

Timo de Wolff

Curriculum Vitae

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Employment and Education

- Starting April 2019 **W2 Professor (Associate Professor with tenure)**, *Department of Mathematics, Technical University of Braunschweig, Braunschweig, Germany.*
- Since July 2017 **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 (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)

- 2017–2021 **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 (Co-PI)

- 2018–2024 **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.
- 2018 **Programme Gaspard Monge pour l'Optimisation**, *Project title: “Optimisation hyperbolique: algorithmes et implantations”, €8000 (~ \$ 9.385).*
Co-PI; PI: S. Naldi; further Co-PI's: M. Kummer, D. Plaumann, R. Sinn.

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

- 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.
- 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 June 2018 **Junior Faculty Member in the Graduiertenkolleg GRK 2434 "Facets of Complexity".**
- Since Oct. 2017 **Postdoctoral Faculty Member of the Berlin Mathematical School.**
- Since Sep. 2017 **Associated Member of the SFB-TRR 195 "Symbolic Tools in Mathematics and their Application".**
- Since July 2017 **Member of the MATHEON Research Center.**
- Since July 2017 **Emmy Noether Programme of the DFG.**
- Since 2017 / 2016 **Member of SIAM and INFORMS.**

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. **Nondegenerate Multistationarity in Small Reaction Networks**
with A. Shiu; to appear in *Discrete and Continuous Dynamical Systems, Series B*.
2. **An Approach to Constrained Polynomial Optimization via Nonnegative Circuit Polynomials and Geometric Programming**

with M. Dressler, and S. Ilman; to appear in the [Journal of Symbolic Computation](#) (special issue for “MEGA 2017”).

3. **Imaginary Projections of Polynomials**
with T. Jörgens, and T. Theobald; to appear in the [Journal of Symbolic Computation](#) (special issue for “MEGA 2017”).
Was accepted for a talk at "[MEGA 2017](#)".
4. **Lopsided Approximation of Amoebas**
with J. Forsgård, L. Matusevich, and N. Mehlhop; [Mathematics of Computation](#), **88** (315) (2019), 485-500.
5. **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](#)".
6. **Lower Bounds for Polynomials with Simplex Newton Polytopes Based on Geometric Programming**
with S. Ilman; [SIAM Journal on Optimization](#), **26** (2) (2016), 1128-1146.
7. **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](#)".
8. **Norms of Roots of Trinomials**
with T. Theobald; [Mathematische Annalen](#), **366** (1) (2016), 219-247.
Was accepted for a talk at "[MEGA 2015](#)".
9. **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](#)".
10. **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](#)".
11. **Amoebas of Genus at Most One**
with T. Theobald; [Advances in Mathematics](#) **239** (2013), 190-213.

Preprints

12. **Computing Elimination Ideals and Discriminants of Likelihood Equations**
with X. Tang and R. Zhao; see [ArXiv 1810.05620](#).
13. **An Experimental Comparison of SONC and SOS Certificates for Unconstrained Optimization**
with H. Seidler; see [ArXiv 1808.08431](#).
14. **Optimization over the Boolean Hypercube via Sums of Nonnegative Circuit Polynomials**
with M. Dressler and A. Kurpisz; see [ArXiv 1802.10004](#).
Was accepted for a talk at “[MFCS 2018](#)” and “[FLoC 2018](#)”.
15. **The Lattice of Amoebas**
with J. Forsgård; see [ArXiv 1711.02705](#).
16. **Intersections of Amoebas**
with M. Juhnke-Kubitzke; see [ArXiv 1510.08416](#)
Was accepted for a poster presentation at "[FPSAC '16](#)".
17. **A Sharp Upper Bound for the Complexity of Labeled Oriented Trees**

with M. Christmann; see [ArXiv 1412.7257](#)

18. **The Boundary of Amoebas**

with F. Schroeter; see [ArXiv 1310.7363](#)

19. **Low Dimensional Test Sets for Nonnegativity of Even Symmetric Forms**

with S. Ilman; see [ArXiv 1303.4241](#)

20. **Polytopes with Special Simplices;**

see [ArXiv 1009.6158](#)

Surveys

1. **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*".

2. **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.

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

1. **POEM**, a [Python](#) based software for polynomial optimization using SONC and SOS nonnegativity certificates;

with H. Seidler.

Latest Version: (0.1.1.0(a)); (prototype – for test purposes only). Latest Update: 04/09/18. Development: July 2017–present.

2. **Maximal_Mediated_Sets.sage**, a [Python](#) class for the computation of maximal mediated sets via [SAGE](#);

with J. Hartzler.

Latest Version: (0.1.0.1(a)). Latest Update: 04/03/17. Development: Fall 2016–present.

3. **Lopsided_Amoeba_Approximation.lib**, a [SINGULAR/SAGE](#) software package for the approximation of amoebas via lopsided amoebas and cyclic resultants.

Latest Version: (0.1.0.0(a)). Latest Update: 08/30/16. Development: Spring 2016–present.

4. **VIRO.sage**, a [Python](#) class for using Viro's Patchworking from within [SAGE](#);

with C. O'Neill and E. Owusu Kwaakwah (alumna).

Latest Version: (0.4b). Latest Update: 05/09/18. Development: Spring 2015–present.

Talks

Peer Reviewed Conference Talks

July 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

- July 9-13, 2019 **Minisymposium “Numerical Methods for Structured Polynomial Solving” at the 2019 SIAM Conference on Applied Algebraic Geometry**, *Bern, Switzerland.*
TBA
- March 18-21, 2019 **Conference “Mathematics of Quantum Information”**, *Siegen, Germany.*
TBA
- 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
- [Further Conference Talks](#)
- 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

- 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**
- May 22, 2019 **Colloquium**, *Universität Osnabrück, Germany.*
TBA
- 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 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 (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 (as undergraduate student)

Provided on request.

Organized Conferences and Workshops

- July 13–17, **ICMS 2020**, *conference*, **local head organizer**.
2020 TU Braunschweig, Germany
- July 3–7, **Sparsity in Polynomial Systems and Applications**, *minisymposium at the “SIAM Conference on Applied Algebraic Geometry”*, organizer.
2019 joint with M. Dressler; Bern, Switzerland.
- July 3–7, **Polynomial Optimization and its Applications**, *minisymposium at the “SIAM Conference on Applied Algebraic Geometry”*, organizer.
2019 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 “SIAM Conference on Applied Algebraic Geometry”*, organizer.
2017 joint with T. Theobald; Atlanta, GA
- June 10, **Polynomials and Polytopes**, *workshop*, organizer.
2017 joint with B. Sturmfels; TU Berlin, Germany
- Aug. 3–7, **Real Algebraic Geometry and Optimization**, *minisymposium at the “SIAM Conference on Applied Algebraic Geometry”*, organizer.
2015 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

- Jan. 2019 – **Associate Editor for the SIAM Journal on Applied Algebra and Geometry (SIAGA)**.
Jan. 2022

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. *Mathematics of Computation*,
12. *Mathematical Proceedings*,
13. *Proceedings of the Royal Society A* (general science journal).

Collections and Conference Proceedings:

1. *Combinatorial Algebraic Geometry Thematic Program*, (book; report on 1 article),
2. *Mathematics: Frontiers and Perspectives* (conference proceedings).

Quick opinion (without full review):

1. *Advances in Mathematics*,
2. *SIAM Journal on Applied Algebra and Geometry (SIAGA)*.

Book reviews:

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

Grant applications:

1. **One review for a European national science foundation** (details on request).

Letters

- Since 2015 In summary letters for 12 undergraduate, master, and PhD students.
Since 2017 In summary 2 host statements for Humboldt and Fulbright fellowship applications.

Outreach Activities

- Nov. 30, 2018 **BMS Career Talks 2018.**
Panelist.
- Since Spring 2018 **BMS Mentor at TU Berlin.**
One PhD student mentored since Spring 2018; 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
- Aug. 8, 2014 **Uni Camp 2014, a university summer school for highschool girls, organizer of the math section.**
Saarland University, Saarbücken

Departmental Service

- Aug. 2015 – May 2017 **Geometry Seminar, administrative organizer.**
Texas A&M University
- Feb. 2009 – June 2013 **AG & Oberseminar Diskrete Mathematik, administrative organizer.**
Goethe University
- 2002–2013 **Professorial Hiring Committees, member, two times as undergraduate representative and one time as graduate students and postdocs representative.**
Goethe University

Students

PhD Students

- Since Oct. 2017 **Oğuzhan Yürük, Applications of SONCs (working title).**
TU Berlin
- Since July 2017 **Henning Seidler, Computational and algebraic aspects of SONCs (working title).**
TU Berlin

Master Students

- 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).
TU Berlin

Bachelor Students

- 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 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 – **Jacob Hartzler**, *project about maximal mediated sets*, see
Jan. 2018 [Maximal_Mediated_Sets.sage](#).
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

Informal Thesis Co-Advisor

- Aug. 2017 – **Mathias Oster**, *project about deformation of materials*, Master thesis, informal co-advisor.
June 2018 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

References

Provided on request.