

# Matthew Faw

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## Research Interests

Stochastic Optimization, Online Learning, Multi-Armed Bandits, Optimal Stopping

## Education

- 2018–Present **Ph.D. in Electrical & Computer Engineering**, *The University of Texas at Austin*, Austin, TX.  
Advisors: Sanjay Shakkottai, Constantine Caramanis.
- 2013–2017 **B.S.E. Electrical & Computer Engineering, B.S. Computer Science, A.B. Math**, *Duke University*, Durham, NC.  
Advisors: Nick Buchler, Richard Fair, Benjamin C. Lee

## Publications (Google Scholar)

### Conference Papers

- COLT 2022 “The Power of Adaptivity in SGD: Self-Tuning Step Sizes with Unbounded Gradients and Affine Variance”, **Matthew Faw**<sup>✉</sup>, Isidoros Tziotis<sup>✉</sup>, Constantine Caramanis, Aryan Mokhtari, Sanjay Shakkottai, and Rachel Ward, *Proceedings of Thirty Fifth Conference on Learning Theory*
- SIGMETRICS 2022 “Learning To Maximize Welfare with a Reusable Resource”, **Matthew Faw**<sup>✉</sup>, Orestis Papadigenopoulos<sup>✉</sup>, Constantine Caramanis, and Sanjay Shakkottai, *Proceedings of the 2022 ACM SIGMETRICS/IFIP PERFORMANCE Joint International Conference on Measurement and Modeling of Computer Systems*
- SODA 2022 “Single-Sample Prophet Inequalities via Greedy-Ordered Selection”, Constantine Caramanis, Paul Dütting, **Matthew Faw**, Philip Lazos, Stefano Leonardi, Orestis Papadigenopoulos, Emmanouil Pountourakis, and Rebecca Reiffenhäuser (alphabetical order), *Proceedings of the 2022 Annual ACM-SIAM Symposium on Discrete Algorithms*
- NeurIPS 2020 “Mix and Match: An Optimistic Tree-Search Approach for Learning Models from Mixture Distributions”, **Matthew Faw**, Rajat Sen, Karthikeyan Shanmugam, Constantine Caramanis, and Sanjay Shakkottai, *Proceedings of the 34th International Conference on Neural Information Processing Systems*

### Journal Papers

- TOCS 2017 “Computational Sprinting: Architecture, Dynamics, and Strategies”, Seyed Majid Zahedi, Songchun Fan, **Matthew Faw**, Elijah Cole, and Benjamin C Lee, *ACM Transactions on Computer Systems*, Volume 34, Issue 4

### Working Papers

- “Beyond Uniform Smoothness: A Stopped Analysis of Adaptive SGD”, **Matthew Faw**<sup>✉</sup>, Litu Rout<sup>✉</sup>, Constantine Caramanis, and Sanjay Shakkottai
- “Multi-source Domain Adaptation Under Sparsity Constraints”, **Matthew Faw**, Karthikeyan Shanmugam, Constantine Caramanis, and Sanjay Shakkottai

## Awards + Honors

- 2022 Top 10% reviewer for NeurIPS 2022
- 2022 Highlighted reviewer for ICLR 2022
- 2022 Top 10% reviewer for AISTATS 2022
- 2020 NXP Foundation Fellowship for the 2020-2021 academic year
- 2017 Cum Laude Graduation Honors, Duke University
- 2016 Member, Tau Beta Pi and Eta Kappa Nu Honor Societies, Duke University
- 2014 Gold medal, International Genetically Engineered Machine Competition

## Grants

- 2022 \$250 DeepMind student travel grant for COLT 2022
- 2022 \$1575 travel grant for SIGMETRICS 2022
- 2015 \$6000 Research Grant, SMiF Undergraduate User Program

## Talks and Poster Presentations

### Talks

- July 2022 COLT 2022, London, UK: "The Power of Adaptivity in SGD: Self-Tuning Step Sizes with Unbounded Gradients and Affine Variance"
- June 2022 SIGMETRICS 2022, IIT Bombay, Mumbai, IN: "Learning To Maximize Welfare with a Reusable Resource"
- April 2022 Machine Learning Lab Research Symposium, UT Austin: "The Power of Adaptivity in SGD: Self-Tuning Step Sizes with Unbounded Gradients and Affine Variance"
- January 2022 SODA 2022, Virtual: "Single Sample Prophet Inequalities via Greedy-Ordered Selection"

### Poster Presentations

- October 2022 Joint IFML/Data-Driven Decision Processes Workshop, Simons Institute, UC Berkeley, "The Power of Adaptivity in SGD: Self-Tuning Step Sizes with Unbounded Gradients and Affine Variance"
- December 2020 NeurIPS 2020, Virtual, "Mix and Match: An Optimistic Tree-Search Approach for Learning Models from Mixture Distributions"
- November 2019 Texas Wireless Summit, UT Austin, "Mix and Match: An Optimistic Tree-Search Approach for Learning Models from Mixture Distributions"

## Conference Reviewing

- 2022 AISTATS (Top 10% reviewer), ICLR (Highlighted reviewer), NeurIPS (Top 10% reviewer)
- 2021 AISTATS, ICML, NeurIPS

## Industry Experience

- June **Software Engineer**, *Verato*, McLean, VA.
- 2017-July 2018 Co-designed and built a custom continuous integration system using Kubernetes, capable of testing hundreds of simultaneous builds of the software stack. Designed software to maintain 300M entry Mongo database and Solr search engine.
- May-August 2016 **Software Engineering Intern**, *Stateflow Semantics*, *MathWorks*, Natick, MA.
- 2016 Co-designed and implemented a proof-of-concept architectural change to the team's code generation process that allowed product extensibility and optimizations that were previously infeasible.

## Undergraduate Research Experience

- Jan-Dec 2016 **Datacenter Architecture**, Advisor: Dr. Benjamin Lee, Duke University.  
Evaluated performance and economic viability of several strategies for system-level computational sprinting for Spark applications. Worked on extensions for co-locating batch and latency-critical workloads.
- Jan-Dec 2015 **Microfluidics**, Advisor: Dr. Richard Fair, Duke University.  
Designed and fabricated digital microfluidic devices capable of manipulating E.coli using magnetic beads within droplet to conduct small-scale biology experiments.
- May-Nov 2014 **Synthetic Biology**, Advisor: Dr. Nick Buchler, Duke University.  
Conducted molecular titration experiments to evaluate several CRISPR-based techniques for creating an ultrasensitive response in gene expression. Designed 3D-printed lab equipment to lower financial barriers to biology research.

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## Teaching Experience

- Fall 2018, **EE 460J, Data Science Lab TA**, UT Austin.  
Spring 2019 Led lab sessions, and graded homeworks and exams
- Spring 2017 **CS 308, Software Design and Implementation TA**, Duke University.  
Personally mentored 3 undergraduate CS students, conducted code reviews, advised and evaluated design and implementation of 3 software projects.
- Fall 2015 **ECE 280, Signals & Systems TA**, Duke University.  
Held office hours and graded assignments for 70 undergraduate students.
- Spring 2015 **Synthetic Biology House Course Co-Designer/Instructor**, Duke University.  
Co-designed and taught the first-offered Duke course on synthetic biology to 10 undergraduates.

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## Graduate Coursework

- Fall 2020 Advanced Probability, Combinatorial Optimization, Sublinear Algorithms
- Spring 2020 Markov Chains & Mixing Times, Theoretical Statistics
- Fall 2019 Online Learning, Combinatorics & Graph Theory
- Spring 2019 Analysis & Design of Communication Networks, Large Scale Optimization II
- Fall 2018 Probability & Stochastic Processes, Large Scale Optimization I

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## Technical Skills

- Programming Java, Python (PyTorch, Sklearn), C/C++, JavaScript
- Infrastructure Kubernetes, AWS, Google Cloud, Mongo, Solr

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## References available upon request