

# TSELIL SCHRAMM

tselil@mit.edu  
tselilschramm.org

## CURRENT POSITION

---

**Postdoctoral Fellow**, Harvard University and Massachusetts Institute of Technology    Spring 2018-present  
Hosted by Boaz Barak, Jon Kelner, Ankur Moitra and Pablo Parrilo

## PREVIOUS POSITIONS

---

**Google Research Fellow**, Simons Institute    Fall 2017  
Program title: bridging discrete and continuous optimization

## EDUCATION

---

**PhD UC Berkeley**, Computer Science    2012 – 2017  
Advised by Prasad Raghavendra and Satish Rao  
Dissertation title: *Random Matrices and the Sum-of-Squares Hierarchy*

**BSc Harvey Mudd College**, Math/Computer Science    2008 – 2012  
Graduated with High Distinction and honors in Math, Computer Science, and the Humanities

## RESEARCH INTERESTS

---

My interests include spectral algorithms, spectral graph theory, approximation algorithms, semidefinite programming, and random matrix theory. Recently I have been working to understand the power and limitations of the sum-of-squares semidefinite programming hierarchy, particularly its performance on average-case problems.

## HONORS AND AWARDS

---

**NSF Graduate Research Fellow**, National Science Foundation    2013 – 2017

**NDSEG Fellowship Recipient**, US Department of Defense    March 2013

**Chancellor's Fellow**, UC Berkeley    2012 – 2017

**Radley Prize in the Humanities, Soc. Sciences, & Arts**, Harvey Mudd College    May 2012

**Freshman Writing Award**, Harvey Mudd College    September 2009

## INTERNSHIP

---

**Theory Group Intern**, Microsoft Research Redmond    Summer 2014  
Hosted by Konstantin Makarychev

## TEACHING EXPERIENCE

---

- CS270: Graduate Algorithms**, UC Berkeley Spring 2015  
Graduate Student Instructor, assistant to Lap Chi Lau
- CS70: Introduction to Discrete Math and Probability Theory**, UC Berkeley Fall 2013  
Graduate Student Instructor, assistant to Umesh Vazirani
- CS170: Undergraduate Algorithms**, UC Berkeley Spring 2013  
Graduate Student Instructor, assistant to Christos Papadimitriou and Prasad Raghavendra

## PAPERS

---

**Nearly efficient algorithms for the graph matching problem on correlated random graphs**, with Boaz Barak, Chi-Ning Chou, Zhixian Lei and Yueqi Sheng. In submission. Preprint on arXiv:1805.02349.

**The threshold for SDP-refutation of random regular NAE-3SAT**, with Yash Deshpande, Andrea Montanari, Ryan O’Donnell and Subhabrata Sen. In submission. Preprint on arXiv:1804.05230.

**Computing exact minimum cuts without knowing the graph**, with Aviad Rubinfeld and S. Matthew Weinberg. In *Proceedings of ITCS 2018*, pp. 39:1–39:16. Preprint on arXiv:1711.03165.

**Braess’s paradox for the spectral gap in random graphs and delocalization of eigenvectors**, with Ronen Eldan and Miklós Z. Rácz. *Random Structures & Algorithms* 50, 4, 2017, 584–611. Preprint on arXiv:1504.07669.

**The power of sum-of-squares for detecting hidden structures**, with Samuel B. Hopkins, Pravesh K. Kothari, Aaron Potechin, Prasad Raghavendra and David Steurer. In *Proceedings of FOCS 2017*, pp. 720–731. Preprint on arXiv:1710.05017.

**Fast and robust tensor decomposition with applications to dictionary learning**, with David Steurer. In *Proceedings of COLT 2017*, pp. 1760–1793. Preprint on arXiv:1706.08672.

**Strongly refuting random CSPs below the spectral threshold**, with Prasad Raghavendra and Satish Rao. In *Proceedings of STOC 2017*, pp. 121–131. Preprint on arXiv:1605.00058.

**Fast spectral algorithms from sum-of-squares proofs: tensor decomposition and planted sparse vectors**, with Sam Hopkins, Jonathan Shi and David Steurer. In *Proceedings of STOC 2016*, pp. 178–191. Preprint on arXiv:1512.02337.

**Global and local information in clustering labeled block models**, with Varun Kanade and Elchanan Mossel. *IEEE Transactions on Information Theory* 62, 10, 2016, 5906–5917. Preprint on arXiv:1404.6325.

**On the integrality gap of degree-4 sum of squares for planted clique**, with Sam Hopkins, Pravesh Kothari, Aaron Potechin and Prasad Raghavendra. In *Proceedings of SODA 2016*. Invited to the SODA 2016 special issue of ACM Transactions on Algorithms. Preprint on arXiv:1507.05136.

**Near optimal LP rounding algorithm for correlation clustering on complete and complete k-partite graphs**, with Shuchi Chawla, Konstantin Makarychev and Grigory Yaroslavtsev. In *Proceedings of STOC 2015*, pp. 219–228. Preprint on arXiv:1412.0681.

**Gap amplification for small-set expansion via random walks**, with Prasad Raghavendra. In *Proceedings of APPROX/RANDOM 2014*, pp. 381–391. Preprint on arXiv:1301.1493.

## SERVICE

---

**Program Committee Member**, APPROX 2018

21st International Conference on Approximation Algorithms for Combinatorial Optimization Problems

**Program Committee Member**, ITCS 2018

9th Innovations in Theoretical Computer Science Conference

**Co-Organizer**, Theory Lunch Seminar  
UC Berkeley CS Theory Group

2015 - 2017

**Co-President**, CS Graduate Student Association  
UC Berkeley Department of Computer Science

Fall 2013 - Spring 2014

## INVITED TALKS

---

**MIT Combinatorics Seminar**

*(Nearly) Efficient Algorithms for the Graph Matching Problem*

May 2018

**Princeton Theory Seminar**

*(Nearly) Efficient Algorithms for the Graph Matching Problem*

April 2018

**CISS Invited Session**

*Tensor decomposition: speeding up sum-of-squares algorithms*

March 2018

**Simons Institute Workshop on Hierarchies, Extended Formulations,  
and Matrix-Analytic Techniques**

*Fast spectral algorithms from sum-of-squares analyses*

November 2017

**San Diego Theory Seminar**

*Duality of low-degree SoS refutations and efficient spectral algorithms in the average case*

November 2017

**Oberwolfach Workshop on Proof Complexity and Beyond**

*Duality of low-degree SoS refutations and efficient spectral algorithms in the average case*

August 2017

**Microsoft Research Redmond Theory Lunch**

*Computing exact min cut without knowing the graph*

August 2017

**AIM Workshop on Phase Transitions in Randomized Computational Problems**

*Refuting random CSPs*

June 2017

**Toyota Institute of Technology Chicago**

*Adventures with sum-of-squares*

January 2017

**Microsoft Research Redmond**

*Adventures with sum-of-squares (and randomness)*

January 2017

<b>UC Berkeley Theory Lunch</b> <i>Strongly refuting CSPs below the spectral threshold</i>	October 2016
<b>Banff Workshop on Computational Complexity</b> <i>Strongly refuting CSPs below the spectral threshold</i>	September 2016
<b>University of Washington Theory Seminar</b> <i>Strongly refuting CSPs below the spectral threshold</i>	August 2016
<b>China Theory Week</b> <i>Strongly refuting CSPs below the spectral threshold</i>	August 2016
<b>Banff Workshop on Algebraic and Spectral Graph Theory</b> <i>Strongly refuting CSPs below the spectral threshold</i>	August 2016
<b>MIT Algorithms &amp; Complexity Seminar</b> <i>Strongly refuting CSPs below the spectral threshold</i>	May 2016
<b>Stanford Theory Seminar</b> <i>Strongly refuting CSPs below the spectral threshold</i>	April 2016
<b>Simons Institute Spectral Graph Theory Reunion Workshop</b> <i>Overcomplete tensor decomposition: speeding up sum-of-squares</i>	December 2015
<b>Stanford Theory Lunch</b> <i>Overcomplete tensor decomposition: speeding up sum-of-squares</i>	December 2015
<b>Cornell Probability Seminar</b> <i>Braess's paradox for the spectral gap in random graphs and delocalization of eigenvectors</i>	November 2015
<b>Cornell Theory Seminar</b> <i>Tight lower bounds for planted clique in the degree-4 sum-of-squares program</i>	November 2015
<b>UC Berkeley Theory Lunch</b> <i>Overcomplete tensor decomposition: speeding up sum-of-squares</i>	October 2015
<b>UC Berkeley Theory Lunch</b> <i>A better approximation for correlation clustering</i>	October 2014