

# Alperen Ali Ergür

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## Education

**2016** PhD in Mathematics - *Texas A&M University, USA*  
Advisors: Grigoris Paouris and J. Maurice Rojas

**2011** MS in Mathematics- *Tobb University, Turkey*

**2009** BS in Mathematics- *Bilkent University, Turkey*

## Employment

**Sep 2019-present** Carnegie Mellon University, Theoretical Computer Science Group  
*Postdoctoral Fellow*  
Mentors: Venkat Gruswami and Pravesh Kothari

**May 2017-Aug 2019** Technical University of Berlin, Algorithmic Algebra Group  
*Einstein Postdoctoral Fellow*  
Mentors: Peter Bürgisser and Felipe Cucker

**Aug 2016-May 2017** North Carolina State University, Symbolic Computation Group  
*Postdoctoral Research Scholar*  
Mentor: Cynthia Vinzant

**Sep 2011-Aug 2016** Texas A&M University, Functional Analysis and Algebraic Geometry Groups  
*Graduate Research/Teaching Assistant*  
Assistant Instructor at Research Experience for Undergraduates Program

## Teaching Experience

1. Technische Universität Berlin  
Seminar on Interior Point Methods in Convex Optimization (co-teaching with T. de Wolff)  
Effective Algebraic Geometry Lectures (co-teaching with P. Bürgisser and J. Tonelli-Cueto)
2. NC State University  
Instructor for the following courses:  
Linear Algebra for Science Majors, Calculus for Engineers, Precalculus
3. Texas A&M University  
Assistant Instructor at Research Experience for Undergraduates Program  
Mentored eight undergraduate research projects in four summers: 2013-2016.  
Recitation Leader for Graduate Algebra, Probability, Advanced Calculus, Calculus

## Research Visits

- April 2019** Sorbonne University, Paris, Host: Elias Tsigaridas  
**Nov 2018** Goethe Universität Frankfurt Am Main, Host: Amin Coja-Oghlan  
**Oct 2018** University of Missouri, Columbia, Host: Petros Valettas  
**April 2017** University of Michigan, Ann Arbor, Host: Alexander Barvinok  
**Mar 2016** Middle East Technical University, Host: Özgür Kışisel  
**Oct 2015** Technische Universität München, Host: Peter Gritzmann  
**Sept 2015** University of Athens, Host: Apostolos Giannopoulos

## Honors and Awards

- Jan 2017** Postdoctoral Fellowship by Einstein Foundation  
**Jun 2015** Travel Grant by University of Trento  
**Jan 2015** Travel Grant by Institut Henri Poincare  
**April 2014** AMS Travel Grant for Graduate Students  
**Sept 2009** Full Scholarship by Tobb University including tuition and stipend  
**Sept 2004** Full Scholarship by Bilkent University including tuition and stipend  
**< 2004** Two Bronze, One Silver Medal in National Math Contest

## Research Interest

Discrete and Convex Geometry, Real Algebraic Geometry, Optimization, Randomized Numerical Analysis, Theory of Computation

## Publications and Preprints

Articles listed below are available at [https://arxiv.org/a/ergur\\_a\\_1.html](https://arxiv.org/a/ergur_a_1.html)

1. Multihomogenous Nonnegative Polynomials and Sums of Squares  
Discrete and Computational Geometry, 2018  
<https://doi.org/10.1007/s00454-018-0011-3>
2. Probabilistic Condition Number Estimates for Real Polynomials I  
(with G. Paouris and J.M. Rojas)  
Foundations of Computational Mathematics, 2018  
<https://doi.org/10.1007/s10208-018-9380-5>
3. Approximating Nonnegative Polynomials via Spectral Sparsification  
SIAM Journal on Optimization, 2019  
<https://doi.org/10.1137/17M1121743>
4. Tropical Varieties for Exponential Sums (with G. Paouris and J.M. Rojas)  
Mathematische Annalen, 2019  
<https://doi.org/10.1007/s00208-019-01808-5>
5. On the Expected Number of Zeros of Random Fewnomials  
(with P. Bürgisser and J. Tonelli-Cueto)  
SIAM Journal on Applied Algebra and Geometry (SIAGA), 2019  
<https://doi.org/10.1137/18M1228682>
6. Probabilistic Condition Number Estimates for Real Polynomials II:  
Structure and Smoothed Analysis (with G.Paouris and J.M Rojas)  
Minor Revision, Mathematics of Computation
7. Plantinga-Vegter Algorithm Takes Average Polynomial Time  
(with F. Cucker and J. Tonelli-Cueto)  
ACM Symposium on Symbolic and Algebraic Computation (ISSAC), 2019  
<https://doi.org/10.1145/3326229.3326252>  
Journal version submission @ Discrete & Computational Geometry
8. The Rank of Sparse Random Matrices  
(with A. Coja-Oghlan, Pu Gao, S. Hettereich, H. Rolvien)  
ACM Symposium on Discrete Algorithms (SODA), 2020  
<https://doi.org/10.1137/1.9781611975994.35>  
Journal version submission @ Random Structures and Algorithms
9. A Polyhedral Homotopy Algorithm for Real Zeros  
(with T. de Wolff)
10. The Multivariate Schwartz-Zippel Lemma  
(with L. Dogan, J. Mundo, E. Tsigaridas)

## Selected Talks

- Jul 2019** SIAM Conference on Applied Algebraic Geometry 2019, Bern
- Jun 2019** Effective Methods in Algebraic Geometry (MEGA) 2019, Madrid
- Apr 2019** Computational Geometry Workshop, Schloss Dagstuhl, Germany
- Feb 2019** Universität Bonn, Theoretical Computer Science Seminar
- Nov 2018** Goethe Universität Frankfurt, Applied Discrete Mathematics Seminar
- Oct 2018** U Missouri Columbia, Convex Geometry Seminar

- Mar 2018** Emerging Trends in Geometric Functional Analysis, Banff Creativity Centre
- Dec 2017** Methods on Discrete Structures Lecture Series, TU Berlin
- Nov 2017** Algebra Meets Numerics Workshop, Berlin Academy of Sciences
- Mar 2017** U Michigan Ann Arbor, Analysis and Probability Seminar
- Feb 2017** TU Berlin, Algorithmic Algebra Seminar, Germany
- July 2016** Geometric Functional Analysis Concentration Week, Texas A&M
- Apr 2016** MIT, LIDS Seminar
- Apr 2016** Georgia Tech, Algebra Seminar
- Mar 2016** Univ of Chicago, Scientific Computing Seminar
- Mar 2016** NC State University, Symbolic Computation Seminar
- Dec 2015** Colorado State University, FRAGMENT Seminar
- Oct 2015** Technical University of Munich, Applied Geometry Seminar, Germany
- Sept 2015** University of Athens, Convex Geometric Analysis Seminar, Greece
- Aug 2015** SUMIRFAS, Texas A&M, College Station
- June 2015** Effective Methods in Algebraic Geometry (MEGA) 2015, Trento ,Italy

## Service

- July 2019** Organizer, SIAM Applied Algebraic Geometry Minisymposia:  
Numerical Methods for Structured Polynomial System Solving
- Fall 2017** Organizer, Algorithmic Algebra OberSeminar, TU Berlin
- Feb 2016** Organizer, Lecture Series on Real Stable Polynomials, Bogazici University
- Jan 2016** Organizer, Combinatorial Algebraic Geometry Workshop, Nesin Math Village
- Nov 2014** Member of Power Team, Texas A&M High School Contest
- 2014-2015** Organizer, Texas A&M Working Seminar in Discrete Mathematics

## References

- Teaching** Timothee Bryan (Visiting Assistant Professor of Mathematics, Colgate College)
- Amin Coja-Oghlan (Professor of Discrete Mathematics, Goethe Universität Frankfurt)
- Felipe Cucker (Professor of Mathematics, City University of Hong Kong)
- Venkatasan Gruswami (Professor of Computer Science, Carnegie Mellon University)
- Grigoris Paouris (Professor of Mathematics, Texas A&M University)
- J.Maurice Rojas (Professor of Mathematics and Computer Science, Texas A&M University)
- Cynthia Vinzant (Assistant Professor of Mathematics, North Carolina State University)