Timo de Wolff

Curriculum Vitae

Technische Universität Braunschweig
Institut für Analysis und Algebra
AG Algebra
Universitätsplatz 2
38106 Braunschweig, Germany
✉ *t.de-wolff@tu-braunschweig.de*
🖥 *http://www.iaa.tu-bs.de/timodewolff/*

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 ($\sim$ \$ 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)"*, $\sim$€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 prices 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.

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. **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.

2. **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".

3. **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.

4. **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".

5. **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/sci-adv.abj6737.

6. **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

7. **Nondegenerate Multistationarity in Small Reaction Networks**
   with A. Shiu; Discrete and Continuous Dynamical Systems, Series B, **24** (6) (June 2019), 2683-2700.

8. **An Approach to Constrained Polynomial Optimization via Nonnegative Circuit Polynomials and Geometric Programming**
   with M. Dressler, and S. Iliman; Journal of Symbolic Computation (special issue for "MEGA 2017"), **91**, (2019), 149-172.

9. **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".

10. **Lopsided Approximation of Amoebas**
with J. Forsgård, L. Matusevich, and N. Mehlhop; Mathematics of Computation, **88** (315) (2019), 485-500.

11. **A Positivstellensatz for Sums of Nonnegative Circuit Polynomials**
with M. Dressler, and S. Iliman; SIAM Journal on Applied Algebra and Geometry, **1** (1) (2017), 536-555.
Was accepted for a talk at "MEGA 2017".

12. **Lower Bounds for Polynomials with Simplex Newton Polytopes Based on Geometric Programming**
with S. Iliman; SIAM Journal on Optimization, **26** (2) (2016), 1128-1146.

13. **Amoebas, Nonnegative Polynomials and Sums of Squares Supported on Circuits**
with S. Iliman; Research in the Mathematical Sciences, **3** (1) (2016), 1-35.
Was accepted for a talk at "MEGA 2015".

14. **Norms of Roots of Trinomials**
with T. Theobald; Mathematische Annalen, **366** (1) (2016), 219-247.
Was accepted for a talk at "MEGA 2015".

15. **Separating Inequalities for Nonnegative Polynomials that Are not Sums of Squares**
with S. Iliman; Journal of Symbolic Computation, **68** (2015), part 2, 181-194 (special issue for "MEGA 2013").
Was accepted for a talk at "MEGA 2013".

16. **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".

17. **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).

18. **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.

19. **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.

20. **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.

21. **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.

22. **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.

23. **A Polyhedral Homotopy Algorithm For Real Zeros**
    with A. A. Ergür; to appear in the Arnold Mathematical Journal; published online on Oct. 27th, 2022; https://doi.org/10.1007/s40598-022-00219-w; see also ArXiv 1910.01957.
    Was accepted for a talk at "MEGA 2021".
24. **Parameter Region for Multistationarity in n-Site Phosphorylation Networks**
    with E. Feliu, N. Kaihnsa, and O. Yürük; to appear in the SIAM Journal on Applied Dynamical Systems (SIADS); see also ArXiv 2206.08908.

Preprints

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

25. **Initial Application of SONC to Lyapunov Stability of Dynamical Systems**
    with J. Heuer; see ArXiv 2303.02031.
26. **A Generalized Muirhead Inequality and Symmetric Sums of Nonnegative Circuits**
    with J. Heuer, and N. Tran; see ArXiv 2211.07266.
27. **Learning Variational Models with Unrolling and Bilevel Optimization**
    with N. Breustedt, C. Brauer, and D. Lorenz; see ArXiv 2209.12651.
28. **The Duality of SONC: Advances in Circuit-based Certificates**
    with J. Heuer; see ArXiv 2204.03918.
    Was accepted for a poster at "MEGA 2022".
29. **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".
30. **The Lattice of Amoebas**
    with J. Forsgård; see ArXiv 1711.02705.
31. **Intersections of Amoebas**
    with M. Juhnke-Kubitzke; see ArXiv 1510.08416
    Was accepted for a poster presentation at "FPSAC '16".
32. **A Sharp Upper Bound for the Complexity of Labeled Oriented Trees**
    with M. Christmann; see ArXiv 1412.7257
33. **The Boundary of Amoebas**
    with F. Schroeter; see ArXiv 1310.7363
34. **Low Dimensional Test Sets for Nonnegativity of Even Symmetric Forms**
    with S. Iliman; see ArXiv 1303.4241
35. **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. **WissZeitVG: Eine Antwort auf das Eckpunktepapier des BMBF**
   Stellungnahme der Jungen Akademie (Statement of the Young Academy); with D. Segets, March 2023.
2. **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.
3. **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.
4. **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.
5. **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.
6. **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 occassion 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.
7. #**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.

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

June 07, 2024	**Conference "Computational and Applied Enumerative Geometry 2024" (Conference in honour of Frank Sottile's 60th birthday)**, *Fields Institute, Toronto, Canada*. TBA
July 10-14, 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 Gradwanderung 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 PGMO 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 PGMO 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

Aug 25, 2023	**"Der perfekte Lehrstuhl: Wie kann Wissenschaft im Team organisiert sein?"**, *TU Dortmund, Germany*.
	Panelist.
June 27, 2023	**"Wie fördern wir erkenntnisbasierte Entscheidungen?" (How do we support enlightment based decissions?)**, *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"**, *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 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

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 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 Kaiserlautern, 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, **Colloquium**, *TU Braunschweig, Germany*.
2018 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

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

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 student)

Winter 12/13   **Optimization**, *Seminar*.
Department of Mathematics; joint with T. Theobald and C. Trabandt

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

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

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 highschool 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 Mathematiker-Vereinigung 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.   https://7abenteuer.diejungeakademie.de

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 – Jan. 2025	**Associate Editor for the SIAM Journal on Applied Algebra and Geometry (SIAGA)**.

Advisory Boards

Since June 2021	**Member of the advisory board for the MEGA (Effective Methods in Algebraic 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. Journal of Software for Algebra and Geometry,
15. 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. 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. Studienstifung des deutschen Volkes (PhD stipend application).
2. Two reviews for European national science foundations (details on request).

Mentoring

Since Fall 2021   **Mentor for Data Science and Computational Science Engineering**.
up to 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 – Spring 2019   **BMS Mentor at TU Berlin**.
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 - May 2016   **Texas A&M Mathematical Coding Club**, organizer.
joint with C. O'Neill

Outreach Activites

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.

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 till Spring 2023   **Auswahlkommission (election committee) for the Class of 2023 of Die Junge Akademie**, head (joint with L. Haffert).
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 Spring 2021	**Auswahlkommission (election committee) for the Class of 2021 of Die Junge Akademie**, member. Die Junge Akademie
Spring 2020 till Spring 2021	**Hiring Committee for W2 Professorship "Mathematische Methoden der Datenanalyse" ("Mathematical Methods in Data Analysis")**, external member. 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 2019	**Applied Algebra and Analysis Seminar**, organizer. TU Braunschweig; since Spring 2020 online together with Univ. Osnabrück, jointly organized with D. Lorenz, K. Kozhasov, S. Kunis, and T. Römer
Aug. 2015 – May 2017	**Geometry Seminar**, administrative organizer. Texas A&M University
Feb. 2009 – June 2013	**AG & Oberseminar Diskrete Mathematik**, administrative organizer. Goethe University

Departmental Service and Local Committees

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

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 2021	**Boulos El Hilany**. TU Braunschweig; DFG Walter Benjamin Fellow
Since April 2019	**Khazhgali Kozhasov**. TU Braunschweig

PhD Students

Since Feb. 2023 — **Birte Ostermann**, *Polynomial Optimization in Quantum Computing (working title)*.
TU Braunschweig; designated co-advisor: S. Stiller

Since June 2021 — **Mandy Stritzke**, *Applications on Neural Networks in the Sciences (working title)*.
TU Braunschweig

Since April 2019 — **Janin Heuer**, *The SONC Cone: Primal and Dual Perspectives (working title)*.
TU Braunschweig; anticipated submission: second quarter of 2023.

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.

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

Nov. 2021 – Jan. 2023 — **Sophie-Theresa Kleinke**, *Sums of Nonnegative Circuit Polynomials and Optimal Circuit Decompositions*.
TU Braunschweig

Nov. 2021 – Dec. 2022 — **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 Autnomous Driving)*.
TU Braunschweig; in cooperation with J. Fricke (Volkswagen AG)

Jan. 2021 – Sep. 2021 — **Marie Rümmler**, *Die Topologie von Amöben, deren Träger einen Circuit bildet (The Topology of Amoebas Supported on Circuits)*.
TU Braunschweig

Jan. 2020 - Jan. 2021 — **Lorenza Buogo**, *Lasserres Hierarchie für oberen Schranken für Nichtnegativitätsprobleme (Lasserre's Hierarchy for Upper Bounds for Nonnegativity Problems)*.
TU Braunschweig

Spring 2019 – Summer 2020 — **Olivia Röhrig**, *Initial Steps In The Classification Of Maximal Mediated Sets*, see 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 – March 2018 — **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).
TU Berlin

Bachelor Students

Since May. 2023 — **Lukas Lojewski**, *Modulformen und die j-Invariante elliptischer Kurven (Modular forms and the j-Invariant of Elliptic Curves; working title)*, Bachelor thesis.
TU Braunschweig

Oct. 2022 – Apr. 2023	**Leif Niehe**, *Effective Bounds on Pólya's Theorem*, Bachelor thesis. TU Braunschweig
Sep. 2020 – Nov. 2021	**Lisa Mertinaschk**, *Voronoi Diagramme und der Sweepline Algorithmus (Voronoi Diagrams and the Sweepline Algorithm)*, Bachelor thesis. TU Braunschweig
Feb 2021 – Aug 2021	**Anastasiia Grigoricheva**, *Tropical Geometry of Deep Neural Networks*, Bachelor thesis. TU Braunschweig
Oct. 2020 – July 2021	**Matthis Heimberg**, *Der NN–CRUST Algorithmus zur Kurvenrekonstruktion (The NN–CRUST Algorithm for Curve Reconstruction)*, Bachelor thesis. TU Braunschweig
June 2020 – Feb 2021	**Marius Koch**, *Grovers Quantenalgorithmus für Suchanfragen in Datenbanken (Grover's Quantum Algorithm for database search)*, Bachelor thesis. TU Braunschweig; supervised jointly with S. Stiller
Nov. 2017 – Oct. 2018	**Helena Müller**, *Minima of Polynomials via SONC Decompositions*, Bachelor thesis. 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 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 Hartzer**, *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

PhD Students – Reviews and Committees

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

2023 **Nanda Kishore Bellam**, 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

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

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

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 &* June 2018 *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