, auf mobiel.de und in der moBiel YOU App.

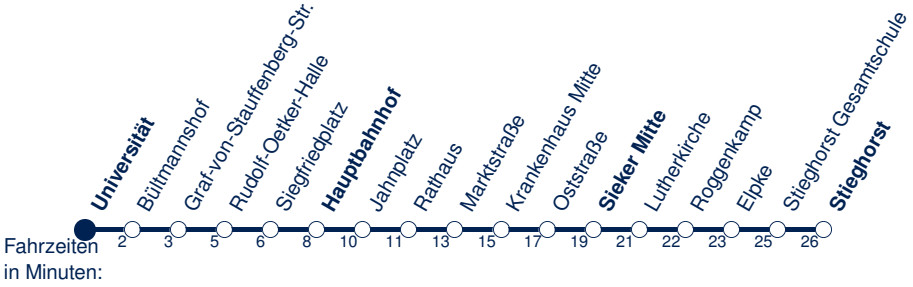
Line 4: University ⟶ Jahnplatz

4 Stieghorst

moBiel

Haltestelle: **Universität, Gleis 1**

gültig ab: 20. Juli 2026



Std.	Montag - Freitag	Samstag	Sonn- u. Feiertag
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6	04 14 24 34 44 54	41 56	
7	04 14 24 32 ⓊH 34 42 ⓊH 44 52 ⓊH 54	11 26 41 56	
8	02 ⓊH 04 12 ⓊH 14 22 ⓊH 24 32 ⓊH 34 42 ⓊH 44 52 ⓊH 54	11 26 41 56	41
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15	04 14 22 ⓊH 24 32 ⓊH 34 44 54	04 14 24 34 44 54	11 26 41 56
16	02 ⓊH 04 12 ⓊH 14 24 32 ⓊH 34 42 ⓊH 44 54	04 14 24 34 44 54	11 26 41 56
17	02 ⓊH 04 14 22 ⓊH 24 32 ⓊH 34 44 52 ⓊH 54	04 14 24 34 44 54	11 26 41 56
18	03 ⓊS 04 14 23 ⓊS 24 34 44 54	04 14 24 34 44 54	11 26 41 56
19	04 14 15 S 24 41 56 59 S	04 14 20 S 24 34 44 54	11 26 41 56
20	11 26 41 56	11 20 S 26 41 56	11 26 41 56
21	11 26 41 56	11 26 41 56	11 26 41 56
22	11 26 41 56	11 26 41 56	11 26 41 56
23	11 26 41 56	11 26 41 56	11 26 41 56
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1	11 S	11 S	11 S

H : fährt nur bis Hauptbahnhof, Gleis 1

S : fährt nur bis Sieker Mitte

ⓈS : fährt nur an Schultagen, Änderungen möglich

ⓊH : fährt nur an Vorlesungstagen der Uni Bielefeld, Änderungen möglich

Aktuelle Abfahrten der Haltestelle

Am 24. und 31. Dezember gelten Sonderfahrpläne.

Some recommendations for restaurants

(1) **Argentina-Steakhouse** (https://argentina-steakhouse.de/)
Argentinian beef at its best

(2) **Brauhaus Joh. Albrecht** (https://bielefeld.brauhaus-joh-albrecht.de/)
Home made beer plus German style food

(3) **KDW** (http://www.kdw-restaurant.de/index.html)
Fine Greek cuisine

(4) **Numa** (http://www.numa.de/)
Asia meets East-Westphalia

(5) **Wernings Weinstube** (https://www.wernings-weinstube.de/)
Some regional dishes plus a good selection of wines

(6) **Sparrenburg** (https://www.restaurant-sparrenburg.de/)
German style food at the castle above Bielefeld

(7) **Wilde Kuh/ Wilde Kuh 2** (https://www.facebook.com/WildeKuhBurger/)
Excellent "build your own burger" place

(8) **Three sixty** (http://bielefeld.three-sixty.de/)
Sports bar with burgers and other snacks

(9) **Jivino** (http://www.jivino-enoteca.de/)
Spanish tapas

(10) **Bernstein** (https://www.the-bernstein.com/)
Dinner plus cocktails in a fancy rooftop restaurant