Workshop on Random Graphs

TU Dortmund

September 4-8

Room E23
Otto-Hahn-Straße 14

Contents

Timetable

Monday, 4 of September

12:00–13:00	**Registration**	
13:00–14:00	**Mihyun Kang** Graz, Austria	Cliques, chromatic number, and independent sets in semi-random processes
14:00–15:00	**Michael Krivelevich** Tel Aviv, Israel	Percolation through isoperimetry
15:00–15:30	**Coffee**	
15:30–16:30	**Clara Stegehuis** Twente, Netherlands	Maximal cliques: many or few?
16:30–17:30	**Mikhail Isaev** Melbourne, Australia	Cumulant expansion for counting Eulerian orientations

Tuesday, 5 of September

6:00–7:00	**Running**	
9:00-10:00	**Peter Mörters** Cologne, Germany	Metastability of the contact process on evolving scale-free networks
10:00-11:00	**Nikolaos Fountoulakis** Birmingham, UK	On majority dynamics with more than two states on a random graph
11:00–11:30	**Coffee**	
11:30–12:30	**Christian Hirsch** Aarhus, Denmark	On the topology of higher-order age-dependent random connection models
12:30–14:30	**Lunch**	
14:30–15:30	**Remco van der Hofstad** Eindhoven, Netherlands	Critical percolation on scale-free random graphs
15:30-16:30	**Vlady Ravelomanana** Paris, France	From bipartiteness to 2-SAT: the enumerative approach to phase transitions in random graphs

Wednesday, 6 of September

6:00–7:00	**Running**	
9:00-10:00	**Charilaos Efthymiou** Warwick, UK	On the Mixing Time of Glauber Dynamics for the Hard-core and Related Models on $G(n, d/n)$
10:00-11:00	**Dan Hefetz** Ariel, Israel	Complete minors in randomly perturbed graphs
11:00–11:30	**Coffee**	
11:30–12:30	**Lutz Warnke** San Diego, USA	Isomorphisms between dense random graphs
12:30–14:30	**Lunch**	
14:30–15:30	**Matthew Kwan** ISTA, Austria	Edge-statistics in Ramsey graphs
15:30-16:30	**Noela Müller** Eindhoven, Netherlands	Improved algorithms for quantitative group testing

Thursday, 7 of September

6:00–7:00	**Running**	
9:00-10:00	**Joon Lee** Lausanne, Switzerland	Phase Transitions in Quantum k-SAT Problem
10:00-11:00	**Jean Ravelomanana** Lausanne, Switzerland	Metastability of the Potts ferromagnet on random regular graphs
11:00–11:30	**Coffee**	
11:30–12:30	**Suman Chakraborty**	Sparse exponential random graphs with linear number of triangles
12:30–14:30	**Lunch**	
14:30–15:30	**Julia Komjathy** Delft, Netherlands	Cluster size decay in spatial random graphs
15:30-17:00	**Open Discussion**	
17:00–19:00	**BBQ**	

Friday, 8 of September

6:00–7:00	**Running**	
9:00-10:00	**Hanna Döring** Osnabrück, Germany	Crossing number in a projected random geometric graph
10:00-11:00	**Anita Winter** Duisburg-Essen, Germany	Aldous diffusion in the space of algebraic measure trees
11:00–11:30	**Coffee**	
11:30–12:30	**Yury Person** Ilmenau, Germany	Some results about weakly p-small classes

List of Abstracts – Talks

Sparse exponential random graphs with linear number of triangles

Suman Chakraborty

Abstract: In many networks, it is common to observe a linear relationship between the number of edges and triangles and the number of vertices. This renders a substantial portion of random graph models ineffective for modeling purposes. To tackle this challenge, Exponential Random Graph Models (ERGMs) propose the concept of ”exponentially adjusting the random graph” to prioritize specific outcomes. Unfortunately, numerous attempts at implementing this approach encounter a degeneracy phenomenon. Within this discussion, we will delve into a particular class of ERGMs that successfully capture the desired properties while avoiding the pitfalls of degeneracy.

Crossing number in a projected random geometric graph

Hanna Döring

Abstract: Consider a random geometric graph over a random point process in $\mathbb{R}^d$. We show that projecting the graph onto a two dimensional plane is expected to yield a constant-factor crossing number (and rectilinear crossing number) approximation. We also show that the crossing number is positively correlated to the stress of the graph's projection. Additionally, I would like to consider a dynamic random geometric graph studied in the context of telecommunication networks and prove a central limit theorem for the number of isolated vertices.

The first result is joint work with Markus Chimani and Matthias Reitzner and the latter one with Stephan Bussmann.

On the Mixing Time of Glauber Dynamics for the Hard-core and Related Models on G(n,d/n)

Charilaos Efthymiou

Abstract: We study the single-site Glauber dynamics for the fugacity λ, Hard-core model on the random graph $G(n, d/n)$. We show that for the typical instances of the random graph $G(n, d/n)$ and for fugacity $\lambda < \frac{d^d}{(d-1)^{d+1}}$, the mixing time of Glauber dynamics is $n^{1+O(1/\log\log n)}$.

Our result improves on the recent elegant algorithm in [Bezakova, Galanis, Goldberg and Štefankovič; ICALP 2022]. The algorithm there is an MCMC-based sampling algorithm, but it is not the Glauber dynamics. Our algorithm here is simpler, as we use the classic Glauber dynamics. Furthermore, the bounds on mixing time we prove are smaller than those in Bezakova et al. paper, hence our algorithm is also faster.

The main challenge in our proof is handling vertices with unbounded degrees. We provide stronger results with regard the spectral independence via branching values and show that the our Gibbs distributions satisfy the approximate tensorisation of the entropy. We conjecture that the bounds we have here are optimal for $G(n, d/n)$.

As corollary of our analysis for the Hard-core model, we also get bounds on the mixing time of the Glauber dynamics for the Monomer-dimer model on $G(n, d/n)$. The bounds we get for this model are slightly better than those we have or the Hard-core model.

On majority dynamics with more than two states on a random graph

Nikolaos Fountoulakis

Abstract: Majority dynamics is class of synchronous dynamics on a graph where each vertex has a state, which is set to an initial value in some way, and subsequently it is updated to the state that is the most popular among the neighbours of that vertex (ties are resolved randomly). We will consider the evolution of this dynamics on a binomial random graph G(n,p) with a uniformly random initial state. In this work we go beyond previous work and analyse the process with more than two states. We will also discuss a generalisation of this process to population games and best response dynamics, in particular.

This is joint work with Jordan Chellig (Birmingham).

Complete minors in randomly perturbed graphs

Dan Hefetz

Abstract: It is known that every n-vertex graph G contains a complete minor of order $\Omega(n/\alpha(G))$. We prove that adding ξn random edges, where $\xi := \xi(n) = \omega(1/n)$, to an n-vertex graph G satisfying $\alpha(G) \leq c\xi n$ for some constant $c > 0$, asymptotically almost surely results in a graph containing a complete minor of order $\tilde{\Omega}\left(\xi n/\sqrt{\alpha(G)}\right)$; this result is tight up to the implicit logarithmic terms.

For complete topological minors, we prove that there exists a constant $C > 0$ such that adding Cn random edges to a graph G satisfying $\delta(G) = \omega(1)$, asymptotically almost surely results in a graph containing a complete topological minor of order $\tilde{\Omega}(\min\{\delta(G), \sqrt{n}\})$; this result is tight up to the implicit logarithmic terms.

Based on a joint work with Elad Aigner-Horev and Michael Krivelevich.

On the topology of higher-order age-dependent random connection models

Christian Hirsch

Abstract: Preferential attachment is a popular mechanism for generating scale-free networks. While it offers a compelling narrative, the underlying reinforced processes make it difficult to rigorously establish subtle properties. Recently, age-dependent random connection models were proposed as an alternative that is capable of generating similar networks with a mechanism that is amenable to a more refined analysis. In this talk, we analyze the asymptotic behavior of higher-order topological characteristics such as higher-order degree distributions and Betti numbers in large domains.

Critical percolation on scale-free random graphs

Remco van der Hofstad

Abstract: Empirical findings have shown that many real-world networks are scale-free, in the sense that there is a high variability in the number of connections of the elements of the networks. Spurred by these empirical findings, models have been proposed for such networks.

Percolation on networks is one of the simplest models for network functionality. It can be interpreted as describing the effect of random attacks on the network, where edges are removed independently with a fixed probability, or the result of a simple epidemic on the network.

We investigate the percolation critical behavior for a popular models of complex networks, the Poisson random graph, which can be interpreted as a model with multi-edges, or single edges by collapsing the multi-edges. We identify what the critical values are, and how they scale with the graph size. Interestingly, this scaling turns out to be rather different for the multi-edge case compared to the single-edge case in the scale-free regime. This clears up part of the confusion in the physics literature. Furthermore, the single-edge case has an unexpected phase transition at the appropriate scale of the percolation parameter, where the size of the largest component jumps from a random value to a much larger almost deterministic value that is proportional to the root of the graph size.

This is joint work with Shankar Bhamidi, Souvik Dhara, Johan van Leeuwaarden and Sanchayan Sen.

Cumulant expansion for counting Eulerian orientations

Mikhail Isaev

Abstract: The probability that every vertex has the same in-degree and out-degree in the random orientation of a given graph is equivalent to counting Eulerian orientations which is known to be #P-hard in general. Furthermore, this count corresponds to the crucial partition function in so-called ”ice-type models” in statistical physics. There is a Markov Chain Monte Carlo algorithm via a reduction to permanents. In this work, for graphs with good expansion properties, we derive an asymptotic formula for approximating the number of Eulerian orientations up to a multiplicative error $O(n^{-c})$, where c is an arbitrary fixed constant. The answer is in terms of the cumulants of a multidimensional polynomial of Gaussian random variables. The proof relies on the new tail bound for the cumulant expansion series, which is of independent interest.

Cliques, chromatic number, and independent sets in semi-random processes

Mihyun Kang

Abstract: The semi-random graph process is a single player game in which the player is initially presented an empty graph on n vertices. In each round, a vertex u is presented to the player independently and uniformly at random. The player then adaptively selects a vertex v, and adds the edge uv to the graph. For a fixed monotone graph property, the objective of the player is to force the graph to satisfy this property with high probability in as few rounds as possible. In this talk we discuss the following three monotone properties: containing a complete graph of order k, having the chromatic number at least k, and not having an independent set of size at least k.

This is based on joint work with David Gamarnik and Pawel Pralat.

Cluster size decay in spatial random graphs

Julia Komjathy

Abstract: We consider a class of spatially-embedded random graphs that includes among others long-range percolation, continuum scale-free percolation and the age-dependent random connection model. We assume that the parameters are such that there is an infinite component. We identify the stretch-exponent $\zeta \in (0,1)$ of the subexponential decay of the cluster-size distribution. That is, with $|C(0)|$ denoting the number of vertices in the component of the vertex at the origin, we prove

$$\mathbb{P}(k \leq |C(0)| < \infty) = \exp(-k^{\zeta+o(1)}), \quad \text{as } k \to \infty .$$

The value of ζ undergoes several phase transitions with respect to three main model parameters: the Euclidean dimension d, the power-law tail exponent τ of the degree distribution and a long-range parameter alpha governing the presence of long edges in Euclidean space. In this talk I present the connection between four quantities:

- the cluster size decay above,
- large deviations of the giant component in a box
- the size of the second largest component in a box
- and the law of large number of the giant component in a box

Joint work with Joost Jorritsma and Dieter Mitsche.

Percolation through isoperimetry

Michael Krivelevich

Abstract: Let G be a d-regular graph of growing degree on n vertices, and form a random subgraph G_p of G by retaining edge of G independently with probability $p = p(d)$. Which conditions on G suffice to observe a phase transition at $p = 1/d$, similar to that in the binomial random graph $G(n, p)$, or, say, in a random subgraph of the binary hypercube Q^d?

We argue that in the supercritical regime $p = (1 + \epsilon)/d, \epsilon > 0$ being a small constant, postulating that every vertex subset S of G of at most $n/2$ vertices has its edge boundary at least $C|S|$, for some large enough constant $C = C(\epsilon) > 0$, suffices to guarantee likely appearance of the giant component in G_p. Moreover, its asymptotic order is equal to that in the random graph $G(n, (1 + \epsilon)/n)$, and all other components are typically much smaller.

We also give examples demonstrating tightness of our main result in several key senses.

A joint work with Sahar Diskin, Joshua Erde and Mihyun Kang.

Edge-statistics in Ramsey graphs

Matthew Kwan

Abstract: An n-vertex graph is called C-Ramsey if it has no clique or independent set of size $C \log n$ (i.e., if it has near-optimal Ramsey behavior). In this talk, we discuss a recent result on edge-statistics in Ramsey graphs, giving very precise control of the distribution of the number of edges in a random vertex subset of a C-Ramsey graph. The proof involves a wide range of different tools and ideas, from Fourier analysis, random matrix theory, the theory of Boolean functions, probabilistic combinatorics, and low-rank approximation. One of the consequences of our result is the resolution of an old conjecture of Erdős and McKay.

Joint work with Ashwin Sah, Lisa Sauermann and Mehtaab Sawhney.

Phase Transitions in Quantum k-SAT Problem

Joon Lee

Abstract: In the quantum version of k-SAT, the ratio of the number of clauses to the number of variables still plays the main parameter to determine phase transitions. Based on prior works of Bravyi as well as Laumann, Läuchli, Moessner, Scardicchio and Sondhi's, we study the phase transitions of the solution space as the ratio increases. Laumann et al. described the threshold where with high probability the product state solutions exist where none of the qubits are in entangled states. While they relied on ideas from algebraic geometry, we arrive at the same conclusion via random graph structure, linear algebra and complex analysis. Moreover, we show an algorithm, albeit exponential, that precisely gives away the product state solutions.

This is a joint work with Nicolas Macris, Jean Ravelomanana and Perrine Vantalon.

Metastability of the contact process on evolving scale-free networks

Peter Mörters

Abstract: We study the contact process on scale-free inhomogeneous random graphs evolving according to a stationary dynamics, where the neighbourhood of each vertex is updated with a rate depending on its strength. We identify the full phase diagram of metastability exponents in dependence on the tail exponent of the degree distribution and the rate of updating.

The talk is based on joint work with Emmanuel Jacob (Lyon) and Amitai Linker (Santiago de Chile).

Improved algorithms for quantitative group testing

Noela Müller

Abstract: The goal of the quantitative group testing (QGT) problem is to correctly identify all k defective items out of a population of n items, using the minimum number of tests possible. Here, we assume that each test outputs the number of defective items within the tested group. In the case where $k \sim n^{\vartheta}$ for $\vartheta \in (0,1)$ and the k defective items are distributed uniformly among the total n items, it is known that all defective items can be identified w.h.p. using $2(1+\delta)\frac{1-\vartheta}{\vartheta}k$ tests, for any $\delta > 0$. On the other hand, all known *efficient* algorithms achieving this goal require $\Omega(k \cdot \ln(n))$ tests. We provide an efficient algorithm that succeeds w.h.p. in the inference of the defective items and uses no more than $\frac{1+\sqrt{\vartheta}}{1-\sqrt{\vartheta}}(1+\delta)2\frac{1-\vartheta}{\vartheta}k$ tests, and discuss optimality of our constants within the chosen approach.

This talk is based on joint work with Max Hahn-Klimroth, Remco van der Hofstad and Connor Riddlesden.

Some results about weakly p-small classes.

Yury Person

Abstract: A conjecture of Talagrand (2010) states that the so-called expectation and fractional expectation thresholds are always within some constant factor. Expectation (resp. fractional expectation) threshold q (resp. q_f) for an increasing family $\mathcal{F}$ allows to locate the threshold for $\mathcal{F}$ within a logarithmic factor (these are important breakthrough results of Park and Pham (2022), resp. Frankston, Kahn, Narayanan and Park(2019)). We will survey what is known about the relation between q and q_f and discuss some further special cases of Talagrand's conjecture.

Joint work with Thomas Fischer (TU Ilmenau).

Metastability of the Potts ferromagnet on random regular graphs

Jean Ravelomanana

Abstract: This talk concerns the performance of Markov chains for the q-state ferromagnetic Potts model on random regular graphs. It is conjectured that their performance is dictated by metastability phenomena, i.e., the presence of "phases" (clusters) in the sample space where Markov chains with local update rules, such as the Glauber dynamics, are bound to take exponential time to escape. The phases that are believed to drive these metastability phenomena in the case of the Potts model emerge as local, rather than global, maxima of the so-called Bethe functional, and previous approaches of analysing these phases based on optimisation arguments fall short of the task.

Our first contribution is to establish the metastability phenomenon on random d-regular graphs, for all integers $q, d \geq 3$. For an interval of temperatures, delineated by the uniqueness and the Kesten-Stigum thresholds on the d-regular tree, we show coexistence of the ferromagnetic and paramagnetic phases. The proofs are based on a conceptual connection between spatial mixing properties and the structure of the Boltzmann distribution on the random regular graph, rather than complicated moment calculations. Based on this new structural understanding of the model, our second contribution is to show exponential-time lower bounds for classical Markov chains throughout the metastability regime, including the local Glauber dynamics, as well as the non-local Swendsen-Wang chain. The sparse random graph structure obstructs previous approaches that have been used in the area, especially for the Swendsen-Wang chain where running a single step of the chain requires revealing the whole graph. We instead invoke our metastability analysis techniques to bound the conductance of the chain using a random graph "planting" argument combined with delicate bounds on random-graph percolation.

From bipartiteness to 2-SAT: the enumerative approach to phase transitions in random graphs

Vlady Ravelomanana

Abstract: The goal of this presentation is to demonstrate how the field of enumerative combinatorics can tackle phase transition problems in random graphs. In these problems, we will focus on some particular concepts. Specifically, while the critical threshold locations of transitions are well understood (at least for computationally tractable problems), we are interested in whether the transition is abrupt or smooth, and in the complete description of the function when zooming around the critical density of transition. We will begin with simpler problems, such as calculating the probability that a random 2-XOR-SAT formula is satisfiable (or that a graph is bipartite). Subsequently, we will delve into directed graphs, concluding with the 2-SAT problem.

Maximal cliques: many or few?

Clara Stegehuis

Abstract: While many graph-based problems are in theory NP complete, for many such problems there exist algorithms that run extremely quickly on large-scale real-world networks. This shows a disparity between theory and practice: while some theoretical examples exist on which any algorithm can take extremely long, these graphs do usually not appear in real-world networks. Therefore, it is often possible to show that these problems can be solved efficiently on random graph with realistic network properties. In this talk, we focus on algorithms that list all cliques in a graph. We show that this problem can take an exponential time even on many classes of random graphs with realistic network properties. However, here again a disparity between theory and practice arises: while we can show an exponential lower bound on the running time of this problem with a max-clique based algorithm, this lower bound is dominated by a linear term for all practical purposes.

Isomorphisms between dense random graphs

Lutz Warnke

Abstract: Applied benchmark tests for the famous 'subgraph isomorphism problem' empirically discovered interesting phase transitions in random graphs. This motivates our rigorous study of two variants of the induced subgraph isomorphism problem for two independent binomial random graphs with constant edge-probabilities p_1, p_2. In particular, (i) we prove a sharp threshold result for the appearance of G_{n,p_1} as an induced subgraph of G_{N,p_2}, (ii) we show two-point concentration of the size of the maximum common induced subgraph of G_{N,p_1} and G_{N,p_2}, and (iii) we show that the number of induced copies of G_{n,p_1} in G_{N,p_2} has an unusual 'squashed lognormal' limiting distribution.

These results confirm simulation-based predictions of McCreesh, Prosser, Solnon and Trimble, and resolve several open problems of Chatterjee and Diaconis. The proofs are based on careful refinements of the first and second moment method, using extra twists to (a) take some non-standard behaviors into account, and (b) work around the large variance issues that prevent standard applications of the second moment method, using in particular pseudorandom properties and multi-round exposure arguments to tame the variance.

Based on joint work with Erlang Surya and Emily Zhu; see arXiv:2305.04850

Aldous diffusion in the space of algebraic measure trees

Anita Winter

Abstract: In 2001 Aldous introduced a symmetric Markov chain on cladograms (binary trees with a fixed number of vertices) and gave bounds on its mixing and relaxation times. The latter bound was sharpened in 2002 by Schweinsberg. He conjectured that this Markov chain run on the time scale of the relaxation time should have a diffusion limit in the space of continuum trees. A suitable notion of continuum trees and a rigorous construction of such a diffusion limit was listed as an open problem.

In this talk we encode cladograms as binary, algebraic measure trees and show that the space of binary, algebraic measure trees is compact if equipped with the notion of convergence of all shapes spanned by a random finite sample. This is similar to compactness of the space of graphons if equipped with the notion of convergence of all subgraph counts. We then construct a diffusion limit by means of a martingale problem, and show that this so-called Aldous diffusion is a Feller process with continuous paths, and that the algebraic measure Brownian CRT is its unique invariant distribution. Furthermore, we consider the vector of the masses of the three subtrees connected to a sampled branch point. In the Brownian CRT, its annealed law is known to be the Dirichlet distribution. Here, we give an explicit expression for the infinitesimal evolution of its quenched law under the Aldous diffusion.

(this is joint work with Wolfgang Löhr and Leonid Mytnik)

Useful Information

Talks will be held at Otto-Hahn-Straße 14 in room E23. It is situated on the ground floor of the building.

Coffee breaks will be offered in the foyer of Otto-Hahn-Straße 14.

Lunch will only be provided at the registration on Monday. For the other days you can for example visit one of the universities cafeterias.

The **running** group will start at 6am at the Dortmund University train station and will be led by Maurice Rolvien.

Venue & Travel

The workshop takes place in Room OH14/E23

Address: Otto-Hahn-Straße 14, 44227 Dortmund, Germany

From within Germany, Dortmund can easily be reached by train. There is also a direct train (Thalys) to Paris. The closest international airport is Düsseldorf (DUS) (about 1h by direct train connection); from Frankfurt/Main airport (FRA) it takes about 2:30 h.

You can reach TU Dortmund form the Dortmund main station via the S1 train. It takes approximately 15 min. to reach Otto-Hahn-Straße 14 by foot from the Dortmund University station.

Local Information

A few things to visit in Dortmund are:

- Westfalenpark
- Signal Iduna Park (football stadium)
- Rombergpark
- DASA World of Work Exhibition

You can find more information about sightseeing and restaurants in Dortmund at `https://visit.dortmund.de/en/`

Organizers

- Amin Coja-Oghlan
- Lena Krieg
- Jan Nagel
- Maurice Rolvien
- Olga Scheftelowitsch

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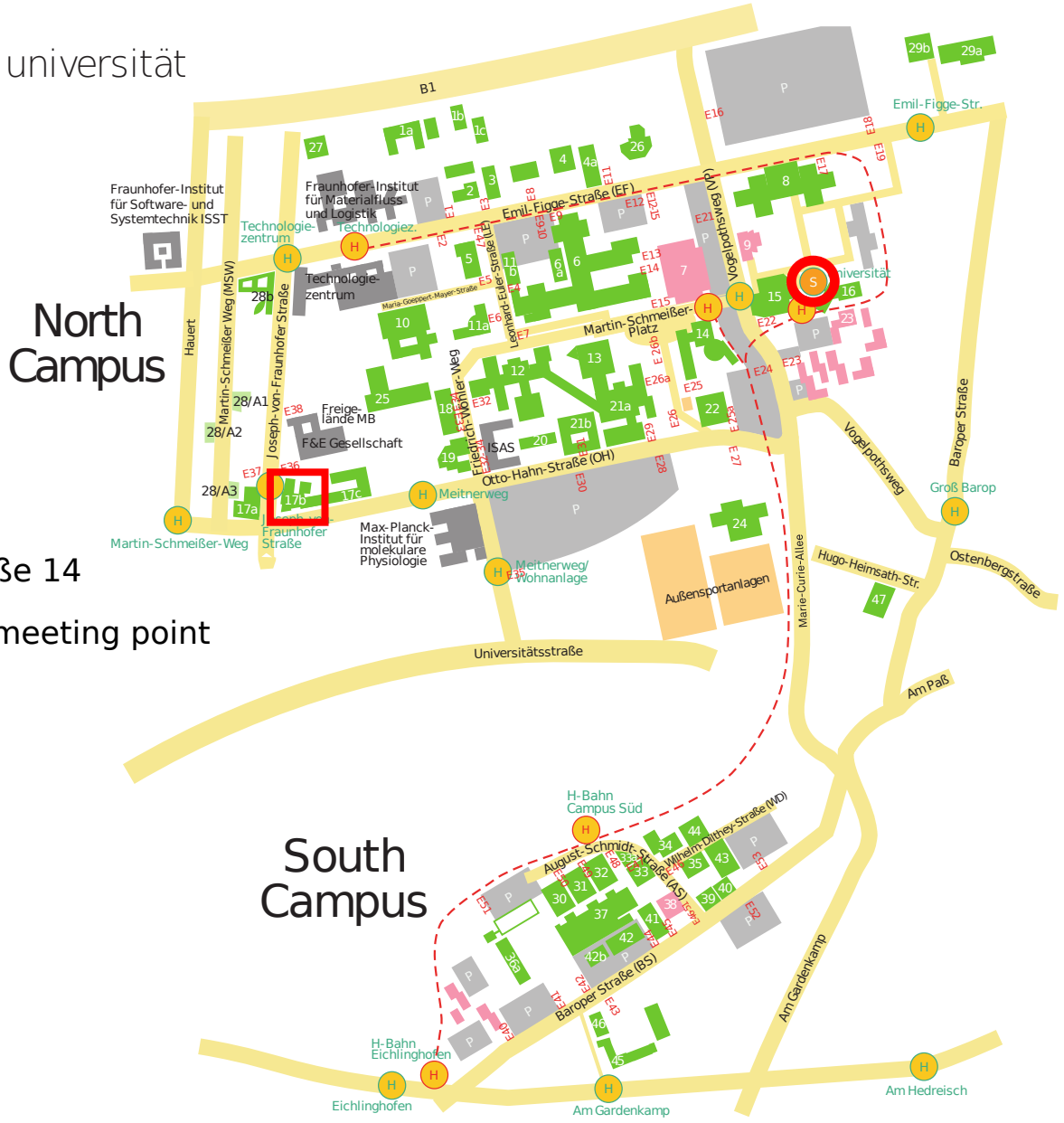

Otto-Hahn-Straße 14

Running group meeting point

North Campus

1a. Rehabilitation Sciences (Pav. 10: EF 73)
1b. Hall for Fluid-Energy Machinery (EF 71b)
1c. Off ce of Occupational Safety, Environmental and Health Protection (EF 71a)
2. Control room, congeneration plant (EF 71c)
3. Dept. of University Development and Organization – THB (EF 71)
4. Dept. Student Services, International Off ce, zhb (EF 61)
4a. International Meeting Center (IBZ) (EF 59)
5. Mechanical Engineering Hall (LE1)
6. Biochemical and Chemical Engineering, Mechanical Engineering, Electrical Engineering and Information Technology, Staff Unit Equal Opportunities, Family and Diversity, Equal Opportunities Off ce, Representative of Severely Disabled Persons (EF 68/70), Off ce of University Sports, DLR_School_Lab (EF 66)
6a. Staff councils, JAV, Dept. of University Development and Organization (EF 72)
7. Studierendenwerk, Main Cafeteria (VP 85)
8. Educational Sciences and Psychology, Humanities and Theology, Cultural studies, Arts and Sports Sciences, Social Sciences, ITMC, AStA, DoKoLL, zhb.dobus (EF 50)
9. University center, Sustainability Off ce, teaching newsroom (VP 74)
10. Physics – DELTA (MGM 2)
11a. Mechanical Engineering I (LE 5)
11b. Mechanical Engineering II (LE 2)
12. Chemistry and Chemical Biology, Business and Bconomics, Electrical Engineering and Information Technology, Mathematics, Mechanical Engineering (OH 6)
13. Lecture Hall Building II (OH 4)
14. Audimax, Mathematics, Statistics, Business and Economics (VP 87)
15. Library (VP 76)
16. Statistics, Center for Higher Education (zhb), Center for Research on Education and School Development (IFS) (CDI building: VP 78)
17a|b Computer Science (OH 16/OH 14)
17c. ITMC, computer science (OH 12)
18. Electrical Engineering and Information Technology (FWW 4)
19. Electrical Engineering, Robotics Research Institute (OH 8)
20. Laboratory Building Chemical Engineering (under construction, pav. 11: OH 6a)
21a. Physics, Electrical Engineering and Information Technology, Business and Economics (OH4)
21b. Chemistry-Physics Building (OH 4a)
22. Erich Brost Institute (OH 2)
23. Campus Treff (VP 120)
24. Arts and Sports sciences, Fitnessförderwerk (OH 3)
25. Seminar Room Building I (FWW 6)
26. Day care center HoKiDo (EF 57)
27. LogistikCampus (J F 2-4)
28. A1– A3 Dept. of Finance and Procurement, (MSW 12, 13, 16), Business and Economics (MSW 12)
28b. NRWision, TechnologieZentrum-Dortmund (TZDO) Center for Entrepreneurship & Transfer CET (EF 80)
29a. High Voltage Direct Current (HVDC) test center (EF 51)
29b. Experimentation f eld (EF 51)

South Campus

30. Spatial Planning (GB III: AS 10)
31. Architecture and Civil Engineering (GB II: AS 8)
32. Spatial Planning, Architecture and Civil Engineering (GB I: AS 6)
33. Lecture halls, Rectorate, Chancellor, Off ce of German and European Education and University Policy, Off ce of Data Protection, Committees, Allowances; Off ce of Internal Audit (HG I: AS 4)
33a. Model-Making Workshop (AS 4a)
34. Dept. of university development and organization, dept. f nance and procurement, off ce of controlling and risk management (WD 2)
35. Dept. of Human Resources, Department of Legal Affairs and Insurances (AS 1)
36a. Mechanical Engineering III (BS 303)
37. Experiments hall (BS 299)
38. Archeteria (AS 2)
39. Off ce of University Communications, off ce of University Marketing (BS 285)
40. Off ce of Research Support Services (BS 283)
41. Rudolf Chaudoire Pavilion (BS 297)
42. Warehouse (BS 299)
42b. Experiments hall
43. Dept. of Human Resources (Pav. 8: WD 1)
44. (Pav. 2: WD 2a)
45. Dörstelmann Building, AStA (Pav. 1: BS 322)
46. (Pav. 7: BS 322)
47. Helmut Keunecke Building/ Guesthouse (BS 233)

Key

AS August-Schmidt-Straße
BS Baroper Straße
EF Emil-Figge-Straße
FWW Friedrich-Wöhler-Weg
J F Joseph-von-Fraunhofer-Straße
LE Leonhard-Euler-Straße
MGM Maria-Goeppert-Mayer-Straße
MSW Martin-Schmeißer Weg
OH Otto-Hahn-Straße
VP Vogelpothsweg
WD Wilhelm-Dilthey-Straße
P Parking places
H H-Bahn (suspended monorail) stop
H Bus and railway stop
A1– A3 Rentals

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