

# Timo de Wolff

## Curriculum Vitae

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## Employment and Education

- 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

- 2017–2021 **DFG Emmy Noether Junior Research Group**, €805.000 (~ \$ 899.466) guaranteed plus ~ €94.000 (~ \$ 105.030) tentative (if evaluated positively after 3 years).  
Single PI
- 2015–2017 **AMS-Simons travel grant**, \$ 4000.  
Single PI

### 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 Oct. 2017 **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

- Nondegenerate Multistationarity in Small Reaction Networks**  
with A. Shiu; to appear in *Discrete and Continuous Dynamical Systems, Series B*.
- 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").
- 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".
- Lopsided Approximation of Amoebas**  
with J. Forsgård, L. Matusevich, and N. Mehlhop; to appear in *Mathematics of Computation*.
- 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".
- 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. **Optimization over the Boolean Hypercube via Sums of Nonnegative Circuit Polynomials**  
with M. Dressler and A. Kurpisz; see [ArXiv 1802.10004](#).  
Is accepted for a talk at "FLoC 2018".
13. **The Lattice of Amoebas**  
with J. Forsgård; see [ArXiv 1711.02705](#).
14. **Intersections of Amoebas**  
with M. Juhnke-Kubitzke; see [ArXiv 1510.08416](#)  
Was accepted for a poster presentation at "FPSAC '16".
15. **A Sharp Upper Bound for the Complexity of Labeled Oriented Trees**  
with M. Christmann; see [ArXiv 1412.7257](#)
16. **The Boundary of Amoebas**  
with F. Schroeter; see [ArXiv 1310.7363](#)
17. **Low Dimensional Test Sets for Nonnegativity of Even Symmetric Forms**  
with S. Ilman; see [ArXiv 1303.4241](#)
18. **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 Simplexes**  
Master thesis (Diplomarbeit) for mathematics (in German), 2008.

### Software

1. A [Python](#) based software for the computation of SONC 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. Hartzer.  
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.

### In Preparation for Submission (Articles)

1. **A Comparison of SONC and SOS Certificates for Global Optimization** (working title) with H. Seidler
2. **An Experimental Classification of Maximal Mediated Sets** (working title) with O. Röhrig and O. Yürük.
3. **Nonnegativity, Discriminants, and Entropy** (working title) with J. Forsgård.

### In Preparation for Submission (Software)

1. [AMOEBAS.jl](#) (working title), a [Julia](#) library for the numerical computation of amoebas, coamoebas, and imaginary projections in dimensions 2 and 3; with S. Timme.
2. [AMOEBAS.lib](#) (working title), a [SINGULAR](#) library for the computation of boundaries of amoebas and related objects;

## 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](#)
- Dec. 12-14, 2018 **Workshop on Applied Algebraic Geometry**, *Bristol, UK*.  
TBA
- Nov. 3-4, 2018 **AMS special session on “Numerical Methods for Nonlinear Systems”**, *University of Arkansas, Fayetteville, AR*.  
TBA; Note: **tentative**
- Oct. 15-19, 2018 **Workshop on Real Algebraic Geometry and Optimization**, *ICERM, Brown University, RI, USA*.  
TBA
- July 9-13, 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 2-6, 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 **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

- 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 Talks

- June 26, 2018 **Colloquium**, *TU Kaiserslautern, Germany.*  
A New Approach to Nonnegativity and Polynomial Optimization
- 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

### 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)

- Summer 08 **Selected Topics of the Philosophy of Mathematics**, *Seminar*.  
Department of Philosophy; joint with W.K. Essler and C. Riener
- Summer 07 **Mathematics for Philosophers**, *Seminar*.  
Department of Philosophy

- Summer 07 **TA for the lecture “Discrete mathematics”**.  
Department of Mathematics; lecturer: T. Theobald
- Winter 06/07 **TA for the lecture “Logic I”**.  
Department of Philosophy; lecturer: A. Fuhrmann
- Summer 06 **TA for the lecture “Logic II”**.  
Department of Philosophy; lecturer: W.K. Essler
- Winter 05/06 **TA for the lecture “Logic I”**.  
Department of Philosophy; lecturer: W.K. Essler
- Winter 04/05 **TA for the lecture “Logic I”**.  
Department of Philosophy; lecturer: W.K. Essler

## Organized Conferences and Workshops

- 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

### Refereeing

1. *Advances in Applied Clifford Algebras*,
2. *Advances in Geometry* (2 reviews),
3. *Advances in Mathematics*,
4. *Advances in two-dimensional Homotopy and Combinatorial Group Theory* (book; report on 1 chapter),
5. *Arkiv for Matematik*,
6. *Beiträge zur Algebra und Geometrie*,
7. *Canadian Mathematical Bulletin*,
8. *Combinatorial Algebraic Geometry Thematic Program*, (book; report on 1 article)
9. *Experimental Mathematics*,
10. *Foundations of Computational Mathematics*,
11. *International Mathematics Research Notices* (2 reviews),

12. **Linear Algebra and its Applications**,
13. **Mathematical Proceedings**,
14. **Mathematics: Frontiers and Perspectives** (conference proceedings),
15. **Proceedings of the Royal Society A** (general science journal)

a) One review for a grant application at a 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

Since Spring **BMS Mentor at TU Berlin**.

2018 One PhD student mentored

Spring 2017 **Mentor at Texas A&M “Academy for Future Faculty”**.

One master student mentored

Spring 2017 **Junior Algebra & Geometry Seminar**, *Seminar for graduate students*.

joint with T. Brysiewicz

Fall 2016 **Student Working seminar in Algebra & Geometry**, *Seminar for graduate students*.

joint with T. Brysiewicz, K. Kordek, and O. Sobieska

Spring 2016 **Junior Algebra & Geometry Seminar**, *Seminar for graduate students*.

joint with T. Brysiewicz

Nov. 2014 - **Texas A&M Mathematical Coding Club**, organizer.

May 2016 joint with C. O'Neill

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 – **Geometry Seminar**, administrative organizer.

May 2017 Texas A&M University

Feb. 2009 – **AG & Oberseminar Diskrete Mathematik**, administrative organizer.

June 2013 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. **Oğuzhan Yürük**, *Applications of SONCs (working title)*.

2017 TU Berlin

Since July **Henning Seidler**, *Computational and algebraic aspects of SONCs (working title)*.

2017 TU Berlin

## Master Students

- Aug 2017 – **Sascha Timme**, *Fast Computation of Amoebas, Coamoebas, and Imaginary Projections in Low Dimensions*.  
March 2018  
TU Berlin

## Bachelor Students

- Since Nov 2017 **Helena Müller**, *Minima of SONC Polynomials (working title)*, 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 Hartzler**, *project about maximal mediated sets*, see [Maximal\\_Mediated\\_Sets.sage](#).  
Texas A&M University; informal supervision from TU Berlin since July 2017.
- Sep. 2015 – Aug. 2016 **Nathan Mehlhop**, *project about cyclic resultants*, see [ArXiv 1608.08663](#).  
Texas A&M University; supervised jointly with L. Matusevich
- Sep. 2015 – May 2016 **Haley Lambright**, *project about nonnegative matrix factorization and geometric programming*.  
Texas A&M University

## Informal Thesis Co-Advisor

- Since Aug. 2017 **Mathias Oster**, *project about deformation of materials*, 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

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## References

Provided on request.