Steven M. Heilman
Curriculum Vitae

University of Notre Dame Mathematics Department
255 Hurley
Notre Dame, IN, 46556
Phone: (574) 631-7393
E–mail: sheilman@nd.edu
Homepage: www.stevenheilman.org

Employment

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

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 DMS 1708908 (transferred to 1829383), 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

Activities/ Professional Service

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

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

Reviewed grant proposals for: NSF

AMS MR Reviewer

Teaching

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

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

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

Low Correlation Noise Stability of Euclidean Partitions, in preparation.

The Structure of Gaussian Minimal Bubbles, arXiv:1805.10203.

A Periodic Isoperimetric Problem Related to the Unique Games Conjecture, arXiv:1708.00917.

Symmetric Convex Sets with Minimal Gaussian Surface Area, arXiv:1705.06643.

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

Strong Contraction and Influences in Tail Spaces, (with Elchanan Mossel and Krzysztof Oleszkiewicz), to appear, Transactions of the AMS. 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.