

Steven M. Heilman  
Curriculum Vitae

USC Mathematics Department  
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**Employment**

Assistant Professor RTPC of Mathematics, USC, 7/2018–

Assistant Professor of Mathematics (Tenure Track), University of Notre Dame, 1/2018–  
7/2018

Assistant Adjunct Professor of Mathematics, UCLA, 7/2014–12/2017

**Education**

Ph.D. in Mathematics, Courant Institute of Mathematical Sciences, NYU, 9/2009–4/2014  
Thesis: Gaussian Isoperimetry for Multiple Sets  
Thesis advisor: Professor Assaf Naor

B.A. in Mathematics, Cornell University, 8/2005–5/2009  
*Summa Cum Laude* with Distinction in all Subjects  
Undergraduate thesis: Homotopies of Eigenfunctions and the Spectrum of the Laplacian on  
the Sierpinski Carpet  
Undergraduate thesis advisor: Professor Robert S. Strichartz

**Research interests**

Probability, Analysis, Geometry, Theoretical Computer Science

**Awards, Grants, and Honors**

NSF Grant CCF 1911216, 2019–2022, \$90,294  
NSF Grant DMS 1708908 (transferred to 1829383, 1839406), 2017–2020, \$96,465  
AMS Simons Travel Grant, 2015–2017  
Simons-Berkeley Graduate Research Fellowship, Fall 2013  
NSF Graduate Research Fellowship, 2011–2014  
Harry S. Kieval Prize in Mathematics, Cornell University, 2009

**Advising**

Mathematics Ph.D. Student, Alex Tarter, USC, October 2019–  
Mathematics Masters Student, Xingyun Zhou, USC, December 2019–

## Activities/ Professional Service

USC RTPC Merit Review Committee, 2019–

USC Postdoctoral Appointments Committee, 2018–2019

Co-Organizer, USC Probability and Statistics Seminar, 2018–

cSplash Outreach Program at NYU, Co-President 2010–2011, President 2011–2012

Reviewed grant proposals for: NSF

Refereed research articles for: Duke Math Journal, Annali di Matematica Pura ed Applicata, Proceedings of the AMS, Experimental Mathematics, Theory of Computing, SIAM Journal on Discrete Mathematics, FOCS

AMS MR Reviewer 2014–2018

## Teaching

Instructor at USC for (2018–2019):

547 Statistical Learning Theory, 541A Graduate Mathematical Statistics

545 Graduate Time Series, 126 Calculus 2 (also course coordinator)

118 Calculus for Business Students (two sections)

Instructor at Notre Dame for: 60850 Graduate Probability, and Independent Reading in Probability

Instructor at UCLA for the following undergraduate courses (2014–2017):

174E Financial Mathematics, 171 Stochastic Processes (twice)

170A Probability Theory 1 (thrice), 170B Probability Theory 2 (twice)

167 Game Theory (twice), 164 Optimization

131A Analysis 1, 131B Analysis 2

115A Linear Algebra (twice)

31A Calculus 1, 31B Calculus 2, 32A Calculus 3 differentiation, 32B Calculus 3 integration

Recitation Leader at NYU for: Analysis 2 and Calculus 1

Teaching Assistant at NYU for: Introduction to Mathematical Proofs

Instructor work included lecturing, creating lecture notes, homeworks and exams, grading exams, and holding office hours. Recitation leader work included holding weekly recitations, grading quizzes and exams, writing homework solutions and holding office hours. Teaching assistant work included grading homework, writing homework solutions and holding office hours.

## Recent Presentations

Probability Seminar, UCI, March 3, 2020

Probability Seminar, UCSD, February 20, 2020

Research Visit, Università degli Studi di Napoli Federico II, December 13-22, 2019

Analysis Seminar, Georgia Tech, February 20, 2019

High-Dimensional Probability Seminar, Georgia Tech, February 20, 2019  
 Probability Seminar, UCI, January 15, 2019  
 Southern California Probability Symposium, USC, December 8, 2018  
 Probability Seminar, UCLA, November 15, 2018  
 Applied Math Seminar, Claremont Mckenna, October 29, 2018  
 Probability Seminar, USC, October 26, 2018  
 AMS Eastern Section Meeting, Special Session on Convex Geometry and Functional  
 Inequalities, September 30, 2018  
 Algebra/Number Theory/Combinatorics Seminar, Claremont Mckenna, December 5, 2017  
 Joint UCLA/Caltech Analysis and PDE seminar, May 19, 2017  
 Probability Seminar, Harvard University, April 5, 2017  
 Mathematics Colloquium, Cal State Northridge, February 21, 2017  
 Mathematics Colloquium, University of Delaware, January 28, 2017  
 Mathematics Colloquium, Notre Dame, January 26, 2017  
 Mathematics Colloquium, UC Irvine, January 10, 2017  
 Probability Seminar, Texas A&M, December 5, 2016  
 Probability Seminar, UC Irvine, November 29, 2016  
 Mathematics Colloquium, Temple University, November 28, 2016  
 Probability Seminar, UCLA, November 17, 2016  
 Joint UCLA/Caltech Analysis and PDE seminar, June 3, 2016  
 Probability Seminar, USC, January 15, 2016  
 Combinatorial Number Theory Seminar, UC Riverside, December 1, 2015  
 Probability Seminar, UC Irvine, November 24, 2015  
 Probability Seminar, UCSD, November 5, 2015  
 Probability Seminar, University of Pennsylvania, September 24, 2015  
 Workshop on Analytic Tools in Probability and Applications, Institute for Mathematics and  
 its Applications, University of Minnesota, April 28, 2015  
 Probability Seminar, IU Bloomington, February 19, 2015  
 Southern California Probability Symposium, IPAM, UCLA, December 6, 2014  
 Probability Seminar, UC Berkeley, April 9, 2014  
 Discrete Math Seminar, Brown University, March 6, 2014  
 Analysis Seminar, Cornell University, March 3, 2014

## Preprints

Maximum Gaussian Perimeter of Convex Sets in the Plane, in preparation.

Designing Stable Elections: a Survey, in preparation.

Independent Sets in Sparse Random Graphs and Random Trees, in preparation.

Ricci Curvature of Markov chains on the Discrete Square (with Georg Menz), in preparation.

Stable Gaussian Minimal Bubbles, arXiv:1901.03934.

The Structure of Gaussian Minimal Bubbles, arXiv:1805.10203.

A Moment Majorization principle for random matrix ensembles with applications to hardness of the noncommutative Grothendieck problem (with Thomas Vidick), arXiv:1603.05620.

Low Correlation Noise Stability of Symmetric Sets, arXiv:1511.00382.

## Publications

A Periodic Isoperimetric Problem Related to the Unique Games Conjecture, to appear, Random Structures and Algorithms. arXiv:1708.00917.

Symmetric Convex Sets with Minimal Gaussian Surface Area, to appear, American Journal of Mathematics, arXiv:1705.06643.

Strong Contraction and Influences in Tail Spaces, (with Elchanan Mossel and Krzysztof Oleszkiewicz), Transactions of the AMS. **369** (2017), no. 7, 4843-4863. arXiv:1406.7855.

Standard Simplices and Pluralities are Not the Most Noise Stable, (with Elchanan Mossel and Joe Neeman), Israel Journal of Mathematics. **213** (2016), no. 1, 33-53. An abstract appeared in ITCS 2015.

Euclidean Partitions Optimizing Noise Stability, Electronic Journal of Probability. **19** (2014), no. 71, 1-37. arXiv:1112.2993.

Solution of the propeller conjecture in  $\mathbb{R}^3$  (with Aukosh Jagannath and Assaf Naor), Discrete & Computational Geometry. **50** (2013), no. 2, 263-305. arXiv:1112.2993. An extended abstract appeared in STOC 2012.

Orthogonal Polynomials with Respect to Self-Similar Measures (with Philip Owrutsky and Robert S. Strichartz), Experiment. Math. **20** (2011), no. 3, 238-259. arXiv:0910.0631

Localized Eigenfunctions: Here You See Them, There You Don't (with Robert S. Strichartz), Notices Amer. Math. Soc. **57** (2010), no. 5, 624-629. arXiv:0909.0783

Homotopies of Eigenfunctions and the Spectrum of the Laplacian on the Sierpinski Carpet (with Robert S. Strichartz), Fractals **18** (2010), no. 1, 1-34. arXiv:0908.2942

Outer Approximation of the Spectrum of a Fractal Laplacian (with Tyrus Berry and Robert S. Strichartz), Experiment. Math. **18** (2009), no. 4, 449-480. arXiv:0904.3757

A hydrogel-based microfluidic device for the studies of directed cell migration. Shing-Yi Cheng, Steven Heilman, Max Wasserman, Shivaun Archer, Michael L. Shuler and Mingming Wu, Lab Chip **7** (2007), 763-769.

A three-channel microfluidic device for generating static linear gradients and its application to the quantitative analysis of bacterial chemotaxis. Jinpian Diao, Lincoln Young, Sue Kim, Elizabeth A. Fogarty, Steven M. Heilman, Peng Zhou, Michael L. Shuler, Mingming Wu and Matthew P. DeLisa, Lab Chip **6** (2006), 381-388.