

# Pravesh K. Kothari

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<b>INTERESTS</b>	Convex Relaxations in Algorithm Design, Machine Learning, Pseudorandomness.	
<b>CURRENT POSITION</b>	<b>Princeton University and the Institute for Advanced Study</b> , Princeton, NJ, USA. Research Instructor in Computer Science (Schmidt Fellow)	2016-2019
<b>EDUCATION</b>	<b>The University of Texas at Austin</b> , Austin, TX, USA Ph.D. in Computer Science Adviser: <a href="#">Adam Klivans</a>	2011 - 2016
	<b>Indian Institute of Technology, Kanpur</b> , Kanpur, India Bachelor of Technology in Electrical Engineering Adviser: <a href="#">Surender Baswana</a>	2006– 2010
<b>PAST EMPLOYMENT</b>	<b>The University of California Berkeley, CA, USA</b> Visiting Student Researcher (Host: <a href="#">Prasad Raghavendra</a> )	Sep-Dec 2015 and June-Aug 2014
	<b>Microsoft Research New England, Cambridge, MA, USA</b> Research Intern (Mentors: <a href="#">Boaz Barak</a> and <a href="#">Madhu Sudan</a> )	May-Aug 2015 and Sep-Dec 2014
	<b>Microsoft Research, Bangalore, India</b> Research Intern (Mentor: <a href="#">Prateek Jain</a> )	July-Sep 2013
	<b>IBM Almaden Research Center, San Jose, CA, USA</b> Research Intern (Mentors: <a href="#">Jan Vondrák</a> and <a href="#">Vitaly Feldman</a> )	May-Aug 2012
	<b>Microsoft Research Redmond, WA, USA</b> Research Intern (Mentors: <a href="#">Madanlal Musuvathi</a> and <a href="#">Sebastian Burckhardt</a> )	May-July 2009
<b>TEACHING</b>	<b>Advanced Algorithms</b> Co-taught with <a href="#">Sanjeev Arora</a>	Fall 2016
	<b>Proofs, Beliefs and Algorithms through the Lens of Sum-of-Squares</b> Co-taught with <a href="#">David Steurer</a> .	Fall 2016
<b>PREPRINTS</b>	<ol style="list-style-type: none"><li><i>Outlier-Robust Moment Estimation Using Sum-of-Squares</i> with <a href="#">David Steurer</a> 2017.</li><li><i>Better Agnostic Clustering via Relaxed Tensor Norms</i> with <a href="#">Jacob Steinhardt</a> 2017.</li><li><i>SoS Lower Bounds for Hard Constraints: Think Global, Act Local</i> with <a href="#">Ryan O’Donnell</a> and <a href="#">Tselil Schramm</a> 2017.</li><li><i>Optimal Lower Bounds for Rounding Sum-of-Squares for Finding Equilibria</i> with <a href="#">Ruta Mehta</a> 2017.</li><li><i>Expansion in Degree 2 Shortcode Graph and the 2-to-1 Games Conjecture</i> with <a href="#">Boaz Barak</a> and <a href="#">David Steurer</a> 2017 (see related blog post at <a href="#">Windows on Theory</a>.)</li></ol>	

6. *Limits on Low-Degree Pseudorandom Generators (Or: Sum-of-Squares Meets Program Obfuscation)*

With Boaz Barak, Zvika Brakerski and Ilan Komargodski.

2017. [IACR]

## PUBLICATIONS

1. *Learning by Refuting*

with Roi Livni

ITCS 2018 (to appear) [Arxiv]

2. *The power of sum-of-squares for detecting hidden structures*

with Samuel B. Hopkins, Aaron Potechin, Prasad Raghavendra, Tselil Schramm and David Steurer

FOCS 2017 [Arxiv]

3. *Quantum Entanglement, Sum-of-Squares and the Log-Rank Conjecture*

with Boaz Barak and David Steurer

STOC, 2017[Arxiv].

4. *Sum-of-Squares Lower Bounds for Refuting Any CSP*

with Ryuhei Mori, Ryan O'Donnell and David Witmer.

STOC, 2017 [Arxiv].

5. *Approximating Rectangles by Juntas and a Weakly Exponential Lower Bound for LP Relaxations of CSPs*

with Raghu Meka and Prasad Raghavendra.

STOC, 2017 [Arxiv].

6. *A Nearly Tight Sum-of-Squares Lower Bound for the Planted Clique Problem*

with Boaz Barak, Samuel B. Hopkins, Jon Kelner, Ankur Moitra and Aaron Potechin

FOCS, 2016. [Arxiv] (see related blog post at [Windows on Theory](#))

Invited to the **Siam Journal of Computing**, *Special Issue for FOCS 2016*

7. *SoS and Planted Clique: Tight Analysis of MPW Moments for all Degrees and an Optimal Lower Bound at Degree 4*

with Samuel B. Hopkins and Aaron Potechin

SODA, 2016.[Arxiv]

Invited to the **ACM Transactions on Algorithms**, *Special Issue for SODA 2016*

(Conference version to be merged with *Tight Lower Bounds for Planted Clique in the Degree 4 SoS Program* by Prasad Raghavendra and Tselil Schramm).

8. *Communication With Contextual Uncertainty*

with Badih Ghazi, Ilan Komargodski and Madhu Sudan.

SODA, 2016. [Arxiv]

9. *Sum of Squares Lower Bounds from Pairwise Independence*

with Boaz Barak and Siu On Chan

STOC, 2015.[Arxiv]

10. *Almost Optimal Pseudorandom Generators for Spherical Caps*

with Raghu Meka

STOC 2015.[Arxiv]

11. *Provable Submodular Minimization Using Wolfe's Algorithm*

with Deeparnab Chakrabarti and Prateek Jain

NIPS (Oral Presentation), 2014.[Arxiv]

12. *Agnostically Learning Disjunctions on Symmetric Distributions*

with Vitaly Feldman

JMLR, 2015.[Arxiv]

13. *Nearly Tight Bounds on  $\ell_1$  Approximation of Self Bounding Functions*  
with Vitaly Feldman and Jan Vondrák  
**ALT**, 2017.[Arxiv]
14. *Embedding Hard Learning Problems into Gaussian Space*  
with Adam Klivans  
**RANDOM**, 2014.[Arxiv]
15. *Learning Coverage Functions and Private Release of Marginals*  
with Vitaly Feldman  
**COLT**, 2014.[Arxiv]
16. *Testing Surface Area*  
with Amir Nayyeri, Ryan O'Donnell and Chenggang Wu  
**SODA**, 2014. [Arxiv]
17. *Constructing Hard Functions from Learning Algorithms*  
with Adam Klivans and Igor Oliveira  
**CCC**, 2013.[Arxiv]
18. *Representation, Approximation and Learning of Submodular Functions using Low Rank Decision Trees*  
with Vitaly Feldman and Jan Vondrák  
**COLT**, 2013.[Arxiv]
19. *An Explicit VC-Theorem for Low Degree Polynomials*  
with Eshan Chattopadhyay and Adam Klivans  
**RANDOM**, 2012.[Arxiv]
20. *Submodular Functions are Noise Stable*  
with Adam Klivans, Homin K. Lee, Mahdi Cheraghchi  
**SODA**, 2012.[Arxiv]
21. *Differentially Private Online Learning*  
with Prateek Jain, Abhradeep G. Thakurta  
**COLT**, 2012.[Arxiv]
22. *A Randomized Scheduler with Probabilistic Guarantees of Finding Bugs*  
With Santosh Nagarakatte, Madanlal Musuvathi and Sebastian Burckhardt.  
**ASPLOS**, 2010. [PDF]

**PATENT**      **Concurrency Software Testing with Probabilistic Bounds on Finding Bugs**

with Madanlal Musuvathi, Sebastian Burckhardt and Santosh Nagarakatte  
USPTO, Filing Date: December 1, 2009, Application number: 12/628,223.

**HONORS**

1. **Simons Award** for Graduate Students in Theoretical Computer Science 2015.
2. Invited speaker at the **China Theory Week 2013** ( Center for Theory of Interactive Computation, Aarhus University, Denmark) and **China Theory Week 2015** (Shanghai Jiao Tong University, Shanghai, China).
3. **O P Jindal (OPJEMS) Engineering Scholarship** , for years 2008 and 2009.

**SERVICE**

Served as reviewer and subreviewer for journals (Journal of the ACM, ACM Transactions on Algorithms, Mathematics of Operations Research, Transactions on Knowledge Discovery and Engineering) and conferences (STOC, FOCS, CCC, SODA, COLT, ITCS).

**INVITED TALKS** MIT Theory of Computation Colloquium Series, Dec 2017  
Simons Workshop on Hierarchies, Extended Formulations and Matrix-Analytic Techniques, Berkeley, CA Nov 2017  
Seminar on New Directions in Theoretical Machine Learning, Princeton, Oct 2017  
Columbia University Theory Seminar, Oct 2017  
Oberwolfach Workshop on Proof Complexity and Beyond, August 2017  
Stanford Crypto Seminar May 2017  
Stanford Theory Seminar May 2017  
Theory Lunch, Princeton University May 2017  
Institute for Quantum Computing Colloquium, University of Waterloo, Waterloo, ON, Canada, March 2017  
Theory Lunch, Carnegie Mellon University, March 2017.  
Quantum Information and Computer Science Seminar, University of Maryland, College Park, MD, USA, February 2017.  
University of Illinois, Urbana Champaign Theory Seminar, Urbana, February 2017  
Columbia University Theory Seminar, New York, January 2017  
Simons Algorithms and Geometry Meeting, New York, January 2017  
Member Seminar, Institute for Advanced Study, Princeton December, 2016  
Theory Seminar, University of Maryland, College Park, MD, USA, February 2017.  
Member Seminar, Institute for Advanced Study, Princeton, December 2016.  
University of Chicago Theory Seminar, Chicago, November 2016  
Princeton University Theory Lunch, Princeton, September 2016  
Rutgers University Theory Seminar, Piscataway, November 2016  
Algorithms and Complexity Seminar, MIT, Cambridge, April 2016  
CS/DM Seminar, Institute for Advanced Study Princeton, Princeton, March 2016  
Workshop on Semidefinite Optimization, NUS, Singapore, February, 2016  
Cornell University Theory Seminar, Ithaca, March 2016  
University of Texas at Austin Theory Seminar, Austin, March 2015  
Microsoft Research, Harvard and MIT, Theory Reading Group, Cambridge, July 2015  
China Theory Week, Shanghai Jiao Tong University, Shanghai, China, August 2015  
Machine Learning Reading Group, Microsoft Research Cambridge, Cambridge, November 2014  
China Theory Week, Aarhus University, Aarhus, Denmark, August 2013