

# Alperen Ali Ergür

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## Education

<b>2016</b>	PhD in Mathematics - <i>Texas A&amp;M University, USA</i>
<b>2011</b>	MS in Mathematics- <i>Tobb University, Turkey</i>
<b>2009</b>	BS in Mathematics- <i>Bilkent University, Turkey</i>

## Employment

<b>Aug 2020-present</b>	University of Texas at San Antonio <i>Assistant Professor</i> Mathematics Department
<b>Sep 2019-Aug 2020</b>	Carnegie Mellon University, Theoretical Computer Science Group <i>Postdoctoral Fellow</i> Mentors: Venkatesan Guruswami and Pravesh Kothari
<b>May 2017-Aug 2019</b>	Technical University of Berlin, Algorithmic Algebra Group <i>Einstein Postdoctoral Fellow</i> Mentors: Peter Bürgisser and Felipe Cucker
<b>Aug 2016-May 2017</b>	North Carolina State University, Symbolic Computation Group <i>Postdoctoral Research Scholar</i> Mentor: Cynthia Vinzant
<b>Sep 2011-Aug 2016</b>	Texas A&M University, Functional Analysis and Algebraic Geometry Groups <i>Graduate Research/Teaching Assistant, and REU Instructor</i> Mentors: Grigoris Paouris and J. Maurice Rojas

## Teaching Experience

### 1. University of Texas at San Antonio

- *Mentoring:*  
Jesus Rebollo-Bueno (postdoctoral scholar), Abigail Martinez (M.S. student),  
Nina De La Torre, Ian Solis, Chris La Valle (undergraduate students)
- *Courses developed for Mathematics of Data and Computing B.S. degree*  
Probability and Computing  
Introduction to Optimization (with C. Walton)  
(Re)designing two course abstract algebra series with an algorithmic view
- *Courses developed for grad students in Math, CS and Engineering*  
Probability Theory and Computing  
High Dimensional Probability with Algorithmic Applications
- *Instructor of the Record:*  
Linear Algebra, Probability and Computing, Abstract Algebra

### 2. Technische Universität Berlin

- *Graduate Seminar:* Interior Point Methods in Convex Optimization (with T. de Wolff)
- *Graduate Class:* Effective Algebraic Geometry (with P. Bürgisser, J. Tonelli-Cueto)
- Worked closely with PhD students Josue Tonelli-Cueto and M. Levent Doğan

### 3. NC State University

- Instructor of the Record for the following courses  
Linear Algebra for Science Majors, Calculus for Engineers, Precalculus

### 4. Texas A&M University

- *Assistant Instructor at Research Experience for Undergraduates Program (REU)*  
Mentored eight undergraduate research projects in four summers: 2013-2016
- Recitation Leader for Graduate Algebra, Probability, Advanced Calculus, Calculus

## Grants, Awards, etc

<b>2022+</b>	MAA NExt Fellow, 2022 Class
<b>July 2021</b>	NSF-CCF-2110075, Algorithmic Foundations Program, started at 10/01/21 Title: Beyond Worst-Case Analysis for Computing with Polynomials
<b>Jan 2017</b>	Postdoctoral Fellowship by Einstein Foundation
<b>Jun 2015</b>	Travel Grants by University of Trento and Institut Henri Poincare
<b>April 2014</b>	AMS Travel Grant for Graduate Students
<b>Sept 2009</b>	Full Scholarship by Tobb University including tuition and stipend
<b>Sept 2004</b>	Full Scholarship by Bilkent University including tuition and stipend
<b>&lt; 2004</b>	Two Bronze, One Silver Medal in National Math Competitions

## Research Interest

Discrete and Convex Geometry, Real Algebraic Geometry, Convex 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 & 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, 2019  
<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, 2020  
<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. Smoothed Analysis for the Condition Number of Structured Real Polynomial Systems  
(with G. Paouris and J.M. Rojas)  
Mathematics of Computation, 2021  
<https://doi.org/10.1090/mcom/3647>
7. On the Complexity of Plantinga-Vegter Algorithm  
(with F. Cucker and J. Tonelli-Cueto)  
ACM Symposium on Symbolic and Algebraic Computation (ISSAC), 2019  
<https://doi.org/10.1145/3326229.3326252>  
In press @ 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>  
Random Structures and Algorithms, 2022  
<https://doi.org/10.1002/rsa.21085>
9. The Multivariate Schwartz-Zippel Lemma  
(with M. L. Doğan, J. Mundo, E. Tsigaridas)  
SIAM Journal of Discrete Mathematics, 2022  
<https://doi.org/10.1137/20M1333869>
10. A Polyhedral Homotopy Algorithm for Real Zeros  
(with T. de Wolff)  
Minor Revision @ Arnold Mathematical Journal
11. Functional Norms, Condition Numbers, and Numerical Algorithms in Algebraic Geometry  
(with F. Cucker, J. Tonelli-Cueto)  
Accepted @ Forum Mathematics Sigma

12. Beyond Worst-Case Analysis for Root Isolation Algorithms  
(with J. Tonelli-Cueto, E. Tsigaridas)  
ACM Symposium on Symbolic and Algebraic Computation, (ISSAC), 2022  
<https://doi.acm.org?doi=3476446.3535475>
13. On the Bit Complexity of Computing Chow Forms  
(with M. L. Doğan, E. Tsigaridas)
14. Approximate Low-Rank Decomposition for Real Symmetric Tensors  
(with J. Rebollo-Bueno, P. Valettas)

## Some Talks

- May 2022** Real Algebraic Geometry and Optimization Seminar, Purdue University
- Jul 2021** Mathematical Congress of Americas, Buenos Aires, Argentina
- Jun 2021** Effective Methods in Algebraic Geometry, MEGA 2021, Tromsø Norway
- Sept 2020** Data Seminar, U Missouri Columbia
- Mar 2020** ACO Seminar, Carnegie Mellon University
- 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
- 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

## Service

- 2021+** Organizer, Geometry, Probability, and Computing Seminar  
A student accessible research seminar co-organized with G. Paouris and P. Valettas  
Resources available at <http://alpergur.xyz/gpcseminar.html>

- 2023** PC Member, ACM Symposium in Algebraic Computation (ISSAC 2023)
- 2020-23** Member of the Committee to design Mathematics of Computation and Data:  
New B.S. degree jointly offered by Math and CS departments of UTSA
- Nov 2021** Organizer, SIAM TX-Louisiana Section Meeting Minisymposia:  
with J. M. Rojas and F. Sottile, Algorithmic Algebra and Geometry (4 sessions)
- July 2021** Organizer, Mathematical Congress of Americas Minisymposia:  
with D. Armentano, M. Bender, and J. Tonelli Cueto,  
Numeric-Symbolic Computation with Polynomials (3 Sessions)
- July 2019** Organizer, SIAM Applied Algebraic Geometry Minisymposia:  
with P. Lairez, G. Malajovich, and J. Tonelli Cueto,  
Numerical Methods for Structured Polynomial System Solving (4 sessions)
- Fall 2017** Organizer, Algorithmic Algebra OberSeminar, with P. Bürgisser, TU Berlin
- Mar 2016** Organizer, Lecture Series on Stable Polynomials, Boğaziçi-METU
- Jan 2016** Organizer, Combinatorial Algebraic Geometry Workshop, Nesin Math Village  
with Ö. Kışisel, H. Güntürkün, and Ö. Öztürk
- Nov 2014** Member of Power Team, Texas A&M High School Contest

## References

- Teaching** Timothee Bryan (Term Assistant Professor of Mathematics, George Mason University)
- Peter Bürgisser (Professor of Algorithmic Algebra, Technical University of Berlin)
- Felipe Cucker (Professor of Mathematics, City University of Hong Kong)
- Pravesh Kothari (Assistant 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, University of Washington, Seattle )