Alperen Ali Ergür

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Education

- **PhD in Mathematics (Algebraic Geometry, High Dimensional Probability)**, Texas A&M University
- **BA in Mathematics** Bilkent University (with full tuition and stipend scholarship)

Awards

- Kay and Steve Robbins Fellowship in Computer Science
- Einstein Postdoctoral Fellowship, Berlin
- Math Olympiad Medals: 2 Bronze, 1 Silver (National Competitions)
- NSF Grants from Algorithmic Foundations directory

Technical Skills

Programming Languages: Python (Pandas, NumPy, PyTorch), Julia (Scientific Computing),

Professional Summary

- Mathematician & Computer Scientist with expertise in randomized algorithms, high dimensional probability, convex geometry, optimization, reinforcement learning, symbolic computation, and real algebraic geometry.
- Track record of 18+ publications in in premier venues including *SIAM Journal of Optimization, ACM SODA and ISSAC, FOCM Journal, Random Structures and Algorithms, Discrete & Computational Geometry.*
- Proven ability to lead independent research, secure funding, build and manage a team, deliver results.
- Strong problem solving skills demonstrated through math olympiad medals and technical research results.

Experience

Frontier Models Mathematics Expert (2025-Present) *Meta Superintelligence Labs*
Worked with Meta-AI research scientist to align their reasoning models with mathematical reasoning. This is a part-time role where I am consulted on data quality and benchmarking for RL post-training.

Assistant Professor (2020–Present) *University of Texas at San Antonio*
Joint appointment in Mathematics (75%) and Computer Science (25%)

- Obtained $950K$\$ in single-PI grants, and lead a research group in algorithmic foundations, optimization, reinforcement learning, and geometry; in total 12 personnel three postdocs, three graduate students, and six undergraduates.
- Developed training in Randomized Algorithms, Algorithmic Foundations of Data Science, Optimization, Algorithmic Algebra, and Reinforcement Learning.

Postdoctoral Researcher, Carnegie Mellon University, Computer Science (2019-2020)
Full time researcher in the theory of computing group working on algorithms and optimization.

Einstein Postdoctoral Fellow at TU Berlin Discrete and Algorithmic Mathematics (2017-2019)
Independent researcher working on randomized algorithms and stochastic geometry.

Postdoctoral Researcher, North Carolina State University, Symbolic Computation Group (2016-2017)
Researcher in Cynthia Vinzant's group working on optimization, discrete geometry, and symbolic computation.

Research Project Samples

- **Reinforcement Learning**: Discovering optimal algorithms Designed an agent to optimize Gröbner basis computations, reduced computational costs up to 75%, distilled the agents strategy for interpretability.
  Learning Biochemical Reaction Networks This is an ongoing work on training an agent that can find configurations for extremal networks. The reward design integrates a probabilistic formulation of systems biology insight.
- **Optimization**: ManifoldOptimization Developed a general purpose preconditioner for linear and non-linear systems of equations utilizing manifold optimization and geodesic convexity.
- **Probability Theory**: The rank of sparse random matrices; This results vindicates a decade-old conjecture in random matrix theory on the rank of large random and very sparse matrices.

References available upon request.
Full CV at alpergur.xyz.