Soheil Behnezhad

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Academic Positions

- **Assistant Professor** Since Aug 2022
  Khoury College of Computer Sciences, Northeastern University
- **Motwani Postdoctoral Fellow** Aug 2021 – Aug 2022
  Stanford University, Department of Computer Science
  - Hosts: Moses Charikar, Aviad Rubinstein, Amin Saberi, and Li-Yang Tan.

Education

- **Ph.D. in Computer Science** Jan 2016 — Aug 2021
  University of Maryland, Department of Computer Science
  - Thesis: **Modern Large-Scale Algorithms for Classical Graph Problems**
  - Advisor: MohammadTaghi Hajiaghayi
- **B.Sc. in Software Engineering** Sep 2011 — Jan 2016
  Sharif University of Technology, Department of Computer Engineering

Research Interests

I am broadly interested in theoretical computer science. Much of my work focuses on the theoretical foundations of big data algorithms. This includes sublinear time algorithms, streaming algorithms, dynamic algorithms, massively parallel computation (MPC), and graph sparsification.

Select Honors and Awards

- **NSF CAREER Award** (CCF-2442812) 2025
- **Best Paper Award** at 57th Annual ACM Symposium on Theory of Computing (STOC'25) 2025
  - For my paper "Vizing's Theorem in Near-Linear Time".
- **Best Paper Award** at 34th ACM-SIAM Symposium on Discrete Algorithms (SODA'23) 2023
  - For my paper "Dynamic Algorithms for Maximum Matching Size".
- **Google Faculty Research Award** 2024
- Charles A. Caramello Distinguished Dissertation Award for the **the best thesis at UMD** 2021
  - Awarded to a single thesis from Mathematics, Physical Sciences, and Engineering departments of UMD.
- Larry S. Davis Doctoral Dissertation Award for **the best thesis at UMD CS** 2021
- Outstanding Junior Faculty Research Award at the Khoury College of Northeastern University 2024
- Stanford's Motwani Postdoctoral Fellowship 2021
- Google Ph.D. Fellowship 2019 in Algorithms, Optimizations and Markets 2019
- University of Maryland Outstanding Graduate Student Dean's Fellowship 2018
- Gold Medal in the 19^{th} Iranian National Olympiad in Informatics 2010

Academic Service

– **Program Committee:**
SODA 2026, STOC 2025, SODA 2025, ESA 2025, SOSA 2024, ESA 2023, SWAT 2022, AAAI 2021, AAAI 2020 (reviewer), NeurIPS 2019 (reviewer), ICML 2019 (reviewer).

Visits/Internships

– **Research Fellow at the Simons Institute, UC Berkeley** Summer 2024
Program: Sublinear Algorithms

– **Research Intern at TTIC, Chicago** Summer 2020
Host: Avrim Blum

– **Research Intern at Google, New York** Summer 2019
Hosts: Jakub Lacki and Vahab Mirrokni

– **Visiting Graduate Student at the Simons Institute, UC Berkeley** Fall 2018
Program: Foundations of Data Science

– **Visiting Graduate Student at the Simons Institute, UC Berkeley** Spring 2018
Programs: The Brain and Computation, Real-Time Decision Making

– **Research Intern at Upwork, Mountain View** Summer 2017 and Summer 2018
Host: Nima Reyhani

Publications

(45) *Vizing's Theorem in Near-Linear Time*
Sepehr Assadi, Soheil Behnezhad, Sayan Bhattacharya, Martin Costa, Shay Solomon, Tianyi Zhang
In Proceedings of the 57th Annual ACM Symposium on Theory of Computing . . . . . **STOC 2025**
Best Paper Award at STOC.

(44) *Stochastic Matching via In-n-Out Local Computation Algorithms*
Amir Azarmehr, Soheil Behnezhad, Alma Ghafari, Ronitt Rubinfeld
In Proceedings of the 57th Annual ACM Symposium on Theory of Computing . . . . . **STOC 2025**

(43) *Settling the Pass Complexity of Approximate Matchings in Dynamic Graph Streams*
Sepehr Assadi, Soheil Behnezhad, Christian Konrad, Kheeran Naidu, Janani Sundaresan
In Proceedings of the 36th Annual ACM-SIAM Symposium on Discrete Algorithms . . . . . **SODA 2025**
Invited to TALG, special issue for SODA.

(42) *Massively Parallel Minimum Spanning Tree in General Metric Spaces*
Amir Azarmehr, Soheil Behnezhad, Rajesh Jayaram, Jakub Lacki, Vahab Mirrokni, and Peilin Zhong
In Proceedings of the 36th Annual ACM-SIAM Symposium on Discrete Algorithms . . . . . **SODA 2025**

(41) *Fully Dynamic* $(\Delta + 1)$ *Coloring Against Adaptive Adversaries*
Soheil Behnezhad, Rajmohan Rajaraman, and Omer Wasim
In Proceedings of the 36th Annual ACM-SIAM Symposium on Discrete Algorithms . . . . . **SODA 2025**

(40) *Fully Dynamic Matching and Ordered Ruzsa-Szemerédi Graphs*
Soheil Behnezhad and Alma Ghafari
In Proceedings of the 65th Annual IEEE Symposium on Foundations of Computer Science . . . . . **FOCS 2024**
Invited to Highlights of Algorithms (HALG) 2025.

(39) *Bipartite Matching in Massive Graphs: A Tight Analysis of EDCS*
Amir Azarmehr, Soheil Behnezhad, and Mohammad Roghani
Proceedings of the 41st International Conference on Machine Learning ..... **ICML 2024**

(38) *Streaming Edge Coloring with Asymptotically Optimal Colors*
Soheil Behnezhad and Mohammad Saneian
In Proceedings of the 51st International Colloquium on Automata, Languages, and Programming ..... **ICALP 2024**

(37) *Sublinear Algorithms for TSP via Path Covers*
Soheil Behnezhad, Mohammad Roghani, Aviad Rubinstein, and Amin Saberi
In Proceedings of the 51st International Colloquium on Automata, Languages, and Programming ..... **ICALP 2024**

(36) *Approximating Maximum Matching Requires Almost Quadratic Time*
Soheil Behnezhad, Mohammad Roghani, and Aviad Rubinstein
In Proceedings of the 56th Annual ACM Symposium on Theory of Computing ..... **STOC 2024**

(35) *Fully Dynamic Matching:* $(2-\sqrt{2})$*-Approximation in Polylog Update Time*
Amir Azarmehr, Soheil Behnezhad, and Mohammad Roghani
In Proceedings of the 35th Annual ACM-SIAM Symposium on Discrete Algorithms ..... **SODA 2024**

(34) *Local Computation Algorithms for Maximum Matching: New Lower Bounds*
Soheil Behnezhad, Mohammad Roghani, and Aviad Rubinstein
In Proceedings of the 64th Annual IEEE Symposium on Foundations of Computer Science ..... **FOCS 2023**

(33) *Robust Communication Complexity of Matching: EDCS Achieves* 5/6 *Approximation*
Amir Azarmehr and Soheil Behnezhad
In Proceedings of the 50th International Colloquium on Automata, Languages, and Programming ..... **ICALP 2023**

(32) *Sublinear Time Algorithms and Complexity of Approximate Maximum Matching*
Soheil Behnezhad, Mohammad Roghani, and Aviad Rubinstein
In Proceedings of the 55th Annual ACM Symposium on Theory of Computing ..... **STOC 2023**

(31) *On Regularity Lemma and Barriers in Streaming and Dynamic Matching*
Sepehr Assadi, Soheil Behnezhad, Sanjeev Khanna, and Huan Li
In Proceedings of the 55th Annual ACM Symposium on Theory of Computing ..... **STOC 2023**

(30) *Dynamic Algorithms for Maximum Matching Size*
Soheil Behnezhad
In Proceedings of the 34th Annual ACM-SIAM Symposium on Discrete Algorithms ..... **SODA 2023**
Best Paper Award at SODA'23
Invited to TALG, special issue for SODA papers.

(29) *Beating Greedy Matching in Sublinear Time*
Soheil Behnezhad, Mohammad Roghani, Aviad Rubinstein, and Amin Saberi
In Proceedings of the 34th Annual ACM-SIAM Symposium on Discrete Algorithms ..... **SODA 2023**

(28) *Single-Pass Streaming Algorithms for Correlation Clustering*
Soheil Behnezhad, Moses Charikar, Weiyun Ma, and Li-Yang Tan
In Proceedings of the 34th Annual ACM-SIAM Symposium on Discrete Algorithms ..... **SODA 2023**

(27) *Almost 3-Approximate Correlation Clustering in Constant Rounds*
Soheil Behnezhad, Moses Charikar, Weiyun Ma, and Li-Yang Tan
In Proceedings of the 63rd Annual IEEE Symposium on Foundations of Computer Science ..... **FOCS 2022**

(26) *New Trade-Offs for Fully Dynamic Matching via Hierarchical EDCS*
Soheil Behnezhad and Sanjeev Khanna

In Proceedings of the 33rd Annual ACM-SIAM Symposium on Discrete Algorithms ..... **SODA 2022**

(25) *Stochastic Vertex Cover with Few Queries*
Soheil Behnezhad, Avrim Blum, Mahsa Derakhshan
In Proceedings of the 33rd Annual ACM-SIAM Symposium on Discrete Algorithms ..... **SODA 2022**

(24) *Time-Optimal Sublinear Algorithms for Matching and Vertex Cover*
Soheil Behnezhad
In Proceedings of the 62nd Annual IEEE Symposium on Foundations of Computer Science ..... **FOCS 2021**
Invited to Highlights of Algorithms (HALG) 2022.

(23) *On the Robust Communication Complexity of Bipartite Matching*
Sepehr Assadi and Soheil Behnezhad
In Proceedings of Approximation, Randomization, and Combinatorial Optimization. ..... **RANDOM 2021**

(22) *Beating Two-Thirds For Random-Order Streaming Matching*
Sepehr Assadi and Soheil Behnezhad
In Proceedings of the 48th International Colloquium on Automata, Languages, and Programming ..... **ICALP 2021**

(21) *Parallel Graph Algorithms in Constant Adaptive Rounds: Theory meets Practice*
Soheil Behnezhad, Laxman Dhulipala, Hossein Esfandiari, Jakub Lacki, and Vahab Mirrokni
In Proceedings of the VLDB Endowment (PVLDB) ..... **VLDB 2020**

(20) *Stochastic Weighted Matching:* $(1-\epsilon)$ *Approximation*
Soheil Behnezhad and Mahsa Derakhshan
In Proceedings of the 61st Annual IEEE Symposium on Foundations of Computer Science ..... **FOCS 2020**

(19) *Stochastic Matching with Few Queries:* $(1-\epsilon)$ *Approximation*
Soheil Behnezhad, Mahsa Derakhshan, and MohammadTaghi Hajiaghayi
In Proceedings of the 52nd Annual ACM Symposium on Theory of Computing ..... **STOC 2020**

(18) *Fully Dynamic Matching: Beating 2-Approximation in* Δ^{ε} *Update Time*
Soheil Behnezhad, Jakub Lacki, and Vahab Mirrokni
In Proceedings of the 31st Annual ACM-SIAM Symposium on Discrete Algorithms ..... **SODA 2020**

(17) *Fully Dynamic Maximal Independent Set with Polylogarithmic Update Time*
Soheil Behnezhad, Mahsa Derakhshan, MohammadTaghi Hajiaghayi, Cliff Stein, and Madhu Sudan
In Proceedings of the 60th Annual IEEE Symposium on Foundations of Computer Science ..... **FOCS 2019**

(16) *Exponentially Faster Massively Parallel Maximal Matching*
Soheil Behnezhad, MohammadTaghi Hajiaghayi, and David G. Harris
In Proceedings of the 60th Annual IEEE Symposium on Foundations of Computer Science ..... **FOCS 2019**
Journal of the ACM ..... **JACM 2023**

(15) *Near-Optimal Massively Parallel Graph Connectivity*
Soheil Behnezhad, Laxman Dhulipala, Hossein Esfandiari, Jakub Lacki, and Vahab Mirrokni
In Proceedings of the 60th Annual IEEE Symposium on Foundations of Computer Science ..... **FOCS 2019**

(14) *Streaming and Massively Parallel Algorithms for Edge Coloring*
Soheil Behnezhad, Mahsa Derakhshan, MohammadTaghi Hajiaghayi, Marina Knittel, and Hamed Saleh
In Proceedings of the 27th Annual European Symposium on Algorithms ..... **ESA 2019**
(A brief announcement of this work appeared at the proceedings of DISC 2019.)

(13) *Stochastic Matching on Uniformly Sparse Graphs*
Soheil Behnezhad, Mahsa Derakhshan, Alireza Farhadi, MohammadTaghi Hajiaghayi, and Nima Reyhani
In Proceedings of the 12th International Symposium on Algorithmic Game Theory ..... **SAGT 2019**

(12) *Massively Parallel Computation of Matching and MIS in Sparse Graphs*
Soheil Behnezhad, Sebastian Brandt, Mahsa Derakhshan, Manuela Fischer, MohammadTaghi Hajiaghayi, Richard M. Karp, and Jara Uitto
In Proceedings of the ACM Symposium on Principles of Distributed Computing ..... **PODC 2019**

(11) *Optimal Strategies of Blotto Games: Beyond Convexity*
Soheil Behnezhad, Avrim Blum, Mahsa Derakhshan, MohammadTaghi Hajiaghayi, Christos Papadimitriou, and Saeed Seddighin
In Proceedings of the 20th ACM Conference on Economics and Computation ..... **EC 2019**

(10) *Massively Parallel Computation via Remote Memory Access*
Soheil Behnezhad, Laxman Dhulipala, Hossein Esfandiari, Jakub Lacki, Vahab Mirrokni, and Warren Schudy
In Proceedings of the 31st ACM Symposium on Parallelism in Algorithms and Architectures ..... **SPAA 2019**
Invited to TOPC 2019, Special Issue for SPAA 2019.

(9) *Stochastic Matching with Few Queries: New Algorithms and Tools*
Soheil Behnezhad, Alireza Farhadi, MohammadTaghi Hajiaghayi, and Nima Reyhani
In Proceedings of the 30th Annual ACM-SIAM Symposium on Discrete Algorithms ..... **SODA 2019**

(8) *Almost Optimal Stochastic Weighted Matching With Few Queries*
Soheil Behnezhad and Nima Reyhani
In Proceedings of the 19th ACM Conference on Economics and Computation ..... **EC 2018**

(7) *Spatio-Temporal Beyond One Dimension*
Soheil Behnezhad, Mahsa Derakhshan, MohammadTaghi Hajiaghayi, and Saeed Seddighin
In Proceedings of the 19th ACM Conference on Economics and Computation ..... **EC 2018**

(6) *Brief Announcement: MapReduce Algorithms For Massive Trees*
Hossein Bateni, Soheil Behnezhad, Mahsa Derakhshan, MohammadTaghi Hajiaghayi, and Vahab Mirrokni
Proceedings of the 45th International Colloquium on Automata, Languages, and Programming .. **ICALP 2018**

(5) *Winning Strategies of Blotto and Auditing Games*
Soheil Behnezhad, Avrim Blum, Mahsa Derakhshan, MohammadTaghi Hajiaghayi, Mohammad Mahdian, Christos Papadimitriou, Ron Rivest, Saeed Seddighin, and Philip Stark
In Proceedings of the 29th Annual ACM-SIAM Symposium on Discrete Algorithms ..... **SODA 2018**

(4) *Affinity Clustering: Hierarchical Clustering at Scale*
Hossein Bateni, Soheil Behnezhad, Mahsa Derakhshan, MohammadTaghi Hajiaghayi, Raimondas Kiveris, Silvio Lattanzi, and Vahab Mirrokni
In Proceedings of the 31st Annual Conference on Neural Information Processing Systems ..... **NIPS 2017**

(3) *A Polynomial Time Algorithm For Spatio-Temporal Games*
Soheil Behnezhad, Mahsa Derakhshan, MohammadTaghi Hajiaghayi, and Alex Slivkins
In Proceedings of the 18th ACM Conference on Economics and Computation ..... **EC 2017**

(2) *Brief Announcement: Graph Matching in Massive Datasets*
Soheil Behnezhad, Mahsa Derakhshan, Hossein Esfandiari, Elif Tan, and Hadi Yami
In Proceedings of the 29th ACM Symposium on Parallelism in Algorithms and Architectures ..... **SPAA 2017**

(1) *Faster and Simpler Algorithm for Optimal Strategies of Blotto Game*
Soheil Behnezhad, Sina Dehghani, Mahsa Derakhshan, Saeed Seddighin, and MohammadTaghi Hajiaghayi
In Proceedings of the 31st AAAI Conference on Artificial Intelligence ..... **AAAI 2017**
Journal version under title "Fast and Simple Solutions of Blotto Games" ..... **Operations Research 2023**

Academic Talks

– **Invited Talks**

– **MIT ToC Colloquium** 2024
  * Vizing's Theorem in Near-Linear Time

– **Boston University** 2024
  * Vizing's Theorem in Near-Linear Time

– **Highlights of Algorithms '24** 2024
  * Dynamic Algorithms for Maximum Matching Size

– **Simons Institute for the Theory of Computing:** Sublinear Algorithms 2024
  * Dynamic Matching and (Ordered) Ruzsa-Szemerédi Graphs: Towards Constructive Matching Sparsifiers

– **Simons Institute for the Theory of Computing:** Sublinear Algorithms 2024
  * Sublinear Time Lower Bounds for Estimating Maximum Matching Size

– **UCSD** 2024
  * Algorithms for Clustering: Lessons from Sublinear Time Graph Algorithms

– **MIT (Theory Reading Group)** 2023

– **Simons Institute for the Theory of Computing:** Dynamic Graphs and Algorithm Design 2023
  * Talk 1: Recent Progress on Sublinear Time Algorithms for Maximum Matching (Part I: Upper Bounds)
  * Talk 2: Recent Progress on Sublinear Time Algorithms for Maximum Matching (Part II: Lower Bounds)

– **Rutgers University (Workshop on Modern Techniques in Graph Algorithms)** 2023

– **Northeastern University weekly seminars** 2023

– **EPFL (Sublinear Algorithms workshop), Switzerland** 2022

– **Google Research, Mountain View** 2022

– **Highlights of Algorithms '22** 2022

– **Stanford's TOCA-SV Workshop** 2022

– **Workshop on Emerging Models of Colossal Computation ($e = mc^2$) '22** 2022

– **Google Research, NY** 2022

– **University of Washington** 2021

– **Stanford Theory Lunch** 2021

– **Rutgers University** 2021

– **Northeastern University** 2021

– **Purdue University** 2021

– **Stony Brook** 2021

– **Microsoft Research, Redmond** 2021

– **Toyota Technological Institute at Chicago (TTIC)** 2021

– **Sharif University of Technology** 2021

– **Workshop on Local Algorithms (WOLA) 2020** 2020

– **Simons Institute for the Theory of Computing:** Foundations of Data Science Reunion 2019

- **Northwestern University (Rising Stars)** 2019
- **Columbia University** 2019
- **Simons Institute for the Theory of Computing:** Platform Markets 2019
- **Google Research, NY** 2018
- **University of Maryland** 2017

– **Conference Talks**

- **STOC 2024:** Approximating Maximum Matching Requires Almost Quadratic Time 2024
- **FOCS 2021:** Time-Optimal Sublinear Algorithms for Matching and Vertex Cover 2022
- **SODA 2022:** New Trade-Offs for Fully Dynamic Matching via Hierarchical EDCS 2022
- **ICALP 2021:** Beating Two-Thirds for Random Order Streaming Matching 2021
- **FOCS 2020:** Stochastic Weighted Matching: $(1-\epsilon)$ Approximation 2020
- **STOC 2020:** Stochastic Matching with Few Queries: $(1-\epsilon)$ Approximation 2020
- **SODA 2020:** Fully Dynamic Matching: Beating 2-Approximation in Δ^{ϵ} Update Time 2020
- **FOCS 2019:** Exponentially Faster Massively Parallel Maximal Matching 2019
- **FOCS 2019:** Near-Optimal Massively Parallel Graph Connectivity 2019
- **ESA 2019:** Streaming and Massively Parallel Algorithms for Edge Coloring 2019
- **SPAA 2019:** Massively Parallel Computation via Remote Memory Access 2019
- **SODA 2019:** Stochastic Matching with Few Queries: New Algorithms and Tools 2019
- **EC 2018:** Almost Optimal Stochastic Weighted Matching With Few Queries 2018
- **NIPS 2017** (Spotlight Video)**:** Affinity Clustering: Hierarchical Clustering at Scale 2017
- **EC 2017:** A Polynomial Time Algorithm for Spatio-Temporal Games 2017