Samuel B. Hopkins

Miller Fellow
UC Berkeley EECS

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Interests

Algorithms and computational complexity: high-dimensional statistics, convex programming, linear and semidefinite programming hierarchies, approximation algorithms, combinatorial optimization, hardness of learning and approximation

Positions

Current: Miller Postdoctoral Fellow, UC Berkeley
Starting 2021/2022: Assistant Professor, MIT

Education

Ph.D., Cornell University, 2013 – 2018
Computer Science
Advisor: David Steurer
Thesis: *Statistical Inference and the Sum of Squares Method*
Received Cornell Computer Science Dissertation Award

B.S., University of Washington, 2008 – 2013
Computer Science, Mathematics, Philosophy (minor)
Advisor: Paul Beame
Thesis: *Towards a Theory of Multiparty Information Complexity*

Other Academic Positions

Research Intern, Microsoft Research New England, Summer 2017
Hosted by Jennifer Chayes and Christian Borgs

Visiting Graduate Student, UC Berkeley, Summer 2016 and Spring 2018
Hosted by Prasad Raghavendra

Research Intern, Microsoft Research New England, Summer 2015
Hosted by Boaz Barak

Visiting Graduate Student, Simons Institute, Fall 2014

Visiting Researcher, DIMACS at Rutgers, Summer 2011
Hosted by Eric Allender

Honors and Awards

Miller Fellow, 2018
Cornell Computer Science Dissertation Award, 2018
Microsoft Research Fellow, 2016
National Science Foundation Graduate Research Fellow, 2013
Cornell University Fellow, 2013
Outstanding Graduating Senior in Computer Science, UW CSE, 2013 Outstanding Graduating Comprehensive Senior, UW Mathematics, 2013

James A. Hewitt, Jr. Endowed Scholar, 2011
Outstanding Undergraduate Scholar, UW Philosophy, 2011
Phi Beta Kappa, 2011
Dean's List, 2008 – 2013
National Merit Finalist, 2008

Publications

Estimating Rank-One Spikes from Heavy-Tailed Noise via Self-Avoiding Walks.
Jingqiu Ding, Samuel B. Hopkins, David Steurer
In submission

Robust and Heavy-Tailed Mean Estimation Made Simple, via Regret Minimization.
Samuel B. Hopkins, Jerry Li, Fred Zhang
In submission

Smoothed Complexity of 2-Player Nash Equilibria.
Shant Boodaghians, Joshua Brakensiek, Samuel B. Hopkins, Aviad Rubenstein.
FOCS 2020

Robustly Learning any Clusterable Mixture of Gaussians.
Ilias Diakonikolas, Samuel B. Hopkins, Daniel Kane, Sushrut Karmalkar.
FOCS 2020, Conference version merged with: Bakshi, Kothari. Outlier-Robust Clustering of Non-Spherical Mixtures.

Subexponential LPs Approximate Max-Cut.
Samuel B. Hopkins, Tselil Schramm, Luca Trevisan.
FOCS 2020

Algorithms for Heavy-Tailed Statistics: Regression, Covariance Estimation, and Beyond.
Yeshwanth Cherapanamjeri, Samuel B. Hopkins, Tarun Kathuria, Prasad Raghavendra, Nilesh Tripuraneni.
STOC 2020

Quantum Entropy Scoring for Fast Robust Mean Estimation and Improved Outlier Detection.
Yihe Dong, Samuel B. Hopkins, Jerry Li
NeurIPS 2019

How Hard is Robust Mean Estimation?
Samuel B. Hopkins, Jerry Li
COLT 2019

A Robust Spectral Algorithm for Overcomplete Tensor Decomposition
Samuel B. Hopkins, Tselil Schramm, Jonathan Shi

COLT 2019

Mean Estimation with Sub-Gaussian Rates in Polynomial Time
Samuel B. Hopkins
Annals of Statistics, 2020

Sum of Squares Meets Program Obfuscation, Revisited
Boaz Barak, Samuel B. Hopkins, Aayush Jain, Pravesh Kothari, Amit Sahai
Eurocrypt 2019

Mixture Models, Robustness, and Sum of Squares Proofs
Samuel B. Hopkins, Jerry Li
STOC 2018

The Power of SoS for Detecting Hidden Structures
Samuel B. Hopkins, Pravesh Kothari, Aaron Potechin, Prasad Raghavendra, Tselil Schramm, David Steurer
FOCS 2017

Efficient Bayesian Estimation from Few Samples: Community Detection and Related Problems
Samuel B. Hopkins, David Steurer
FOCS 2017

A Nearly-Tight Sum-of-Squares Lower Bound for the Planted Clique Problem
Boaz Barak, Samuel B. Hopkins, Jonathan Kelner, Pravesh Kothari, Ankur Moitra, Aaron Potechin
FOCS 2016, Invited to Special Issue for FOCS 2016

Fast Spectral Algorithms from Sum-of-Squares Proofs: Tensor Decomposition and Planted Sparse Vectors
Samuel B. Hopkins, Tselil Schramm, Jonathan Shi, David Steurer
STOC 2016

On the SoS Integrality Gap for Planted Clique
Samuel B. Hopkins, Pravesh Kothari, Aaron Potechin, Prasad Raghavendra, Tselil Schramm
SODA 2016, Invited to Special Issue for SODA 2016

Tensor Principal Component Analysis via Sum-of-Squares Proofs
Samuel B. Hopins, Jonathan Shi, David Steurer
COLT 2015

Kolmogorov Complexity, Circuits, and the Strength of Formal Theories of Arithmetic
Eric Allender, George Davie, Luke Friedman, Samuel B. Hopkins, Iddo Tzameret

Chicago Journal of Theoretical Computer Science, 2013

On Objects as Events and the Ontology of Temporal Parts
Sam Hopkins
Res Cogitans, Summer 2010

Service and Outreach

PC Member: RANDOM 2020, ITCS 2021
Conference reviewing (external): STOC, FOCS, SODA, NeurIPS, ICML, CCC, ITCS, APPROX, RANDOM, ALT
Journal reviewing: Mathematics of Operations Research, Mathematical Statistics and Learning, Physical Review X, Annals of Statistics

Member, Miller Institute Working Group on Diversity, Equity, and Inclusion, 2020-present
Volunteer mathematics tutor, Berkeley High School, 2018-present
Co-Organizer, STOC workshop on computational thresholds, 2018
Organizer, Cornell student theory seminar, 2013–2015
Center for Talented Youth Outreach Workshop Instructor, 2015
Co-Organizer, Cornell CS theory retreat, 2015
Berkeley Math Circle Guest Instructor, 2014
Co-Organizer, Cornell CS prospective Ph.D. visit day, 2014

Invited Talks and Guest Lectures

DIMACS workshop on polynomial optimization, May 2020 (canceled due to COVID-19 pandemic)
UC Davis MADDD seminar, April 2020
UCLA computer science, March 2020
MIT computer science, March 2020
Harvard computer science, March 2020
Information Theory and Applications Workshop, February 2020
CMU, CS theory lunch, December 2019
Georgia Tech, Algorithms and Randomness Center Colloquium, December 2019
ETH, Mittagseminar, October 2019
Stanford, Information Systems Lab Colloquium, October 2019
UT Austin, CS theory seminar, September 2019
USC, probability and statistics seminar, September 2019
Crypto 2019, new roads to cryptopia workshop, August 2019
UC Berkeley, theory reading group, August 2019
MIT, theory colloquium, April 2019
Harvard, theory seminar, April 2019
NYU, math and data seminar, April 2019
UC Berkeley, Neyman seminar, February 2019
Information Theory and Applications, February 2019
UC Berkeley, theory lunch, February 2019
University of Washington, theory seminar, January 2019

UC San Diego, theory seminar, December 2018
Stanford, theory seminar, December 2018
Simons Institute, workshop on high-dimensional and robust statistics, November 2018
TTIC, workshop on robust statistics, August 2018
TheoryFest, workshop on computational thresholds, June 2018
University of Massachusetts, discrete math seminar, May 2018
Columbia, theory seminar, May 2018
NYU, theory seminar, May 2018
University of Washington, theory seminar, November 2017
BIRS, workshop on approximation algorithms and hardness of approximation, November 2017
Simons Institute, workshop on hierarchies, extended formulations, and matrix-analytic techniques, November 2017
TheoryFest, sum of squares workshop, June 2017
Stanford, graduate algorithms guest lecture, May 2017
Stanford, theory seminar, May 2017
TTIC, young researcher seminar, May 2017
KTH Stockholm, complexity reading group, May 2017
KTH Stockholm, theory seminar, May 2017
Cornell, theory seminar, April 2017
Stanford, theory seminar, November 2016
University of Washington, theory seminar, November 2016
Cornell, theory seminar, March 2016

Teaching and Industry Experience

TA, senior-level complexity theory, Cornell CS, Fall 2015
TA, senior-level compilers, Cornell CS, Fall 2013
Engineering Intern, Google, Summer 2012
Tutor, UW Philosophy Writing Center, Fall 2010 – Spring 2012
TA, sophomore/junior-level probability, UW CSE, Fall 2011
TA, University of Washington Robinson Center for Young Scholars, ethics and mathematics, 2010