

Friday@Noon 2026 - Program

12:00 – 12:45	Light Lunch	
12:45 – 13:00	Opening and Welcome	
13:00 – 14:00	Session 1	
	13:00 – 13:40	Keynote: Stefan Weltge (TUM) – <i>Integer programming and bounded subdeterminants</i>
	13:40 – 14:00	Pitch: Korbinian Hirschmüller (UA) – <i>Online 3D Container Loading with Known Offline Packing</i>
		Pitch: Alexander Armbruster (TUM) – <i>Improved Approximation Algorithms for (Non-Preemptive) Throughput Maximization</i>
		Pitch: Christoph Hertrich (UTN) – <i>Are two LPs better than one? Extension complexity goes virtual</i>
14:00 – 14:30	Coffee Break and Group Photo	
14:30 – 15:50	Session 2	
	14:30 – 14:50	Talk: Eleon Bach (TUM) – <i>Beyond Smoothed Analysis: Analyzing the Simplex Method by the Book</i>
	14:50 – 15:10	Talk: Nicola Wengiel (FAU) – <i>Online Discrepancy Minimization for Sub-Gaussian Inputs via Regularization and Restriction</i>
	15:10 – 15:30	Talk: Moritz Stargalla (UTN) – <i>Parameterized Hardness of Zonotope Containment and Neural Network Verification</i>
	15:30 – 15:50	Pitch: Trajana Erlenberg (UP) – <i>Activation-Based Robust Optimization</i>
		Pitch: Dorothee Henke (UP) – <i>On the Complexity of Partitioned-Items Bilevel Optimization Problems</i>
		Pitch: Johannes Thürauf (UTN) – <i>Robust Bilevel Optimization with a Wait-and-See Follower: A Column-and-Constraint Generation Approach</i>
15:50 – 16:20	Coffee Break	
16:20 – 18:00	Session 3	
	16:20 – 17:00	Keynote: Pascal Lenzner (UA) – <i>Strategic Location Choice</i>
	17:00 – 17:20	Talk: Kristina Rolsing (UTN) – <i>Robust Network Design with Controllable Elements</i>
	17:20 – 17:40	Talk: Tobias Mömke (UA) – <i>Approximating Multiple-Depot Capacitated Vehicle Routing via LP Rounding</i>
	17:40 – 18:00	Talk: Edina Marica and Alina Wittmann (TUM) – <i>Structural and Algorithmic Analysis of the Multiobjective Temporal Shortest Path Problem</i>
18:30	Dinner at Restaurant TONI's by Wenisch	

TUM = Technical University of Munich,
FAU = Friedrich-Alexander-Universität Erlangen-Nürnberg,
UTN = University of Technology Nuremberg,
UA = University of Augsburg,
UP = University of Passau

Keynote (40 min)
Talk (15 min + 5 min for questions)
Pitch (5 min + 1 min for questions)

Abstracts

Stefan Weltge (TUM)

Integer programming and bounded subdeterminants

Identifying parameters that capture the difficulty of integer programs is a central theme in the study of integer programming. One such parameter is the largest absolute value of any subdeterminant of the constraint matrix. In this talk, we explore how bounding this parameter influences the complexity of integer programs. We survey several recent results and discuss intriguing open questions in this area.

Korbinian Hirschmüller (UA)

Online 3D Container Loading with Known Offline Packing

This talk presents ongoing work on an online three-dimensional container loading problem arising as a subproblem in an industrial project. Although the full set of parcels and a feasible offline packing are known in advance, parcels arrive in random order and must be placed immediately; otherwise, they are discarded. The talk outlines our current approaches to reduce the number of rejected parcels.

Alexander Armbruster (TUM)

Improved Approximation Algorithms for (Non-Preemptive) Throughput Maximization

The Throughput Maximization problem is arguably among the most natural and fundamental scheduling problems. Here we are given n jobs, where each job j is characterized by a processing time and a time window in $[0, T]$ within which j can be scheduled. Our goal is to schedule the maximum possible number of jobs (non-preemptively) on a single machine, so that no two scheduled jobs are processed at the same time. This problem is known to be Strongly NP-hard. We showed how to improve the best known approximation factor for this problem to $3/4 - \varepsilon$. Using pseudo-polynomial time $(nT)^{O(1)}$, we can further improve this factor to $4/5 - \varepsilon$.

Christoph Hertrich (UTN)

Are two LPs better than one? Extension complexity goes virtual

Classical extension complexity measures how many inequalities are needed to represent a polytope via a single linear program. We introduce the more general *virtual extension complexity*, which additionally allows the optimization problem at hand to be expressed as a *difference of two linear programs*, posing the open problem of whether this genuinely increases expressive power. We argue that virtual extension complexity is a compelling object of study for two very different reasons: (i) we prove that it is a lower bound on the size of ReLU neural networks solving the corresponding optimization problem, and (ii) we prove that the virtual extension complexity of regular matroid polytopes is indeed lower than the currently best known upper bound on their classical extension complexity. Based on joint work with Stefan Kober and Georg Loho: <https://arxiv.org/abs/2411.03006> and <https://arxiv.org/abs/2511.02406>.

Eleon Bach (TUM)

Beyond Smoothed Analysis: Analyzing the Simplex Method by the Book

Narrowing the gap between theory and practice is a longstanding goal of the algorithm analysis community. In this talk we discuss the new by the book algorithm analysis framework which in contrast to earlier frameworks, models not only an algorithm's input data, but also the algorithm itself. This paper is to appear at STOC'26.

Nicola Wengiel (FAU)

Online Discrepancy Minimization for Sub-Gaussian Inputs via Regularization and Restriction

We study the problem of discrepancy minimization, in which we have to sign a sequence of vectors with the goal of keeping the l_∞ -norm of their signed sum small. In this work, we present an online algorithm for discrepancy minimization that is based on a potential function approach. Two key new technical ingredients, the regularization of the l_∞ -norm and the restriction of the coordinates to an adaptively chosen subset, provide us with a potential function that possesses favorable analytical properties. For n -dimensional random vectors with independent, symmetric, centered, sub-gaussian entries, we prove that our algorithm achieves a discrepancy of $O(\sqrt{n})$ with high probability. This substantially generalizes a corresponding result of Bansal and Spencer (2020) for random vectors with independent Rademacher entries. In particular, our result applies to random vectors with independent Gaussian entries, for which such an algorithmic guarantee has been conjectured by Gamarnik, Kızıldağ, Perkins and Xu (2022). There is strong evidence that the $O(\sqrt{n})$ performance cannot be significantly improved for Gaussian vectors, even in the offline setting. Recently, Vafa and Vaikuntanathan (2025) showed that the optimal value that efficient algorithms can achieve with non-negligible probability is $\tilde{O}(\sqrt{n})$, assuming the worst-case hardness of approximating the shortest vector problem on lattices.

Moritz Stargalla (UTN)

Parameterized Hardness of Zonotope Containment and Neural Network Verification

We study decision problems for two-layer ReLU networks from the viewpoint of polyhedral geometry. Neural network verification ("for all inputs in a polyhedral input set, does the output lie in a polyhedral output set?") can be solved in a brute-force way by enumerating linear regions of the network and solving a linear program on each region. We show that, under standard assumptions (including the Exponential Time Hypothesis), even restricted instances of verification cannot be solved substantially faster than the brute-force approach with respect to the dependence on the input dimension in the exponent. We prove this by showing that no such algorithms exist for the positivity problem ("is there an input with positive output?"), which is the complement of a special case of verification.

Trajana Erlenberg (UP)

Activation-Based Robust Optimization

This work investigates two-stage robust optimization under an activation structure, where an initial set of items is activated before the uncertain cost parameters are revealed and the final decision is made. Activation costs differ from purchase costs, as the latter are subject to uncertainty and therefore part of the uncertainty set. This dynamic setup captures situations in which early investments determine the feasible decision space. We contrast

the activation setting with classic two-stage and recoverable robustness and discuss first complexity insights across multiple uncertainty sets.

Dorothee Henke (UP)

On the Complexity of Partitioned-Items Bilevel Optimization Problems

In bilevel optimization, the leader takes the first decision and has to anticipate the follower's reaction in order to optimize their own objective. Due to this hierarchical structure, bilevel problems are hard to solve and typically on the second level of the polynomial hierarchy. In this talk, we focus on a class of bilevel combinatorial problems called partitioned-items bilevel problems. We give an overview of known complexity results for bilevel versions of, e.g., the knapsack problem, the spanning tree problem, and the shortest path problem.

Johannes Thürauf (UTN)

Robust Bilevel Optimization with a Wait-and-See Follower: A Column-and-Constraint Generation Approach

In this talk, we address robust bilevel optimization problems in which the follower adopts a so-called wait-and-see approach. In this setting, the leader decides without knowledge of the specific realization of the uncertainty. Then, the uncertainty realizes in a worst-case manner, and afterward the follower makes their own decisions. For this challenging problem class, we discuss mathematical properties, present a corresponding solution approach based on column-and-constraint generation, and demonstrate its effectiveness through numerical experiments.

Pascal Lenzner (UA)

Strategic Location Choice

Many phenomena like the emergence of homogeneous neighborhoods in cities and the location choices of competing firms in a spatial market are the outcome of the complex interaction of selfish agents. These settings can be modeled as strategic games and methods from Algorithmic Game Theory can be employed to rigorously analyze them.

In this talk I will present case studies for game-theoretic models for residential segregation and for competitive facility location. In particular, I will focus on the study of game dynamics via potential function analysis, on efficient algorithms for finding best strategies, and on measuring the quality of equilibrium outcomes via the Price of Anarchy. With the use of these concepts, I will present insights into why residential patterns in cities stabilize over time and how competing firms can find suitable locations in a spatial market.

Kristina Rolsing (UTN)

Robust Network Design with Controllable Elements

We study an adjustable robust network design problem for energy networks with uncertain demand. In doing so, we accurately model the underlying physics using nonlinear potential-based flows and explicitly incorporate controllable elements such as compressors or pumps, leading to an adjustable robust nonlinear mixed-integer optimization problem.

Venue

Location of the Workshop:

Technical University of Munich
Campus Straubing for Biotechnology and Sustainability

Seminar Room U3 (Roomcode 3505.EG.062)
Ground Floor
Uferstraße 53
94315 Straubing

Location of the Dinner:

Restaurant TONI's by Wenisch
Innere Passauer Str. 59
94315 Straubing

