

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, Nilesch 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. Hopkins, 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 MADD 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