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 Missiouri, Columbia, Host: Petros Valettas
April 2017 University of Michigan, Ann Arbor, Host: Alexander Barvinok
Mar 2016 Middle East Technical University, Host: Özgür Kişisel
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

Efficient ways to understand and manipulate real polynomials, complexity theoretic limits therein. This naturally involves tools and applications from

optimization, convex geometry (e.g., 1,3)

high dimensional probability, numerical analysis, (e.g., 2,5,6,7)

discrete geometry (e.g., 4,9), extremal and probabilistic combinatorics (e.g., 8,10).

Publications and Preprints

Articles listed below are available at `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)
   Accepted, SIAM Journal on Applied Algebra and Geometry

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 @ Journal of Computational Geometry

8. The Rank of Sparse Random Matrices
   (with A. Coja-Oghlan, S. Hettereich, H. Rolvien)
   Accepted, ACM Symposium on Discrete Algorithms (SODA), 2020
   Journal version submission @ Discrete Analysis

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 Missiouri 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)

Peter Bürgisser (Professor of Algorithmic Algebra, TU Berlin)

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)