

Timo de Wolff

Curriculum Vitae

Technische Universität Braunschweig
Institut für Analysis und Algebra
AG Algebra

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Employment and Education

- Since April 2019 **W2 Professor (tenured Associate Professor)**, *Department of Mathematics, Technical University Braunschweig*, Braunschweig, Germany.
- July 2017 – April 2019 **Head of Emmy Noether Junior Research Group**, *Department of Mathematics, Technical University Berlin*, Berlin, Germany.
- Aug 2014– May 2017 **Visiting Assistant Professor**, *Department of Mathematics, Texas A&M University*, College Station, TX, USA.
Mentors: Frank Sottile, Maurice Rojas
- July 2013– Aug 2014 **Postdoc**, *Department of Mathematics, Saarland University*, Saarbrücken, Germany.
Mentor: Hannah Markwig
- 2009–2013 **PhD in Mathematics**, *Goethe University*, Frankfurt/Main, Germany.
Advisor: Thorsten Theobald; Total grade: Summa cum laude (with highest honors)
- 2004–2009 **Diplom (Master) in Mathematics**, *Goethe University*, Frankfurt/Main, Germany.
Advisor: Thorsten Theobald; Total grade: Mit Auszeichnung (with distinction)
- 2002–2011 **Magister Artium (Master) in Philosophy**, *Goethe University*, Frankfurt/Main, Germany.
Advisor: Wilhelm K. Essler; Total grade: Mit Auszeichnung (with distinction)

Grants, Awards, Scholarships, and Long Term Visits

Grants (Single PI)

- 2017–2023 **DFG Emmy Noether Junior Research Group**, *Project title: “New Certificates of Nonnegativity and Their Application in Science and Engineering”*, €770.800 (~\$ 901.200) .
Single PI
- 2015–2017 **AMS-Simons travel grant**, \$ 4000.
Single PI

Grants (Several PIs)

- 2024–2027 **DFG Sachbeihilfe in context of SPP 2458 “Combinatorial Synergies”**, *Project title: “Sums of Nonnegative Circuit Polynomials and Combinatorics in Polynomial Optimization”*, ~€239.500 (total project).
PI; joint with T. Theobald (Uni Frankfurt).

2022–2025 **Quanten-Computing – Anwendungen für die Wirtschaft (Bundesministerium für Wirtschaft und Klimaschutz (BMWK))**, *Project title: “Quantum Readiness for Optimization Providers (ProvideQ)”*, ~€2.297.000 (total project).

PI; seven PIs in total (TU Braunschweig, Leibniz Univ. Hannover, Univ. zu Köln, Univ. Linz) and two industry partners in the project.

2021–2024 **Niedersächsisches Vorab: Digitalisierung in den Naturwissenschaften (VW-Stiftung und Land Niedersachsen)**, *Project title: “Deep Learning for imaging in nano and quantum science”*, ~€927.000 (total project).

PI; I was nominated as a PI by the other PIs to join only after the project was already accepted for funding. Seven PIs (TU Braunschweig) in the project.

Grants (Die Junge Akademie)

2019–2024 **Die Junge Akademie**, *Funding for various projects joint with various PI's (fellow members of the academy).*, Since Spring 2020: €153.426 member project funding and additionally €118.312 project funding granted as part of the board; further funding granted before 2020.

Further details on request.

Grants (Supported as Host)

2021–2023 **Host and mentor for DFG Walter Benjamin Fellow Boulos El Hilany**, *Project title: “Classifying polynomial maps by means of polyhedral geometry”*, €153.600 .

Conference Support Grants

2026 **DFG Conference Grant in context of SPP 2458 “Combinatorial Synergies”**, *Workshop: “Positivity, Convexity and Computation in Rigidity Theory” at TU Braunschweig*, €3.600.

PI; Co-PIs: M. Himmelmann (TU Braunschweig), and M. Winter (TU Berlin)

2025 **DFG Conference Grant in context of SPP 2458 “Combinatorial Synergies”**, *Summer School: “Nonlinear Optimization and Combinatorics” at TU Braunschweig*, €7.220.

PI; Co-PIs: C. Kirches (TU Braunschweig), and T. Theobald (Goethe Univ. Frankfurt/Main)

Conference Travel Grants

2016 **XXI Coloquio Latinoamericano de Álgebra NSF travel grant**, \$ 1600.

2016 **FPSAC '16 conference travel grant**, \$ 750.

2015 **SIAM Conference on Applied Alg. Geom. 2015 NSF travel grant**, \$ 1350.

2015 **MEGA 2015 conference travel grant**, ~ \$ 550.

Grants (Co-PI)

2018–2019 **DFG Excellence Strategy**, *Project title: “Berlin Mathematics Research Center “MATH+ ””*, Several million Euro funding volume.

Co-PI; in summary 25 PI's and 10 Co-PI's; joint proposal of the math institutes of TU Berlin, FU Berlin, Humboldt University, as well as WIAS and the Zuse Institute.

Note: The program runs until 2024; I left in April '19 due to my move to TU Braunschweig.

2018–2021 **Programme Gaspard Monge pour l'Optimisation**, *Project title: “Optimisation hyperbolique: algorithmes et implantations”*, €8000.

Co-PI; PI: S. Naldi; further Co-PI's: M. Kummer, D. Plaumann, R. Sinn.

Awards

- 2019–2024 **Elected member of Die Junge Akademie (German Young Academy); elected member of the board (Präsidium) for the academic years 2021/22, and 2022/23; elected chair (Sprecher) for the academic year 2022/23**, at the Berlin-Brandenburgische Akademie der Wissenschaften (BBAW) and the Nationale Akademie der Wissenschaften Leopoldina.
- 2014 **Prize of the association of supporters of the Goethe University for young scientists 2014**.
Preis der Vereinigung von Freunden und Förderern der Goethe Universität für den naturwissenschaftlichen Nachwuchs 2014. Three prizes granted in total.
- 2009 **Minor prize of the DMV-Studierendenkonferenz 2009**.
for the Diploma thesis “*Polytope mit speziellen Simplizes*”.
- 2009 **Honors for the best graduation**.
master level in mathematics at the Goethe University in the winter term 08/09.

Scholarships

- Oct. 2007 – **Scholarship of the “German National Academic Foundation”**.
Dec. 2009 Scholarship of the “*Studienstiftung des deutschen Volkes*”.

Long Term Visits

- Jan 22–Mar. **Institut Mittag-Leffler, Djursholm, Sweden**.
17; Apr. Semester program “Tropical geometry, amoebas and polytopes”
16–20, 2018

Publications

Research Articles

- 1. Revealing hidden physical nonclassicality with nonnegative polynomials**
with T.-A. Ohst, B. Yadin, B. Ostermann, O. Gühne, and H.-C. Nguyen; *Physical Review Letters* **134** (3), 030201, published 24 January, 2025, DOI: 10.1103/PhysRevLett.134.030201
- 2. Chirality Detection in Scanning Tunneling Microscopy Data Using Artificial Intelligence**
with T. Seifert, M. Stritzke, P. Kasten, B. Möller, T. Fingscheidt, M. Etzkorn, and U. Schlickum; *Small Methods*, 2400549 (2024), <https://doi.org/10.1002/smt.202400549>.
- 3. Learning Variational Models with Unrolling and Bilevel Optimization**
with N. Breustedt, C. Brauer, and D. Lorenz; *Analysis and Applications* (special issue: “Interaction between Harmonic Analysis and Data Science”), **22** (03) (2024), 569-617; DOI: 10.1142/S0219530524400037
- 4. Divergent associations between slow-wave and rapid-eye movement sleep and amyloid-beta**
with Y. Rosenblum, M. Pereira, O. Stange, F. D. Weber, L. Bovy, S. Tzioridou, E. Lancini, D. A. Neville, N. Klein, M. Stritzke, I. Kersten, M. Uhr, J. A.H.R. Claassen, A. Steiger, M. M. Verbeek, and M. Dresler; *Annals of Neurology*; <https://doi.org/10.1002/ana.26935>.
- 5. Parameter Region for Multistationarity in n-Site Phosphorylation Networks**
with E. Feliu, N. Kaihnsa, and O. Yürük; *SIAM Journal on Applied Dynamical Systems (SIADS)*; **22** (3) (2023), 2024–2053; doi: 10.1137/22M1504548.
- 6. A Polyhedral Homotopy Algorithm For Real Zeros**
with A. A. Ergür; *Arnold Mathematical Journal*; **9**, 305–338 (2023); <https://doi.org/10.1007/s40598->

022-00219-w.

Was accepted for a talk at "MEGA 2021".

7. **The Algebraic Boundary of the SONC Cone**
with J. Forsgård; *SIAM Journal on Applied Algebra and Geometry*; **6** (3) (2022), 468-502; doi: 10.1137/20M1325484.
8. **Optimization over the Boolean Hypercube via Sums of Nonnegative Circuit Polynomials**
with M. Dressler and A. Kurpisz; *Foundations of Computational Mathematics*; **22** (2022), 365-387; published electronically on April 06, 2021; doi: 10.1007/s10208-021-09496-x. Extended abstract was published in the proceedings of *43rd International Symposium on Mathematical Foundations of Computer Science, MFCS 2018*, Liverpool, UK, August 27-31, 2018, (I. Potapov, P. G. Spirakis, and J. Worrell, eds.), LIPIcs, **117**, Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik, (2018), 82:1-82:17. Was also accepted for a talk at "FLoC 2018".
9. **The Kinetic Space of Multistationarity in Dual Phosphorylation**
with E. Feliu, N. Kaihnsa, and O. Yürük; *Journal of Dynamics and Differential Equations*; **34** (2022), 825-852; published electronically on Sep. 04, 2020; doi: 10.1007/s10884-020-09889-6.
10. **Initial Steps in the Classification of Maximal Mediated Sets**
with J. Hartzer, O. Röhrig, and O. Yürük; *Journal of Symbolic Computation* (special issue for "MEGA 2019") **109** (2022), 404-425; published electronically on July 08, 2020; doi: 10.1016/j.jsc.2020.07.013
Was accepted for a poster presentation at "MEGA 2019".
11. **Re-entrant tensegrity: A three-periodic, chiral, tensegrity structure that is auxetic.**
with M. Oster, M. Dias, and M. Evans; *Science Advances*, **7** (50) (2021), doi: 10.1126/sciadv.abj6737.
12. **Evaluation of Pool-based Testing Approaches to Enable Population-wide Screening for COVID-19**
with D. Pflüger, M. Rehme, J. Heuer, and M.-I. Bittner; *PLoS ONE* 15(12): e0243692. <https://doi.org/10.1371/journal.pone.0243692>;
see the accompanying website at <https://ipvs.informatik.uni-stuttgart.de/sgs/cgi-bin/JA/covid19/>
and the code and data at <https://github.com/SC-SGS/covid19-pooling>
13. **Nondegenerate Multistationarity in Small Reaction Networks**
with A. Shiu; *Discrete and Continuous Dynamical Systems, Series B*, **24** (6) (June 2019), 2683-2700.
14. **An Approach to Constrained Polynomial Optimization via Nonnegative Circuit Polynomials and Geometric Programming**
with M. Dressler, and S. Ilman; *Journal of Symbolic Computation* (special issue for "MEGA 2017"), **91**, (2019), 149-172.
15. **Imaginary Projections of Polynomials**
with T. Jörgens, and T. Theobald; *Journal of Symbolic Computation* (special issue for "MEGA 2017"), **91**, (2019), 181-199.
Was accepted for a talk at "MEGA 2017".
16. **Lopsided Approximation of Amoebas**
with J. Forsgård, L. Matusevich, and N. Mehlhop; *Mathematics of Computation*, **88** (315) (2019), 485-500.
17. **A Positivstellensatz for Sums of Nonnegative Circuit Polynomials**
with M. Dressler, and S. Ilman; *SIAM Journal on Applied Algebra and Geometry*, **1** (1) (2017), 536-555; doi: <https://doi.org/10.1137/16M1086303>

Was accepted for a talk at "MEGA 2017".

18. **Lower Bounds for Polynomials with Simplex Newton Polytopes Based on Geometric Programming**
with S. Ilman; *SIAM Journal on Optimization*, **26** (2) (2016), 1128-1146; <https://doi.org/10.1137/140962425>
19. **Amoebas, Nonnegative Polynomials and Sums of Squares Supported on Circuits**
with S. Ilman; *Research in the Mathematical Sciences*, **3** (1) (2016), 1-35; doi: 10.1186/s40687-016-0052-2
Was accepted for a talk at "MEGA 2015".
20. **Norms of Roots of Trinomials**
with T. Theobald; *Mathematische Annalen*, **366** (1) (2016), 219-247.
Was accepted for a talk at "MEGA 2015".
21. **Separating Inequalities for Nonnegative Polynomials that Are not Sums of Squares**
with S. Ilman; *Journal of Symbolic Computation*, **68** (2015), part 2, 181-194 (special issue for "MEGA 2013").
Was accepted for a talk at "MEGA 2013".
22. **Approximating Amoebas and Coamoebas by Sums of Squares**
with T. Theobald; *Mathematics of Computation* **84** (2015), 455-473.
Was accepted for a poster presentation at "MEGA 2011".
23. **Amoebas of Genus at Most One**
with T. Theobald; *Advances in Mathematics* **239** (2013), 190-213; <https://doi.org/10.1016/j.aim.2013.03.001>

Conference Articles

Covers only articles accepted for talks at peer reviewed conferences, which appeared in the conference proceedings, and which have not additionally been published in a journal (yet).

24. **Enhancing Composite Micrograph Analysis with Semantic Segmentation**
with C. Brauer, J. Naumann, J. Appels, P. Sämann; *SAMPE 2025*.
25. **Initial Application of SONC to Lyapunov Stability of Dynamical Systems**
with J. Heuer; *Proceedings of ISSAC 2024*, Raleigh, NC, USA, July 16-19, 2024 (J. D. Hauenstein, W. Lee, and S. Chen (eds.)), ACM, (2024), 361 - 370, doi: <https://doi.org/10.1145/3666000.3669709>.
26. **Global Optimization via the Dual SONC Cone and Linear Programming**
with M. Dressler, H. Naumann, and J. Heuer; *Proceedings of ISSAC 2020*, Kalamata, Greece, July 20-23, 2020 (virtual conference due to COVID-19) (I. Z. Emiris, and L. Zhi (eds.)), ACM, (2020), 138 - 145, doi: <https://doi.org/10.1145/3373207.3404043>.
27. **Computing the Real Isolated Points of an Algebraic Hypersurface**
with P. L. Huu, and M. Safey El Din; *Proceedings of ISSAC 2020*, Kalamata, Greece, July 20-23, 2020 (virtual conference due to COVID-19) (I. Z. Emiris, and L. Zhi (eds.)), ACM, (2020), 297-304.
28. **New Dependencies of Hierarchies in Polynomial Optimization**
with A. Kurpisz; *Proceedings of ISSAC 2019*, Beijing, China, July 15-18, 2019 (J. H. Davenport, D. Wang, M. Kauers, and R. J. Bradford (eds.)), ACM, (2019), 251-258.
29. **Exact Optimization via Sums of Nonnegative Circuits and Sums of AM/GM Exponentials**
with V. Magron and H. Seidler; *Proceedings of ISSAC 2019*, Beijing, China, July 15-18, 2019 (J. H. Davenport, D. Wang, M. Kauers, and R. J. Bradford (eds.)), ACM, (2019), 291-298.
30. **A New Method for Computing Elimination Ideals of Likelihood Equations**
with X. Tang and R. Zhao; *Proceedings of ISSAC 2019*, Beijing, China, July 15-18, 2019 (J. H. Davenport, D. Wang, M. Kauers, and R. J. Bradford (eds.)), ACM, (2019), 339-346.

Articles Accepted for Publication

Covers articles accepted for publication in a journal or in conference proceedings after a peer-review.

31. **The Duality of SONC: Advances in Circuit-based Certificates**
with J. Heuer; to appear in *Journal of Symbolic Computation*, (special issue for "MEGA 2024");
see also [ArXiv 2204.03918](#).
Was accepted for a poster at "MEGA 2022".

Preprints

Covers also articles accepted for talks or posters at peer reviewed conferences, which did not appear in the conference proceedings or journals yet.

31. **Nonnegativity of signomials with Newton simplex over convex sets**
J. Ellwanger, T. Theobald, T. de Wolff; see [ArXiv 2504.10302](#).
32. **Benchmarking of quantum and classical SDP relaxations for QUBO formulations of real-world logistics problems**
with B. Ostermann, T. Garnowski, F. Henze, V. Jha, A. Dia, F. Fiand, D. Gross, W. Groß, J. Nowak, T. de Wolff; see [ArXiv 2503.10801](#).
33. **Solving quadratic binary optimization problems using quantum SDP methods: Non-asymptotic running time analysis**
with F. Henze, V. Tran, B. Ostermann, R. Kueng, T. de Wolff, D. Gross; see [ArXiv 2502.15426](#).
34. **A Speed-up for Helsgaun's TSP Heuristic by Relaxing the Positive Gain Criterion**
with S. Ammann, B. Ostermann, and S. Stiller; see [ArXiv 2401.16149](#).
35. **Realistic Runtime Analysis for Quantum Simplex Computation**
with S. Ammann, M. Hess, D. Ramacciotti, S. Fekete, P. Goedicke, D. Gross, A. Lefterovici, T. Osborne, M. Perk, A. Rotundo, S. Skelton, and S. Stiller; see [ArXiv 2311.09995](#).
36. **A Generalized Muirhead Inequality and Symmetric Sums of Nonnegative Circuits**
with J. Heuer, and N. Tran; see [ArXiv 2211.07266](#).
37. **An Experimental Comparison of SONC and SOS Certificates for Unconstrained Optimization**
with H. Seidler; see [ArXiv 1808.08431](#).
Was accepted for a talk at "MEGA 2019".
38. **The Lattice of Amoebas**
with J. Forsgård; see [ArXiv 1711.02705](#).
39. **Intersections of Amoebas**
with M. Juhnke-Kubitzke; see [ArXiv 1510.08416](#).
Was accepted for a poster presentation at "FPSAC '16".
40. **A Sharp Upper Bound for the Complexity of Labeled Oriented Trees**
with M. Christmann; see [ArXiv 1412.7257](#).
41. **The Boundary of Amoebas**
with F. Schroeter; see [ArXiv 1310.7363](#).
42. **Low Dimensional Test Sets for Nonnegativity of Even Symmetric Forms**
with S. Ilman; see [ArXiv 1303.4241](#).
43. **Polytopes with Special Simplices;**
see [ArXiv 1009.6158](#)

Conference Proceedings (as editor)

1. **Mathematical Software - ICMS 2020, Proceedings**
with A.M. Bigatti, J. Carette, J.H. Davenport, and M. Joswig (Eds.), LNCS 12097, Springer

2020.

Surveys

1. **Amoebas and their Tropicalizations – a Survey**
“*Analysis meets Geometry: The Mikael Passare Memorial Volume*”, M. Andersson, J. Boman, C. Kiselman, P. Kurasov, R. Sigurdsson (Eds.), Series: **Trends in Mathematics**, Birkhäuser Mathematics, 2017, 157-190.
2. **Amoebas, Nonnegative Polynomials and Sums of Squares Supported on Circuits**
an extended abstract for the correspondent article; **Oberwolfach Report**, no. 23, 2015, 1308-1311; for the workshop “*Tropical Aspects in Geometry, Topology and Physics*”.

Outreach Writings

1. **Leitlinien für unbefristete Stellen an Universitäten neben der Professur**
Stellungnahme der Jungen Akademie gemeinsam mit der Hochschulrektorenkonferenz (Statement of the Young Academy joint with the German Rectors' Conference); with G. Kopp, G. Krausch, W. Rosenthal, E. Schleiff, D. Segets, A. Steinbeck; June 2024.
2. **WissZeitVG: Eine Antwort auf das Eckpunktepapier des BMBF**
Stellungnahme der Jungen Akademie (Statement of the Young Academy); with D. Segets, March 2023.
3. **Perspektiven auf das Wissenschaftszeitvertragsgesetz**
Stellungnahme der Jungen Akademie (Statement of the Young Academy); with A. Eichhorn, S. Fuchs, G. Kopp, R. Kretschmer, T. Merl, and D. Segets, June 2022.
4. **Freundschaft in der Mathematik** (Friendship in Mathematics)
in the **Kalender der Jungen Akademie 2021** (Hrsg. S. Büchner, B. Esche), Mitte/Rand Verlag (in German), 2021.
5. **Sprache und Bilder in der Mathematik** (Language and Images in Mathematics)
in the **Junge Akademie Magazin**, # 28 “*Bild / Sprache*” (“*Image / Language*”) (Hrsg. B. Bock, B. Esche), die Junge Akademie (in German), 2021.
6. **The International Congress on Mathematical Software goes virtual: Experience from organizing an online conference in times of Covid-19**
with M. Joswig; **Notices of the American Mathematical Society**, **68**, (6), (2021), 938-939.
7. **Existiert überhaupt eine Methode, die das bewirkt, was man erreichen möchte?** (Does there exist a method to achieve ones goals?)
with support of K. Vaillant; Interview (in German) of Alexandra Carpentier at the occasion of her winning the von Kaven Award 2020 of the DFG; **Mitteilungen der DMV** **28**, 4 (2020); published online: April 1, 2021; doi: 10.1515/dmvm-2020-0068.
8. **#StopPandemicBias: scientists, share your privilege**
with U. Endesfelder, D. Pflüger; correspondence; **Nature**, **583**, 683 (2020); doi: 10.1038/d41586-020-02234-3.

Theses

1. **On the Geometry, Topology and Approximation of Amoebas**
PhD-thesis (Dissertation) for mathematics, 2013.
2. **Goodmans “New Riddle of Induction” - Eine Analyse auf mathematischer Grundlage**
Master thesis (Magisterarbeit) for philosophy (in German), 2010.
3. **Polytope mit speziellen Simplizes**
Master thesis (Diplomarbeit) for mathematics (in German), 2008.

Software Projects (Selection)

1. **POEM**, a **Python** based software for polynomial optimization using SONC and SOS nonnegativity certificates;
with H. Seidler.
Latest Version: (0.2.1.0(a)); (prototype – for test purposes only). Latest Update: 07/04/19;
Development: Summer 2017–Spring 2019
2. **Maximal_Mediated_Sets.sage**, a **Python** class for the computation of maximal mediated sets via **SAGE**;
with J. Hartzler.
Latest Version: (0.1.0.1(a)). Latest Update: 04/03/17. Development: Fall 2016–Spring 2017.
3. **VIRO.sage**, a **Python** class for using Viro’s Patchworking from within **SAGE**;
with C. O’Neill and E. Owusu Kwaakwah (alumna).
Latest Version: (0.4b). Latest Update: 05/09/18. Development: Spring 2015–present.

Talks

Peer Reviewed Conference Talks

- July 19, 2024 **ISSAC 2024**, *North Carolina State University, NC, USA*.
Initial Application of SONC to Lyapunov Stability of Dynamical Systems
- June 18, 2019 **MEGA 2019**, *Universidad Complutense de Madrid, Spain*.
An Experimental Comparison of SONC and SOS Certificates for Unconstrained Optimization
- July 5, 2016 **FPSAC '16**, *Simon Fraser University, Vancouver, Canada*.
Intersections of Amoebas (poster presentation)
- June 18, 2015 **MEGA 2015**, *University of Trento, Italy*.
Norms of Roots of Trinomials
- June 15, 2015 **MEGA 2015**, *University of Trento, Italy*.
Amoebas, Nonnegative Polynomials and Sums of Squares Supported on Circuits
- June 5, 2013 **MEGA 2013**, *Goethe University, Frankfurt/Main, Germany*.
Separating Inequalities for Nonnegative Polynomials that Are not Sums of Squares
- May 31, 2011 **MEGA 2011**, *Stockholm University, Sweden*.
Approximation of Amoebas and Coamoebas by Sums of Squares (poster presentation)

Invited Conference Talks

- Oct 17, 2025 **Conference “Algebraic methods in dynamics and particle physics”**, *Saarland Univ., Saarbrücken, Germany*.
A Spotlight on Polynomial Optimization Problems in Dynamical Systems
- July 09, 2025 **Minisymposium “The Intersection of Polynomial Optimization, Dynamics, and Combinatorics” at the SIAM Conference on Applied Algebraic Geometry**, *Univ. of Wisconsin–Madison, WI, USA*.
Combinatorial Challenges in Polynomial Optimization Problems Arising in Dynamical Systems
- Aug 02, 2024 **Workshop “Polynomial Optimization for Nonlinear Dynamics: Theory, Algorithms, and Applications”**, *Oberwolfach, Germany*.
Determining Multistationarity in n -site Phosphorylation using Sums of Nonnegative Circuit Polynomials
- June 07, 2024 **Conference “Computational and Applied Enumerative Geometry 2024” (Conference in honour of Frank Sottile’s 60th birthday)**, *Fields Institute, Toronto, Canada*.
Amoebas and Nonnegativity – A Journey through the Real World

- July 14, 2023 **Minisymposium “Polynomial optimization: Approximation hierarchies and their convergence analysis” at the SIAM Conference on Applied Algebraic Geometry, Eindhoven University, The Netherlands.**
The SONC Cone: Primal and Dual Perspectives
- June 17, 2023 **Workshop “Computational Algebraic Geometry” at the Foundations of Computational Mathematics (FoCM 2023) Conference, Paris, France.**
The SONC Cone: Primal and Dual Perspectives
- Apr. 13, 2023 **Interdisciplinary Workshop: “Mehr-als-Menschliche Heroisierungen: Darstellungen eines Phänomens” (“More-than-Human Heroization: Portrayal of a Phenomenon”), Universität Freiburg, Germany.**
Eine Gratwanderung zwischen Entheroisierung und Mystifizierung von künstlicher Intelligenz
- Mar 11, 2022 **Annual Conference of the Fachgruppe Computeralgebra of the DMV (virtual), München, Germany / virtual.**
The SONC Cone: Primal and Dual Perspectives
- Sep 20, 2021 **Workshop “Numerical and Probabilistic Nonlinear Algebra”, Max Planck Institute for Mathematics in the Sciences; Leipzig, Germany.**
An Introduction to Nonnegativity and Polynomial Optimization
- Sep 16, 2021 **Workshop “POEMA (Polynomial Optimization, Efficiency through Moments and Algebra) ITN Learning Week” (virtual), LAAS-CNRS, Toulouse, France / virtual.**
An Introduction to Circuitpolynomials and AM/GM-based Certificates of Nonnegativity
- Aug 16, 2021 **Minisymposium “Computational Real Algebraic Geometry” at the 2021 SIAM Conference on Applied Algebraic Geometry, Texas A&M University, TX, USA.**
Applications of SONCs and other Certificates of Nonnegativity in Chemical Reaction Networks; Note: [Talk cancelled due to COVID-19 vaccination \(side effects\)](#)
- May 21, 2021 **Online-Workshop Computational Algebra 2021 (virtual), Oldenburg, Germany / virtual.**
An Introduction to Nonnegativity and Polynomial Optimization
- March 14, 2021 **AMS special session on “Optimization and Real Algebraic Geometry” at the Spring Southeastern Sectional Meeting 2021 (online), Georgia Tech, Atlanta, GA, USA.**
Certificates of Nonnegativity and Their Applications in Theoretical Computer Science
- Sep 14-17, 2020 **Minisymposium “Computeralgebra” at the DMV Jahrestagung (online), TU Chemnitz, Germany.**
Note: [Minisymposium cancelled due to COVID-19](#)
- June 15-24, 2020 **Workshop “Computational Algebraic Geometry” at the FoCM 2020 Conference, Simon Fraser University, Vancouver, Canada.**
Note: [Conference cancelled due to COVID-19](#)
- Oct 8, 2019 **“Varieties, Polyhedra, Computation” - Opening Conference for the MATH+ Semester on Applied Algebraic Geometry, TU Berlin, Germany.**
Discriminants, Nonnegativity, and Tropical Geometry
- Sep 27, 2019 **Workshop “Discrete Geometry with a View on Symplectic and Tropical Geometry”, Univ. zu Köln, Germany.**
Discriminants, Nonnegativity, and Tropical Geometry
- Aug 6, 2019 **Conic, Copositive and Polynomial Optimization Cluster, ICCOPT 2019, Berlin, Germany.**
New Dependencies of Hierarchies in Polynomial Optimization
- July 11, 2019 **Minisymposium “Numerical Methods for Structured Polynomial Solving” at the 2019 SIAM Conference on Applied Algebraic Geometry, Bern, Switzerland.**
Polyhedral Real Homotopy Continuation

- March 20, 2019 **Conference “Mathematics of Quantum Information”**, *Siegen, Germany*.
New Dependencies of Hierarchies in Polynomial Optimization
- Dec. 14, 2018 **Workshop on Applied Algebraic Geometry**, *Bristol, UK*.
Nondegenerate Multistationarity in Small Reaction Networks
- Nov. 21, 2018 **Session on “Semialgebraic Optimization and Applications” at the PGM Days 2018**, *EDF’Lab Paris-Saclay, France*.
An Experimental Comparison of SONC and SOS Certificates for Unconstrained Optimization
- Nov. 3, 2018 **AMS special session on “Numerical Methods for Nonlinear Systems”**, *University of Arkansas, Fayetteville, AR, USA*.
Polynomial Optimization via SONC Certificates
- Oct. 19, 2018 **Workshop on Real Algebraic Geometry and Optimization**, *ICERM, Brown University, RI, USA*.
An Experimental Comparison of SONC and SOS Certificates for Unconstrained Optimization
- Oct. 2, 2018 **Workshop on “Hot Topics: Shape and Structure of Materials”**, *MSRI, Berkeley, CA, USA*.
An Introduction to Computational Algebraic Geometry and Polynomial Optimization
- July 12, 2018 **Session on “Theory of Convex Optimization” at the 2018 SIAM Annual Meeting**, *Portland, OR*.
Optimization over the Boolean Hypercube via Sums of Nonnegative Circuit Polynomials
- July 3, 2018 **Workshop on “Relative Entropy Programming” at the ISMP 2018**, *Bordeaux, France*.
Optimization over the Hypercube via Sums of Nonnegative Circuit Polynomials
- Feb 22, 2018 **Workshop on “Combinatorics, Polytopes, and Complexity” during the Semester Program “Tropical Geometry, Amoebas, and Polytopes”**, *Institut Mittag-Leffler, Djursholm, Sweden*.
The Lattice of Amoebas
- Nov. 14, 2017 **Session on “Hierarchies of Certified Convex Programs for Polynomial Systems” at the PGM Days 2017**, *EDF’Lab Paris-Saclay, France*.
Note: **Cancelled due to sickness**
- Aug. 4, 2017 **Minisymposium “Semidefinite Optimization and Convex Algebraic Geometry” at the 2017 SIAM Conference on Applied Algebraic Geometry**, *Atlanta, GA*.
The Relation between SOS and SONC
- July 11, 2017 **Workshop “Computational Algebraic Geometry” at FoCM 2017**, *Barcelona, Spain*.
A Positivstellensatz for Sums of Nonnegative Circuit Polynomials
- May 22-25, 2017 **Minisymposium “Relative Entropy Relaxations for Signomial Optimization” at the 2017 SIAM Conference on Optimization**, *Vancouver, Canada*.
Note: **Cancelled due to move to Germany**
- Nov. 30, 2016 **Workshop “Algorithms and Effectivity in Tropical Mathematics and Beyond”**, *Schloss Dagstuhl, Germany*.
Lopsided Amoeba Approximation
- Nov. 14, 2016 **Session “Mixed Integer Polynomial Optimization” at the 2016 INFORMS Annual Meeting**, *Nashville, TN*.
New Certificates for Nonnegativity via Nonnegative Circuit Polynomials
- Nov. 12, 2016 **AMS special session on “Applied Algebraic Geometry”**, *North Carolina State University, Raleigh, NC*.
New Certificates for Nonnegativity via Nonnegative Circuit Polynomials
- May 4, 2016 **Eighth Discrete Geom. and Algebr. Combinatorics Conf.**, *South Padre Island, TX*.
New Certificates for Nonnegativity via Circuit Polynomials and Geometric Programming

- April 9, 2016 **Meeting on Algebraic Geometry for Applications**, *Clemson University, SC*.
New Certificates for Nonnegativity via Circuit Polynomials and Geometric Programming
- Aug. 4, 2015 **Minisymposium “Tropical Geometry” at the SIAM Conference on Applied Algebraic Geometry**, *NIMS & KAIST, Deajeon, South Korea*.
Roots of Trinomials from the Viewpoint of Amoeba Theory
- May 29, 2015 **Workshop on NonLinear Algebra**, *Academy of Sciences and Humanity, Berlin, Germany*.
Computing Amoebas
- May 1, 2015 **Tropical Aspects in Geometry, Topology and Physics**, *MFO, Oberwolfach, Germany*.
Amoebas, Nonnegative Polynomials and Sums of Squares Supported on Circuits
- June 27, 2014 **Tropical Dibbelabbes**, *Saarland University, Saarbrücken, Germany*.
Amoebas, Nonnegative Polynomials and Sums of Squares Supported on Circuits
- Sep. 3, 2013 **Tropical Geometry and Topology**, *MPI, Bonn, Germany*.
Roots of Trinomials from the Viewpoint of Amoeba Theory
- July 30, 2011 **4th PhD-students Conference on Tropical Geometry**, *Technische Universität Kaiserslautern, Germany*.
The Configuration Space of Amoebas with Barycentric Simplex Newton Polytope
- Oct. 2, 2009 **DMV-Studierendenkonferenz**, *Ruhr Universität, Bochum, Germany*.
Polytopes with Special Simplices
- Dec. 11, 2009 **1st PhD-students Conference on Tropical Geometry**, *Technische Universität Berlin, Germany*.
Amoebas of Genus at Most One
- Invited Panel Discussions**
- Oct. 19, 2023 **Debate on “slow”, impactful, methodical science**, *The Belgian Young Academy, Port House, Antwerp, Belgium*.
Panelist.
- Aug. 25, 2023 **“Der perfekte Lehrstuhl: Wie kann Wissenschaft im Team organisiert sein?” (The perfect chair: How can science be organized as a team?)**, *Projekt “UnSicht” Abschlussstagung, TU Dortmund, Germany*.
Panelist.
- June 27, 2023 **“Wie fördern wir erkenntnisbasierte Entscheidungen?” (How do we support enlightenment based decisions?)**, *DFG Annual Meeting, Saarbrücken, Germany*.
Panelist.
- June 16, 2023 **“Die Zukunft der Akademie” (The Future of the Academy)**, *BBAW, Berlin, Germany*.
Panelist.
- May 04, 2023 **“Academic Freedom in a New Era”; Part 2: “The Impact of Freedom”**, *ENYA Annual Meeting, Stockholm, Sweden*.
Chair.
- Mar. 14, 2023 **“The Academy of Tomorrow: Many Routes to Many Futures”**, *AGYA Annual Meeting, Leopoldina, Halle, Germany*.
Panelist.
- Dec. 19, 2022 **“Aufbruch für Ost und West” (Inception for East and West); panel discussion as part of the initialization of a Young East-West-Network of the Berlin-Brandenburgische Akademie der Wissenschaften**, *BBAW, Berlin, Germany*.
Panelist.

- Nov. 07, 2022 **“Technologie- und Innovationstransfer” (Transfer of Technology and Innovation) at the Transfer-Veranstaltungsreihe of the Universitätsallianz (UA) 11+ e.V., die Junge Akademie and der Stifterverband, Berlin, Germany.**
Panelist.
- Oct. 11, 2022 **Jubiläumssymposium “Reflexion der Wissenschaft – Wissenschaft der Reflexion” (Reflexion of Science – Science of Reflexion) at the Zentrum für Wissenschaftsforschung an der Nationalen Akademie der Wissenschaften Leopoldina, Halle, Germany.**
Panelist.
- July 14, 2022 **“Wissenschaftspolitischer Abend” (Evening on Science Politics) at the DFG Emmy Noether Program Annual Meeting, Potsdam, Germany.**
Panelist.
- Sep. 27, 2021 **“Get-together and career advice for young mathematicians” at the DMV-ÖMG Annual Conference 2021, Virtual.**
Panelist.
- Nov. 30, 2018 **BMS Career Talks 2018, Urania, Berlin.**
Panelist.
- [Further Conference and Workshop Talks](#)
- Oct. 26, 2023 **Internal Workshop the “ProvideQ” Project on Benchmarks, Cologne, Germany.**
An Introduction to Polynomial Optimization with Focus on the Boolean Hypercube
- Oct. 09, 2023 **Retreat of the Working Group “Posthumanism” of the German Young Academy, Kloster Seeon, Germany.**
Eine Gratwanderung zwischen Enteroisierung und Mystifizierung von künstlicher Intelligenz
- Oct 11, 2019 **Herbstplenum der Jungen Akademie, Katholische Akademie Hamburg, Germany.**
Artificial Intelligence in Medicine (poster presentation; joint with I. N. Schellinger)
- Oct 11, 2019 **Herbstplenum der Jungen Akademie, Katholische Akademie Hamburg, Germany.**
Identifying Parameter Regions of Monostationarity via SONC (poster presentation)
- Sep. 27, 2017 **First annual meeting of the DFG collaborative research center SFB-TRR 195, RWTH Aachen, Germany.**
Lopsided Amoeba Approximation
- Aug. 2, 2017 **Minisymposium “Real Algebraic Geometry and Optimization” at the SIAM Conference on Applied Algebraic Geometry, Atlanta, GA.**
Current Key Problems on Sums of Nonnegative Circuit Polynomials
- June 10, 2017 **Workshop “Polynomials and Polytopes”, Technische Universität Berlin, Germany.**
A New Approach to Nonnegativity and Polynomial Optimization
- July 26, 2016 **XXI Coloquio Latinoamericano de Álgebra, Universidad de Buenos Aires, Argentina.**
Intersections of Amoebas (poster presentation)
- April 2, 2016 **TAGS 2016, University of Texas at Austin, TX.**
Intersections of Amoebas (poster presentation)
- Jan. 9, 2016 **Joint Mathematics Meeting, Seattle, WA.**
Nonnegative Polynomials and Sums of Squares Supported on Circuits
- Nov. 7, 2015 **TGTC '15, Rice University, Houston, TX.**
Norms of Roots of Trinomials (poster presentation)
- Apr. 11, 2015 **TAGS 2015, Texas A&M University, College Station, TX.**
Norms of Roots of Trinomials (poster presentation)

- March 15, 2014 **Annual conference of the DFG priority project SPP 1489 “Algorithmic and experimental methods in algebra, geometry, and number theory”**, *Bad Boll, Germany*.
Amoebas, Nonnegative Polynomials and Sums of Squares Supported on Circuits
- Sep. 25, 2013 **ÖMG-DMV Congress 2013**, *University of Innsbruck, Austria*.
Roots of Trinomials from the Viewpoint of Amoeba Theory
- Sep. 18, 2012 **DMV-Jahrestagung**, *Saarland University, Saarbrücken, Germany*.
Tropical Approaches to Amoebas Supported on a Circuit
- April 2, 2012 **Workshop “Tropical Geometry”**, *ICMS, Edinburgh, Scotland*.
The Configuration Space of Amoebas (poster presentation)
- Nov. 12, 2010 **Kolkom 2010**, *MPI, Saarbrücken, Germany*.
Polytopes with Special Simplices
- [Research Seminar Talks](#)
- May 20, 2025 **Algebra und Geometrie Seminar**, *OvGU Magdeburg, Germany*.
Recent Developments in Sparse Polynomial Optimization
- Apr 01, 2025 **AROMATH (Algebra, Geometry, Modelling and Algorithms) Seminar**, *Inria Sophia Antipolis, France*.
Recent Developments in Sparse Polynomial Optimization
- Aug 28, 2024 **Applied Geometry and Topology Seminar**, *Univ. Potsdam, Germany*.
Amoebas and Nonnegativity – A Journey through the Real World
- Jan 24, 2024 **DACO Seminar**, *ETH Zürich, Switzerland*.
An Introduction to Nonnegativity and Polynomial Optimization
- Nov 07, 2023 **Applied Algebra Seminar**, *University of Copenhagen, Denmark*.
Recent Developments of Circuit Polynomials in Polynomial Optimization
- Oct 07, 2021 **Applied Algebra Seminar (online)**, *University of Wisconsin at Madison, USA*.
Certificates of Nonnegativity and Maximal Mediated Sets
- March 09, 2021 **SIAM SAGA - Seminar on Applied Geometry and Algebra (online)**, *Recurring monthly virtual seminar by the SIAM algebraic geometry activity group*.
Certificates of Nonnegativity and Their Applications in Theoretical Computer Science
- Jan 21, 2021 **Oberseminar Algebraische Geometrie**, *LUH Hannover, Germany (online)*.
Nonnegativity, Discriminants, and Tropical Geometry
- Sep 8, 2020 **Nonlinear Algebra Seminar Online (NASO)**, *MPI Leipzig, Germany (online)*.
New Dependencies of Hierarchies in Polynomial Optimization
- June 11, 2020 **Seminar on Combinatorial Aspects of Commutative Algebra and Algebraic Geometry (CACAAG)**, *IITB, Bombay, India (online)*.
Nonnegativity, Discriminants, and Tropical Geometry
- Jan. 09, 2019 **Discrete Mathematics and Geometry Seminar**, *Technische Universität Berlin, Germany*.
Nondegenerate Multistationarity in Small Reaction Networks
- Oct. 29, 2018 **Industrial & Applied Mathematics Seminar**, *Texas A&M University, College Station, TX, USA*.
An Experimental Comparison of SONC and SOS Certificates for Unconstrained Optimization
- Oct. 26, 2018 **Valley Geometry Seminar**, *UMass Amherst, MA, USA*.
An Experimental Comparison of SONC and SOS Certificates for Unconstrained Optimization
- May 14, 2018 **Séminaire Parisien d’Optimisation**, *Institut Henri Poincaré, Paris, France*.
A New Approach to Nonnegativity and Polynomial Optimization
- Nov. 29, 2017 **Graduiertenkolleg: “Kombinatorische Strukturen in der Geometrie”**, *Universität Osnabrück, Germany*.
Discrete Structures Related to Nonnegativity

- Nov. 20, 2017 **Graduiertenkolleg: "Methods for Discrete Structures"**, *Technische Universität Berlin, Germany.*
Discrete Structures Related to Nonnegativity
- Oct. 27, 2017 **Oberseminar "Mathematische Optimierung"**, *Otto von Guericke Universität Magdeburg, Germany.*
A New Approach to Nonnegativity and Polynomial Optimization
- Aug. 23, 2017 **Discrete Mathematics and Geometry Seminar**, *Technische Universität Berlin, Germany.*
Intersections of Amoebas
- July 14, 2017 **Applied Mathematics Seminar**, *Hausdorff Center for Mathematics, Bonn, Germany.*
A New Approach to Nonnegativity and Polynomial Optimization
- Feb 17, 2017 **Geometry Seminar**, *Texas A&M University, College Station, TX.*
Constrained Polynomial Optimization via SONCs and Relative Entropy Programming
- Feb 17, 2017 **Algebra and Combinatorics Seminar**, *Texas A&M University, College Station, TX.*
A Positivstellensatz for Sums of Nonnegative Circuit Polynomials
- Feb 7, 2017 **Junior Algebra & Geometry Seminar**, *Texas A&M University, College Station, TX.*
An Introduction to Tropical Geometry
- Nov. 25, 2016 **Discrete Geometry Seminar**, *Freie Universität Berlin, Germany.*
A New Approach to Nonnegativity and Polynomial Optimization
- Nov. 24, 2016 **Discrete and Algorithmic Geometry Seminar**, *Technische Universität Berlin, Germany.*
A New Approach to Nonnegativity and Polynomial Optimization
- April 8, 2016 **Algebraic Geometry and Number Theory Seminar**, *Clemson University, SC.*
Intersections of Amoebas
- March 16, 2016 **Algebra Seminar**, *Universidad de Los Andes, Bogotá, Colombia.*
An Introduction to Amoeba Theory and Intersections of Amoebas
- Feb 16, 2016 **Junior Algebra & Geometry Seminar**, *Texas A&M University, College Station, TX.*
An Introduction to Tropical Geometry
- Feb. 11, 2016 **Scientific and Statistical Computing Seminar**, *University of Chicago, IL.*
New Certificates for Nonnegativity via Circuit Polynomials and Geometric Programming
- Feb. 4, 2016 **FRAGMENT Seminar**, *Colorado State University, Fort Collins, CO.*
An Introduction to Amoeba Theory and Intersections of Amoebas
- Feb. 3, 2016 **Joint FRAGMENT and Poisson Geometry Seminar**, *Univ. of Colorado at Boulder, CO.*
New Certificates for Nonnegativity via Circuit Polynomials and Geometric Programming
- Jan. 29, 2016 **Algebra and Combinatorics Seminar**, *Texas A&M University, College Station, TX.*
Intersections of Amoebas
- Oct. 6, 2015 **Algebra seminar**, *Emory University, Atlanta, GA.*
Roots of Trinomials from the Viewpoint of Amoeba Theory
- Oct. 5, 2015 **Algebra seminar**, *Georgia Tech, Atlanta, GA.*
Amoebas, Nonnegative Polynomials and Sums of Squares Supported on Circuits
- Sep. 15, 2015 **Algebraic Geometry and Number Theory Seminar**, *Rice University, Houston, TX.*
Nonnegative Polynomials and Sums of Squares Supported on Circuits
- June 26, 2015 **CAKE Seminar**, *Universität Osnabrück, Germany.*
An Introduction to Amoeba Theory
- June 11, 2015 **Oberseminar Algebraische Geometrie**, *Universität Augsburg, Germany.*
Roots of Trinomials from the Viewpoint of Amoeba Theory
- March 6, 2015 **Algebra and Combinatorics Seminar**, *Texas A&M University, College Station, TX.*
A Sharp Upper Bound for the Complexity of Labeled Oriented Trees

- Feb. 19, 2015 **Number Theory Seminar**, *University of Texas at Austin, TX.*
Nonnegative Polynomials and Sums of Squares Supported on Circuits
- Feb. 16, 2015 **Geometry Seminar**, *Texas A&M University, College Station, TX.*
The Boundary of Amoebas
- Sep. 30, 2014 **Student Working Sem. in Discrete Math.**, *Texas A&M University, College Station, TX.*
An Introduction to Amoeba Theory
- Sep. 29, 2014 **Geometry Seminar**, *Texas A&M University, College Station, TX.*
Amoebas, Nonnegative Polynomials and Sums of Squares Supported on Circuits
- Sep. 23, 2014 **Student Working Sem. in Discrete Math.**, *Texas A&M University, College Station, TX.*
An Introduction to Tropical Geometry
- June 5, 2014 **Discrete Geometry Seminar**, *Freie Universität Berlin, Germany.*
Nonnegative Polynomials and Sums of Squares Supported on Circuits
- Jan. 28, 2014 **Research Group “Polyhedral Surfaces”**, *Technische Universität Berlin, Germany.*
An Introduction to Amoeba Theory
- Jan. 27, 2014 **AG Diskrete Mathematik**, *Goethe University, Frankfurt/Main, Germany.*
The Boundary of Amoebas
- Jan. 15, 2014 **Oberseminar: Optimierung, Geometrie und diskrete Math.**, *Universität zu Köln, Germany.*
Amoebas, Nonnegative Polynomials and Sums of Squares Supported on Circuits
- Dec. 5, 2013 **Oberseminar Algebraische Geometrie und Computeralgebra**, *Saarland University, Saarbrücken, Germany.*
The Boundary of Amoebas
- July 12, 2013 **AG Diskrete Mathematik**, *Goethe University, Frankfurt/Main, Germany.*
Contemporary Key Problems in Amoeba Theory
- Oct. 28, 2012 **PhD-students seminar**, *Goethe University, Frankfurt/Main, Germany.*
An Introduction to Amoeba Theory
- June 27, 2012 **AG & Oberseminar Diskrete Mathematik**, *Goethe University, Frankfurt/Main, Germany.*
Roots of Trinomials from the Viewpoint of Amoeba Theory
- June 8, 2012 **Working group algebra and combinatorics**, *CWI, Amsterdam, The Netherlands.*
Separating Inequalities for Nonnegative Polynomials that Are not Sums of Squares
- June 6, 2012 **Séminaire de Géométrie Tropicale**, *Université Pierre et Marie Curie (Paris 6), Paris, France.*
Roots of Trinomials from the Viewpoint of Amoeba Theory
- May 23, 2012 **Oberseminar “Kombinatorik und Algebra”**, *Philipps-Universität, Marburg.*
Roots of Trinomials from the Viewpoint of Amoeba Theory
- Feb. 1, 2012 **Research Seminar**, *Université de Genève, Switzerland.*
Contemporary Key Problems in Amoeba Theory
- July 5, 2011 **AG & Oberseminar Diskrete Mathematik**, *Goethe University, Frankfurt/Main, Germany.*
The Configuration Space of Amoebas with Barycentric Simplex Newton Polytope
- Nov. 27, 2010 **Research Seminar**, *Courant Research Centre, Göttingen, Germany.*
(Co)Amoebas: Different Aspects of Approximation, Boundary and Homotopy
- Dec. 18, 2009 **AG & Oberseminar Diskrete Mathematik**, *Goethe University, Frankfurt/Main, Germany.*
Amoebas of Genus at Most One
- [Colloquium and Job Talks](#)
- Oct. 15, 2025 **Colloquium**, *TU Graz, Austria.*
Sparsity in Polynomial Optimization: Theory and Application

- Nov. 22, 2024 **Colloquium**, *RWTH Aachen, Germany*.
An Introduction to Nonnegativity and Polynomial Optimization
- April 12, 2024 **Colloquium**, *Paris Lodron Universität, Salzburg, Austria*.
An Introduction to Nonnegativity and Polynomial Optimization
- July 21, 2023 **Colloquium**, *Eberhard Karls Universität, Tübingen, Germany*.
An Introduction to Nonnegativity and Polynomial Optimization
- Apr. 1, 2023 **Antrittsvorlesung**, *TU Braunschweig, Germany*.
Ein Streifzug durch die angewandte Algebra
- June 17, 2022 **Tutte Colloquium**, *University of Waterloo (virtual), Canada*.
An Introduction to Nonnegativity and Polynomial Optimization
- May 5, 2022 **Colloquium**, *TU Hamburg-Harburg (virtual), Germany*.
A New Approach to Polynomial Optimization
- Jan. 19, 2022 **Colloquium**, *Universität Osnabrück (virtual), Germany*.
The SONC Cone: Primal and Dual Perspectives
- Nov 6, 2020 **Colloquium**, *Universität des Saarlandes (virtual), Germany*.
A New Approach to Nonnegativity and its Applications
- May 22, 2019 **Colloquium**, *Universität Osnabrück, Germany*.
An Introduction to Nonnegativity and Polynomial Optimization
- June 26, 2018 **Colloquium**, *TU Kaiserslautern, Germany*.
Ein neuer Ansatz zu Nichtnegativität und polynomieller Optimierung
- May 24, 2018 **Colloquium**, *Universität Siegen, Germany*.
A New Approach to Nonnegativity and Polynomial Optimization
- May 3, 2018 **Colloquium**, *Otto von Guericke Universität Magdeburg, Germany*.
A New Approach to Nonnegativity and Polynomial Optimization
- March 27, 2018 **Colloquium**, *TU Braunschweig, Germany*.
A New Approach to Nonnegativity and Polynomial Optimization
- Jan. 17, 2018 **Colloquium**, *Universität Trier, Germany*.
A New Approach to Nonnegativity and Polynomial Optimization
- June 12, 2017 **Colloquium**, *Universität Leipzig, Germany*.
A New Approach to Nonnegativity and Polynomial Optimization
- Dec. 14, 2016 **Colloquium**, *University of Massachusetts at Amherst, Amherst, MA*.
A New Approach to Nonnegativity and Polynomial Optimization
- Oct. 5, 2016 **Colloquium**, *Sam Houston State University, Huntsville, TX*.
An Introduction to Amoeba Theory
- Oct. 19, 2015 **Postdoc Colloquium**, *Texas A&M University, College Station, TX*.
Nonnegative Polynomials and Sums of Squares Supported on Circuits
- Oct. 9, 2014 **Postdoc Colloquium**, *Texas A&M University, College Station, TX*.
Roots of Trinomials from the Viewpoint of Amoeba Theory

Outreach Talks

- June 22, 2024 **Sommerplenum der Jungen Akademie**, *Berlin, Germany*.
Ein Quäntchen Angewandte Algebra
- Feb. 21, 2024 **Frühjahrsakademie der Studienstiftung des dt. Volkes**, *Kloster Roggenburg, Germany*.
Ein Quäntchen Angewandte Algebra
- Sep. 20, 2022 **GAMM Juniors at the GAMM Annual Meeting**, *TU Braunschweig, Germany*.
Some Experiences from Teaching Mathematics

- Aug. 28, 2022 **Wissenschaftsnetzwerk**, Konrad Adenauer Stiftung, Berlin, Germany.
Diskussionsbeitrag der Jungen Akademie zur Überarbeitung des WissZeitVG
- Feb. 19, 2018 **BMS-Days**, Urania, Berlin, Germany.
An Introduction to Nonnegativity and Polynomial Optimization
- May 7, 2016 **Math Circle**, Texas A&M University, College Station, TX.
Public Key Cryptography
- Aug. 8, 2014 **Uni Camp 2014**, Saarland University, Saarbrücken, Germany.
Public Key Kryptoverfahren
- Aug. 8, 2014 **Uni Camp 2014**, Saarland University, Saarbrücken, Germany.
Mathematik Studieren
- Oct. 8, 2009 **Introduction week**, Goethe University, Frankfurt/Main, Germany.
Das Art Gallery Problem

Teaching

TU Braunschweig

- Fall 25 **Diskrete Mathematik für Informatik (Discrete Math for Computer Science)**, *Lecture; 2 hours per week.*
roughly 500 students, mostly in first year
- Fall 25 **Advanced Laboratory on Data Science**, *Laboratory (coding); 6 hours per week.*
joint with C. Brauer; 20 master level students
- Fall 25 **Computational Algebraic Geometry**, *Lecture; 4 hours per week.*
- Spring 25 **Mathematische Algorithmen und Programmieren II**, *Lecture/Lab; 1 hour lecture plus 2 hours exercise per week.*
- Spring 25 **Algebra für Informatiker (Algebra for Computer Scientists)**, *Lecture; 2 hours per week plus exercises 1 hour per week.*
- Spring 25 **Nonnegativity and Polynomial Optimization**, *Lecture; 4 hours per week plus exercises 2 hours per week.*
- Spring 25 **Ramp-up Course Mathematics**, *Lecture; 4 hours per week plus exercises 2 hours per week.*
joint with six further colleagues
- Fall 24 **Advanced Laboratory on Data Science**, *Laboratory (coding); 6 hours per week.*
joint with C. Brauer; 20 master level students
- Fall 24 **Algebra**, *Seminar; 2 hours per week.*
4 bachelor level students
- Fall 24 **Ramp-up Course Mathematics**, *Lecture; 4 hours per week plus exercises 2 hours per week.*
joint with six further colleagues
- Spring 24 **Computational Algebraic Geometry**, *Lecture; 4 hours per week.*
joint with B. El Hilany; 3 master level students
- Spring 24 **Algebra**, *Lecture; 4 hours per week.*
4 bachelor level students
- Spring 24 **Ramp-up Course Mathematics**, *Lecture; 4 hours per week plus exercises 2 hours per week.*
joint with six further colleagues
- Fall 23 **Master Seminar "Nonnegativity and Polynomial Optimization"**, *2 hours per week.*
Seminar; joint with B. El Hilany; 1 master level student and talks by group members; block course

- Fall 23 **Ramp-up Course Mathematics**, *Lecture; 4 hours per week plus exercises 2 hours per week.*
joint with six further colleagues; 59 master level students
- Spring 23 **Nonnegativity and Polynomial Optimization**, *Lecture; 4 hours per week plus exercises 2 hours per week.*
4 master level students
- Spring 23 **Ramp-up Course Mathematics**, *Lecture; 4 hours per week plus exercises 2 hours per week.*
joint with six further colleagues; 14 master level students
- Fall 22 **Advanced Laboratory on Data Science**, *Laboratory (coding); 6 hours per week.*
joint with C. Brauer; 18 master level students
- Fall 22 **Diskrete Mathematik für Informatiker (Discrete Math for Computer Scientists)**,
Lecture; 2 hours per week.
roughly 360 students, mostly in first year
- Falls 22 **Ramp-up Course Mathematics**, *Lecture; 4 hours per week plus exercises 2 hours per week.*
joint with six further colleagues; 14 master level students
- Spring 22 **Algebra**, *Lecture; 4 hours per week.*
roughly 15 bachelor level students
- Spring 22 **Ramp-up Course Mathematics**, *Lecture; 4 hours per week plus exercises 2 hours per week.*
joint with six further colleagues; 14 master level students
- Fall 21 **Master Seminar “Nonnegativity and Polynomial Optimization”**, *2 hours per week.*
Seminar; 2 master level students; block course
- Fall 21 **Advanced Laboratory on Data Science**, *Laboratory (coding); 6 hours per week.*
joint with C. Brauer and M. Neumann-Brosig; 16 master level students
- Fall 21 **Machine Learning with Neural Networks**, *Lecture; 2 hours per week.*
joint with C. Brauer; 71 master level students
- Fall 21 **Ramp-up Course Mathematics**, *Lecture; 4 hours per week plus exercises 2 hours per week.*
joint with six further colleagues; 21 master level students
- Spring 21 **Nonnegativity and Polynomial Optimization**, *Lecture; 4 hours per week plus exercises 2 hours per week.*
3 master level students
- Spring 21 **Algebra für Informatiker (Algebra for Computer Scientists)**, *Lecture; 2 hours per week plus exercises 1 hour per week.*
roughly 200 students, mostly in first year
- Fall 20 **Bachelor Seminar on Algebra**, *Seminar; 2 hours per week; block course.*
2 bachelor level students
- Fall 20 **Diskrete Mathematik für Informatiker (Discrete Math for Computer Scientists)**,
Lecture; 2 hours per week.
roughly 230 students, mostly in first year
- Fall 20 **Fortgeschrittenenpraktikum Data Science (Advanced Practical Course on Data Science)**, *Laboratory (coding); 6 hours per week.*
joint with C. Brauer and M. Neumann-Brosig; 17 master level students
- Fall 20 **Maschinelles Lernen mit neuronalen Netzen (Machine Learning with Neural Networks)**, *Lecture; 2 hours per week.*
joint with C. Brauer; 75 master level students

- Fall 20 **Topologie (Topology)**, *Lecture; 4 hours per week; 11 bachelor / master level students.*
joint with K. Kozhasov
- Spring 20 **Master Seminar on Algebra**, *Seminar; 2 hours per week.*
joint with B. Eick; 4 master level students
- Spring 20 **Mathematische Algorithmen (Mathematical Algorithms)**, *Laboratory (coding and student talks); 2 hours per week.*
joint with J. Heuer and O. Yürük; 4 bachelor level students
- Spring 20 **Algebra**, *Lecture; 4 hours per week.*
roughly 25 bachelor level students
- Fall 19 **Computeralgebra (Computational Algebraic Geometry)**, *Lecture; 4 hours per week.*
3 master level students
- Fall 19 **Diskrete Mathematik (Discrete Mathematics)**, *Lecture; 2 hours per week.*
roughly 20 bachelor level students
- Fall 19 **Kryptographie (Cryptography)**, *Lecture; 2 hours per week.*
roughly 15 master level students
- Spring 19 **Nonnegativity and Polynomial Optimization**, *Lecture; 4 hours per week.*
5 master level students

[TU Berlin](#)

- Fall 18 **Interior Point Methods**, *Reading Seminar.*
joint with A. Ergür

[Texas A&M University, College Station](#)

- Spring 17 **Math 304 – Linear Algebra**, *Lecture, Section 504.*
45 mostly second year students
- Fall 16 **2 × Math 304 – Linear Algebra**, *Lecture, Sections 505 and 506.*
39 and 45 mostly second year students
- Spring 16 **Math 302 – Discrete Mathematics**, *Lecture, Section 501.*
30 mostly second year students
- Fall 15 **Discriminants, Resultants, and Multidim. Determinants**, *Reading Seminar.*
joint with L. Matusevich
- Fall 15 **2 × Math 151 – Engineering Math I**, *Lecture, Sections 501 - 503 and 528 - 530.*
99 and 100 first year students
- Spring 15 **2 × Math 151 – Engineering Math I**, *Lecture, Sections 516 - 521.*
96 and 100 first year students
- Fall 14 **Math 302 – Discrete Mathematics**, *Lecture, Section 501.*
11 mostly second year students

[Saarland University, Saarbrücken](#)

- Summer 14 **Toric Geometry**, *Reading Seminar.*
joint with C. Jürgens
- Winter 13/14 **Tutorial for the lecture “Linear Algebra I”.**
lecturer: H. Markwig

[Goethe University, Frankfurt am Main \(as graduate and undergraduate student\)](#)

Provided on request.

Organized Conferences and Workshops

- Feb. 26–27, 2026 **“Positivity, Convexity, and Computation in Rigidity Theory”**, *Workshop*, organizer.
joint with M. Himmelmann, M. Winter; Braunschweig, Germany
- Aug. 28 – **“Nonlinear Optimization and Combinatorics”**, *Summer school*, head organizer.
- Sep. 2, 2025 joint with C. Kirches, B. Ostermann, T. Theobald; Braunschweig, Germany
- July 7–11, 2025 **The Intersection of Polynomial Optimization, Dynamics, and Combinatorics**, *Minisymposium at the 2025 “SIAM Conference on Applied Algebraic Geometry”*, organizer.
joint with E. Carlsson; Madison, WI, USA.
- July 7–11, 2025 **Recent Trends in Polynomial Optimization**, *Minisymposium at the 2025 “SIAM Conference on Applied Algebraic Geometry”*, organizer.
joint with M. Dressler; Madison, WI, USA.
- July 16–19, 2024 **ISSAC 2024**, *conference*, member of the Program Committee.
Raleigh, NC, USA
- May 19–24, 2024 **Positive Solutions of Polynomial Systems Arising from Real-life Applications**, *workshop*, organizer.
joint with F. Bihan, A. Dickenstein, and E. Feliu; BIRS-IMAG Granada, Spain
- Feb. 19–23, 2024 **“Struktur und Abstraktion – was ist Ästhetik?” (Structure and Abstraction – what is Aesthetics?)**, *working group*, organizer.
joint with B. Esche; at the Frühjahrsakademie (Spring Academy) of the Studienstiftung des deutschen Volkes in Roggenburg, Germany.
- Sep. 6–8, 2023 **Conference on Applied Algebra**, *workshop*, organizer.
joint with T. Römer, P. Breiding, T. Boege, P. Santarsiero, and L. Gustafsson; Univ. Osnabrück, Germany (**postponed from 2020** due to COVID-19)
- June 12–23, 2023 **Algebraic Methods for Biochemical Reaction Networks**, *summer graduate school*, organizer.
joint with A. Dickenstein and E. Feliu; MPI Leipzig, Germany; joint with MSRI Berkeley, CA, USA.
- June – November, 2022 **“Die sieben größten Abenteuer der Mathematik” (The Seven Biggest Adventures in Mathematics)**, *A series of talks, outreach events, workshops for high-school students, and discussion panels on the seven Millennium Problems.*, **main organizer**.
joint with S. Stiller; supported by J. Heuer and A. Wienhard; series organized by Die Junge Akademie and the Deutsche Mathematiker-Vereinigung under patronage of the German Minister of Science and Education B. Stark-Watzinger; supported by the DFG; events were located in Münster, Bonn, Berlin, Heidelberg, München, Braunschweig, and Hannover, Germany. <https://www.diejungeakademie.de/en/projekte/7-adventures>
- October 17–22, 2021 **Real polynomials: Counting and stability**, *workshop*, organizer.
joint with F. Bihan, A. Dickenstein, T. Theobald; virtual / BIRS Oaxaca, Mexico
- Aug 16–20, 2021 **Polynomial Optimization and Applications**, *minisymposium at the 2021 “SIAM Conference on Applied Algebraic Geometry”*, organizer.
joint with M. Dressler; virtual / College Station, TX, USA

- July 29-30, 2021 **Workshop on Real Algebraic and Convex Geometry**, *workshop*, organizer.
joint with B. El Hilany and K. Kozhasov; virtual / TU Braunschweig, Germany
- June 7–11, 2021 **MEGA 2021**, *conference*, member of the **executive committee** and member of the program committee.
Virtual / the Arctic University, Tromsø, Norway
- Nov. 27, 2020 and April 16/17, 2021 **Music & Mathematics**, *Interdisciplinary symposium*, organizer.
joint with M. Akkermann and D. Pflüger; virtual / TU Dresden, Germany
- July 20–23, 2020 **ISSAC 2020**, *conference*, member of the poster committee.
Kalamata, Messinia, Greece (occurred online due to COVID-19)
- July 13–17, 2020 **ICMS 2020**, *conference*, **local head organizer** and member of the program committee.
TU Braunschweig, Germany (occured online due to COVID-19)
- July 3–7, 2019 **Sparsity in Polynomial Sytems and Applications**, *minisymposium at the 2019 “SIAM Conference on Applied Algebraic Geometry”*, organizer.
joint with M. Dressler; Bern, Switzerland.
- July 3–7, 2019 **Polynomial Optimization and its Applications**, *minisymposium at the 2019 “SIAM Conference on Applied Algebraic Geometry”*, organizer.
joint with J. Gouveia and S. Naldi; Bern, Switzerland.
- June 7–8, 2019 **Applied Algebra**, *workshop*, organizer.
joint with B. Sturmfels; TU Braunschweig, Germany.
- Dec. 17–18, 2017 **Berlin-Leipzig Seminar on Algebra, Geometry and Combinatorics**, *workshop*;
3rd meeting of this series in Fall '17, organizer.
joint with M. Kummer; TU Berlin, Germany
- Aug. 1–2, 2017 **Real Algebraic Geometry and Optimization**, *minisymposium at the 2017 “SIAM Conference on Applied Algebraic Geometry”*, organizer.
joint with T. Theobald; Atlanta, GA
- June 10, 2017 **Polynomials and Polytopes**, *workshop*, organizer.
joint with B. Sturmfels; TU Berlin, Germany
- Aug. 3–7, 2015 **Real Algebraic Geometry and Optimization**, *minisymposium at the 2015 “SIAM Conference on Applied Algebraic Geometry”*, organizer.
joint with T. Theobald and C. Riener; NIMS, Daejeon, South Korea
- June 3–7, 2013 **MEGA 2013**, *conference*, coorganizer in the local committee.
Goethe University, Frankfurt/Main, Germany
- March 7, 2013 **Math across the Main**, *workshop for PhD students and postdocs*, organizer.
joint with S. Horn; Technische Universität Darmstadt, Germany
- May 5–7, 2011 **Discrete, Tropical and Algebraic Geometry**, *conference*, coorganizer.
Goethe University, Frankfurt/Main, Germany
- June 16–17, 2010 **2nd PhD Students Conference on Tropical Geometry**, *conference*, organizer.
joint with M. Häbich and T. Wagner; Goethe University, Frankfurt/Main, Germany

Professional Activities

Editorial Work

Covers only editorial work for journals that does not result in a published conference proceedings, which is listed under "Publications".

Jan. 2019 – **Associate Editor for the SIAM Journal on Applied Algebra and Geometry (SIAGA)**.
Jan. 2028

Advisory Boards

Since June **Member of the advisory board for the MEGA (Effective Methods in Algebraic Geometry) conference series.**
2021

2020 – 2026 **Member of the advisory board for ICMS (International Congress on Mathematical Software) conference series.**

Refereeing

Including reviews in progress.

Full Reviews for Research Journals:

1. *Advances in Applied Clifford Algebras*,
2. *Advances in Geometry* (2 reviews),
3. *Advances in Mathematics*,
4. *Arkiv for Matematik*,
5. *Beiträge zur Algebra und Geometrie*,
6. *Canadian Mathematical Bulletin*,
7. *Experimental Mathematics*,
8. *Foundations of Computational Mathematics* (2 reviews),
9. *International Mathematics Research Notices* (2 reviews),
10. *Linear Algebra and its Applications*,
11. *Mathematical Proceedings*,
12. *Mathematical Programming*,
13. *Notices of the AMS*,
14. *Journal of Algebra*,
15. *Journal of Software for Algebra and Geometry*,
16. *Journal of Symbolic Computation*,
17. *Proceedings of the Royal Society A* (general science journal).

Collections, Conferences, and Conference Proceedings:

1. *ISSAC 2024*, (reports / organization of subreviews on 6 articles),
2. *MEGA 2024*, (reports on 4 articles),
3. *MEGA 2021*, (reports on 3 articles, 1 poster, 1 software contribution),
4. *ISSAC 2021*, (report on 1 article),
5. *ISSAC 2020*, (poster session; reviews on 7 poster submissions),
6. *ICMS 2020*, (conference proceedings; reports on 1 article and 5 software contributions),
7. *Combinatorial Algebraic Geometry Thematic Program*, (book; report on 1 article),
8. *Mathematics: Frontiers and Perspectives* (conference proceedings).

Quick opinions (without full review):

1. *Mathematische Zeitschrift*,
2. *SIAM Journal on Applied Dynamical Systems (SIADS)*,
3. *SIAM Journal on Applied Algebra and Geometry (SIAGA)* (4 opinions),
4. *SIAM Journal on Matrix Analysis and Applications (SIMAX)*.

Book reviews:

1. *Advances in two-dimensional Homotopy and Combinatorial Group Theory* (report on 1 chapter).

Grant applications:

1. *Studienstiftung des deutschen Volkes* (PhD stipend application; 2 reviews).
2. *Two reviews for European national science foundations* (details on request).

Mentoring

- Since Fall 2021 **Mentor for Data Science and Computational Science Engineering.**
Roughly five new students per semester.
- Spring 2020 – **DHV Welcome Program.**
Fall 2022 Mentoring program by the DHV for refugees studying at German universities; mentoring of one student from Syria starting in February 2020.
- Spring 2018 – **BMS Mentor at TU Berlin.**
Spring 2019 One PhD student mentored Spring 2018 - Spring 2019; early mentor for two PhD students in Fall 2018.
- Spring 2017 **Mentor at Texas A&M “Academy for Future Faculty”.**
One master student mentored
- Spring 2017 **Junior Algebra & Geometry Seminar, Seminar for graduate students.**
joint with T. Brysiewicz
- Fall 2016 **Student Working seminar in Algebra & Geometry, Seminar for graduate students.**
joint with T. Brysiewicz, K. Kordek, and O. Sobieska
- Spring 2016 **Junior Algebra & Geometry Seminar, Seminar for graduate students.**
joint with T. Brysiewicz
- Nov. 2014 - **Texas A&M Mathematical Coding Club, organizer.**
May 2016 joint with C. O’Neill

Outreach Activities

- Jan. - May, 2025 **Unendlichkeit – Leere – Lebendigkeit (Infinity – Emptiness – Liveliness).**
Vernissage (Jan. 24, 2025), and exhibition (Jan. – May 2025) at the Planetarium Hamburg, Germany; joint with A. Hemkendreis and M. Saliba; supported by Die Junge Akademie and the Bodo-von-Borries-Stiftung.
- Sep. 18, 2021 **Silbersalz Science & Media Festival 2021, Halle an der Saale.**
“Pull up a Chair” – Ask your questions to researchers from “Die Junge Akademie”.
- Aug. 13, 2020 **In the Pursuit of Mathematics (Matematik’in Peşinde), Youtube Channel.**
Public discussion with the host O. Yürük about “Interdisciplinary Researchers and Where to Find Them”.
- June 17, 2020 **Junge Akademie@, Virtual Format.**
Public discussion with the architect B. Esche about “Ästhetik und Abstraktion” (“Aesthetics and Abstraction”).
- Jan. 18, 2020 **Salon-Sophie-Charlotte, BBAW, Berlin.**
Interdisciplinary exhibition “Zwischenwelten” as one part of the Salon; organized by the Class 2019 of Die Junge Akademie.
- Aug. 8, 2014 **Uni Camp 2014, Saarland University, Saarbücken.**
University summer school for highschool girls; organizer of the math section.

Hiring and Election Committees

- Since Spring 2025 **Hiring Committee for W3 Professorship “Angewandte partielle Differentialgleichungen”, head).**
TU Braunschweig

Summer 2022 **Auswahlkommission (election committee) for the Class of 2023 of Die Junge**
till Spring **Akademie, head** (joint with L. Haffert).
2023 Die Junge Akademie

Fall 2022 **Election of the initial class of the UK Young Academy**, Supporting Reviewer
(not part of the core election committee, but reviewing applications in the initial
phase of the election).
UK Young Academy

Fall 2020 till **Auswahlkommission (election committee) for the Class of 2021 of Die Junge**
Spring 2021 **Akademie**, member.
Die Junge Akademie

Spring 2020 **Hiring Committee for W2 Professorship “Mathematische Methoden der Da-**
till Spring **tenanalyse” (“Mathematical Methods in Data Analysis”)**, external member.
2021 Univ. Osnabrück

Spring 2020 **Hiring Committee for MPI W2 Research Group Leader**, external member.
MPI Leipzig

2002–2013 **Professoral Hiring Committees**, *member*, two times as undergraduate represen-
tative and one time as graduate students and postdocs representative.
Goethe University

Local Seminar Organization

2019 – 2024 **Applied Algebra and Analysis Seminar**, organizer.
TU Braunschweig; since Spring 2020 online together with Univ. Osnabrück, jointly organized
with D. Lorenz, S. Kunis, and T. Römer, K. Kozhasov (until Fall '23), B. El Hilany (since
Spring '24); was paused for some time between 2019 and 2024.

Aug. 2015 – **Geometry Seminar**, administrative organizer.
May 2017 Texas A&M University

Feb. 2009 – **AG & Oberseminar Diskrete Mathematik**, administrative organizer.
June 2013 Goethe University

Departmental Service and Local Committees

April 2025 – **Faculty Council (Fakultätsrat) of the Gauß Fakultät**.
2027 TU Braunschweig

April 2025 – **Department Head Mathematics**.
2027 TU Braunschweig

starting April **Standing PhD committee (Ständige Promotionskommission)**, member.
2025 TU Braunschweig

since 2023 **Study Commission (Studienkommission) for data science**, member.
TU Braunschweig

since 2022 **Research Funding Network (Netzwerk Forschungsförderung)**, member.
TU Braunschweig

since 2021 **Student admission committee (Zulassungsausschuss) for mathematics**,
member.
TU Braunschweig

- 2021 - 2023 **Student admission committee for data science**, member (2021/22); backup member (2022/23).
TU Braunschweig
- Fall 2019 **Math Department Strategy Committee**, member.
TU Braunschweig

Successful Former and Current Students

For Bachelor and master students all times refer to the total time of supervision in our group, including preliminary work directing towards a thesis.

Postdocs

- Since June 2025 **Matthias Himmelmann**.
TU Braunschweig
- Since May 2021 **Boulos El Hilany**.
TU Braunschweig; DFG Walter Benjamin Fellow 2021-23. Habilitation thesis submitted Fall 2024.
- April 2019 – Oct. 2023 **Khazhgali Kozhasov**.
TU Braunschweig; now: TT Assist. Prof. at the Université Côte d'Azur in Nice, France.

PhD Students

- Since Oct. 2024 **Nikolas Rieke**, *Combinatorial Aspects of Sums of Nonnegative Circuit Polynomials (working title)*.
TU Braunschweig
- Since Aug. 2024 **Jonas Naumann**, *Using AI Methods for Detecting Properties in Lightweight Materials (working title)*.
TU Braunschweig; full time employed at the DLR Center for Lightweight-Production-Technology in Stade; informal co-advisor: C. Brauer
- Since Feb. 2023 **Birte Ostermann**, *Polynomial Optimization in Quantum Computing (working title)*.
TU Braunschweig; co-advisor: S. Stiller
- Since June 2021 **Mandy Stritzke**, *Applications on Neural Networks in the Sciences (working title)*.
TU Braunschweig; working at Hannoversche Volksbank eG since Fall 2024
- April 2019 – Dec. 2023 **Janin Heuer**, *The SONC Cone: Primal and Dual Perspectives*.
TU Braunschweig; thesis submitted in June 2023. Defense in December 2023. First job / now at: TNG Technology Consulting GmbH (Data Science Consulting)
- Oct. 2017 – May 2021 **Oğuzhan Yürük**, *On the Maximal Mediated Set Structure and the Applications of Nonnegative Circuit Polynomials*.
TU Braunschweig; thesis submitted in Dec. 2020; defended in May 2021. First job: Postdoc at TU Berlin, now at TNG Technology Consulting GmbH (Data Science Consulting)

PhD Students (as co-advisor)

- Since April 2022 **Sabrina Ammann**, *Combinatorial Optimization in Quantum Computing (working title)*, co-advisor.
TU Braunschweig; principal advisor: S. Stiller

Master Students

- since Apr 2025 – **Leif Niehe**, *Solution Recovery in Sparse Polynomial Optimization*.
TU Braunschweig
- July 2024 – **Hemant Sirsat**, *Voronoi Diagrams for Multi-Leak Detection in Composite Manufacturing*.
Feb 2025 TU Braunschweig; in cooperation with C. Brauer (DLR)
- Jan. – July 2024 – **Bhupender Bindal**, *Microscopic Image Super-Resolution for Carbon Fiber Reinforced Polymer Samples*.
TU Braunschweig; in cooperation with C. Brauer (DLR)
- Mar. 2023 – **Hannes Drobek**, *Pattern Mining in medical time series*.
Feb. 2024 TU Braunschweig
- Mar. 2023 – **Jonas Naumann**, *Robust Detection and Explanation of Cracks in Microscopic Images*.
Jan. 2024 TU Braunschweig; in cooperation with C. Brauer (DLR)
- Nov. 2021 – **Sophie-Theresa Kleinke**, *Sums of Nonnegative Circuit Polynomials and Optimal Circuit Decompositions*.
Jan. 2023 TU Braunschweig
- Nov. 2021 – **Lina Elz**, *Analyse und Anwendung von Logic Tensor Networks auf das Schätzen von Fahrspuren im Kontext des autonomen Fahrens (Analysis and Application of Logic Tensor Networks on Lane Estimation in the Context of Autonomous Driving)*.
Dec. 2022 TU Braunschweig; in cooperation with J. Fricke (Volkswagen AG)
- Jan. 2021 – **Marie Rümmler**, *Die Topologie von Amöben, deren Träger einen Circuit bildet (The Topology of Amoebas Supported on Circuits)*.
Sep. 2021 TU Braunschweig
- Jan. 2020 – **Lorenza Buogo**, *Lasserres Hierarchie für oberen Schranken für Nichtnegativitätsprobleme (Lasserre's Hierarchy for Upper Bounds for Nonnegativity Problems)*.
Jan. 2021 TU Braunschweig
- Spring 2019 – **Olivia Röhrig**, *Initial Steps In The Classification Of Maximal Mediated Sets*, see Summer 2020 the corresponding article at [ArXiv 1910.00502](https://arxiv.org/abs/1910.00502).
supervised jointly with M. Joswig; Joint work started at TU Berlin, then supervised remotely from TU Braunschweig.
- Aug. 2017 – **Sascha Timme**, *Fast Computation of Amoebas, Coamoebas, and Imaginary Projections in Low Dimensions*, "[Dies Mathematicus](#)" award for the best master thesis in mathematics at TU Berlin in 2018 (tied with two other students).
Mar. 2018 TU Berlin

Bachelor Students

- May 2023 – **Lukas Lojewski**, *Modulformen und die j -Invariante elliptischer Kurven (Modular forms and the j -Invariant of Elliptic Curves)*, Bachelor thesis.
Jan. 2024 TU Braunschweig
- Oct. 2022 – **Leif Niehe**, *Effective Bounds on Pólya's Theorem*, Bachelor thesis.
Apr. 2023 TU Braunschweig

- Sep. 2020 – **Lisa Mertinaschk**, *Voronoi Diagramme und der Sweepline Algorithmus (Voronoi Diagrams and the Sweepline Algorithm)*, Bachelor thesis.
Nov. 2021 TU Braunschweig
- Feb. 2021 – **Anastasiia Grigorieva**, *Tropical Geometry of Deep Neural Networks*, Bachelor thesis.
Aug. 2021 TU Braunschweig
- Oct. 2020 – **Matthis Heimberg**, *Der NN-CRUST Algorithmus zur Kurvenrekonstruktion (The NN-CRUST Algorithm for Curve Reconstruction)*, Bachelor thesis.
July 2021 TU Braunschweig
- June 2020 – **Marius Koch**, *Grovers Quantenalgorithmus für Suchanfragen in Datenbanken (Grover's Quantum Algorithm for database search)*, Bachelor thesis.
Feb 2021 TU Braunschweig; supervised jointly with S. Stiller
- Nov. 2017 – **Helena Müller**, *Minima of Polynomials via SONC Decompositions*, Bachelor thesis.
Oct. 2018 TU Berlin
- 2011 **Florian Landsgesell**, *Der Goemans-Williamson-Algorithmus für MAX CUT (The Goemans-Williamson Algorithm for MAX CUT)*, Bachelor thesis, co-advisor.
Goethe University; principal advisor: T. Theobald

Student Research Theses

In our applied master programs, a Student Research Thesis (Studienarbeit) is assigned and supervised during one semester.

- July – Dec. 2024 **Hemant Sirsat**, *AI-Based Prediction of Energy Consumption in Dry Fiber Placement Processes*, Student Research Thesis.
TU Braunschweig; supervised jointly with C. Brauer, German Aerospace Center (DLR)
- May – Oct. 2023 **Sreerag V. Naveenachandran**, *Data-based Leakage Detection and Uncertainty Quantification in the Manufacturing of Large-Scale CFRP Components*, Student Research Thesis.
TU Braunschweig; supervised jointly with C. Brauer, German Aerospace Center (DLR)
- May – Aug. 2023 **Bhupender Bindal**, *Multi view classification of chloroplast cells*, Student Research Thesis.
TU Braunschweig

Habilitation – Committees

- 2024–2025 **Boulos El Hilany**, Habilitation committee member and mentor.
Technische Universität Braunschweig
- 2024 **Andreas Tillmann**, Habilitation committee member.
Technische Universität Braunschweig; mentor: S. Stiller

PhD Students – Reviews and Committees

- 2024 **Matthias Himmelmann**, *Optimization in Geometric Materials*, second reviewer and defense committee member.
Universität Potsdam; principal advisor: M. Evans
- 2022 **Markus Wageringel**, *Parameter recovery of moment problems on algebraic varieties*, second reviewer and defense committee member.
Universität Osnabrück; principal advisor: S. Kunis

- 2021 **Helen Naumann**, *AM/GM-Based Optimization: Geometry and Generalizations*, second reviewer and defense committee member.
Goethe Universität Frankfurt am Main; principal advisor: T. Theobald
- 2019 **Nidhi Kaihnsa**, *Algebraic Methods for Dynamical Systems and Optimisation*, second reviewer and defense committee member.
MPI Leipzig and Universität Leipzig, Germany; principal advisor: B. Sturmfels

PhD Students – Committees Only

- 2025 **Felix Schneppe**, *Abweichungen in der Adjungierten im Kontext von primal-dualen Algorithmen*, head of the defense committee.
Technische Universität Braunschweig; principal advisor: D. Lorenz
- 2025 **Emanuele Naldi**, *Investigating Degenerate Preconditioners for Proximal Point Algorithms*, head of the defense committee.
Technische Universität Braunschweig; principal advisor: D. Lorenz
- 2024 **Lionel Nguoupeyou Tondji**, *Advances in Bregman-Kaczmarz Methods: Accelerations and Inconsistency*, head of the defense committee.
Technische Universität Braunschweig; principal advisor: D. Lorenz
- 2024 **Robert Rauch**, *Darstellbarkeit von Dichtematrizen und fermionische Korrelationsungleichungen*, head of the defense committee.
Technische Universität Braunschweig; principal advisor: V. Bach
- 2023 **Nanda Kishore Bellam**, *Ultrasonic Monitoring of Fiber Metal Laminates using Integrated Sensors: Model-based Damage Analysis*, head of the defense committee.
Technische Universität Braunschweig; principal advisor: D. Lorenz
- 2023 **Dominik Cebulla**, *Mathematical Modeling and Mixed-Integer Optimization of Multimodal Chromatographic Processes*, head of the defense committee.
Technische Universität Braunschweig; principal advisor: C. Kirches
- 2022 **Christoph Hansknecht**, *Dynamic flow problems arising from traffic planning*, head of the defense committee.
Technische Universität Braunschweig; principal advisor: S. Stiller
- 2021 **António Goucha**, *Non-Standard Ranks of Matrices*, defense committee member.
Universidade de Coimbra, Portugal; principal advisor: J. Gouveia

Master Students – Second Reviewer

- 2025 **Amit Amit**, *Training properties of Physics – Informed Neural Networks in the context of PDE's*, second reviewer.
TU Braunschweig; principal advisor: N. Mücke
- 2025 **Nick Harcken**, *Reference measures for quadratic regularization of optimal transport problems*, second reviewer.
TU Braunschweig; principal advisor: D. Lorenz
- 2024 **Daniel Lass**, *Lineare Codes und ihre Automorphismengruppen (Linear codes and their automorphism groups)*, second reviewer.
TU Braunschweig; principal advisor: B. Eick

- 2023 **Menglin Xi**, *Learned High-Fidelity Speech Coding in the Mel Domain with a Hyperprior*, second reviewer.
TU Braunschweig; principal advisor: T. Fingscheidt
- 2023 **Birte Ostermann**, *Grover type speedups and traveling salesman problem*, second reviewer.
TU Braunschweig; principal advisor: S. Stiller
- 2022 **Jonas Bresch**, *Finite p -groups with cyclic Frattini subgroups*, second reviewer.
TU Braunschweig; principal advisor: B. Eick
- 2021 **Nihal Acharya Adde**, *Deep reinforcement learning and graph-based approaches for multi-robot collision control*, second reviewer.
TU Braunschweig; principal advisor: C. Brauer; first reviewer: S. Stiller
- 2021 **Norman Hupfeld**, *Isomorphietest für einfache Lie-Algebren über endlichen Körpern (Isomorphism testing for simple Lie algebras over finite fields)*, second reviewer.
TU Braunschweig; principal advisor: B. Eick
- 2021 **Mandy Stritzke**, *Analyse und Implementation Generativer Modelle zur Adaption von Bilddatenverteilungen für Semantische Segmentierung (Analysis of Generative Models for Adapting Image Data for Semantic Segmentation)*, second reviewer.
TU Braunschweig; principal advisor: C. Brauer
- 2021 **Hoang Duc Phung**, *Algorithmisches Lösen von Sudokus (Algorithmic Solving of Sudokus)*, second reviewer.
TU Braunschweig; principal advisor: D. Lorenz
- 2020 **Benjamin Kocurov**, *Rekonstruierbarkeit von dünnbesetzten Lösungen von linearen Gleichungssystemen (Reconstructability of Sparse Solutions of Systems of Linear Equations)*, second reviewer.
TU Braunschweig; principal advisor: D. Lorenz
- 2018 **Marco Buhlheller**, *On the tropical central path*, second reviewer.
TU Berlin; principal advisor: M. Joswig
- [Bachelor Students – Second Reviewer](#)
- 2025 **Karl Essink**, *Robust optimization of minimal spanning trees*, second reviewer.
TU Braunschweig; principal advisor: S. Stiller
- 2023 **Nils Nordwig**, *Das Lösen kubischer Gleichungen mit Origami (The solution of cubic equations with origami)*, second reviewer.
TU Braunschweig; principal advisor: D. Lorenz
- 2023 **Wassili Kreuzer**, *The Alexander Theorem*, second reviewer.
TU Braunschweig; principal advisor: B. El Hilany
- 2023 **Rene Sammy Semla**, *Faltungen im euklidischen Raum und das Shopping-Bag-Theorem (Foldings in euclidean space and the shopping bag theorem)*, second reviewer.
TU Braunschweig; principal advisor: D. Lorenz
- 2023 **Christian Neufeld**, *Algorithmische Lösung von Least-Squares Problemen ohne Zugriff auf die adjungierte Abbildung (Adjoint-free algorithmic solution of least-squares problems)*, second reviewer.
TU Braunschweig; principal advisor: D. Lorenz

Undergraduate Research Students

- Jan. – May 2017 **Gerar Nawab**, *reading project about numerical methods for pricing exotic options.*
Texas A&M University
- Jan. – May 2017 **Ryan Bailey**, *project about braid group representations over finite fields.*
Texas A&M University; supervised jointly with J. Plavnik
- Sep. 2016 – Jan. 2018 **Jacob Hartzler**, *project about maximal mediated sets*, see [Maximal_Mediated_Sets.sage](#) and eventually [ArXiv 1910.00502](#).
Texas A&M University; informal supervision from TU Berlin since July 2017.
- Sep. 2015 – Aug. 2016 **Nathan Mehlhop**, *project about cyclic resultants*, see [ArXiv 1608.08663](#).
Texas A&M University; supervised jointly with L. Matusevich
- Sep. 2015 – May 2016 **Haley Lambright**, *project about nonnegative matrix factorization and geometric programming.*
Texas A&M University

Informal Thesis Co-Advisor

- July 2021 – May 2022 **Leona Hennig**, *Novelty Detection via Kernel Mean Embeddings*, Master thesis, informal co-advisor.
TU Braunschweig; principal advisor: M. Neumann-Brosig
- Aug. 2017 – June 2018 **Mathias Oster**, *Three Dimensional Auxetic Materials: Geometry, Deformation & Numerics*, Master thesis, informal co-advisor.
TU Berlin; principal advisors: M. Evans and J. Sullivan
- 2013 **Sandra Kiefer**, *Layered Realizations of Polytopes*, Master thesis, informal co-advisor.
Goethe University; principal advisor: T. Theobald
- 2013 **Jan Hofmann**, *Comparison of the Effective Nullstellensätze and Applications*, Diploma thesis, informal co-advisor.
Goethe University; principal advisor: T. Theobald
- 2011 **Sadik Iliman**, *Reihenbasierte Berechnung des Gerüsts von Amöben (Computation of the Spine of Amoebas Based on Power Series Representations)*, Master thesis, informal co-advisor.
Goethe University; principal advisor: T. Theobald