Samuel B. Hopkins

Miller Fellow
UC Berkeley EECS

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Interests

Algorithms and Complexity – high-dimensional statistics, linear and semidefinite programming hierarchies, approximation algorithms, combinatorial optimization, hardness of learning and approximation

Education

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

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

Visitor, Berkeley Theory Group, 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
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

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

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

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, 2019

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

Speeding up Sum-of-Squares for 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

Volunteer mathematics tutor, Berkeley High School, 2018
Organizer, STOC workshop on computational thresholds, 2018
Organizer, Cornell student theory seminar (a.k.a. *theory tea*), 2013–2015
Co-Organizer, Cornell CS theory retreat, 2015
Co-Organizer, Cornell CS prospective PhD visit day, 2014
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

Invited Talks and Guest Lectures

Cornell, theory seminar, March 2016
University of Washington, theory seminar, November 2016
Stanford, theory seminar, November 2016

Cornell, theory seminar, April 2017
KTH Stockholm, theory seminar, May 2017
KTH Stockholm, complexity reading group, May 2017
Toyota Technical Institute Chicago, young researcher seminar, May 2017
Stanford, theory seminar, May 2017
Stanford, graduate algorithms guest lecture on robust tensor decomposition, May 2017
Sum of Squares Workshop, STOC 2017
Simons Institute Workshop on Hierarchies, Extended Formulations, and Matrix-Analytic Techniques, November 2017
Banff Workshop on Approximation Algorithms and Hardness of Approximation, November 2017
University of Washington, theory seminar, November 2017
NYU, theory seminar, May 2018
Columbia, theory seminar, May 2018
University of Massachusetts, discrete math seminar, May 2018
TheoryFest workshop on computational thresholds, June 2018
Robust statistics workshop at TTIC, August 2018
High-dimensional and robust statistics workshop at Simons Institute, November 2018
Stanford, theory seminar, December 2018
University of California, San Diego, theory seminar, December 2018
University of Washington, theory seminar, January 2019
University of California, Berkeley, theory lunch, February 2019
Information Theory and Applications, February 2019
University of California, Berkeley, Neyman Seminar, February 2019
New York University, Math and Data seminar, April 2019
Harvard University, theory seminar, April 2019
Massachusetts Institute of Technology, theory colloquium, April 2019
UC Berkeley theory reading group, August 2019
New Road to Cryptopia workshop at Crypto 2019, August 2019
USC Probability and Statistics Seminar, September 2019
UT Austin CS Theory seminar, September 2019
CMU CS Theory Lunch, December 2019

Teaching and Industry Experience

TA, senior-level complexity theory, Cornell CS, Fall 2015
TA, senior-level compilers, Cornell CS, Fall 2013
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, Winter 2010, mathematics, Summer 2010

Engineering Intern, Google, Summer 2012