

# Nima Anari

## (Nima Ahmadipouranari)

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📍 Gates Computer Science 484  
353 Serra Mall  
Stanford, CA 94305

RESEARCH INTERESTS      Geometry of Polynomials and Applications in Algorithms, Combinatorics, and Probability  
Approximate Sampling and Counting  
Spectral Graph Theory and Spectral Algorithms  
Algorithmic Game Theory and Mechanism Design

ACADEMIC POSITIONS      **Simons Institute for the Theory of Computing** ..... 1/2019 - present  
Microsoft Research Fellow.  
**Stanford University** ..... 1/2018 - present  
Research Engineer in Computer Science.  
**Simons Institute for the Theory of Computing** ..... 8/2017 - 12/2017  
Research Fellow.  
**Stanford University** ..... 1/2016 - 8/2017  
Postdoctoral Scholar in Management Science & Engineering.

EDUCATION      **University of California, Berkeley** ..... 8/2010 - 12/2015  
Ph.D. in Computer Science. Advisor: Satish Rao.  
Dissertation: New Approaches to the Asymmetric Traveling Salesman and Related Problems.  
**Sharif University of Technology** ..... 9/2006 - 6/2010  
B.Sc. in Computer Engineering and B.Sc. in Pure Mathematics.  
Thesis: Resource-Constrained Routing and Network Design Problems.

PREPRINTS AND MANUSCRIPTS      [22] **A Pseudo-Deterministic RNC Algorithm for General Graph Perfect Matching** ..... *Manuscript*  
*Nima Anari and Vijay V. Vazirani.*  
CoRR abs/1901.10387 (2019).  
[21] **Log-Concave Polynomials III: Mason's Ultra-Log-Concavity Conjecture for Independent Sets of Matroids** ..... *Manuscript*  
*Nima Anari, Kuikui Liu, Shayan Oveis Gharan, and Cynthia Vinzant.*  
CoRR abs/1811.01600 (2018).  
[20] **A Tight Analysis of Bethe Approximation for Permanent** ..... *Manuscript*

*Nima Anari* and Alireza Rezaei.  
CoRR abs/1811.02933 (2018).

- [19] **Nearly Optimal Pricing Algorithms for Production Constrained and Laminar ... Bayesian Selection** *Manuscript*  
*Nima Anari*, Rad Niazadeh, Amin Saberi, and Ali Shameli.  
CoRR abs/1807.05477 (2018).
- [18] **The Kadison-Singer Problem for Strongly Rayleigh Measures and Applications to Asymmetric TSP** *Manuscript*  
*Nima Anari* and Shayan Oveis Gharan.  
CoRR abs/1412.1143 (2014).

PUBLICATIONS

- [17] **Log-Concave Polynomials II: High-Dimensional Walks and an FPRAS for Counting Bases of a Matroid** *STOC 2019*  
*Nima Anari*, Kuikui Liu, Shayan Oveis Gharan, and Cynthia Vinzant.  
Proceedings of the 51st Annual ACM SIGACT Symposium on Theory of Computing (2019).
- [16] **Structured Robust Submodular Maximization: Offline and Online Algorithms** *AISTATS 2019*  
*Nima Anari*, Nika Haghtalab, Joseph (Seffi) Naor, Sebastian Pokutta, Mohit Singh, and Alfredo Torrico.  
Proceedings of the 22nd Conference on Artificial Intelligence and Statistics (2019).
- [15] **Smoothed Analysis of Discrete Tensor Decomposition and Assemblies of Neurons** *NeurIPS 2018*  
*Nima Anari*, Constantinos Daskalakis, Wolfgang Maass, Christos Papadimitriou, Amin Saberi, and Santosh Vempala.  
Proceedings of the 32nd Conference on Advances in Neural Information Processing Systems (2018).
- [14] **Log-Concave Polynomials I: Entropy and a Deterministic Approximation Algorithm for Counting Bases of Matroids** *FOCS 2018*  
*Nima Anari*, Shayan Oveis Gharan, and Cynthia Vinzant.  
Proceedings of the 59th IEEE Annual Symposium on Foundations of Computer Science (2018).
- [13] **Planar Graph Perfect Matching is in NC** *FOCS 2018*  
*Nima Anari* and Vijay V. Vazirani.  
Proceedings of the 59th IEEE Annual Symposium on Foundations of Computer Science (2018).  
Invited to special issue of SIAM Journal on Computing.
- [12] **Budget Feasible Procurement Auctions** *Oper. Res. 66*  
*Nima Anari*, Gagan Goel, and Afshin Nikzad.  
Operations Research 66 (2018).
- [11] **Graph Clustering using Effective Resistance** *ITCS 2018*  
Vedat Levi Alev, *Nima Anari*, Lap Chi Lau, and Shayan Oveis Gharan.  
Proceedings of the 9th Conference on Innovations in Theoretical Computer Science (2018).
- [10] **Approximating the Largest Root and Applications to Interlacing Families** *SODA 2018*  
*Nima Anari*, Shayan Oveis Gharan, Amin Saberi, and Nikhil Srivastava.  
Proceedings of the 29th Annual ACM-SIAM Symposium on Discrete Algorithms (2018).

- [9] **Nash Social Welfare for Indivisible Items under Separable, Piecewise-Linear ... Concave Utilities** ... *SODA 2018*  
*Nima Anari, Tung Mai, Shayan Oveis Gharan, and Vijay V. Vazirani.*  
 Proceedings of the 29th Annual ACM-SIAM Symposium on Discrete Algorithms (2018).
- [8] **Simply Exponential Approximation of the Permanent of Positive Semidefinite ... Matrices** ... *FOCS 2017*  
*Nima Anari, Leonid Gurvits, Shayan Oveis Gharan, and Amin Saberi.*  
 Proceedings of the 58th IEEE Annual Symposium on Foundations of Computer Science (2017).
- [7] **A Generalization of Permanent Inequalities and Applications in Counting and ... Optimization** ... *STOC 2017*  
*Nima Anari and Shayan Oveis Gharan.*  
 Proceedings of the 49th Annual ACM SIGACT Symposium on Theory of Computing (2017).
- [6] **Nash Social Welfare, Matrix Permanent, and Stable Polynomials** ..... *ITCS 2017*  
*Nima Anari, Shayan Oveis Gharan, Amin Saberi, and Mohit Singh.*  
 Proceedings of the 8th Conference on Innovations in Theoretical Computer Science (2017).  
 Elevated to invited paper.
- [5] **Monte Carlo Markov Chain Algorithms for Sampling Strongly Rayleigh Dis-... tributions and Determinantal Point Processes** ... *COLT 2016*  
*Nima Anari, Shayan Oveis Gharan, and Alireza Rezaei.*  
 Proceedings of the 29th Conference on Learning Theory (2016).
- [4] **Effective-Resistance-Reducing Flows, Spectrally Thin Trees, and Asymmetric ... TSP** ... *FOCS 2015*  
*Nima Anari and Shayan Oveis Gharan.*  
 Proceedings of the 56th IEEE Annual Symposium on Foundations of Computer Science (2015).  
 Invited to special issue of SIAM Journal on Computing.
- [3] **Mechanism Design for Crowdsourcing: An Optimal  $1 - 1/e$  Competitive ... Budget-Feasible Mechanism for Large Markets** ... *FOCS 2014*  
*Nima Anari, Gagan Goel, and Afshin Nikzad.*  
 Proceedings of the 55th IEEE Annual Symposium on Foundations of Computer Science (2014).
- [2] **Euclidean Movement Minimization** ..... *CCCG 2011*  
*Nima Anari, MohammadAmin Fazli, Mohammad Ghodsi, and MohammadAli Safari.*  
 Journal of Combinatorial Optimization 32 (2016).  
 Proceedings of the 23rd Annual Canadian Conference on Computational Geometry (2011).
- [1] **Equilibrium Pricing with Positive Externalities** ..... *WINE 2010*  
*Nima Anari, Shayan Ehsani, Mohammad Ghodsi, Nima Haghpanah, Nicole Immorlica, Hamid Mahini, and Vahab S. Mirrokni.*  
 Theoretical Computer Science 476 (2013).  
 Proceedings of the 6th International Workshop on Internet and Network Economics (2010).

WORK AND  
TEACHING  
EXPERIENCE

**University of California, Berkeley** ..... 9/2012 - 12/2015  
 Graduate Student Researcher.  
 Graduate Student Instructor for Discrete Mathematics and Probability Theory.  
 Graduate Student Instructor for Efficient Algorithms and Intractable Problems.

**Microsoft Research, Redmond** ..... 5/2015 - 8/2015  
Intern at Theory Group.

**Google, New York** ..... 5/2014 - 8/2014  
Intern at Algorithms Research Group.

**Jane Street, New York** ..... 5/2013 - 8/2013  
Research Intern.

**Facebook, Menlo Park** ..... 5/2012 - 8/2012  
Software Engineering Intern.

**D.E. Shaw & Co., New York** ..... 6/2011 - 8/2011  
Quantitative Analyst Intern.

**Farzanegan High School, Tehran** ..... 10/2007 - 8/2008  
Mentored a Team of Students.  
The project, Computation of the Minimum and Maximum Area Shadows of Convex Polyhedra, received First Prize at Khwarizmi Award for Young Researchers.

PRESS

**‘Outsiders’ Crack 50-Year-Old Math Problem** ..... *Quanta and Wired Magazines*  
Erica Klarreich.  
Mentioned my work on the Asymmetric Traveling Salesman Problem.

**Calling All Salesmen** ..... *What’s Happening in the Mathematical Sciences, Volume 10*  
Dana Mackenzie.  
Mentioned my work on the Asymmetric Traveling Salesman Problem.

SERVICE

Co-organized reading group “Algorithmic Toolbox: Counting and Sampling” during spring 2018 at Stanford university.

Co-organized workshop on “Approximating Traveling Salesman Problems using Algebraic Techniques” at FOCS 2016.

Reviewer for FOCS, STOC, SODA, WINE, WSDM, SoCG, ICALP, ITCS, STACS, ESA, and SICOMP.

HONORS AND AWARDS

**Microsoft Research Fellow** ..... 1/2019 - 5/2019  
Simons Institute for the Theory of Computing.  
Program on Geometry of Polynomials.

**Simons-Berkeley Research Fellow** ..... 8/2017 - 12/2017  
Simons Institute for the Theory of Computing.  
Program on Bridging Continuous and Discrete Optimization.

**Berkeley Fellowship for Graduate Studies** ..... 8/2010 - 8/2012  
University of California, Berkeley.

**Grant for Undergraduate Studies** ..... 9/2006 - 6/2010  
Iranian National Elites Foundation.

**Outstanding Student Award** ..... 2007, 2008, and 2009  
Sharif University of Technology.

**Ranked 14th Team** ..... ACM ICPC 2009  
ACM International Collegiate Programming Contest World Finals, Stockholm.

**First Prize** ..... IMC 2007 and 2008  
International Mathematics Competition, Blagoevgrad.

**Ranked 13th Team** ..... ACM ICPC 2008  
ACM International Collegiate Programming Contest World Finals, Banff.

**Gold Medal** ..... 2006 and 2007  
Iranian Mathematical Society Collegiate Competition, Tehran.

**Silver Medal** ..... IOI 2006  
International Olympiad in Informatics, Merida.

**Gold Medal** ..... IMO 2006  
International Mathematical Olympiad, Ljubljana.

**Gold Medal** ..... 2006  
Iranian National Olympiad in Informatics, Tehran.

**Silver Medal** ..... IMO 2005  
International Mathematical Olympiad, Merida.

**Gold Medal** ..... 2004 and 2005  
Iranian National Mathematical Olympiad, Tehran.

RECENT  
TALKS

**Simons Institute for the Theory of Computing** ..... 2/11/2019  
Thin Trees and Interlacing Families on Strongly Rayleigh Distributions.  
Workshop on “Beyond Randomized Rounding and the Probabilistic Method”.

**Simons Institute for the Theory of Computing** ..... 1/25/2019  
Log-Concave Polynomials and Distributions.  
Bootcamp for the Program “Geometry of Polynomials”.

**University of California, San Diego** ..... 1/14/2019  
Log-Concave Polynomials and Matroids.  
Theory Seminar.

**Bernoulli Center, EPFL** ..... 11/12/2018  
Log-Concave Polynomials: Counting and Sampling Matroid Bases and Beyond.  
Workshop on “Applications of Partition Functions”.

**Stanford University** ..... 10/29/2018  
Log-Concave Polynomials: Counting and Sampling Matroid Bases and Beyond.  
Probability Seminar.

**MIT** ..... 10/24/2018  
Log-Concave Polynomials and Matroids: Algorithms and Combinatorics.  
Algorithms and Complexity Seminar.

<b>University of California, Irvine</b> .....	10/18/2018
Planar Graph Perfect Matching is in NC. Algorithms, Combinatorics, and Optimization Seminar.	
<b>Stanford University</b> .....	10/9/2018
Log-Concave Polynomials: Combinatorics and Algorithms. Theory Lunch.	
<b>Bernoulli Center, EPFL</b> .....	10/1/2018
Counting Bases of Matroids, Entropy, and Log-Concave Polynomials. Workshop on "Theoretical Challenges in Partition Functions".	
<b>Banff International Research Station</b> .....	9/25/2018
Thin Trees and the Asymmetric Traveling Salesman. BIRS Workshop on "The Traveling Salesman Problem: Algorithms & Optimization".	
<b>Harvard University</b> .....	9/24/2018
Log-Concave Polynomials: Combinatorics, Counting, and Optimization.	
<b>Banff International Research Station + Casa Matemática Oaxaca</b> .....	8/14/2018
Counting Algorithms over Matroids. BIRS-CMO Workshop on "Analytic Techniques in Theoretical Computer Science".	
<b>University of California, Los Angeles</b> .....	5/24/2018
Entropy, Log-Concavity, and a Deterministic Approximation Algorithm for Counting Bases of Matroids.	
<b>Georgia Tech</b> .....	4/30/2018
Entropy, Log-Concavity, and a Deterministic Approximation Algorithm for Counting Bases of Matroids. Algorithms and Randomness Center Colloquium.	
<b>TCS+</b> .....	3/14/2018
Planar Graph Perfect Matching is in NC.	
<b>Stanford University</b> .....	2/14/2018
Matroids, Entropy, and Log Concavity. Theory Lunch.	
<b>University of Washington</b> .....	1/23/2018
Planar Graph Perfect Matching is in NC.	
<b>Stanford University</b> .....	1/22/2018
Planar Graph Perfect Matching is in NC. Theory Seminar.	
<b>Visa Research</b> .....	11/21/2017
Nash Social Welfare, Matrix Permanent, and Stable Polynomials.	
<b>Simons Institute for the Theory of Computing</b> .....	11/8/2017
Counting and Optimization Using Stable Polynomials. Workshop on "Hierarchies, Extended Formulations and Matrix-Analytic Techniques".	
<b>Simons Institute for the Theory of Computing</b> .....	9/15/2017
Approximating the Permanent of Positive Semidefinite Matrices.	

Workshop on “Discrete Optimization via Continuous Relaxation”.

**University of California, Berkeley** ..... 9/6/2017

Strongly Rayleigh Measures in Counting and Optimization.  
Theory Lunch.

**Google Research, Mountain View** ..... 8/29/2017

Strongly Rayleigh Measures in Counting and Optimization.

**TOCA-SV** ..... 5/12/2017

Algorithm Design Using Stable Polynomials.