

Touch down of stochastic analysis in Bielefeld

25 – 26 September 2019

Bielefeld University
Lecture Room: X-E0-002

This workshop is part of the DFG-funded CRC 1283
*Taming uncertainty and profiting from randomness and low regularity
in analysis, stochastics and their applications*
at Bielefeld University

Organisers: Benjamin Gess, Martina Hofmanova and Michael Röckner

https://www.sfb1283.uni-bielefeld.de/2019_TDSA/

Schedule

	Wednesday	Thursday
08:40–09:00	Registration in X-E0-222	
09:00–10:00	Hendrik Weber	Nina Gantert
10:00–11:00	Peter Friz	Peter Nejjar
11:00–11:30	Tee and Coffee	Tee and Coffee
11:30–12:00	Konstantinos Dareiotis	Aleksandra Zimmermann
12:00–12:30	Martin Grothaus	Massimiliano Gubinelli
12:30–14:30	Lunch break and Poster Session in X-E0-222	End of Conference
14:30–15:00	Jurij Kozicki	
15:00–16:00	Annie Millet	
16:00–17:00	Arnaud Debussche	
17:00–17:30	Tee and Coffee	
17:30–18:00	Dirk Becherer	
18:00–18:30	Ludwig Streit	
From 19:30	Conference Dinner	

Schedule: Wednesday September 25

Lecture Room: **X-E0-002**

- 08:40 – 09:00 **Registration** (Room X-E0-222)
- 09:00 – 10:00 **Hendrik Weber**
A-priori bounds for singular SPDEs
- 10:00 – 11:00 **Peter Friz**
Analysis of rough volatility via rough paths / regularity structures
- 11:00 – 11:30 **Tee and Coffee** (Room X-E0-222)
- 11:30 – 12:00 **Konstantinos Dareiotis**
Approximation of stochastic equations with irregular drift
- 12:00 – 12:30 **Martin Grothaus**
On the stochastic heat equation with sticky reflected boundary condition
- 12:30 – 14:30 **Lunch break and Poster Session in X-E0-222**
- 14:30 – 15:00 **Jurij Kozicki**
A Markov process for an infinite interacting particle system in the continuum
- 15:00 – 16:00 **Annie Millet**
Behavior of solutions in stochastic critical and supercritical NLS equation with additive or multiplicative noise
- 16:00 – 17:00 **Arnaud Debussche**
From random Boltzmann to the stochastic fluid equations
- 17:00 – 17:30 **Tee and Coffee** (Room X-E0-222)
- 17:30 – 18:00 **Dirk Becherer**
Skorokhod M1-stability and free boundaries in non-convex stochastic singular control
- 18:00 – 18:30 **Ludwig Streit**
Some Recent Results on Fractional Brownian Motion
- From 19:30 **Conference Dinner**
Wirtshaus 1802 im Bültmannshof (Kurt-Schumacher-Str. 17a, 33615 Bielefeld)

Schedule: Thursday September 26

Lecture Room: **X-E0-002**

- 09:00 – 10:00 **Nina Gantert**
Mixing times for open boundary exclusion processes
- 10:00 – 10:30 **Peter Nejjar**
Shock fluctuations in asymmetric exclusion: The KPZ regime
- 10:30 – 11:00 **Tee and Coffee** (Room X-E0-222)
- 11:00 – 11:30 **Aleksandra Zimmermann**
Renormalized solutions for a stochastic p -Laplace equation with L^1 -initial data
- 11:30 – 12:30 **Massimiliano Gubinelli**
Stochastic analysis and quantum fields

End of conference

Abstracts

Dirk Becherer (Humboldt Universität zu Berlin)

Skorokhod M1-stability and free boundaries in non-convex stochastic singular control

We discuss how continuity in the M1 path-topology by Skorokhod and calculus of variation arguments permit for a surprisingly constructive solutions to singular optimal control problems, characterizing optimal trading strategies in financial asset markets with limited liquidity. Although there is no apparent convexity structure in the problem, a key step to prove global optimality turns out to show at first local optimality of the candidate free boundary surface, which separates the respective (no-)action regions in the state space and characterizes the optimal dynamic control strategy. As an application, we obtain optimal trading strategies for large investors under transient price impact, generalizing e.g. the seminal result by Obizhaeva and Wang to multiplicative impact, non-negative asset prices and non-zero price trends.

Konstantinos Dareiotis (MPI Leipzig)

Approximation of stochastic equations with irregular drift

Arnaud Debussche (École Normale Supérieure de Rennes)

From random Boltzmann to the stochastic fluid equations

Peter Friz (TU Berlin, WIAS Berlin)

Analysis of rough volatility via rough paths / regularity structures

Rough paths and regularity structures have emerged as new toolbox to analysis a popular recent class of models from quantitative finance, in which volatility is modelled with fractional noise, in the “rough” regime of Hurst parameter less than $1/2$.

This talk is based on joint work with P. Gassiat (U Dauphine, Paris), C. Bayer und Pigato (WIAS Berlin).

Nina Gantert (TU München)

Mixing times for open boundary exclusion processes

Martin Grothaus (TU Kaiserslautern)

On the stochastic heat equation with sticky reflected boundary condition

Via Dirichlet form techniques we constructed a Markov process corresponding to the gradient Dirichlet form with respect to the law of the modulus of the Brownian bridge. The process is conjectured to be the scaling limit of the dynamical wetting model, also known as Ginzburg-Landau dynamics with pinning and reflection competing on the boundary. In order to identify the constructed process as a solution of the stochastic heat equation with boundary condition, we prove an integration by parts formula for modulus of the Brownian bridge. First we construct the generalized logarithmic derivative in the space of Hida distributions. In a second step we identify the obtained distribution with a regular countable additive set function in a Gelfand triple. This allows us to show that the constructed process is a solution to an infinite-dimensional Skorohod problem.

Massimiliano Gubinelli (University of Bonn)

Stochastic analysis and quantum fields

In recent years there have been substantial progresses in the understanding of certain classes of singular SPDEs which describe large scale non-linear fluctuations of particle systems. Some of these equations are also relevant to the construction of Euclidean quantum fields via the idea of stochastic quantisation. I will review this connection, the multiple ways stochastic quantisation can be realised, and in general how stochastic analysis can be used to construct and analyse Euclidean quantum fields.

Jurij Kozićki (Maria Curie-Skłodowska University, Lublin)

A Markov process for an infinite interacting particle system in the continuum

An infinite system of point particles placed in a continuous habitat is studied. Its constituents perform random jumps with mutual repulsion described by translation invariant jump kernel and interaction potential, respectively. The pure states of this system are locally finite subsets of the habitat, which can also be interpreted as locally finite Radon measures. For a special class of (sub-Poissonian) probability measures on the state space, there is proved that a restricted initial-value martingale problem employing sub-Poissonian measures has a unique solution. Thereby, a Markov process with cadlag paths is constructed that describes the stochastic evolution of the considered particle system.

Annie Millet (Université Paris 1 Panthéon-Sorbonne)

Behavior of solutions in stochastic critical and supercritical NLS equation with additive or multiplicative noise

We study nonlinear Schrödinger (NLS) equation with focusing nonlinearity, subject to additive or multiplicative stochastic perturbations driven by an infinite dimensional Brownian motion. Under the appropriate assumptions on the space covariance of the driving noise, previously A. de Bouard and A. Debussche established the H^1 local well-posedness in a general case and global well-posedness in the mass-subcritical case. In our work we study the L^2 -critical, intercritical and energy (\dot{H}^1)-critical cases of stochastic NLS, and obtain quantitative estimates on the blow-up time when the mass, energy and L^2 -norm of the gradient of the initial condition are controlled by similar quantities of the ground state.

This is joint work with Svetlana Roudenko.

Peter Nejjar (IST Austria)

Shock fluctuations in asymmetric exclusion: The KPZ regime

The asymmetric simple exclusion process (ASEP) is an interacting particle system which belongs to the Kardar-Parisi-Zhang (KPZ) universality class of random growth models. Models in this class are believed to share a common large time behavior characterized by probability distributions from random matrix theory. Here we consider ASEP with a discontinuity (shock) in the macroscopic density, and show that at the shock a product of two Tracy-Widom distributions from the Gaussian unitary ensemble arises.

Ludwig Streit (Universidade da Madeira)

Some Recent Results on Fractional Brownian Motion

We intend to present three results - extension of the Edwards model for weakly self-avoiding fBm to fBm loops and starbursts, an unexpected scaling property for weakly self-avoiding fBm, and a dynamical model for the conformations of discretized fBm.

This is joint work with Wolfgang Bock and Torben Fattler.

Hendrik Weber (University of Bath)

A-priori bounds for singular SPDEs

The theory of regularity structures is a powerful tool to develop a stable solution theory for a whole class of stochastic PDEs arising in statistical mechanics and quantum field theory. Initiated in Hairer's groundbreaking work in 2013, in only a few years an astonishingly general solution theory covering essentially all equations which satisfy a certain scaling condition (subcriticality or super-renormalizability), has been developed. However, up to now, most results only gave control over solutions for small times and on bounded spatial domains.

The aim of this talk is to present a method to prove a priori estimates in the framework of regularity structures. These bounds complement the short time existence and uniqueness theory to obtain control of solutions globally in time and on unbounded domains. Our bounds are implemented in the example of the dynamic ϕ^4 equation, which is formally given by

$$(\partial_t - \Delta)u = -u^3 + \infty u + \xi.$$

This equation is subcritical if the distribution ξ is of class $C^{-3+\frac{\delta}{2}}$ for $\delta > 0$, and we obtain bounds for all such ξ . An analogy to the regularity of white noise suggests to interpret this as a solution theory for ϕ^4 in all fractional dimensions < 4 .

This is joint work with Ajay Chandra and Augustin Moinat.

Aleksandra Zimmermann (University of Rostock/University of Duisburg-Essen)

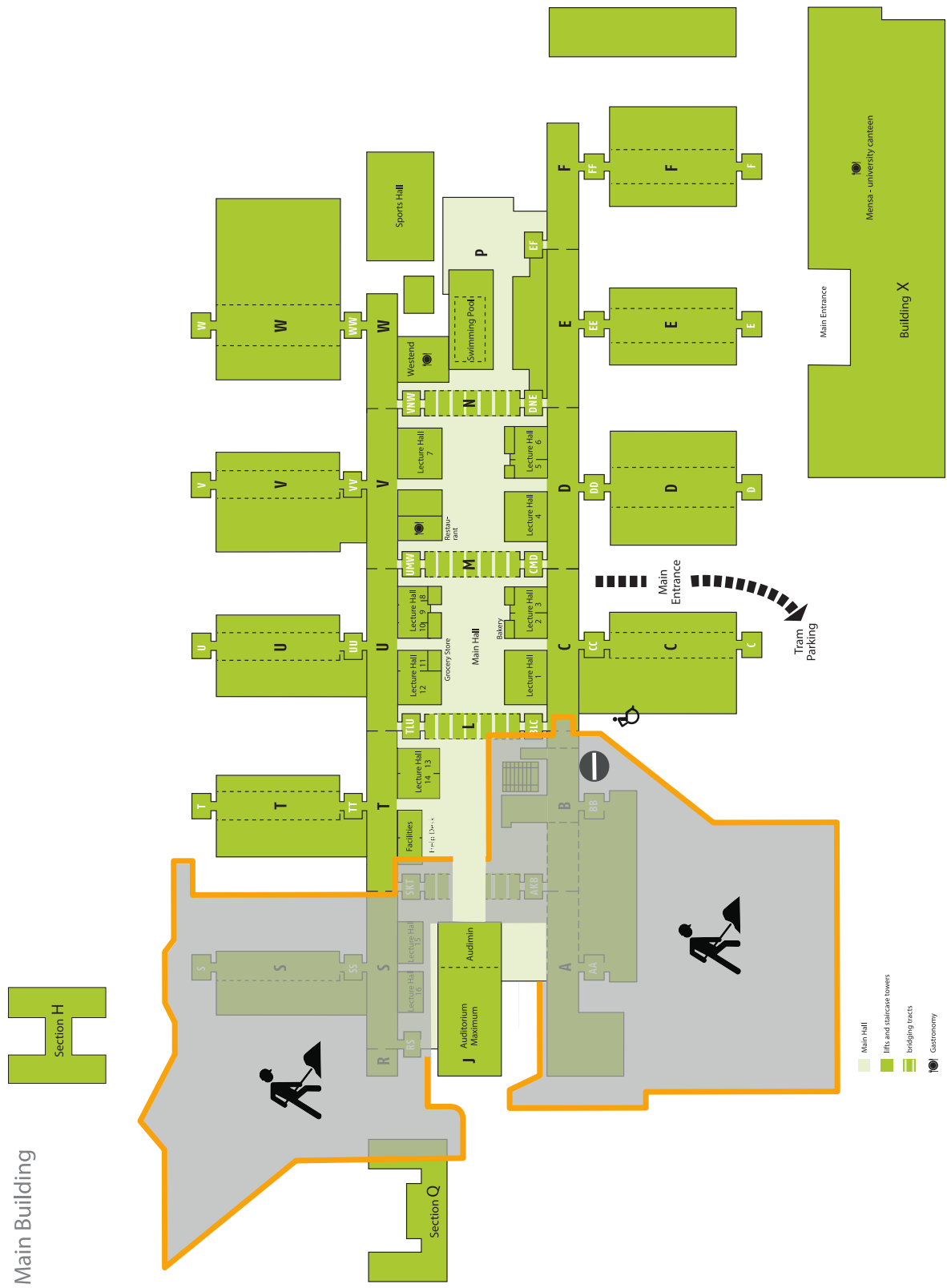
Renormalized solutions for a stochastic p -Laplace equation with L^1 -initial data

We consider a p -Laplace evolution problem with stochastic forcing on a bounded domain $D \subset \mathbb{R}^d$ with homogeneous Dirichlet boundary conditions for $1 < p < \infty$. The additive noise term is given by a stochastic integral in the sense of Itô. The technical difficulties arise from the merely integrable random initial data u_0 under consideration. Due to the poor regularity of the initial data, estimates in $W_0^{1,p}(D)$ are available with respect to truncations of the solution only and therefore well-posedness results have to be formulated in the sense of generalized solutions. We extend the notion of renormalized solution for this type of SPDEs, show well-posedness in this setting and study the Markov properties of solutions.

Registered participants

Family Name	Given Name	Affiliation
Becherer	Dirk	Humboldt Universität zu Berlin
Boutaib	Youness	RWTH Aachen
Cioica-Licht	Petru-Adrian	University of Duisburg-Essen
Dareiotis	Konstantinos	MPI MiS Leipzig
Debussche	Arnaud	ENS, Rennes
Dieckmann	Martin	Bielefeld University
Friz	Peter	TU Berlin
Ferrari	Giorgio	Bielefeld University
Gantert	Nina	Technical University of Munich
Gess	Benjamin	Bielefeld University, MPI Leipzig
Grothaus	Martin	TU Kaiserslautern
Gubinelli	Masimiliano	University of Bonn
Gussetti	Emanuela	Bielefeld University
Hofmanova	Martina	Bielefeld University
Huber	Florian	TU Wien
Kozicki	Jurij	Maria Curie-Sklodowska University, Lublin
Krylov	Nicolai V.	University of Minnesota
Kulczycki	Tadeusz	Wroclaw University of Science and Technology
Kumagai	Takashi	Kyoto University
Ling	Chengcheng	Bielefeld University
Ma	Zhi-Ming	AMSS, CAS, Beijing
Millet	Annie	Université de Paris 1 Panthéon-Sorbonne
Müller	Nora	Bielefeld University
Neamtu	Alexandra	Technical University of Munich
Nejjar	Peter	IST Austria
Nendel	Max	Bielefeld University
Neuß	Marius	MPI MiS Leipzig
Pasurek	Tetyana	Bielefeld University
Randrianasolo	Tsiry	Bielefeld University
Rehmeier	Marco	Bielefeld University
Robert	Tristan	Bielefeld University
Röckner	Michael	Bielefeld University
Rolfsmeier	Tim	Bielefeld University
Salkeld	William	University of Edinburgh
Schenke	Andre	Bielefeld University
Streit	Ludwig	Universidade da Madeira, Bielefeld University
Terasawa	Yutaka	Nagoya University
Tran	Tat Dat	MPI MiS Leipzig
Weber	Hendrik	University of Bath
Xie	Longjie	Jiangsu Normal University
Yang	Li	Shandong University
Yaroslavtsev	Ivan	MPI MiS Leipzig
Zhao	Guohuan	Bielefeld University
Zimmermann	Aleksandra	University of Rostock/University of Duisburg-Essen

Campus map



Building X



Tram map



Ihre StadtBahn-Linien:

- 1** Senne – Jahnplatz – Schildesche
- 2** Sieker – Jahnplatz – Milse – Altenhagen
- 3** Stieghorst – Jahnplatz – Babenhausen Süd
- 4** Rathaus – Jahnplatz – Uni – Lohmannshof
- barrierefreie Haltestelle
- U** unterirdische Haltestelle

- i** ServiceCenter moBiel
- Nr. 5** Jahnplatz Nr. 5 | Kundenzentrum der Stadtwerke Bielefeld Gruppe
- U** Umsteigemöglichkeit zum Bus
- B** Bahnhof
- R** Radstation moBiel
- P+R** Park + Ride | kostenloser Parkplatz für Fahrgäste

- AST** Anruf-Sammel-Taxi
- 🚲** abschließbare Fahrradbox/-garage
- 🚲** überdachter Fahrradstand
- 📦** Schließfächer
- 🚻** Toiletten
- 🔌** Strom-Ladestation für Elektro-Autos

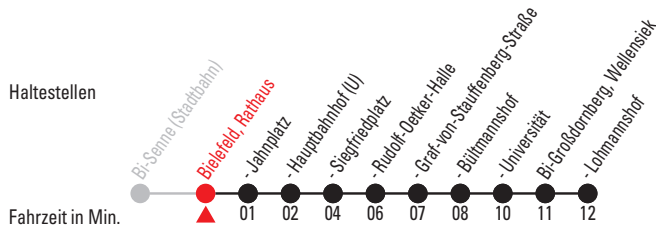


Stand: August 2018

Line 4: Rathaus → University

4 Richtung: Großdornberg Bi-Großdornberg, Lohmannshof

Abfahrt: Bielefeld, Rathaus



Uhr	Montag - Freitag	Samstag	Sonn- und Feiertag
5	11 26 41 56		
6	07 17 27 37 47 57	41 56	
7	07 10 ¹ 17 21 ¹ 27 31 ^A 37 47 57	11 26 41 56	
8	07 17 27 37 47 57	11 26 41 56	56
9	07 17 27 37 47 57	11 26 41 56	11 26 41 56
10	07 17 27 37 47 57	11 26 41 50 56	11 26 41 56
11	07 17 27 37 47 57	07 17 27 37 47 57	11 26 41 56
12	07 17 27 37 41 ^A 47 57	07 17 27 37 47 57	11 26 41 56
13	07 17 27 37 40 ^A 47 50 ¹ 57	07 17 27 37 47 57	11 26 41 56
14	07 17 27 37 47 57	07 17 27 37 47 57	11 26 41 56
15	07 17 27 37 47 57	07 17 27 37 47 57	11 26 41 56
16	07 17 27 37 47 57	07 17 27 37 47 57	11 26 41 56
17	07 17 27 37 47 57	07 17 27 37 47 57	11 26 41 56
18	07 17 27 37 47 57	07 17 27 37 47 57	11 26 41 56
19	00 ^A 07 17 27 42 56	07 17 27 37 47 57	11 26 41 56
20	11 26 41 56	11 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
0	11 26 41	11 26 41	11 26 41

A=nicht 15.7.19 bis 23.8. 1=bis Bielefeld, Universität

Gültig ab 12.07.2019
Alle Angaben ohne Gewähr

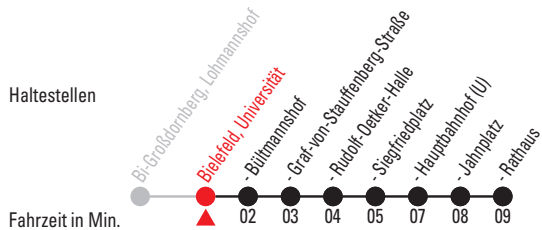


Aktuelle Abfahrten hier:

Line 4: University → Rathaus

4 Richtung: Bielefeld Bielefeld, Rathaus

Abfahrt: Bielefeld, Universität



Uhr	Montag - Freitag	Samstag	Sonn- und Feiertag
5	09 24 39 54		
6	09 19 29 39 49 59	39 54	
7	09 19 29 31 [Ⓟ] 31 [Ⓜ] 39 41 [Ⓟ] 41 [Ⓜ] 49 51 [Ⓟ] 59	09 24 39 54	
8	01 [Ⓟ] 01 [Ⓜ] 09 11 [Ⓟ] 11 [Ⓜ] 19 21 [Ⓟ] 29 31 [Ⓟ] 31 [Ⓜ] 39 41 [Ⓟ] 41 [Ⓜ] 49 51 [Ⓟ] 59	09 24 39 54	39
9	01 [Ⓟ] 01 [Ⓜ] 09 11 [Ⓟ] 11 [Ⓜ] 19 29 31 [Ⓟ] 31 [Ⓜ] 39 41 [Ⓟ] 41 [Ⓜ] 49 59	09 24 39 54	09 24 39 54
10	09 19 29 39 49 59	09 24 39 49 59	09 24 39 54
11	09 19 29 39 49 59	09 19 29 39 49 59	09 24 39 54
12	09 19 29 39 49 59	09 19 29 39 49 59	09 24 39 54
13	09 19 29 39 49 57 [Ⓜ] 59	09 19 29 39 49 59	09 24 39 54
14	07 [Ⓜ] 09 19 29 37 [Ⓜ] 39 47 [Ⓜ] 49 59	09 19 29 39 49 59	09 24 39 54
15	09 17 [Ⓜ] 19 27 [Ⓜ] 29 39 49 57 [Ⓜ] 59	09 19 29 39 49 59	09 24 39
16	07 [Ⓜ] 09 19 27 [Ⓜ] 29 37 [Ⓜ] 39 49 57 [Ⓜ] 59	09 19 29 39 49 59	09 24 39 54
17	09 17 [Ⓜ] 19 29 37 [Ⓜ] 39 49 57 [Ⓜ] 59	09 19 29 39 49 59	09 24 39 54
18	09 19 29 39 49 59	09 19 29 39 49 59	09 24 39 54
19	09 19 39 54	09 19 29 39 49	09 24 39 54
20	09 54	09 24 39 54	09 24 39 54
21	09 24 39 54	09 24 39 54	09 24 39 54
22	09 24 39 54	09 24 39 54	09 24 39 54
23	09 [Ⓟ] 09 [Ⓜ] 24 39 54	09 24 39 54	09 24 39 54
0	09 24 54 [Ⓜ]	09 24 39 [Ⓜ]	09 24 54 [Ⓜ]
1	09 [Ⓜ]	09 [Ⓜ]	09 [Ⓜ]
2			

A=nicht 15.7.19 bis 23.8. B=ab 15.7.19 bis 23.8.19 1=bis Bielefeld, Hauptbahnhof (U)

Gültig ab 12.07.2019
Alle Angaben ohne Gewähr



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) **Kometsu** (<http://www.kometsu.de/index.html>)
Authentic Japanese place for sushi
- (4) **KDW** (<http://www.kdw-restaurant.de/index.html>)
Fine Greek cuisine
- (5) **Numa** (<http://www.numa.de/>)
Asia meets East-Westphalia
- (6) **Wernings Weinstube** (<https://www.wernings-weinstube.de/>)
Some regional dishes plus a good selection of wines
- (7) **Sparrenburg** (<https://www.restaurant-sparrenburg.de/>)
German style food at the castle above Bielefeld
- (8) **Wilde Kuh/ Wilde Kuh 2** (<https://www.facebook.com/WildeKuhBurger/>)
Excellent "build your own burger" place
- (9) **Three sixty** (<http://bielefeld.three-sixty.de/>)
Sports bar with burgers and other snacks
- (10) **Jivino** (<http://www.jivino-enoteca.de/>)
Spanish tapas
- (11) **Bernstein** (<https://www.the-bernstein.com/>)
Dinner plus cocktails in a fancy rooftop restaurant

Notes