

# Timo de Wolff

## Curriculum Vitae

Technische Universität Braunschweig  
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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; overhead not included).  
Single PI
- 2015–2017 **AMS-Simons travel grant**, \$ 4000.  
Single PI

#### Grants (Several PIs)

- 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).  
Seven PIs (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).

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

#### Grants (Die Junge Akademie)

since 2019 **Die Junge Akademie**, *Funding for more than ten projects joint with various PI's (fellow members of the academy) so far.*, In summary more than €150.000.

Further details on request.

#### 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.

#### 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 (overhead not included).

#### 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.

#### Awards

2019–2024 **Elected member of Die Junge Akademie (German National Young Academy)**; **elected member of the board (Präsidium) for the academic year 2021/22 and 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*”.

## Memberships

- Since July 2017 **Emmy Noether Programme of the DFG**.  
Since Sep. 2017 **Associated Member of the SFB-TRR 195 “Symbolic Tools in Mathematics and their Application”**.  
Since 2017 / 2019 **Member of SIAM and Deutsche Mathematiker Vereinigung (DMV)**.

## Long Term Visits

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

## Publications

### Research Articles

- 1. 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.
- 2. Initial Steps in the Classification of Maximal Mediated Sets**  
with J. Hartzler, 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”.
- 3. 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>
- 4. Nondegenerate Multistationarity in Small Reaction Networks**  
with A. Shiu; *Discrete and Continuous Dynamical Systems, Series B*, **24** (6) (June 2019), 2683-2700.
- 5. 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.
- 6. 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”.
- 7. Lopsided Approximation of Amoebas**  
with J. Forsgård, L. Matusevich, and N. Mehlhop; *Mathematics of Computation*, **88** (315) (2019),

485-500.

8. **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.  
Was accepted for a talk at "MEGA 2017".
9. **Lower Bounds for Polynomials with Simplex Newton Polytopes Based on Geometric Programming**  
with S. Ilman; *SIAM Journal on Optimization*, **26** (2) (2016), 1128-1146.
10. **Amoebas, Nonnegative Polynomials and Sums of Squares Supported on Circuits**  
with S. Ilman; *Research in the Mathematical Sciences*, **3** (1) (2016), 1-35.  
Was accepted for a talk at "MEGA 2015".
11. **Norms of Roots of Trinomials**  
with T. Theobald; *Mathematische Annalen*, **366** (1) (2016), 219-247.  
Was accepted for a talk at "MEGA 2015".
12. **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".
13. **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".
14. **Amoebas of Genus at Most One**  
with T. Theobald; *Advances in Mathematics* **239** (2013), 190-213.

#### 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).

15. **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.
16. **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.
17. **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.
18. **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.
19. **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.

20. **The Kinetic Space of Multistationarity in Dual Phosphorylation**  
with E. Feliu, N. Kaihnsa, and O. Yürük; to appear in the [Journal of Dynamics and Differential Equations](#); published electronically on Sep. 04, 2020; doi: 10.1007/s10884-020-09889-6; see also [ArXiv 2001.08285](#).
21. **Optimization over the Boolean Hypercube via Sums of Nonnegative Circuit Polynomials**  
with M. Dressler and A. Kurpisz; to appear in [Foundations of Computational Mathematics](#); published electronically on April 06, 2021; doi: 10.1007/s10208-021-09496-x; see also [ArXiv 1802.10004](#). 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](#)".
22. **The Algebraic Boundary of the SONC Cone**  
with J. Forsgård; to appear in the [SIAM Journal on Applied Algebra and Geometry](#); see also [ArXiv 1905.04776](#).

### Preprints

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

22. **Parameter Region for Multistationarity in n-Site Phosphorylation Networks**  
with E. Feliu, N. Kaihnsa, and O. Yürük; see [ArXiv 2206.08908](#) .
23. **The Duality of SONC: Advances in Circuit-based Certificates**  
with J. Heuer; see [ArXiv 2204.03918](#).  
Was accepted for a poster at "[MEGA 2022](#)".
24. **A Polyhedral Homotopy Algorithm For Real Zeros**  
with A. A. Ergür; see [ArXiv 1910.01957](#).  
Was accepted for a talk at "[MEGA 2021](#)".
25. **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](#)".
26. **The Lattice of Amoebas**  
with J. Forsgård; see [ArXiv 1711.02705](#).
27. **Intersections of Amoebas**  
with M. Juhnke-Kubitzke; see [ArXiv 1510.08416](#)  
Was accepted for a poster presentation at "[FPSAC '16](#)".
28. **A Sharp Upper Bound for the Complexity of Labeled Oriented Trees**  
with M. Christmann; see [ArXiv 1412.7257](#)
29. **The Boundary of Amoebas**  
with F. Schroeter; see [ArXiv 1310.7363](#)
30. **Low Dimensional Test Sets for Nonnegativity of Even Symmetric Forms**  
with S. Ilman; see [ArXiv 1303.4241](#)
31. **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**, Birkäuser 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. **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.
2. **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.
3. **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.
4. **The International Congress on Mathematical Software goes virtual: Experience from organizing an online conference in times of Covid-19**  
with M. Joswig; to appear in the **Notices of the American Mathematical Society**.
5. **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.
6. **#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: July 2017–present.

2. [Maximal\\_Mediated\\_Sets.sage](#), a [Python](#) class for the computation of maximal mediated sets via [SAGE](#);  
with J. Hartzer.

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.

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## Talks

### Peer Reviewed Conference Talks

- 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

- 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
- [Further Conference Talks](#)
- 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](#)
- Oct 07, 2021 **Applied Algebra Seminar (online), University of Wisconsin at Madison.**  
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 (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

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 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

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

## Further Conferences and Workshops (selected)

- Nov. 27 – Dec. 2, 2016 **Seminar on Algorithms and Effectivity in Tropical Mathematics and Beyond**, *Schloss Dagstuhl, Germany.*
- Nov. 12–16, 2013 **GeoLMI 2013**, *CIRM, Marseille-Luminy, France.*
- May 31 – June 4, 2010 **Algebraic Optimization and Semidefinite Programming**, *MFO, Oberwolfach, Germany.*
- May 14–15, 2010 **Symposium “Diskrete Mathematik”**, *Erwin Schrödinger Institute, Vienna, Austria.*
- Nov. 22–28, 2009 **New Trends in Algorithms for Real Algebraic Geometry**, *CWI, Amsterdam, The Netherlands*, EIDMA Minicourse.
- Aug. 24–28, 2009 **Introductory Workshop: Tropical Geometry**, *MSRI, Berkeley, CA.*

## Teaching

### TU Braunschweig

- Spring 22 **Algebra**, *Lecture; 4 hours per week.*
- Spring 22 **Ramp-up Course Mathematics**, *Lecture; 4 hours per week plus exercises 2 hours per week.*  
joint with six further colleagues
- Fall 21 **Master Seminar “Nonnegativity and Polynomial Optimization”**, *2 hours per week.*  
Seminar; 2 master level students; block course
- Fall 21 **Advanced Practical Course 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 (Computer Algebra)**, *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 \(as graduate student\)](#)

- Winter 12/13 **Optimization**, *Seminar.*  
Department of Mathematics; joint with T. Theobald and C. Trabant
- Summer 11 **Geometry and Combinatorics of Spectrahedra**, *Seminar.*  
Department of Mathematics; joint with T. Theobald

- Summer 10 **TA for the lecture “Tropical geometry”**.  
Department of Mathematics; lecturer: T. Theobald
- Winter 09/10 **Fundamental Problems of Induction and Probability, Seminar**.  
Department of Philosophy, joint with W.K. Essler
- Winter 09/10 **TA for the lecture “Symbolic computation and Gröbner bases”**.  
Department of Mathematics; lecturer: T. Theobald
- Summer 09 **TA for the lecture “Lattices and cryptography”**.  
Department of Mathematics; lecturer: C.-P. Schnorr

Goethe University, Frankfurt am Main (as undergraduate student)

Provided on request.

## Organized Conferences and Workshops

- 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 and J. Heuer; series organized by Die Junge Akademie and the Deutsche Mathematikervereinigung under patronage of the German Minister of Science and Education B. Stark-Watzinger; events located in Münster, Bonn, Berlin, Heidelberg, München, Braunschweig, and Hannover, Germany.
- October 17–22, 2021 **Real polynomials: Counting and stability**, *workshop*, organizer.  
joint with F. Bihan, A. Dickenstein, T. Theobald; virtual / 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 Systems and Applications**, *minisymposium at the 2019 “SIAM Conference on Applied Algebraic Geometry”*, organizer.  
joint with M. Dressler; Bern, Switzerland.



- July 3–7, **Polynomial Optimization and its Applications**, *minisymposium at the 2019*  
 2019 “SIAM Conference on Applied Algebraic Geometry”, organizer.  
 joint with J. Gouveia and S. Naldi; Bern, Switzerland.
- June 7–8, **Applied Algebra**, *workshop*, organizer.  
 2019 joint with B. Sturmfels; TU Braunschweig, Germany.
- Dec. 17–18, **Berlin-Leipzig Seminar on Algebra, Geometry and Combinatorics**, *workshop*;  
 2017 *3rd meeting of this series in Fall '17*, organizer.  
 joint with M. Kummer; TU Berlin, Germany
- Aug. 1–2, **Real Algebraic Geometry and Optimization**, *minisymposium at the 2017 “SIAM*  
 2017 *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, **Real Algebraic Geometry and Optimization**, *minisymposium at the 2015 “SIAM*  
 2015 *Conference on Applied Algebraic Geometry”*, organizer.  
 joint with T. Theobald and C. Riener; NIMS, Daejeon, South Korea
- June 3–7, **MEGA 2013**, *conference*, coorganizer in the local committee.  
 2013 Goethe University, Frankfurt/Main, Germany
- March 7, **Math across the Main**, *workshop for PhD students and postdocs*, organizer.  
 2013 joint with S. Horn; Technische Universität Darmstadt, Germany
- May 5–7, **Discrete, Tropical and Algebraic Geometry**, *conference*, coorganizer.  
 2011 Goethe University, Frankfurt/Main, Germany
- June 16–17, **2nd PhD Students Conference on Tropical Geometry**, *conference*, organizer.  
 2010 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**  
 Jan. 2025 **(SIAGA)**.

### Advisory Boards

Since June **Member of the advisory board for the MEGA (Effective Methods in Algebraic**  
 2021 **Geometry) 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. [Journal of Algebra](#),
14. [Proceedings of the Royal Society A](#) (general science journal).

**Collections, Conferences, and Conference Proceedings:**

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

**Quick opinions (without full review):**

1. [Journal of Software for Algebra and Geometry](#),
2. [Mathematische Zeitschrift](#),
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. [One review for a European national science foundation](#) (details on request).

## Mentoring

- Since Fall 2021 **Mentor for Data Science and Computational Science Engineering.**  
roughly five new students per semester.
- Since Spring 2020 **DHV Welcome Program.**  
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

- 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.
- 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 (Matematiğin 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.
- Nov. 30, 2018 **BMS Career Talks 2018, Urania, Berlin.**  
Panelist.
- Aug. 8, 2014 **Uni Camp 2014, Saarland University, Saarbücken.**  
University summer school for highschool girls; organizer of the math section.

### Hiring and Election Committees

- 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 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 representative and one time as graduate students and postdocs representative.  
Goethe University

### Local Seminar Organization

- Since Spring **Applied Algebra and Analysis Seminar, organizer.**  
2019 TU Braunschweig; since Spring 2020 online together with Univ. Osnabrück, jointly organized with D. Lorenz, K. Kozhasov, S. Kunis, and T. Römer
- 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](#)

2021 - 2023 **Student admission committee 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

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## 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 May **Boulos El Hilany**.

2021 TU Braunschweig; DFG Walter Benjamin Fellow

Since April **Khazhgali Kozhasov**.

2019 TU Braunschweig

### [PhD Students](#)

Since June **Mandy Stritzke**, *Applications on Neural Networks in the Sciences (working title)*.

2021 TU Braunschweig

Since April **Janin Heuer**, *Dual SONC certificates (working title)*.

2019 TU Braunschweig

Oct. 2017 – **Oğuzhan Yürük**, *On the Maximal Mediated Set Structure and the Applications of Nonnegative Circuit Polynomials*.

May 2021

TU Braunschweig; thesis submitted in Dec. 2020; defended in May 2021.

### [Master Students](#)

Since Nov. **Lina Elz**, *Knowledge-based Road Modeling in the Presence of HD Map Deviations (working title)*.

2021

TU Braunschweig; joint supervision with J. Fricke (Volkswagen AG)

Since Nov. **Sophie-Theresa Kleinke**, *Sums of Nonnegative Circuit Polynomials and Optimal Circuit Decompositions (working title)*.

2021

TU Braunschweig

Jan. 2021 – **Marie Rümmler**, *Die Topologie von Amöben, deren Träger einen Circuit bildet*.

Sep. 2021 *(The Topology of Amoebas Supported on Circuits)*.

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](#).

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).

March 2018  
TU Berlin

### Bachelor Students

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 Grigoricheva**, *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

### Undergraduate Research Students

Jan. – May **Gerar Nawab**, *reading project about numerical methods for pricing exotic options.*

2017  
Texas A&M University

Jan. – May **Ryan Bailey**, *project about braid group representations over finite fields.*

2017  
Texas A&M University; supervised jointly with J. Plavnik

Sep. 2016 – **Jacob Hartzler**, *project about maximal mediated sets*, see Jan. 2018 [Maximal\\_Mediated\\_Sets.sage](#) and eventually [ArXiv 1910.00502](#).

Texas A&M University; informal supervision from TU Berlin since July 2017.

Sep. 2015 – **Nathan Mehlhop**, *project about cyclic resultants*, see [ArXiv 1608.08663](#).

Aug. 2016  
Texas A&M University; supervised jointly with L. Matusevich

Sep. 2015 – **Haley Lambright**, *project about nonnegative matrix factorization and geometric programming.*

May 2016  
Texas A&M University

## PhD Students – Reviews and Committees

- 2022 **Christoph Hansknecht**, *Dynamic flow problems arising from traffic planning*, head of the defense committee.  
Technische Universität Braunschweig; principal advisor: S. Stiller
- 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
- 2021 **António Goucha**, *Non-Standard Ranks of Matrices*, defense committee member.  
Universidade de Coimbra, Portugal; principal advisor: J. Gouveia
- 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

## Master Students – Second Reviewer

- 2022 **Jonas Bresch**, *Finite  $p$ -groups with cyclic Frattini subgroups (working title)*, 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

## Informal Thesis Co-Advisor

- July 2021 – **Leona Hennig**, *Novelty Detection via Kernel Mean Embeddings*, Master thesis,  
May 2022 informal co-advisor.  
TU Braunschweig; principal advisor: M. Neumann-Brosig

- Aug. 2017 – **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