Shayan Oveis Gharan

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RESEARCH INTERESTS	Design and Analysis of Algorithms
EDUCATION	Stanford University, 2008 - 2013
	Ph.D. in Management Science and Engineering
	Concentration Area: Information Science and Technology
	Thesis Title: New Rounding Techniques for the Design and Analysis of Approximation Algorithms
	Sharif University of Technology, Tehran, Iran. 2004 - 2008
	B.Sc. in Computer Engineering

APPOINTMENTS

⋄ Associate Professor in Paul Allen School of Computer Science and Engineering at University of Washington, 2020-present.

⋄ Assistant Professor in Paul Allen School of Computer Science and Engineering at University of Washington, 2015-2020.

⋄ Postdoctoral Miller fellow at University of California Berkeley, 2013-2014.

HONORS AND AWARDS

⋄ Simons Invesitagor Award, 2022

⋄ Jean-Loup Baer Career Development Award, 2021

⋄ Presburger Award, 2021

⋄ Best Paper Award at STOC 2021, STOC 2019, FOCS 2011 and SODA 2010

⋄ Sloan Fellowship, 2019

⋄ Google Faculty Research Award, 2019

⋄ ONR Young Investigator Award, 2017

⋄ 10 Scientists to Watch, ScienceNews, 2016

⋄ NSF Career Award, 2016

⋄ ACM Doctoral Dissertation Award (honorable mention), 2014

⋄ Miller Postdoctoral Fellowship, 2013-2014

⋄ Stanford Graduate Fellowship, 2010-2013

⋄ Gold Medal in International Olympiad in Informatics (IOI) 2004 and silver medal in CEOI 2003

JOURNAL PUBLICATIONS

⋄ Log-Concave Polynomials II: High-Dimensional Walks and an FPRAS for Counting Bases of a Matroid, with N. Anari, K. Liu, C. Vinzant, STOC 2019, best paper award, 2nd round of review in Annals of Math.

⋄ A (Slightly) Improved Approximation Algorithm for Metric TSP, with A. Karlin, N. Klein, STOC 2021, best paper award, Operations Research 2023.

⋄ Spectral Independence in High-Dimensional Expanders and Applications to the Hardcore Model, with N. Anari, K. Liu, FOCS 2020, invited to special issue of the SIAM Journal of Computing.

⋄ Log-Concave Polynomials III: Mason's Ultra-Log-Concavity Conjecture for Independent Sets of Matroids, with N. Anari, K. Liu, C. Vinzant, 2nd round of review in Proceedings of the American Mathematical Society

⋄ Log-Concave Polynomials I: Entropy and a Deterministic Approximation Algorithm for Counting Bases of Matroids, with N. Anari, and C. Vinzant, FOCS 2018, Duke Math Journal

⋄ A Generalization of Permanent Inequalities and Applications in Counting and Optimization, with N. Anari, STOC 2018, Advances in Mathematics, 2021

⋄ On the Bias of Reed-Muller Codes over Odd Prime Fields, with Paul Beame and Xin Yang, COLT 2018, SIAM J. Discret. Math 2020.

⋄ Thickness and Information in Dynamic Matching Markets with M. Akbarpour, S. Li, EC 2014, Journal of Political Economy, 2020

⋄ Sharp Bounds on Random Walk Eigenvalues via Spectral Embedding, with R. Lyons, IMRN (International Mathematics Research Notices) 2017.

⋄ An $O(\log n/\log\log n)$-Approximation Algorithm for the Asymmetric Traveling Salesman Problem, with A. Asadpour, M. Goemans, A. Madry, A. Saberi, SODA 2010, best paper award, Operations Research 2017.

⋄ A New Regularity Lemma and Faster Approximation Algorithms for Low Threshold-Rank Graphs, with L. Trevisan, in APPROX 2013, Theory of Computing 2015.

⋄ Almost Optimal Local Graph Clustering using Evolving Sets, with R. Andersen, Y. Peres, L. Trevisan, FOCS 2012, Journal of the ACM 2015.

⋄ Multi-way Spectral Partitioning and Higher-Order Cheeger Inequalities, with J. R. Lee, L. Trevisan, STOC 2012, Journal of the ACM 2014.

⋄ Online Stochastic Matching: Online Actions Based on Offline Statistics, with V. Manshadi, A. Saberi, SODA 2012, Math of Operations Research 2013.

⋄ On Variants of the Matroid Secretary Problem, with J. Vondrak, Algorithmica 2013.

CONFERENCE PUBLICATIONS

⋄ Matroid Partition Property and the Secretary Problem, with D. Abdolazimi, A. Karlin, N. Klein, ITCS 2023

⋄ A (Slightly) Improved Bound on the Integrality Gap of the Subtour LP for TSP, with Anna Karlin and Nathan Klein, FOCS 2022.

⋄ An Improved Approximation Algorithm for the Minimum k-Edge Connected Multi-Subgraph Problem, with Anna Karlin, Nathan Klein and Xinzhi Zhang, STOC 2022.

⋄ Counting and Sampling Perfect Matchings in Regular Expanding Non-Bipartite Graphs, with Farzam Ebrahimnejad and Ansh Nagda, ITCS 2022.

⋄ A Matrix Trickle-Down Theorem on Simplicial Complexes and Applications to Sampling Colorings, with D. Abdolazimi, K. Liu, FOCS 2021.

⋄ Log-concave polynomials IV: approximate exchange, tight mixing times, and near-optimal sampling of forests, with N. Anari, K. Liu, C. Vinzant, T. Vuong, STOC 2021

⋄ An improved approximation algorithm for TSP in the half integral case, with Anna R. Karlin, Nathan Klein, STOC 2020.

⋄ Composable Core-sets for Determinant Maximization Problems via Spectral Spanners, with P. Indyk, S. Mahabadi, and A. Rezaei, SODA 2020.

⋄ Composable Core-sets for Determinant Maximization: A Simple Near-Optimal Algorithm, with Sepideh Mahabadi, Piotr Indyk and Alireza Rezaei, ICML 2019.

⋄ A Polynomial Time MCMC Method for Sampling from Continuous Determinantal Point Processes, with Alireza Rezaei ICML 2019.

⋄ A Simply Exponential Upper Bound on the Maximum Number of Stable Matchings, with A. Karlin, R. Weber, STOC 2018.

⋄ Graph Clustering using Effective Resistance, with V. Levi Alev, N. Anari, L. C. Lau, ITCS 2018.

⋄ Approximating the Largest Root and Applications to Interlacing Families, with N. Anari, A. Saberi, N. Srivastava, SODA 2018.

⋄ Nash Social Welfare for Indivisible Items under Separable, Piecewise-Linear Concave Utilities, with N. Anari, T. Mai, V. Vazirani, SODA 2018.

⋄ Simply Exponential Approximation of the Permanent of Positive Semidefinite Matrices, with N. Anari, L. Gurvits, A. Saberi, FOCS 2017.

⋄ Nash Social Welfare, Matrix Permanent, and Stable Polynomials, with N. Anari, A. Saberi, M. Singh, ITCS 2017, invited.

⋄ Monte Carlo Markov Chain Algorithms for Sampling Strongly Rayleigh Distributions and Determinantal Point Processes, with N. Anari, A. Rezaei, COLT 2016.

⋄ Effective-Resistance-Reducing Flows, Spectrally Thin Trees, and Asymmetric TSP, with N. Anari, FOCS 2015.

⋄ The Kadison Singer Problem for Strongly Rayleigh Measures and Applications to Asymmetric TSP, with N. Anari, FOCS 2015.

⋄ Partitioning into Expanders, with L. Trevisan, SODA 2014.

⋄ Improved Cheeger's Inequality: Analysis of Spectral Partitioning Algorithms through Higher Order Spectral Gap, with T. C. Kwok, L. C. Lau, Y. T. Lee, L. Trevisan, STOC 2013.

⋄ A Rounding by Sampling Approach to the Minimum Size k- Arc Connected Subgraph Problem, with B. Laekhanukit, M. Singh, ICALP 2012.

⋄ Simultaneous approximations for adversarial and stochastic online budgeted allocation, with V. Mirrokni, M. Zadimoghaddam, SODA 2012.

⋄ A Randomized Rounding Approach to the Traveling Salesman Problem, with A. Saberi, M. Singh, FOCS 2011, best paper award.

⋄ The Asymmetric Traveling Salesman Problem on Graphs with Bounded Genus, with A. Saberi, SODA 2011.

⋄ Submodular Maximization by Simulated Annealing, with J. Vondrak, SODA 2011.

WORKING
PAPERS

⋄ An Improved Trickle-Down Theorem for Partite Complexes, with D. Abdolazimi, 2022.

⋄ A Deterministic Better-than-3/2 Approximation Algorithm for Metric TSP, with A. Karlin, N. Klein, 2022.

MEDIA
COVERAGE

⋄ Computer Scientists Break Traveling Salesperson Record by Erica Klarreich.

⋄ A Vast and Tiny Breakthrough, by Kenneth Regan

⋄ Nima Anari, Kuikui Liu, Shayan Oveis Gharan, and Cynthia Vinzant Solved the Mihail-Vazirani Conjecture for Matroids! by Gil Kalai

⋄ Shayan Oveis Gharan finds the shortest route to success by Emily Conover.

⋄ Whats happening in mathematical sciences volume 10, Dana Mackenzie.

⋄ 'Outsiders' Crack a 50-Year-Old Math Problem by Erica Klarreich.

⋄ Computer Scientists Find New Shortcuts for Infamous Traveling Salesman Problem by Erica Klarreich.

⋄ BREAKTHROUGH in algorithms: Improved algorithm for Metric TSP!!!!!!!! by Mohammad Hajiaghayi.

INVITED
LECTURES

⋄ Summer School, IPCO 2022.

⋄ Plenary Talk, SODA 2022.

⋄ Oberwolfach Workshop on Complexity Theory, 2021.

⋄ Hausdorff Colloquium, University of Bonn, 2021.

⋄ Prague Summer School on Discrete Mathematics, 2020.

⋄ BIRS Workshop on Geometry of Real Polynomials, Convexity and Optimization, 2019

⋄ BIRS workshop on TSP, Banff, 2018

⋄ BIRS workshop on Analytic Techniques in Theoretical Computer Science, Oaxaca, 2018

⋄ Introduction to Partition Functions Workshop, Bernoulli Center, EPFL 2018

⋄ Workshop on Expected Characteristic Polynomial Techniques and Applications in Quantitative Linear Algebra program in UCLA, 2018

⋄ BIRS workshop on Approximation Algorithms and Hardness of Approximation, Banff, 2017

⋄ Simons Symposium on New Directions in Approximation Algorithms, Krün, 2017

⋄ BIRS workshop on Algebraic and Spectral Graph Theory, Banff, 2016

⋄ Highlights of Algorithms, Paris, 2016

⋄ Spectrum of Random Graphs, Centre International de Recontres Mathématioues, 2016

⋄ Simons Collaboration on Algorithms & Geometry Annual Meeting, 2015

⋄ Workshop on Stochastic Processes, Learning, and Optimization, UW-MSR Summer Institute, 2015

⋄ Approximation and Online Algorithms Cluster, ISMP 2015

⋄ MSRI workshop on Kadison-Singer, Interlacing Polynomials, and Beyond, Berkeley, 2015

⋄ UCLA mathematics colloquium, 2015

⋄ Workshop on "Advances in Market Design", Paris School of Economics 2014

⋄ BIRS workshop on Approximation Algorithms and the Hardness of Approximation, Banff, 2014

⋄ Combinatorics of Hyperbolic and Real Stable Polynomials minisymposium, SIAM Discrete Mathematics Conference, Minneapolis, 2014

⋄ Talking Across Fields, Institut de Mathématiques de Toulouse, 2014

⋄ FOCS Workshop on Zeros of Polynomials and their Applications to Theory, 2013

⋄ Simons New Directions in Approximation Algorithms Workshop, 2013

WORKSHOP ORGANIZER	⋄ A semester on Geometry of Polynomials at Simons Institute in Winter/Spring of 2019 with Nikhil Srivastava.
	⋄ A session on Geometry of Polynomials and Applications in Approximate Counting in ISMP 2018, Bordeaux.
	⋄ A session on Approximating Traveling Salesman Problem using Algebraic Techniques in FOCS 2016, with Amin Saberi.
SERVICE	⋄ Journal Editor: Siam Journal of Computing 2023-2025.
	⋄ PC Member: SODA 2015, APPROX 2016, ESA 2017, ITCS 2018, FOCS 2019, SODA 2021, FOCS 2022
	⋄ NSF review panel, 2016, 2020
GRADUATE STUDENTS (ALUMNI)	⋄ Nima Anari (student at UC Berkeley, that I mentored) now Assistant Professor of Computer Science at Stanford University,
	⋄ Kuikui Liu, Postdoctoral fellow at MIT → Assistant Professor of Computer Science at MIT.
	⋄ Alireza Rezaei, The Voleon Group.
	⋄ Mert Salgam (co-advised with Paul Beame), Google.
	⋄ Robert Weber (co-advised with Anna Karlin), Assistant Teaching Professor of Computer Science at University of Washington.
CURRENT STUDENTS	⋄ Dorna Abdolazimi
	⋄ Farzam Ebrahimnejad (co-advised with James Lee),
	⋄ Nathan Klein (co-advised with Anna Karlin), ,