

## CURRICULUM VITAE: STEVEN J. MILLER

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**Nationality:** American.

**Thesis Advisors:** Peter Sarnak (Princeton University), Henryk Iwaniec (Rutgers University)

**Society Memberships:** American Mathematical Society, Math Alliance (Mentor), Mathematical Association of America, Phi Beta Kappa, Sigma Xi.

**Homepage:** [http://web.williams.edu/Mathematics/sjmillier/public\\_html/index.htm](http://web.williams.edu/Mathematics/sjmillier/public_html/index.htm)

**Research Interests:** Distribution of zeros and  $n$ -level statistics for families of  $L$ -functions, especially families of elliptic curves with rank over  $\mathbb{Q}(T)$ , Random Matrix Theory, Random Graphs, Elliptic Curves, Additive, Analytic and Computational Number Theory, Probability Theory and Statistics, Benford's Law, the  $L$ -function Ratios Conjecture, Cryptography, Sabermetrics and Linear Programming.

### Education

Ph. D., Mathematics	Princeton University, 2002.
M. A., Mathematics	Princeton University, 1998.
B. S., Mathematics & Physics	Yale University, 1996 (summa cum laude, PBK).

### Positions

Associate Professor	Williams College	2012 -
Visiting Professor	Smith College	2011 - 2012
Visiting Professor	Mount Holyoke College	2011 - 2012
Assistant Professor	Williams College	2008 - 2012
Tamarkin Assistant Professor	Brown University	2005 - 2008
Visiting Assistant Professor	Brown University	2004 - 2005
Ross Assistant Professor	The Ohio State University	2003 - 2004
Visiting Scholar	Boston University	2004
VIGRE Consultant	Princeton University	2003 - 2004
Post-doctoral Fellow	American Institute of Mathematics	2003
Instructor	Princeton University	2002 - 2003
Research Scientist	Courant Institute, NYU	2002
Lecturer	Princeton University	2001 - 2002

**Individual Grants**

- (1) NSF Grant DMS1561945, RUI: Additive Number Theory, Zeros of L-Functions, and Benford's Law, June 30, 2016 to June 30, 2019, \$149,999.
- (2) NSF Grant DMS1265673, RUI: Low-Lying Zeros of  $L$ -functions & Problems in Additive Number Theory, August 15, 2013 to August 15, 2016, \$135,610 (no cost extension till 7/31/2017).
- (3) NSF Grant DMS0970067 (Analysis, Number Theory and Combinatorics): *Investigations of L-functions and Benford's Law*, June 1, 2010 to June 1, 2013, \$112,521, plus two extensions for travel for students and to support my math riddles page (till May 31, 2014).
- (4) DHS Center at Rutgers (for work on a cryptography project with Midge Cozzens): January 1, 2010 to December 31, 2010: \$3,000.
- (5) NSF Grant DMS0600848 (Analysis, Number Theory and Combinatorics): *Investigations on low-lying zeros of L-functions*, July 2006 - June 2009, \$108,000 (relabeled DMS0855257; no cost extension to 2010 due to birth of daughter).
- (6) NSF Graduate Fellowship, 1998 - 2000.

**Conference and REU/REUF Grants**

- (1) NSF Grant DMS1347804: PI for: REU Site: The Williams College SMALL REU program: \$360,000 for 3 years, June 2014 - June 2017.
- (2) NSF Grant DMS1239280: PIs Leslie Hogben, Roselyn Williams, Ulrica Wilson, Project Title: Research Experiences for Undergraduate Faculty (REUF): Led a REUF group in Summer '14, had subsequent meetings and long-term mentoring of four junior faculty.
- (3) NSF Grant DMS0850577 (The Williams College SMALL REU Project), summer support in 2009 and, with Williams College, support for summer REU students.
- (4) NSF Grant DMS536991 (MAA Regional Undergraduate Mathematics Conferences program): *Brown University Symposium for Undergraduates in the Mathematical Sciences*, March 8, 2008, \$1,500.
- (5) Office of the Vice President for Research, Brown University: Conference on the Theory and Applications of Benford's Law (December 16th - 18th, 2007, Santa Fe, NM), \$5,000.
- (6) NSF Grant DMS0753043 (Probability program), Conference on the Theory and Applications of Benford's Law (December 16th - 18th, 2007, Santa Fe, NM), \$13,368.
- (7) NSF Grant DMS536991 (MAA Regional Undergraduate Mathematics Conferences program): *Brown University Symposium for Undergraduates in the Mathematical Sciences*, March 3, 2007, \$1,500.

**Organized Conferences: Research**

- (1) Theory and Applications of Benford's Law (with Chaouki Abdallah, Greg Heileman, Ted Hill and Fernando Perez-Gonzalez), Santa Fe, NM, December 16-18, 2007.
- (2) AMS Sectional Special Session on Analytic Number Theory (with Alina Bucur, Stephen D. Miller and Akshay Venkatesh), New York, NY, March 15-16, 2008.
- (3) AMS Sectional Special Session on Random Processes (with Andrew Ledoan and Mihai Stoiciu), Worcester, MA, April 9 - 10, 2011.
- (4) AMS Sectional Special Session on Difference Equations (with Michael Radin), University of Maryland, March 29, 2014. Had participants skyping in from around the world, posted videos of talks and slides online in almost real-time:  
[http://web.williams.edu/Mathematics/sjmiller/public\\_html/conferences/AMS\\_DiffEq\\_Balt2014/index.htm](http://web.williams.edu/Mathematics/sjmiller/public_html/conferences/AMS_DiffEq_Balt2014/index.htm).
- (5) AMS Special Session On Difference Equations & Applications (with Michael Radin), Joint Meetings of the AMS/MAA, San Antonio, January 10, 2015.
- (6) AMS Special Session on Difference Equations & Applications (with Michael Radin), Washington DC Meeting, March 7-8, 2015.
- (7) Northeast REU Conference (with Alyssa Epstein, Becky Durst and Chi Huynh), Williams College, July 29, 2016.
- (8) AMS Special Session on Analytic Number Theory (with Sheng-Chi Liu), Washington State University, April 22-23, 2017.

**Organized Conferences: Undergraduate**

- (1) Symposium for Undergraduates in the Mathematical Sciences, Brown University (faculty advisor for 2006, 2007 and 2008).
- (2) AMS Sectional Special Session on Undergraduate Research (joint with undergraduates and faculty): Holy Cross 2011.

- (3) AMS Sectional Special Session on Undergraduate Research (joint with undergraduates and faculty): Boston College 2013.
- (4) Panel discussion on REUs and undergraduate research (joint with David Damiano), Joint Meetings of the AMS / MAA, Boston 2012. Authored report available here:

[http://web.williams.edu/Mathematics/sjmiller/public\\_html/math/handouts/NotesonPanelonUndergraduateResearch12.pdf](http://web.williams.edu/Mathematics/sjmiller/public_html/math/handouts/NotesonPanelonUndergraduateResearch12.pdf).

## Bibliography

Papers and Talks available online at <http://www.williams.edu/Mathematics/sjmiller/>

### Papers

- (1) *1- and 2-level densities for families of elliptic curves: evidence for the underlying group symmetries*, *Compositio Mathematica* **140** (2004), 952–992.
- (2) *Distribution of eigenvalues for the ensemble of real symmetric Toeplitz matrices* (with Christopher Hammond), *Journal of Theoretical Probability* **18** (2005), no. 3, 537–566.
- (3) *Benford's Law, values of L-functions and the  $3x + 1$  problem* (with Alex Kontorovich), *Acta Arithmetica* **120** (2005), no. 3, 269–297.
- (4) *Variation in the number of points on elliptic curves and applications to excess rank*, *C. R. Math. Rep. Acad. Sci. Canada* **27** (2005), no. 4, 111–120.
- (5) *Incomplete quadratic exponential sums in several variables* (with Eduardo Dueñez, Amitabha Roy and Howard Straubing), *Journal of Number Theory* **116** (2006), no. 1, 168–199.
- (6) *Closed-form Bayesian inference for the logit model via polynomial expansions* (with Eric T. Bradlow and Kevin Dayaratna), *Quantitative Marketing and Economics* **4** (2006), no. 2, 173–206.
- (7) *Investigations of zeros near the central point of elliptic curve L-functions*, *Experimental Mathematics* **15** (2006), no. 3, 257–279.
- (8) *The low lying zeros of a  $GL(4)$  and a  $GL(6)$  family of L-functions* (with Eduardo Dueñez), *Compositio Mathematica* **142** (2006), no. 6, 1403–1425.
- (9) *Low lying zeros of L-functions with orthogonal symmetry* (with Christopher Hughes), *Duke Mathematical Journal* **136** (2007), no. 1, 115–172.
- (10) *Constructing one-parameter families of elliptic curves over  $\mathbb{Q}(T)$  with moderate rank* (with Scott Arms and Álvaro Lozano-Robledo), *Journal of Number Theory* **123** (2007), no. 2, 388–402.
- (11) *A derivation of the Pythagorean Won-Loss Formula in baseball*, *Chance Magazine* **20** (2007), no. 1, 40–48 (an abridged version appeared in The Newsletter of the SABR Statistical Analysis Committee **16** (February 2006), no. 1, 17–22).
- (12) *Distribution of eigenvalues of real symmetric palindromic Toeplitz matrices and circulant matrices* (with Adam Massey and John Sinsheimer), *Journal of Theoretical Probability* **20** (2007), no. 3, 637–662.
- (13) *Benford's Law applied to hydrology data - results and relevance to other geophysical data* (with Mark Nigrini), *Mathematical Geology* **39** (2007), no. 5, 469–490.
- (14) *When the Cramér-Rao Inequality provides no information*, *Communications in Information and Systems* **7** (2007), no. 3, 265–272.
- (15) *The Modulo 1 Central Limit Theorem and Benford's Law for Products* (with Mark Nigrini), *International Journal of Algebra* **2** (2008), no. 3, 119–130.
- (16) *A symplectic test of the L-Functions Ratios Conjecture*, *Int Math Res Notices* (2008) Vol. 2008, article ID rnm146, 36 pages, doi:10.1093/imrn/rnm146.
- (17) *An identity for sums of polylogarithm functions*, *Integers: Electronic Journal Of Combinatorial Number Theory* **8** (2008), #A15.
- (18) *A probabilistic proof of Wallis' formula for  $\pi$* , *Amer. Math. Monthly* **115** (2008), no. 8, 740–745.
- (19) *The distribution of the second largest eigenvalue in families of random regular graphs* (with Tim Novikoff and Anthony Sabelli), *Experimental Mathematics* **17** (2008), no. 2, 231–244.
- (20) *Order statistics and Benford's law* (with Mark Nigrini), *International Journal of Mathematics and Mathematical Sciences*, Volume 2008 (2008), Article ID 382948, 19 pages. doi:10.1155/2008/382948
- (21) *Lower order terms in the 1-level density for families of holomorphic cuspidal newforms*, *Acta Arithmetica* **137** (2009), 51–98.
- (22) *Chains of distributions, hierarchical Bayesian models and Benford's Law* (with D. Jang, J. U. Kang, A. Kruckman and J. Kudo), *Journal of Algebra, Number Theory: Advances and Applications*, volume 1, number 1 (March 2009), 37–60.
- (23) *An orthogonal test of the L-Functions Ratios Conjecture*, *Proceedings of the London Mathematical Society* 2009, doi:10.1112/plms/pdp009.
- (24) *Silver Scheduler: a demand-driven modeling approach for the construction of micro-schedules of movies in a multiplex* (with Jehoshua Eliashberg, Quintus Hegie, Jason Ho, Dennis Huisman, Sanjeev Swami, Charles B. Weinberg and Berend Wierenga), *Intern. J. of Research in Marketing* (2009), doi:10.1016/j.ijresmar.2008.09.004 (lead article, and won the *IJRM Best Paper Award for 2009*).

- (25) *The effect of convolving families of L-functions on the underlying group symmetries* (with Eduardo Dueñez), Proceedings of the London Mathematical Society, 2009; doi: 10.1112/plms/pdp018.
- (26) *When almost all sets are difference dominated* (with Peter Hegarty), Random Structures and Algorithms **35** (2009), no. 1, 118–136.
- (27) *Nuclei, Primes and the Random Matrix Connection* (with Frank W. K. Firk), invited submission to Symmetry **1** (2009), 64–105; doi:10.3390/sym1010064.
- (28) *Data diagnostics using second order tests of Benford’s Law* (with Mark Nigrini), Auditing: A Journal of Practice and Theory **28** (2009), no. 2, 305–324. doi: 10.2308/aud.2009.28.2.305
- (29) *Explicit constructions of infinite families of MSTD sets* (with Brooke Orosz and Dan Scheinerman), Journal of Number Theory **130** (2010), 1221–1233.
- (30) *A unitary test of the L-functions Ratios Conjecture* (with John Goes, Steven Jackson, David Montague, Kesinee Ninsuwan, Ryan Peckner and Thuy Pham), Journal of Number Theory **130** (2010), no. 10, 2238–2258.
- (31) *Towards an ‘average’ version of the Birch and Swinnerton-Dyer Conjecture* (with John Goes), Journal of Number Theory **130** (2010), no. 10, 2341–2358.
- (32) *An Orthogonal Test of the L-functions Ratios Conjecture, II* (with David Montague), Acta Arith. **146** (2011), 53–90.
- (33) *Explicit constructions of infinite families of MSTD sets* (with Dan Scheinerman), Additive Number Theory: Festschrift In Honor of the Sixtieth Birthday of Melvyn B. Nathanson (David Chudnovsky and Gregory Chudnovsky, editors), Springer-Verlag, 2010.
- (34) *Demand-driven scheduling of movies in a multiplex* (with Jehoshua Eliashberg and Charles B. Weinberg), newsletter of the European Marketing Academy, October 2010 (requested summary of Silver-Scheduler paper in honor of it receiving the IJRM Best Paper Award for 2009).
- (35) *The lowest eigenvalue of Jacobi Random Matrix Ensembles and Painlevé VI*, (with Eduardo Dueñez, Duc Khiem Huynh, Jon Keating and Nina Snaith), Journal of Physics A: Mathematical and Theoretical **43** (2010), no. 40, 405204 (27pp).
- (36) *Effective equidistribution and the Sato-Tate law for families of elliptic curves* (with M. Ram Murty), Journal of Number Theory **131** (2011), no. 1, 25–44.
- (37) *Isoperimetric Sets of Integers* (with Frank Morgan, Edward Newkirk, Lori Pedersen and Deividas Seferis), Mathematics Magazine **84** (Feb. 2011), 37–42.
- (38) *An elliptic curve family test of the Ratios Conjecture* (with Duc Khiem Huynh and Ralph Morrison), Journal of Number Theory **131** (2011), 1117–1147.
- (39) *On the number of summands in Zeckendorf decompositions* (with Murat Koloğlu, Gene S. Kopp and Yinghui Wang), Fibonacci Quarterly **49** (2011), no. 2, 116–130.
- (40) *Rational irrationality proofs* (with David Montague), Mathematics Magazine **85** (2012), no. 2, 110–114.
- (41) *Distribution of eigenvalues for highly palindromic real symmetric Toeplitz matrices* (with Steven Jackson and Thuy Pham), Journal of Theoretical Probability **25** (2012), 464–495.
- (42) *A combinatorial identity for studying Sato-Tate type problems* (with M. Ram Murty and Frederick Strauch), Rendiconti del Seminario Matematico **68** (2010), no. 4, 337–348.
- (43) *Moments of the rank of elliptic curves* (with Siman Wong), Canadian Journal of Mathematics **64** (2012), no. 1, 151–182.
- (44) *The real analogue of the Schwarz lemma* (with David Thompson), American Mathematical Monthly **118** (October 2011), Number 8, page 725.
- (45) *Generalized More Sums Than Differences Sets* (with Geoffrey Iyer, Oleg Lazarev and Liyang Zhang), Journal of Number Theory **132** (2012), no. 5, 1054–1073.
- (46) *Explicit Constructions of Large Families of Generalized More Sums Than Differences Sets* (with Sean Pegado and Luc Robinson), Integers **12** (2012), #A30.
- (47) *Models for zeros at the central point in families of elliptic curves* (with Eduardo Dueñez, Duc Khiem Huynh, Jon Keating and Nina Snaith), J. Phys. A: Math. Theor. **45** (2012), no. 11, 115207 (32pp).
- (48) *From Fibonacci numbers to Central Limit Type Theorems* (with Yinghui Wang), Journal of Combinatorial Theory, Series A **119** (2012), no. 7, 1398–1413.
- (49) *First Order Approximations of the Pythagorean Won-Loss Formula for Predicting MLB Teams Winning Percentages* (with Kevin Dayaratna), By The Numbers – The Newsletter of the SABR Statistical Analysis Committee **22** (2012), no 1, 15–19.

- (50) *Low-lying zeros of number field L-functions* (with Ryan Peckner), *Journal of Number Theory* **132** (2012), 2866–2891.
- (51) *Quadratic fields with cyclic 2-class groups* (with Carlos Dominguez and Siman Wong), *Journal of Number Theory* **133** (2013), no. 3, 926–939.
- (52) *Leading, learning and herding* (with Daniel Stone), *Mathematical Social Sciences* **65** (2013), 222–231, DOI information: 10.1016/j.mathsocsci.2012.12.002.
- (53) *The Pythagorean Won-Loss Formula and Hockey: A Statistical Justification for Using the Classic Baseball Formula as an Evaluative Tool in Hockey* (with Kevin Dayaratna), *The Hockey Research Journal: A Publication of the Society for International Hockey Research* (2012/2013), pages 193–209.
- (54) *The Average Gap Distribution for Generalized Zeckendorf Decompositions* (with O. Beckwith, A. Bower, L. Gaudet, R. Insoft, S. Li, and P. Tosteson), *The Fibonacci Quarterly* **51** (2013), 13–27.
- (55) *Closed Form Continued Fraction Expansions of Special Quadratic Irrationals* (with Dan Fishman), *ISRN Combinatorics*, vol. 2013, Article ID 414623, 5 pages, 2013. doi:10.1155/2013/414623.
- (56) *Distribution of Missing Sums in Sumsets* (with Oleg Lazarev and Kevin O’Bryant), *Experimental Mathematics* **22** (2013), no. 2, 132–156.
- (57) *The  $n$ -level density of zeros of quadratic Dirichlet L-functions* (with Jake Levinson), *Acta Arithmetica* **161** (2013), 145–182.
- (58) *Viruslike dynamics on starlike graphs* (with Thealexa Becker, Alec Greaves-Tunnell, Leo Kontorovich and Karen Shen), *the Journal of Nonlinear Systems and Applications* **4** (2013), no. 1, 53–63.
- (59) *The Limiting Spectral Measure for Ensembles of Symmetric Block Circulant Matrices* (with Murat Koloğlu, Gene S. Kopp, Frederick W. Strauch and Wentao Xiong), *Journal of Theoretical Probability* **26** (2013), no. 4, 1020–1060.
- (60) *Coordinate sum and difference sets of  $d$ -dimensional modular hyperbolas* (with Amanda Bower, Victor Luo and Ron Evans), *INTEGERS* #A31, 2013, 16 pages.
- (61) *The Pi Mu Epsilon 100th Anniversary Problems: Part I* (with James M. Andrews, Avery T. Carr and many of my students), *The Pi Mu Epsilon Journal* **13** (2013), no. 9, 513–534.
- (62) *The low-lying zeros of level 1 Maass forms* (with Levent Alpoge), *Int Math Res Notices* (2014), 24 pages, doi:10.1093/imrn/rnu012.
- (63) *Sets of Special Primes in Function Fields* (with Julio Andrade, Kyle Pratt and Minh-Tam Trinh), *INTEGERS* **14** (2014), #A18.
- (64) *Generalizing Zeckendorf’s Theorem to  $f$ -decompositions* (joint with Philippe Demontigny, Thao Do, Archit Kulkarni, David Moon and Umang Varma), *Journal of Number Theory* **141** (2014), 136–158.
- (65) *Pythagoras at the Bat* (with Taylor Corcoran, Jennifer Gossels, Victor Luo and Jaclyn Porfilio), book chapter in *Social Networks and the Economics of Sports* (edited by Panos M. Pardalos and Victor Zamaraev), Springer-Verlag, 2014, pages 89–114.
- (66) *A Generalization of Fibonacci Far-Difference Representations and Gaussian Behavior* (joint with Philippe Demontigny, Thao Do, Archit Kulkarni and Umang Varma), *Fibonacci Quarterly* **52** (2014), no. 3, 247–273.
- (67) *The Pi Mu Epsilon 100th Anniversary Problems: Part II* (with James M. Andrews, Avery T. Carr and many of my students), *The Pi Mu Epsilon Journal* **13** (2014), no. 10, 577–608.
- (68) *Newman’s conjecture in various settings* (with Julio Andrade and Alan Chang), *Journal of Number Theory* **144** (2014), 70–91.
- (69) *Generalized Ramanujan Primes* (with Nadine Amersi, Olivia Beckwith, Ryan Ronan and Jonathan Sondow), *Combinatorial and Additive Number Theory, CANT 2011 and 2012* (Melvyn B. Nathanson, editor), Springer Proceedings in Mathematics & Statistics (2014), 1–13.
- (70) *Finding and Counting MSTD sets* (with Geoffrey Iyer, Oleg Lazarev and Liyang Zhang), *Combinatorial and Additive Number Theory, CANT 2011 and 2012* (Melvyn B. Nathanson, editor), Springer Proceedings in Mathematics & Statistics (2014), 79–98.
- (71) *Most Subsets are Balanced in Finite Groups* (with Kevin Vissuet), *Combinatorial and Additive Number Theory, CANT 2011 and 2012* (Melvyn B. Nathanson, editor), Springer Proceedings in Mathematics & Statistics (2014), 147–157.
- (72) *Gaussian Behavior in Generalized Zeckendorf Decompositions* (with Yinghui Wang), *Combinatorial and Additive Number Theory, CANT 2011 and 2012* (Melvyn B. Nathanson, editor), Springer Proceedings in Mathematics & Statistics (2014), 159–173.

- (73) *The  $n$ -Level Density of Dirichlet  $L$ -Functions over  $\mathbb{F}_q[T]$*  (with Julio Andrade, Kyle Pratt and Minh-Tam Trinh), *Communications in Number Theory and Physics* **8** (2014), no. 3, 1–29.
- (74) *The expected eigenvalue distribution of large, weighted  $d$ -regular graphs* (with Leo Goldmakher, Cap Khoury and Kesinee Ninsuwan), *Random Matrices: Theory and Applications* **3** (2014), no. 4, 1450015 (22 pages).
- (75) *The Pi Mu Epsilon 100th Anniversary Problems: Part III* (with many of my students), *The Pi Mu Epsilon Journal* **14** (2014), no. 1, 65–99.
- (76) *Benford Behavior of Zeckendorf Decompositions* (with A. Best, P. Dynes, X. Edelsbrunner, B. McDonald, C. Turnage-Butterbaugh and M. Weinstein), *Fibonacci Quarterly* **52** (2014), no. 5, 35–46.
- (77) *Gaussian Behavior of the Number of Summands in Zeckendorf Decompositions in Small Intervals* (with A. Best, P. Dynes, X. Edelsbrunner, B. McDonald, C. Turnage-Butterbaugh and M. Weinstein), *Fibonacci Quarterly* **52** (2014), no. 5, 47–53.
- (78) *Generalizing Zeckendorf's Theorem: The Kentucky Sequence* (with M. Catral, P. Ford, P. Harris and D. Nelson), *Fibonacci Quarterly* **52** (2014), no. 5, 68–90.
- (79) *The Pi Mu Epsilon 100th Anniversary Problems: Part IV* (with many of my students), *The Pi Mu Epsilon Journal* **14** (2015), no. 2, 100–134.
- (80) *Continued Fraction Digit Averages and Maclaurin's Inequalities* (with Francesco Cellarosi, Doug Hensley and Jake Wellens), *Experimental Mathematics* **24** (2015), no. 1, 23–44.
- (81) *Surpassing the Ratios Conjecture in the 1-level density of Dirichlet  $L$ -functions* (with Daniel Fiorilli), *Algebra & Number Theory* **Vol. 9** (2015), No. 1, 13–52.
- (82) *Gaps between zeros of  $GL(2)$   $L$ -functions* (with Owen Barrett, Brian McDonald, Ryan Patrick, Caroline Turnage-Butterbaugh and Karl Winsor), *Journal of Mathematical Analysis and Applications* **429** (2015), 204–232.
- (83) *The James Function* (with Christopher N. B. Hammond and Warren P. Johnson), *Mathematics Magazine* **88** (2015) 54–71.
- (84) *Distribution of gaps in generalized Zeckendorf decompositions* (with Amanda Bower, Rachel Insoft, Shiyu Li and Philip Tosteson, and an appendix on *Extensions to Initial Segments* with Iddo Ben-Ari), *Journal of Combinatorial Theory, Series A* **135** (2015), 130–160.
- (85) *Limiting Spectral Measures for Random Matrix Ensembles with a Polynomial Link Function* (with Kirk Swanson, Kimsy Tor and Karl Winsor), *Random Matrices: Theory and Applications* **4** (2015), no. 2, 1550004 (28 pages).
- (86) *Relieving and Readjusting Pythagoras* (with Victor Luo), *By The Numbers – The Newsletter of the SABR Statistical Analysis Committee* **25** (2015), no. 1, 5–14.
- (87) *Sums and Differences of Correlated Random Sets* (with Thao Do, Archit Kulkarni, David Moon and Jake Wellens), *Journal of Number Theory* **147** (2015), 44–68.
- (88) *Sets Characterized by Missing Sums and Differences in Dilating Polytopes* (with Thao Do, Archit Kulkarni, David Moon, Jake Wellens and James Wilcox), *Journal of Number Theory* **157** (2015), 123–153.
- (89) *Newman's Conjecture in Function Fields* (with Alan Chang, David Mehrle, Tomer Reiter, Joseph Stahl and Dylan Yott), *Journal of Number Theory* **157** (2015), 154–169.
- (90) *Distribution of eigenvalues of weighted, structured matrix ensembles* (with Olivia Beckwith, Victor Luo, Karen Shen and Nicholas Triantafillou), *Integers: Electronic Journal Of Combinatorial Number Theory* **15** (2015), paper A21, 28 pages.
- (91) *Equipartitions and a distribution for numbers: A statistical model for Benford's law* (with Joe Iafrate and Frederick Strauch), *Physical Review E* **91** (2015), no. 6, 062138 (6 pages).
- (92) *Leading Digit Laws on Linear Lie Groups* (with Corey Manack), *Research in Number Theory* (2015) 1:22, DOI 10.1007/s40993-015-0024-4.
- (93) *Gaussian Distribution of the Number of Summands in Generalized Zeckendorf Decompositions in Small Intervals*, joint with Andrew Best, Patrick Dynes, Xixi Edelsbrunner, Brian McDonald, Kimsy Tor, Caroline Turnage-Butterbaugh and Madeleine Weinstein, *Integers* **16** (2016), #A6.
- (94) *Maass waveforms and low-lying zeros* (with Levent Alpoge, Nadine Amersi, Geoffrey Iyer, Oleg Lazarev and Liyang Zhang), in “Analytic Number Theory: In honor of Helmut Maier's 60th birthday” (Carl Pomerance, Michael Th. Rassias, editors), Springer-Verlag, 2015.
- (95) *Determining Optimal Test Functions for Bounding the Average Rank in Families of  $L$ -Functions* (with Jesse Freeman), in *SCHOLAR – a Scientific Celebration Highlighting Open Lines of Arithmetic Research*, Conference in Honour of M. Ram Murty's Mathematical Legacy on his 60th

- Birthday (A. C. Cojocaru, C. David and F. Pappardi, editors), Contemporary Mathematics **655**, AMS and CRM, 2015.
- (96) *Lower-Order Biases in Elliptic Curve Fourier Coefficients in Families* (with B. Mackall, C. Rapti and K. Winsor), Frobenius Distributions: Lang-Trotter and Sato-Tate Conjectures (David Kohel and Igor Shparlinski, editors), Contemporary Mathematics **663**, AMS, Providence, RI 2016.
- (97) *From Quantum Systems to L-Functions: Pair Correlation Statistics and Beyond* (with Owen Barrett, Frank W. K. Firk and Caroline Turnage-Butterbaugh), in Open Problems in Mathematics (editors John Nash Jr. and Michael Th. Rassias), Springer-Verlag, 2016.
- (98) *The Weibull distribution and Benford's law* (with Victoria Cuff and Allie Lewis), *Involve, a Journal of Mathematics* 8-5 (2015), 859–874. DOI 10.2140/involve.2015.8.859.
- (99) *Some Results in the Theory of Low-lying Zeros* (with Blake Mackall, Christina Rapti, Caroline Turnage-Butterbaugh and Karl Winsor, and an appendix with Megumi Asada, Eva Fourakis, Kevin Yang), in Families of Automorphic Forms and the Trace Formula (Werner Müller, Sug Woo Shin and Nicolas Templier, editors), Simons Symposia series, Springer-Verlag, 2016.
- (100) *Multiple Regression Analysis: Understanding the Impact of Offensive and Defensive Contributions to Team Performance* (with Kevin D. Dayaratna), *The Hockey Research Journal*, 2014/2015, 41–43.
- (101) *Individual Gap Measures from Generalized Zeckendorf Decompositions* (with Robert Dorward, Pari Ford, Eva Fourakis, Pamela Harris, Eyvindur Palsson, and Hannah Paugh), to appear in *Uniform Distribution Theory*.
- (102) *A Generalization of Zeckendorf's Theorem via Circumscribed  $m$ -gons* (with Robert Dorward, Pari L. Ford, Eva Fourakis, Pamela E. Harris, Eyvindur A. Palsson and Hannah Paugh), *Involve, a Journal of Mathematics* 10-1 (2017), 125–150.
- (103) *Geometric-Progression-Free Sets over Quadratic Number Fields* (with Andrew Best, Karen Huan, Nathan McNew, Jasmine Powell, Kimsy Tor, Madeleine Weinstein), to appear in the Proceedings of the Royal Society of Edinburgh, Section A: Mathematics.
- (104) *Crescent configurations* (with David Burt, Eli Goldstein, Sarah Manski, Eyvindur Ari Palsson and Hong Suh), *Integers* (electronic journal of combinatorial number theory) **16** (2016), #A38.
- (105) *A Probabilistic Approach to Generalized Zeckendorf Decompositions* (with Iddo Ben-Ari), *SIAM Journal on Discrete Mathematics* **30** (2016), no. 2, 1302–1332.
- (106) *The M&M Game: From Morsels to Modern Mathematics* (with Ivan Badinski, Nathan McCue, Cameron Miller, Kayla Miller and Michael Stone), to appear in *Mathematics Magazine*.
- (107) *Constructing families of moderate-rank elliptic curves over number fields* (with David Mehrle, Tomer Reiter, Joseph Stahl and Dylan Yott), to appear in the *Minnesota Journal of Undergraduate Mathematics*.
- (108) *Legal Decompositions Arising from Non-positive Linear Recurrences* (with Minerva Catral, Pari Ford, Pamela Harris, Steven J. Miller, Dawn Nelson), to appear in the *Fibonacci Quarterly*.
- (109) *Subsets of  $\mathbb{F}_q[x]$  free of 3-term geometric progressions* (with Megumi Asada, Eva Fourakis, Sarah Manski, Gwyneth Moreland and Nathan McNew), to appear in *Finite Fields and their Applications*.
- (110) *On the Asymptotic Behavior of Variance of PLS Decompositions* (with Dawn Nelson, Zhao Pan and Huanzhong Xu), to appear in the Proceedings of the 17th International Fibonacci Conference (in the *Fibonacci Quarterly*).
- (111) *Fringe pairs in generalized MSTD sets* (with Sarah Manski and Hong Suh), to appear in the *International Journal of Number Theory*.
- (112) *A Collection of Central Limit Type results in Generalized Zeckendorf Decompositions* (with Ray Li), submitted to the Proceedings of the 17th International Fibonacci Conference.
- (113) *Problem Session Notes from CANT Conferences* (currently 2009 through 2015, inclusive); distributed to interested parties and posted on the arXiv, 35 pages.

## Books

- (1) *An Invitation to Modern Number Theory* (with Ramin Takloo-Bighash), Princeton University Press, Princeton, NJ, 2006, 503 pages.
- (2) *The Mathematics of Encryption: An Elementary Introduction* (with Midge Cozzens), AMS Mathematical World series **29**, Providence, RI, 2013, 332 pages.
- (3) *Theory and Applications of Benford's Law*, Princeton University Press, 2015, 438 pages.



**Papers under Review**

- (1) *Irrationality measure and lower bounds for  $\pi(x)$*  (with David Burt, Sam Donow, Matthew Schiffman, Ben Weiland), submitted May 2015 to Integers.
- (2) *Benford Behavior of Generalized Zeckendorf Decompositions* (with Andrew Best, Patrick Dynes, Xixi Edelsbrunner, Brian McDonald, Kimsy Tor, Caroline Turnage-Butterbaugh and Madeleine Weinstein), submitted July 2015 to the 2015 CANT Proceedings.
- (3) *Ramsey Theory Problems over the Integers: Avoiding Generalized Progressions* (with Andrew Best, Karen Huan, Nathan Mcnew, Steven J. Miller, Jasmine Powell, Kimsy Tor and Madeleine Weinstein), submitted July 2015 to the 2015 CANT Proceedings.
- (4) *The Emergence of 4-Cycles in Polynomial Maps over the Extended Integers* (with Andrew Best, Patrick Dynes, Jasmine Powell and Benjamin Weiss), submitted August 2016 to the Minnesota Journal of Undergraduate Mathematics.
- (5) *If a prime divides a product...* (with Cesar Silva), submitted October 2015 to the College Mathematics Journal.
- (6) *The M&M Game: From Morsels to Modern Mathematics* (with Ivan Badinski, Christopher Huffaker, Nathan McCue, Cameron N. Miller, Kayla S. Miller and Michael Stone), submitted September 2015 to Mathematics Magazine.
- (7) *One-Level density for holomorphic cusp forms of arbitrary level* (with Owen Barrett, Paula Burkhardt, Robert Dorward and Jon DeWitt), submitted June 2016 to Communications in Number Theory and Physics.
- (8) *Central Limit Theorems for Gaps of Generalized Zeckendorf Decompositions* (with Ray Li), submitted October 2016 to the Fibonacci Quarterly.
- (9) *On Identities of Ruggles, Horadam, Howard, And Young* (with Curtis Cooper, Peter J. C. Moses, Murat Sahin and Thotsaporn Thanatipanonda), submitted to the Proceedings of the 17th International Fibonacci Conference.
- (10) *New Behavior in Legal Decompositions Arising from Non-positive Linear Recurrences* (with Minerva Catral, Pari Ford, Pamela Harris, Steven J. Miller, Dawn Nelson, Zhao Pan and Huanzhong Xu), submitted August to the European Journal of Combinatorics.
- (11) *Irrationality measure and lower bounds for  $\pi(x)$*  (with David Burt, Sam Donow, Matthew Schiffman and Ben Wieland), submitted May 2016 to Integers.
- (12) *New Behavior in Legal Decompositions Arising from Non-positive Linear Recurrences* (with M. Catral, P. Ford, P. Harris, D. Nelson, Z. Pan and H. Xu).
- (13) *Central Limit Theorems for Gaps of Generalized Zeckendorf Decompositions* (with Ray Li), submitted August 2016 to Electronic Journal of Combinatorics.
- (14) *When almost all sets are difference dominated in  $\mathbb{Z}/n\mathbb{Z}$*  (with Anand Hemmady and Adam Lott), submitted August 2016 to Integers.
- (15) *When Sets Can and Cannot Have MSTD Subsets* (with Nathan McNew, Victor Xu and Sean Zhang), submitted August 2016 to Integers.
- (16) *Optimal point sets determining few distinct triangles* (with Alyssa Epstein, Adam Lott and Eyvindur Palsson), submitted September 2016 to Discrete Mathematics.
- (17) *On Summand Minimality of Generalized Zeckendorf Decompositions* (with Katherine Cordwell, Max Hlavacek, Chi Huynh, Carsten Peterson, and Yen Nhi Truong Vu), submitted September 2016 to Annals of Combinatorics.
- (18) *Random Matrix Ensembles with Split Limiting Behavior* (with Paula Burkhardt, Peter Cohen, Jonathan Dewitt, Max Hlavacek, Carsten Sprunger, Yen Nhi Truong Vu, Roger Van Peski, and Kevin Yang, and an appendix joint with Manuel Fernandez and Nicholas Sieger), submitted September 2016 to the Annals of Probability.
- (19) *The Inverse Gamma Distribution and Benford's Law* (with Rebecca F. Durst, Chi Huynh, Adam Lott, Eyvindur A. Palsson, Wouter Touw, and Gert Vriend), submitted September 2016 to Involve.
- (20) *Classification of crescent configurations* (with Rebecca F. Durst, Max Hlavacek, Chi Huynh, Steven J. Miller and Eyvindur A. Palsson), submitted to October 2016 to Integers (electronic journal of combinatorial number theory).
- (21) *Low-lying zeros for L-functions associated to Hilbert modular forms of large level* (with Sheng-Chi Liu), submitted October 2016 to Acta Arithmetica.

**Preprints**

- (1) *Benford's Law and Continuous Dependent Random Variables* (with Thealexa Becker, Taylor C. Corcoran, Alec Greaves-Tunnell, Joseph R. Iafrate, Joy Jing, Jaclyn D. Porfilio, Ryan Ronan, Jirapat Samranvedhya and Frederick W. Strauch).
- (2) *The Ratios Conjecture and Convolving Families of L-functions* (with Minh-Tam Trinh), preprint from SMALL '13.
- (3) *Moment Formulas for Ensembles of Classical Compact Groups* (with Alan Chang, Geoffrey Iyer, Kyle Pratt, Nicholas Triantafillou and Minh-Tam Trinh), preprint from SMALL '13.
- (4) *When Generalized Sumsets are Difference Dominated* (with Virginia Hogan).
- (5) *m-paths and the  $(3x + 1)$  Problem* (with Bruce Adcock, Carlos Dominguez and Sucheta Soundarajan), in preparation.

**Books under contract and development**

- (1) *The Probability Lifesaver* (with students at Williams), Princeton University Press, about to be in press.
- (2) *The Pi Mu Epsilon Centennial Problems* (with Stephan Garcia), American Mathematical Society. First draft done.
- (3) *Capstone course in linear algebra* (with students at Williams), in discussion with the AMS. Goal is to develop much of the theory of linear programming (and possibly random matrix theory) in an accessible way as a capstone course, emphasizing both real world applications and connections with other mathematical material seen in earlier classes. Rough draft done.

## Selected Talks (343 total)

Papers and Talks available online at <http://www.williams.edu/Mathematics/sjmiller/>

### **L-Functions and Random Matrix Theory (47)**

- (1) *From Random Matrix Theory to L-functions*, Tel Aviv University, December 23, 2004; Hebrew University, December 27, 2004; Theoretical Physics Seminar, Brown University, April 12, 2006.
- (2) *Identifying and breaking the symmetry group of zeros of families of L-functions*, Number Theory and Random Matrix Theory Workshop, Canadian Mathematical Society Summer Meeting, Waterloo, Canada, June 1, 2005; Collaborative Number Theory Seminar, CUNY, October 20, 2006; Rutgers University, December 12th, 2006.
- (3) *From Random Matrix Theory to Number Theory*, Graduate Workshop on Zeta Functions, L-Functions and their Applications, Utah Valley University, June 2, 2009. Williams College SMALL Program, July 16, 2014.
- (4) *Random Matrix Theory and Number Theory: Progress report from the 2009 SMALL REU at Williams College* (presented by my students John Goes, Steven Jackson, David Montague, Eve Ninsuwan, Ryan Peckner and Vincent Pham), Williams College, August 11, 2009.
- (5) *Low Lying Zeros of Number Field L-Functions* (presented by Ryan Peckner), Young Mathematicians Conference, Ohio State, August 29, 2009.
- (6) *The n-level density of zeros of quadratic Dirichlet L-functions* (presented by Jake Levinson), Young Mathematicians Conference, August 19, 2011; AMS Session on Number Theory, Field Theory, and Polynomials, Joint Meetings of the AMS / MAA, January 6, 2012.
- (7) *Low-lying zeros of cuspidal Maass forms* (presented by Oleg Lazarev and Liyang Zhang), Young Mathematicians Conference, August 20, 2011; Maine-Quebec Number Theory Conference, University of Maine, October 1, 2011; MAA General Contributed Paper Session: Research in Analysis, Joint Meetings of the AMS / MAA, January 6, 2012.
- (8) *Moment Formulas for Ensembles of Classical Compact Groups* (joint with Geoffrey Iyer), MAA General Contributed Paper Session: Research in Geometry and Linear Algebra, Joint Meetings of the AMS / MAA, January 4, 2012.
- (9) *Low-lying zeros of cuspidal Maass forms* (with Levent Alpoge), Québec-Maine Number Theory Conference, September 29, 2012. MAA General Contributed Paper Session: Research in Number Theory, II (given by Levent Alpoge), Joint Meetings of the AMS-MAA, San Diego, January 9, 2013.
- (10) *Determinantal Expansions in Random Matrix Theory and Number Theory* (with Nicholas Triantafyllou), Québec-Maine Number Theory Conference, September 30, 2012. MAA General Contributed Paper Session: Research in Number Theory, II (given by Nicholas Triantafyllou), Joint Meetings of the AMS-MAA, San Diego, January 9, 2013.
- (11) *Low-lying zeros of  $GL(2)$  L-functions*, University of Michigan, October 22, 2012; AMS Special Session on Arithmetic Statistics, I, San Diego, January 10, 2013.
- (12) *Low-lying zeros of  $GL(2)$  L-functions*, Québec-Vermont Number Theory Seminar, March 21, 2013; Random Seminar, University of Illinois, March 26, 2013.
- (13) *The n-Level Density of Dirichlet L-Functions*, presented by Kyle Pratt and Minh-Tam Trinh, UMass REU Conference, July 29, 2013; Young Mathematicians Conference, August 2013; Maine-Québec Number Theory Conference, October 5, 2013.
- (14) *Problems in the theory of low-lying zeros*, Simons Symposium on Families of Automorphic Forms and the Trace Formula, Puerto Rico, January 27, 2014.
- (15) *Results in the theory of low-lying zeros*, Simons Symposium on Families of Automorphic Forms and the Trace Formula, Puerto Rico, January 28, 2014.
- (16) *From Sato-Tate distributions to low-lying zeros*, Frobenius distributions of curves, CIRM, February 27, 2014; SouthEastern Regional Meeting on Numbers (SERMON XXVII), Wofford College, April 26, 2014 (Plenary Speaker).
- (17) *Large gaps between zeros of  $GL(2)$  L-functions*, (Owen Barrett, Brian McDonald, Patrick Ryan, Karl Winsor), Yale REU Conference, July 25, 2014. Conférence de Théorie des Nombres Québec-Maine, Université Laval, Québec, 28 Septembre 2014.
- (18) *Results on  $GL(2)$  L-Functions: Biases in Coefficients and Gaps Between Zeros*, Workshop on Families of Automorphic Forms and the Trace Formula, Banff International Research Station, Calgary, Canada, December 1, 2014.
- (19) *Gaps between zeros of  $GL(2)$  L-functions* (joint with Owen Barrett, Brian McDonald, Patrick Ryan, Caroline L. Turnage-Butterbaugh), AMS Session on Number Theory, II, Joint Mathematical

- Meetings, San Antonio, January 12, 2014; 29th Automorphic Forms Workshop, University of Michigan, March 2, 2015.
- (20) *On the vanishing of  $L$ -functions at the central point through the method of Fredholm determinants* (given by Jesse Freeman), MAA General Contributed Paper Session on Research in Analysis, Joint Mathematical Meetings, San Antonio, January 13, 2014.
  - (21) *Low-Lying Zeros of Families of  $L$ -Functions* (given by Blaine Talbut and Gwyneth Moreland), Young Mathematicians Conference, Ohio State, August 22, 2015.
  - (22) *A Twisted Second Moment for Automorphic  $L$ -Functions* (given by David Burt and Blaine Talbut), Young Mathematicians Conference, Ohio State, August 22, 2015.
  - (23) *One-Level Density for Cusp Forms of Arbitrary Level* (given by Jonathan DeWitt), Young Mathematicians Conference, Ohio State, August 22, 2015.
  - (24) *Biases in Second Moments of Satake Parameters of  $L$ -Functions* (given by Megumi Asada), Young Mathematicians Conference, Ohio State, August 21, 2015.
  - (25) *Biases in Moments of Satake Parameters and Models for  $L$ -function Zeros* (with Kevin Yang), Maine-Québec Number Theory Conference, October 3, 2015.
  - (26) *Large Gaps Between Zeros of  $L$ -Functions Associated to  $GL(2)$  Cusp Forms* (given by David Burt and Blaine Talbut), Maine-Québec Number Theory Conference, October 3, 2015.
  - (27) *Biases in Moments of Satake Parameters and in Zeros near the Central Point in Families of  $L$ -Functions*, Computational Aspects of  $L$ -functions, ICERM, Providence, RI, November 10, 2015.
  - (28) *Gaps Between Zeros of  $GL(2)$   $L$ -functions*, Southern New England Conference on Quadratic Forms and Modular Forms, June 2, 2016.
  - (29) *Extending agreement in the Katz-Sarnak Density Conjecture*, given by Peter Cohen and Carsten Sprunger, Young Mathematicians Conference, Ohio State, August 2016. Joint with Peter Cohen and Roger Van Peski), Québec-Maine Number Theory Conference, October 8, 2016.
  - (30) *The Langlands Program: Beyond Endoscopy*, given by Oscar Gonzalez and Chung Hang Kwan, Young Mathematicians Conference, Ohio State, August 2016.

### **Elliptic Curves and Random Matrix Theory (30)**

- (1) *Random Matrix Theory and elliptic curves: evidence for the underlying group symmetries*, Joint Meeting of the AMS and the UMI, University of Pisa, June 13, 2002; AMS sectional, Salt Lake City, October 27, 2002; Johns Hopkins University, Baltimore, MD, March 3, 2004; Five College Number Theory Seminar, Amherst, MA, April 20, 2004; Boston University, Boston, MA, May 13, 2004.
- (2) *Ranks of one-parameter families of elliptic curves over  $\mathbb{Q}(T)$  and thoughts on the excess rank question*, Boston College, March 10, 2003; AMS Sectional, Boulder, October 4, 2003.
- (3) *Random Matrix Theory models for zeros near the central point (and applications to elliptic curves)*, AMS Sectional, Lawrenceville, NJ, April 2004; Workshop on Spectral Theory and Automorphic Forms, Montréal, Canada, May 8, 2004; Brandeis University, April 1, 2005; Brown University, September 19, 2005; Advances in Number Theory and Random Matrix Theory, Rochester, NY, June 7, 2006.
- (4) *Finite conductor models for zeros of elliptic curves*, workshop on  $L$ -functions, ranks of elliptic curves, and random matrix theory, Banff, July 12, 2007; AMS Special Session on Number Theory, Wesleyan University, Middletown, CT, October 11, 2008. Expanded version (with results towards an average version of Birch and Swinnerton-Dyer and incorporating discretization and lower order terms in the Jacobi ensemble modeling): University of Rochester, October 13, 2009; Five College Number Theory Seminar, Amherst, November 2, 2009; Williams College, February 26, 2010; Maine-Quebec Number Theory Conference, University of Maine, October 1, 2011; Algebra Seminar, Brown University, October 24, 2011; Number Theory Seminar, Yale University, April 15, 2014.
- (5) *Towards an “Average” Version of the Birch and Swinnerton-Dyer Conjecture* (presented by John Goes), Young Mathematicians Conference, Ohio State, August 29, 2009.
- (6) *Closed-form moments in elliptic curve families and low-lying zeros*, Simons Symposium on Families of Automorphic Forms and the Trace Formula, Puerto Rico, January 31, 2014.
- (7) *From the Manhattan Project to Elliptic Curves*, Number Theory Seminar, The Ohio State University, March 24, 2014; Number Theory Seminar, Duke University, September 7, 2016.
- (8) *Lower-order biases in elliptic curve Fourier coefficients* (presented by Blake Mackall and Karl Winsor), Conférence de Théorie des Nombres Québec-Maine, Université Laval, Québec, 27 Septembre 2014.
- (9) *A Family of Rank 6 Elliptic Curves over Number Fields* (joint David Mehrle, Tomer Reiter, Joseph Stahl and Dylan Yott), AMS-MAA-SIAM Special Session on Research in Mathematics by

- Undergraduates and students in Post-Bac Programs, Joint Mathematical Meetings, San Antonio, January 10, 2014.
- (10) *Lower-order biases in elliptic curve Fourier coefficients* (joint with Blake Mackall, Christina Rapti and Karl Winsor), MAA General Contributed Paper Session on Research in Number Theory, II, Joint Mathematical Meetings, San Antonio, January 13, 2014.
  - (11) *Generalizing repulsion of elliptic curve zeros near the central point to other  $GL(2)$  forms* (with Owen Barrett), 29th Automorphic Forms Workshop, University of Michigan, March 2, 2015.
  - (12) *Biases in the second moments of Fourier coefficients in one-parameter families of elliptic curves* (with Blake Mackall and Karl Winsor), 29th Automorphic Forms Workshop, University of Michigan, March 3, 2015.
  - (13) *Finite conductor models for zeros near the central point of elliptic curve  $L$ -functions and Biases in the Second Moments*, Number Theory and Algebraic Geometry Seminar, Boston College, May 1, 2015.
  - (14) *Biases in Moments of Elliptic Curve*, 30th Automorphic Forms Workshop, Wake Forest University, March 8, 2016.

### ***L*-Function Ratios Conjecture (7)**

- (1) *A symplectic test of the  $L$ -functions Ratios Conjecture*, Algebra Seminar, Brown University, September 17, 2007; AMS Special Session on  $L$ -functions and automorphic forms, Courant, NYC, March 16, 2008; Johns Hopkins University, Baltimore, MD, April 4, 2008; Cornell University, June 5, 2008.
- (2) *Tests of the  $L$ -Functions Ratios Conjecture*, Maine - Québec Number Theory Conference, October 3, 2009; Rutgers University, March 2, 2010.
- (3) *Surpassing the Ratios Conjecture in the 1-level density of Dirichlet  $L$ -functions* (given by Daniel Fiorilli), AMS Session on Elliptic Curves,  $L$ -Functions, and Number Fields, Joint Meetings of the AMS-MAA, San Diego, January 11, 2013.

### **Newman's Conjecture (6)**

- (1) *Newman's Conjecture for Automorphic and Function Field  $L$ -functions*, presented by Alan Chang, Young Mathematicians Conference, August 2013; Maine-Québec Number Theory Conference, October 5, 2013; Joint Meetings of the AMS / MAA, MAA General Contributed Paper Session on Research in Number Theory, II, January 17, 2014; CANT 2014, May 28, 2014. AMS-MAA-SIAM Special Session on Research in Mathematics by Undergraduates and students in Post-Bac Programs, Joint Mathematical Meetings, San Antonio, January 10, 2014.
- (2) *Newman's conjecture for function field  $L$ -functions* (presented by David Mehrle and Joseph Stahl), Conférence de Théorie des Nombres Québec-Maine, Université Laval, Québec, 28 Septembre 2014.

### **Benford's Law (33)**

- (1) *Benford's Law, values of  $L$ -functions and the  $3x + 1$  problem*, Boston College, October 19, 2004; University of Michigan, November 15, 2004; University of Arizona, January 11, 2006; Brown University, March 20, 2006; Boston University, April 9, 2007 (a variant was given at PROMYS at Boston University on July 16, 2007); Special Session on Number Theory, AMS Sectional Meeting, Worcester, MA, April 25, 2009. Another variant, *Benford's Law: Why the IRS might care about the  $3x + 1$  problem and  $\zeta(s)$* , was given at Western New England College (2/11/08), Smith College (10/7/08), Williams College (10/21/08) and Central Connecticut State University (9/25/2009), as well as a more number theoretic variant at the Five Colleges Number Theory Seminar at Amherst (1/31/12). A new variant (*Benford's Law: Why the IRS cares about number theory*) was given at Bentley University (2/1/10), Brown University (11/12/12).
- (2) *Benford's Law and order statistics*, Brown University, February 1, 2006.
- (3) *The Modulo 1 Central Limit Theorem*, Analysis Seminar, Brown University, September 27, 2006; The Ohio State University, January 23, 2007.
- (4) *Poisson Summation and Benford's Law: From values of  $L$ -functions to the  $3x+1$  Problem to products of random variables*, Bristol University, December 12, 2007; Workshop on Applications of Benford's Law, Sante Fe, NM, December 18, 2007.
- (5) *The logarithmic link between economic, hydrologic, and seismic statistics* (with Mark Nigrini), Workshop on Applications of Benford's Law, Sante Fe, NM, December 17, 2007.
- (6) *Chains of distributions and Benford's Law* (with Dennis Jang, Jung Uk Kang, Alex Kruckman and Jun Kudo), Workshop on Applications of Benford's Law, Sante Fe, NM, December 17, 2007.

- (7) *Theory and Applications of Benford's Law, or: Why the IRS should care about number theory!*, IRS, Boston office, March 28, 2008 (with Mark Nigrini); Williams College: SMALL Summer Colloquium, June 23, 2010; Hampshire College, July 14, 2011; Mount Holyoke College, February 1, 2012.
- (8) *Theory and Applications of Benford's Law: Analysis of election and climate data and the Weibull distribution* (Victoria Cuff and Allie Lewis, presenters), SMALL progress report, August 3, 2010, and Shenandoah Undergraduate Mathematics and Statistics Conference, October 23, 2010 (Allie Lewis, presenter).
- (9) *Benford's law and dependent random variables* (presented by Thealexa Becker), WiMiN Conference, September 24, 2011; MAA General Contributed Paper Session: Research in Analysis Joint Meetings of the AMS / MAA, January 5, 2012.
- (10) *Benford's Law, Values of L-Functions and the  $3x + 1$  Problem, or: Why the IRS cares about Number and Ergodic Theory*, Ergodic Theory Seminar, University of Illinois, March 26, 2013.
- (11) *Benford Behavior of Dependent Random Variables*, presented by Taylor C Corcoran and Jaclyn D Porfilio, Young Mathematicians Conference, August 2013.
- (12) *Benford's Law: Why the IRS cares about Algebra and Number Theory (and why you should too!)*, SMALL Faculty Seminar, July 22, 2015; SACNAS, Washington, DC, October 2015; PME Induction Ceremony, Holy Cross, April 20, 2016; Duke University, September 7, 2016.
- (13) *Can math detect fraud? CSI: Math: The natural behavior of numbers*, Science Cafe, Northampton (Mt Holyoke), September 26, 2016.

### Eigenvalue Statistics (20)

- (1) *Eigenvalue statistics for ensembles of random matrices: Toeplitz ensembles and Diophantine obstructions*, Probability and Ergodic Theory Seminar, Ohio State, October 30, 2003; Boston University, June 7, 2004; Brown University, September 15, 2004.
- (2) *Random matrix theory and real symmetric palindromic Toeplitz matrices*, Brown University, March 21, 2007.
- (3) *On the probability that random graphs are Ramanujan*, Expanders and Ramanujan Graphs: Construction and Applications, AMS National Meeting, San Diego, January 9, 2008.
- (4) *Eigenvalue Statistics of Toeplitz and Block  $m$ -Circulant Ensembles* (Gene Kopp and Murat Koloğlu, presenters), SMALL progress report, August 4, 2010. Expanded Version: Young Mathematicians Conference, Ohio State, August 28, 2010. Updated Version: AMS Special Session on Undergraduate Research (joint with Murat Koloğlu), Holy Cross, April 9, 2011.
- (5) *Eigenvalue statistics for Toeplitz ensembles*, ICM Satellite Meeting in Probability & Stochastic Processes, Bangalore, India, August, 2010.
- (6) *Eigenvalue statistics for Toeplitz and circulant ensembles*, AMS Special Session on Random Processes, Holy Cross, MA, April 9, 2011.
- (7) *Painlevé VI and Tracy-Widom Distributions in Random Graphs, Random Matrix Theory and Number Theory*, AMS Special Session on Random Processes, Worcester, MA, 4/9/11.
- (8) *Distributions of Eigenvalues of Weighted, Structured Matrix Ensembles* (presented by Olivia Beckwith and Karen Shen), Young Mathematicians Conference, August 19, 2011; MAA General Contributed Paper Session: Research in Geometry and Linear Algebra, Joint Meeting of the AMS / MAA, January 4, 2012.
- (9) *Distributions of Eigenvalues of Real Symmetric Period  $m$ -Circulant Matrices*, IMS Asia Pacific Rim Meetings, July 2011. (Postponed to 2012 due to Tsunami)
- (10) *On the Limiting Distribution of Eigenvalues of Large Random  $d$ -Regular Graphs with Weighted Edges* (presented by Michael Cap Khoury), MAA General Contributed Paper Session: Research in Graph Theory and Combinatorics, Joint Meetings of the AMS / MAA, January 7, 2012.
- (11) *Eigenvalue Statistics for Toeplitz and Circulant Ensembles*, Analysis and Probability Seminar, UConn, March 2, 2012. Expanded version July 3, 2012 (with Gene Kopp, Murat Kologlu and Karen Shen) at the second Institute of Mathematical Sciences Asia Pacific Rim Meeting, Tsukuba, Japan.
- (12) *Toward Combinatorial Proofs of the Sato-Tate Law and The Weil Bound For Kloosterman Sums* (joint with Xixi Edelsbrunner, Stephan Garcia, Kimsy Tor and Karl Winsor), MAA General Contributed Paper Session on Research in Number Theory, III, Joint Mathematical Meetings, San Antonio, January 13, 2014.
- (13) *Deviations from large eigenvalues of a special matrix ensemble*, given by Carsten Sprunger and Peter Cohen, Young Mathematicians Conference, Ohio State, August 2016.

### Zeckendorf Decompositions (55)

- (1) *From Fibonacci Numbers to Central Limit Type Theorems* (Yinghui Wang, presenter), SMALL progress report, August 4, 2010. Expanded version: Young Mathematicians Conference, Ohio State, August 28, 2010. Further expanded: Williams College Seminar, October 1, 2010.
- (2) *Cookie Monster Meets the Fibonacci Numbers. Mmmmmm – Theorems!*, Workshop on Combinatorial and Additive Number Theory (CANT 2010), CUNY Graduate Center, New York, May 29, 2010; Hampshire College Summer Program (expanded version), July 15, 2010; Smith College, January 28, 2011; Pi Mu Epsilon Induction Ceremony, College of the Holy Cross, May 5, 2011; Amherst College, September 21, 2011; Mount Holyoke College, October 5, 2011; Brown University, October 24, 2011; Algebra Seminar, University of Connecticut, February 7, 2012; Colby College, March 28, 2012; Summer Science Program, Williams College, June 19, 2012; Williams College (9/14/12); Middlebury College (9/28/12); Wesleyan College (10/19/12); Brown University (11/12/12); Yale University (4/14/14).
- (3) *Cookie Monster Meets the Fibonacci Numbers, II. Mmmmmm – Theorems*, Workshop on Combinatorial and Additive Number Theory (CANT 2011), May 2011.
- (4) *Gaps between summands in generalized Zeckendorf decompositions* (presented by Olivia Beckwith), Young Mathematicians Conference, August 19, 2011; MAA General Contributed Paper Session: Research in Number Theory, Joint Meetings of the AMS / MAA, January 6, 2012.
- (5) *Cookie Monster Meets the Fibonacci Numbers. Mmmmmm – Theorems*, SUMS Conference, Brown University, March 10, 2012 (presented by Louis Gaudet).
- (6) *Distribution of Summands in Generalized Zeckendorf Decompositions* (joint with Yinghui Wang), Special Session on Difference Equations and Applications, AMS Special Session, George Washington University, March 17, 2012.
- (7) *To Infinity and Beyond: Gaps Between Summands in Zeckendorf Decompositions*, May 2012 at CANT 2012.
- (8) *Distribution of Summands in Generalized Zeckendorf Decompositions*, Special Session on Additive and Combinatorial Number Theory, AMS Sectional, Akron, Ohio, October 21, 2012; AMS Session on Number Theory, I, Joint Meetings of the AMS/MAA, San Diego, January 9, 2013. MAA General Contributed Paper Session: Research in Number Theory, I (given by Amanda Bower and Rachel Insoft), Joint Meetings of the AMS-MAA, San Diego, January 9, 2013.
- (9) *Mind the Gap: Distribution of Gaps in Generalized Zeckendorf Decompositions*, CANT, May 21, 2013; Williams College, September 13, 2013; Maine-Québec Number Theory Conference, October 5, 2013; AMS Special Session on Difference Equations, Temple, October 12, 2013; 16<sup>th</sup> International Conference on Fibonacci Numbers and their Applications, Rochester, NY, July 25, 2014.
- (10) *A Generalization of Fibonacci Far-Difference Representations and Gaussian Behavior*, presented by Philippe Demontigny and Thao T Do, UMass REU Conference, July 29, 2013; Young Mathematicians Conference, August 2013; AMS Special Session on Difference Equations, Temple, October 12, 2013, Joint Meetings of the AMS / MAA, MAA General Contributed Paper Session on Research in Number Theory, II, January 17, 2014.
- (11) *Zeckendorf's Theorem and  $f$ -decompositions* (presented by Umang Varma), Joint Meetings of the AMS / MAA, MAA General Contributed Paper Session on Research in Number Theory, II, January 17, 2014.
- (12) *Distribution of Summands in Generalized Zeckendorf Decompositions*, presented by Umang Varma and Archit Kulkarni, Young Mathematicians Conference, August 2013; AMS Special Session on Difference Equations, Temple, October 12, 2013.
- (13) *Generalizing Zeckendorf's Theorem: The Kentucky Sequence* (given by Pamela Harris), Special Session on Difference Equations and Applications, AMS Fall Sectional, Greensboro, NC, November 8, 2014.
- (14) *Zeckendorf Expansions from Kentucky Decompositions to Fibonacci Quilts* (with Minnie Catral, Pari Ford, Pamela Harris, Dawn Nelson) July 11, 2014. *From Fibonacci Quilts to Benford's Law through Zeckendorf Decompositions*, AMS Special Session on Difference Equations & Applications, Joint Meetings of the AMS/MAA, San Antonio, January 10, 2015. Special Session on Difference Equations and Applications, AMS Fall Sectional, Greensboro, NC, November 8, 2014.
- (15) *Benfordness of Zeckendorf Decompositions* (joint with Andrew Best, Patrick Dynes, Xixi Edelsbrunner, Brian McDonald, Kimsy Tor, Caroline Turnage-Butterbaugh and Madeleine Weinstein), 16th International Conference on Fibonacci Numbers and Their Applications, July 25, 2014. Special Session on Difference Equations and Applications, AMS Fall Sectional, Greensboro, NC, November 8, 2014.

- (16) *Cookie Monster meets the Fibonacci Numbers — Mmmm, Theorems!* (Andrew Best, Patrick Dynes, Xixi Edelsbunner, Brian McDonald, Kimsy Tor and Madeleine Weinstein), 16th International Conference on Fibonacci Numbers and Their Applications, July 25, 2014.
- (17) *From Fibonacci Quilts to Benford's Law through Zeckendorf Decompositions*, AMS Special Session on Difference Equations & Applications, Joint Meetings of the AMS/MAA, San Antonio, January 10, 2015.
- (18) *Benfordness of Zeckendorf Decompositions* (joint with Andrew Best, Patrick Dynes, Xixi Edelsbunner, Brian McDonald, Kimsy Tor, Caroline Turnage-Butterbaugh and Madeleine Weinstein), MAA General Contributed Paper Session on Research in Number Theory, III, Joint Mathematical Meetings, San Antonio, January 13, 2014.
- (19) *From the Kentucky Sequence to Benford's Law through Zeckendorf Decompositions*, AMS Special Session on Difference Equations, March 7, 2015.
- (20) *The Fibonacci Quilt Sequence* (presented by Pari Ford), AMS Special Session on Difference Equations, March 7, 2015. *The Fibonacci Quilt Sequence: A Generalization of Zeckendorf Decompositions with Non-Uniqueness* (presented by Dawn Nelson, joint with M. Catral, P. Ford and P. Harris), AMS Session on Number Theory II, Joint Mathematical Meetings, Seattle, January 7, 2016.
- (21) *Convergence rates in generalized Zeckendorf decomposition problems* (with Ray Li, Zhao Pan and Huanzhong Xu), CANT May 26, 2016.
- (22) *Convergence rates in generalized Zeckendorf decomposition problems* (with Zhao Pan and Huanzhong Xu), 17<sup>th</sup> International Fibonacci Conference, June 28, 2016.
- (23) *A Collection of Central Limit Type Theorems in Generalized Zeckendorf Decompositions*, given by Ray Li, Young Mathematicians Conference, Ohio State, August 2016.
- (24) *On Summand Minimality of Generalized Zeckendorf Decompositions*, given by Katherine Cordwell and Magda Hlavacek, Young Mathematicians Conference, Ohio State, August 2016.

### More Sum Than Difference Sets (30)

- (1) *When almost all sets are difference dominated*, Analysis Seminar, Brown University, September 12, 2007; Williams College, September 12, 2008; Wesleyan University, November 20, 2008; Workshop on Combinatorial and Additive Number Theory (CANT 2009), CUNY Graduate Center, New York, May 2009.
- (2) *Explicit constructions of infinite families of MSTD sets* (presented by Dan Scheinerman), Number Theory Session, Joint Mathematics Meetings, January 5, 2009.
- (3) *Explicit Constructions of Generalized MSTD Sets* (joint with Sean Pegado and Sidney Luc Robinson), Workshop on Combinatorial and Additive Number Theory (CANT 2011), May 2011.
- (4) *Constructing Generalized Sum-Dominant Sets* (presented by Geoff Iyer and Liyang Zhang), Young Mathematicians Conference, August 19, 2011; Maine-Quebec Number Theory Conference, University of Maine, October 1, 2011; MAA General Contributed Paper Session: Research in Number Theory, Joint Meetings of the AMS / MAA, January 6, 2012; CANT 2012 (May 24).
- (5) *Constructing generalized sum-dominant sets* (with Geoff Iyer and Liyang Zhang), May 24, 2012 at CANT 2012.
- (6) *The Distribution of the Number of Missing Sums in Sumsets* (presented by Oleg Lazarev), Young Mathematicians Conference, August 21, 2011; MAA General Contributed Paper Session: Research in Number Theory, Joint Meetings of the AMS / MAA, January 6, 2012; CANT 2012 (May 23).
- (7) *Most Sets are Balanced in Finite Groups* (presented by Kevin Vissuet), Special Session on Additive and Combinatorial Number Theory, AMS Sectional, Akron, Ohio, October 21, 2012. MAA General Contributed Paper Session: Research in Number Theory, I (given by Kevin Vissuet), Joint Meetings of the AMS-MAA, San Diego, January 9, 2013.
- (8) *Distribution of the Longest Gap in Positive Linear Recurrence Sequences* (given by Shiyu Li and Philip Tosteson), MAA General Contributed Paper Session: Research in Number Theory, I, Joint Meetings of the AMS-MAA, San Diego, January 9, 2013. AMS Special Session on Difference Equations, March 29, 2014 (given by Phil Tosteson with the title Coin Flips, Fibonacci Numbers and Gaps!).
- (9) *When Almost All Generalized Sumsets Are Difference-Dominated* (given by Ginny Hogan), MAA General Contributed Paper Session: Research in Number Theory, I, Joint Meetings of the AMS-MAA, San Diego, January 9, 2013; CANT, May 2013.



- (10) *Coordinate sum and difference sets of  $d$ -dimensional modular hyperbolas* (given by Amanda Bower and Victor Luo), AMS Session on Undergraduate Research in Combinatorics and Number Theory, Joint Meetings of the AMS-MAA, San Diego, January 12; CANT, May 2013.
- (11) *When Almost All Sets Are Difference Dominated*, Number Theory Seminar, University of Illinois, March 25, 2013.
- (12) *Sums and Differences of Correlated Random Sets*, presented by Thao Do and Jake Wellens, Young Mathematicians Conference, August 2013; Garden State Undergraduate Mathematics Conference (presented by Thao Do), April 5, 2014.
- (13) *More Sums Than Differences Sets in  $d$  Dimensions*, presented by David Moon and Archit Kulkarni, Young Mathematicians Conference, August 2013.
- (14) *MSTD Subsets and Properties of Divots in the Distribution of Missing Sums* (with Victor Xu and Xiaorong Zhang), CANT May 26, 2016.
- (15) *When almost all sets are difference dominated in  $\mathbb{Z}/n\mathbb{Z}$*  (given by Adam Lott), Integers Conference, University of West Georgia, October 7, 2016.
- (16) *A geometric perspective on the MSTD question* (given by Carsten Peterson), Integers Conference, University of West Georgia, October 7, 2016.

### Ramsey Theory (5)

- (1) *Complex Ramsey Theory* (Andrew Best, Karen Huan, Jasmine Powell, Kimsy Tor, Madeleine Weinstein), Yale REU Conference, July 25, 2014.
- (2) *Ramsey Theory Over Imaginary Quadratic Number Fields* (joint with Andrew Best, Karen Huan, Nathan McNew, Jasmine Powell, Kimsy Tor and Madeleine Weinstein), MAA General Contributed Paper Session on Research in Number Theory, III, Joint Mathematical Meetings, San Antonio, January 13, 2014.
- (3) *A Ramsey Theoretic Approach to Function Fields and Quaternions* (given by Megumi Asada and Sarah Manski), UConn, July 28, 2015.
- (4) *Quaternionic Ramsey Theory* (given by Sarah Manski and Gwyneth Moreland), Young Mathematicians Conference, Ohio State, August 22, 2015.
- (5) *A Ramsey Theoretic Approach to Finite Fields and Quaternions* (given by Sarah Manski), Maine-Québec Number Theory Conference, October 3, 2015.

### Continued Fractions (3)

- (1) *Continued Fraction Digit Averages and Maclaurin's Inequalities*, CANT (Combinatorial and Additive Number Theory) Conference, May 28, 2014. Conférence de Théorie des Nombres Québec-Maine, Université Laval, Québec, 28 Septembre 2014. AMS Special Session on Continued Fractions, San Antonio, January 12, 2015.

### Miscellaneous Number Theory and Harmonic Analysis (9)

- (1) *The Circle Method and Class Groups of Quadratic Fields* (Carlos Dominguez, presenter), SMALL progress report, August 4, 2010. Expanded Version: Young Mathematicians Conference, Ohio State, August 27, 2010.
- (2) *The Distribution of Generalized Ramanujan Primes* (presented by Nadine Amersi and Ryan Ronan), Young Mathematicians Conference, August 20, 2011; MAA General Contributed Paper Session: Research in Number Theory, Joint Meetings of the AMS / MAA, January 6, 2012; CANT 2012 (May 23).
- (3) *On a Variant of the Lang-Trotter Conjecture Involving Binomial Elliptic Curve Coefficients* (joint with Patrick J Dynes, Brian McDonald and Christina Rapti), MAA General Contributed Paper Session on Research in Number Theory, II, Joint Mathematical Meetings, San Antonio, January 13, 2014.
- (4) *The Emergence of 4-cycles Over Extended Integers* (joint with Jasmine Powell, Andrew Best, Patrick Dynes and Benjamin Weiss), MAA General Contributed Paper Session on Research in Number Theory, III, Joint Mathematical Meetings, San Antonio, January 13, 2014.
- (5) *Optimal point sets determining few distinct triangles*, given by Alyssa Epstein and Adam Lott, Williams College REU Conference, July 29, 2016.
- (6) *Sharpness Of Falconer's Incidence Theorem In Higher Dimensions* (given by Eli Goldstein and Jonathan DeWitt), Young Mathematicians Conference, Ohio State, August 21, 2015.
- (7) *Near-perfect, within-perfect, and order- $a$ -abundant numbers*, given by Adam Lott Chung and Hang Kwan, Young Mathematicians Conference, Ohio State, August 2016.
- (8) *Classification of All Crescent Configurations on Four and Five Points*, given by Rebecca Durst and Magda Hlavacek, Young Mathematicians Conference, Ohio State, August 2016.

- (9) *Classification of Crescent Configurations on Four and Five Points* (given by Chi Huynh), University of West Georgia, October 8, 2016.

### Sabermetrics (19)

- (1) *The Pythagorean Won-Loss Formula in baseball* (title changed to *Pythagoras at the Bat: an introduction to mathematical modeling* in later versions), Brown University, September 28, 2005; Hudson River Undergraduate Mathematics Conference, April 8, 2006; SABRBoston Sabermetrics Regional Meeting, May 20, 2006; Williams College, January 15, 2008; Holy Cross, February 7, 2008; Western New England College, February 12, 2008; Connecticut Smoky Joe Wood SABR Chapter, Hamden, CT, February 16, 2008; PROMYS, Boston University, July 25, 2008; Bennington College, February 27, 2009; Hampshire College, July 22, 2009; Awards Night at the University of Connecticut, April 12, 2010; Virginia Tech, March 28, 2011; UMass Amherst, October 19, 2011 (with Cameron Miller); Fitchberg State University, November 3, 2011; Boston College, March 29, 2012. Science Days for Prospective Williams Students, August 15, 2015 and August 12, 2016. University of Vermont, December 2, 2016.
- (2) *Pythagoras on the Ice*, Babson Hockey Analytics Conference, Babson, October 1, 2016.

### Colloquium / General Talks (mostly Random Matrix Theory and Number Theory) (38)

- (1) *Random Matrices, Random Graphs, and L-Functions*, University of Cincinnati, October 16, 2003; Brown University, October 6, 2006; Yale University, November 14, 2006.
- (2) *From nuclear physics to number theory: How the Manhattan project helped us understand primes*, Symposium for Undergraduates in Mathematical Sciences, Brown University, February 12, 2005; Colby College, March 8, 2005; University of Connecticut, March 22, 2005; Bronfman Science Lunch, Williams College, June 23, 2009; Wellesley College, February 2, 2010.
- (3) *Heuristics and Ballpark Estimates: From the  $3x + 1$  problem to counting primes and birthdays*, PROMYS (Boston University), July 28, 2009.
- (4) *Pythagoras at the bat: An introduction to statistics and mathematical modeling*, Wellesley College, September 21, 2009; Boston College invited undergraduate lecture, Spring 2012.
- (5) *The Riemann Hypothesis at 150: From Primes to Nuclei and Many Things Between*, Williams College, Colloquium in honor of 150 years of RH, November 18, 2009.
- (6) *Title: How low can we go? Lower order terms in CLTs from Benford's Law to Elliptic Curves*, NES MAA Fall 2009 Meeting, November 21, 2009.
- (7) *Great Expectations, or: Expect More, Work Less*, Wellesley College, February 3, 2010.
- (8) *From the Manhattan Project to Elliptic Curves*, Smith College, January 28, 2011.
- (9) *From Cookie Monster to the IRS: Some Fruitful Interactions between Probability, Combinatorics and Number Theory*, UNC Charlotte, 2/1/2011.
- (10) *Biases: From Benford's Law to Additive Number Theory via the IRS and Physics*, SMALL Summer REU, Williams College, June 22, 2011.
- (11) *Number Theory and Random Matrix Theory Progress Report* (joint with Nadine Amersi, Thealexa Becker, Olivia Beckwith, Geoffrey Iyer, Oleg Lazarev, Karen Shen, Alec Greaves-Tunnell, Ryan Ronan, Liyang Zhang). SMALL End of Summer Progress Report, Williams College, August 2, 2011.
- (12) *Virus dynamics on star graphs* (presented by Thealexa Becker), WiMiN Conference, September 24, 2010; MAA General Contributed Paper Session: Research in Graph Theory and Combinatorics, Joint Meetings of the AMS / MAA, January 7, 2012; AMS Special Session on Difference Equations, March 29, 2014.
- (13) *From the Manhattan Project to Elliptic Curves*, Dartmouth College, January 28, 2013; UMass Boston, February 4, 2014; Washington State University, October 12, 2015.
- (14) *Number Theory and Probability, SMALL '13 Projects*, Williams College, June 19, 2013.
- (15) *Probability and Number Theory*, end of summer presentation by my 12 SMALL REU students, Williams College, July 30, 2013.
- (16) *Lunch & Learn: LEGO Play with Children*, Williams College Children's Center, February 21, 2014.
- (17) *The Latke-Hamantaschen Debate: The Primacy of Three*, Williams College, March 19, 2014.
- (18) *Fractals: From Khan to Frozen*, Williams College, March 20, 2014 (supplemental lecture for multivariable calculus), March 20, 2014.
- (19) *Some Results on Low-Lying Zeros of L-Functions*, SMALL Colloquium, Williams College, July 17, 2014.
- (20) *He's just going through a phase: Miller's SMALL students and Phase Transitions*, Math/Stats Colloquium, Williams College, October 10, 2014.

- (21) *From Fibonacci Quilts to Benford's Law through Zeckendorf Decompositions*, Williams College, Science Talk, November 11, 2014.
- (22) *Why the IRS cares about the Riemann Zeta Function and Number Theory (and why you should too!)*, Williams College 2015 Faculty Lecture Series, February 12, 2015. Carnegie Mellon, March 25, 2015. Winona State University, March 30, 2015.
- (23) *Extending Pythagoras*, Colloquium, Williams College, April 8th, 2015. Williams Summer Science Talk, Williams College, June 30, 2015. Hampshire College Summer Studies in Mathematics, July 28, 2015; August 3, 2016.
- (24) *From the Manhattan Project to Elliptic Curves: Introduction to Random Matrix Theory*, SMALL Faculty Talk, Williams College, July 27, 2016.

## Education (25)

- (1) *Computers in undergraduate education and zeros of elliptic curves*, Foundations of Computational Mathematics, Computational Number Theory Workshop, University of Minnesota, August 9, 2002; NSF Workshop on Computation in Algebra, Number Theory and Combinatorics, Washington, D.C., September 21, 2002.
- (2) *Statistical investigations as a tool in undergraduate mathematics research: Poster and workshop sessions*, International Conference on Statistics, Honolulu, June 4, 2003.
- (3) *What Is Mathematics?*, panelist at RUMBUS07, Boston University, November 10, 2007.
- (4) *What Can I Do With A Mathematics Major?*, panelist at the Northeastern Section of the Mathematical Association of America (NES/MAA) Fall 2007 meeting, Framingham State College, November 17, 2007.
- (5) *The Pythagorean Won-Loss Theorem: An introduction to modeling*, Great Activities for an Introductory Statistics Class, AMS National Meeting, San Diego, January 7, 2008.
- (6) Workshop on Mathematicians in Mathematics Education, participant, Institute for Mathematics Education, Tucson, Arizona: March 20 - 22, 2008 and April 25-27, 2010.
- (7) *Mentoring Undergraduate Research*, AMS Special Session on Undergraduate Research, Holy Cross, April 10, 2011.
- (8) *Models for engaging undergraduate students in research* (with Dave Damiano, Dean Evasius, Joe Gallian, Ivelisse Rubio, Jake Levinson and Gina-Maria Pomann), AMS Committee on Education Panel Discussion, Joint Meetings of the AMS / MAA, January 7, 2012.
- (9) *From M&Ms to Mathematics, or, how I learned to answer questions and help my kids love math*, keynote address to the Association of Teachers of Mathematics in Massachusetts, Spring Conference, March 23, 2013. Hampshire College, July 17+, 2013. Maine-Québec Number Theory Conference, October 3, 2015. Math League Summer Program, College of New Jersey, July 25, 2016.
- (10) *Why more is better: the power of multiple proofs*, Session on High School Mathematics, Association of Teachers of Mathematics in Massachusetts, Spring Conference, March 23, 2013. Hampshire College Summer Studies in Mathematics, July 31, 2014.
- (11) *Why Cookies And M&Ms Are Good For You (Mathematically)*, Stuyvesant High School (5/9/14).
- (12) *YouTube University: The Benefits of Recording Lectures*, Blended Learning conference, Bryn Mawr, May 22, 2014. Conference for the 150th Anniversary of the Williams College Phi Beta Kappa Chapter, March 18, 2015.
- (13) *From M&Ms to Mathematics, or, how I learned to answer questions and help my kids love math*, Dr. Philip O. Coakley Middle School, Norwood, MA, June 9, 2014.
- (14) *Using modern technologies to enrich the classroom experience*, All-Faculty NFD Lunch, October 3, 2014.
- (15) *Lessons Learned and Learning from years of Experiential Classes*, presentation to delegation from a Hong Kong liberal arts college, June 3, 2015.
- (16) *Panel Discussion on 'A Lego Brickumentary'*, led discussion on August 8th and 9th, 2015, at Images (Williamstown, MA) after showing the documentary.
- (17) *Careers in Academia*, panelist at the 2015 Field of Dreams Conference, Birmingham, Alabama, November 7, 2015.
- (18) *Building YouTube University Brick by Brick*, AMS-MAA Special Session on Innovative Ideas in Enhancing Success in Mathematics Classes, Joint Meetings of the AMS-MAA, Seattle, January 6, 2015.
- (19) *Balancing responsibilities in academia*, panelist at the 30th Automorphic Forms Workshop, Wake Forest University, March 7, 2016.

- (20) *Success and/or Significance, A musician and mathematician discuss beauty, perfection, and faith in the liberal arts*, Veritas forum, Williams College, April 14, 2016.
- (21) *Springboards to Mathematics: From Zombies to Zeckendorf*, Math League Summer Program, College of New Jersey, July 25, 2016.
- (22) *From the Fibonacci Numbers to Roulette*, Boston Museum of Science, September 14, 2016.

**Programming (2)**

- (1) *Sage Days 21: Progress Report on Statistics in Function Fields*, Sage Days 21, Seattle, Washington, May 27, 2010.
- (2) *An Introduction to Matlab in Mathematics*, IAS Women in Mathematics Conference, May 18, 2011.

**Undergraduate, Graduate and General Talks**

- (1) Undergraduate Math Club Talks (Brown, Ohio State, Princeton and Yale). Topics include Benford's law, the circle method, cryptography, dynamical systems, mathematical riddles, the prime number theorem, probability and statistics, random matrix theory and sabermetrics.
- (2) Graduate Seminars (Brown, Princeton). Topics include the circle method, detecting and proving patterns,  $L$ -functions and automorphic forms, number theory, random matrix theory and sabermetrics.
- (3) General talks (to undergraduates, graduate students and postdocs). Topics include applying for postdocs and tenure track jobs, careers in mathematics, and using props in teaching.

Papers and Talks available online at <http://www.williams.edu/Mathematics/sjmillier/>

## Education Outreach Activities (Representative Sample)

- (1) Maintain math riddles website, consistently in top ten when googling ‘math riddles’: <http://mathriddles.williams.edu/>. This leads to numerous conversations with mathematics educators about using riddles in the classroom. Expanding the site to include material for high school and junior high school teachers and students, receiving over 4000 distinct hits per month.
- (2) Problem editor for Pi Mu Epsilon journal and the American Mathematical Monthly.
- (3) Mentor for the Math Alliance; frequent participant at their Field of Dreams Conferences, where I am often a panelist on careers in academia, and also assist students in applying to Research Experiences for Undergraduate summer programs, and share that information with a network of REU directors.
- (4) Invited participant: VCTAL - the computational thinking modules (designing modules to be used in high school math classes): (1) a cryptography module to be used in high school classrooms (which is currently being field tested); (2) a module on streaming information (first draft 90% completed); (3) a module on randomness (first draft 40% completed).
- (5) Invited participant: Institute for Mathematics & Education: Mathematicians in Mathematics Education Workshop: March 20-22, 2008 and April 25-27, 2010.
- (6) Frequent speaker at Hampshire College, Ross and PROMYS programs for talented high school students in mathematics, 2004 – present. Often bring my students to mentor them in mentoring, having them talk to the younger students about college in general and math in particular.
- (7) Wrote and reviewed exam questions for the American Mathematics Competitions, 2008 – present.
- (8) Lecturer in the Teachers as Scholars program (2011, 2012, 2013, 2014), where I gave continuing education lectures on (1) cryptography and Benford’s law (2011, 2012) and (2) “a-ha” moments in mathematics for the classroom (2013, 2014), with an emphasis on creating modules for high school / junior high school classes.
- (9) Judge of a math competition at the Berkshire Hills Regional School District (2012).
- (10) Visited and gave lectures at Norwood Middle School in Massachusetts (2012).
- (11) Visited and gave lectures at the Brooks School in North Andover, Massachusetts, and was a one-man visiting committee for their math department (2012).
- (12) Problem editor for Pi Mu Epsilon journal. Mentored undergraduates and graduate students in writing and editing problems. Doing 100 problems for 100 years (to celebrate the 100th anniversary). Wrote many problems for the general problem section.
- (13) Wrote many exam questions for math competitions (especially the Green Chicken and the University of Rochester Math Olympiad), and posted these online as a resource for students.
- (14) Wrote a problem for Math Horizons with Stan Wagon (Self-referential probability, 23:2 (Nov 2015) 30).
- (15) Represented Williams SMALL REU at an REU conference at Mount Holyoke; participated in discussions and served as recording secretary for half the meeting. Also represented SMALL at an REU conference at UMass (and brought 12 of my students).
- (16) Ran a math table at Summer Sundays with several of my students, providing another mentoring opportunity for them and doing an outreach activity for the community. Activities included the mathematics of LEGO bricks (combinatorics, game theory), origami and the Rubik’s cube.
- (17) Run numerous undergraduate research sessions at AMS Sectional Meetings and a Joint Meetings.
- (18) SMALL REU Director at Williams (2013 - 2014, 2016 - present), wrote the current and pending grant proposals with Cesar Silva.

## Teaching Experience

### Course evaluations

Course evaluations from Brown and Williams are available upon request. Course homepages online (which include videos of all lectures for the past several years) at

[http://www.williams.edu/Mathematics/sjmillier/public\\_html/index.htm](http://www.williams.edu/Mathematics/sjmillier/public_html/index.htm)

### Standard Classes

Graduate Linear Algebra	Ohio State (Summer 2004)
Advanced Analysis	Williams College (Fall 2014)
Analysis and Number Theory	Williams College (Spring 2009, Fall 2010)
Complex Analysis	Williams College (Fall 2010, 2013, 2015)
Operations Research	Williams College (Fall 2014, Fall 2016)
Advanced Applied Linear Algebra	Williams College (Fall 2012)
Linear Programming	Mount Holyoke College (Spring 2012)
Probability	Williams College (Fall 2009, Fall 2012, 2013, 2015, 2016, Spring 2015) Mount Holyoke College (Fall 2011)
Abstract Algebra	Brown (Fall 2005 & 2006)
Mathematical Statistics	Brown (Spring 2005, 2006, 2007 & 2008)
Honors Problem Solving	Ohio State (Autumn 2003)
Problem Solving	Williams College (Fall 2014, Spring 2017)
Differential Equations and Vector Calculus	Williams College (Spring 2009)
Number Theory	Williams College (Spring 2017) Smith College (Fall 2011)
Discrete Mathematics	Ohio State (Summer 2003)
Honors Linear Algebra	Princeton (Spring 1999); Brown (Spring 2007)
Linear Algebra	Brown (Fall 2004)
Honors Vector Calculus	Brown University (Fall 2007)
Multivariable Calculus	Williams College (Springs 2010, 2011, 2012, 2013, 2014)
Freshman Seminar	Brown (Spring 2006)
(From Riddles to Modern Mathematics)	
Reading Classics Working Group	Ohio State (with Vitaly Bergelson and Warren Sinnott, 2003–2004)
Calculus I	Princeton (Summer 1999, 2000 & 2002); Brown (Fall 2004, Summer 2005, 2006, 2007 & 2008) Williams (Fall 2008)
Introduction to Cryptography	Williams (Winter 2010, 2013)
Fundamentals of College Algebra	Ohio State (Autumn 2003)
Basic College Mathematics	Ohio State (Autumn 2003)

## Advising Experience

I have supervised almost 300 undergraduate and graduate students in research projects and programs since 2000, many of which have led to publications, conference presentations, fellowships and awards, and have been active in numerous undergraduate math clubs. Below are some representative examples of activities.

**Graduate dissertations:** Committee member for three dissertations at Brown University: Alina Bucur (Number Theory), Michelle Manes (Number Theory), Minh Quang (Analysis). Significant mentoring and assistance to one dissertation at Bristol University (Duc Khiem, Number Theory and Random Matrix Theory) and one at the University of Maryland (Kevin Dayaratna, Mathematical Statistics).

**Undergraduate dissertations (Williams):** Supervised fifteen (19) honors theses at Williams College: Ari Binder (Probability / Graph Theory), David Burt (Machine Learning), Weng-Him Cheung (Benford's Law; joint with Fred Strauch), Dan Costanza (Economics), Becky Durst (Benford's law), Carson Eisenach (operations research / sabermetrics), Jesse Freeman ( $L$ -functions), Anand Hemmady ( $L$ -functions), Joe Iafrete (Benford's law; joint with Fred Strauch), Joy Jing (Benford's law), Jake Levinson (Number Theory and Random Matrix Theory), Lawrence Luo (MSTD), Victor Luo (sabermetrics), Yang Lu (Benford's law), Ralph Morrison (Number Theory and Random Matrix Theory), Chris Picardo (Sabermetrics /

Statistics; joint with Dick De Veaux), Aadi Sharma (RMT), David Stevens (Mathematical Biology; joint with Julie Blackwood), Kirk Swanson (Random Matrix Theory), Wentao Xiong (Random Matrix Theory).  
 Second reader for many dissertations, advised many others at Princeton.

### Guided Research Classes / Programs / Independent Studies

CMU	Undergraduate research class (12 students, Spring 2016)
Williams	Independent study on operations research (Spring 2013, Spring 2014)
Williams	Independent study on arithmetic dynamics (Fall 2012)
Smith	undergraduate research class on Benford's law and additive number theory (Spring 2012)
Williams	Independent study on Probability (Spring 2011, Winter 2011)
Williams	Independent study on Number Theory (Winter 2011)
Williams	Independent study on Cryptography (Winter 2011)
Williams	Independent study on the Putnam and Problem Solving (Fall 2010)
Williams	Independent study on sabermetrics (Fall 2008, 2009, Winter 2011)
Williams	Independent study on differential equations (Spring 2009)
Brown	Math 197: undergraduate research class on Sabermetrics (2008), working on general problems and some projects for the San Diego Padres. Math 197: undergraduate research class on Benford's law (2007) Math 197: undergraduate research class on number theory and automorphic forms (2007); Math 197: undergraduate research class on cryptography (with Jill Pipher, 2006); Math 197: undergraduate research class on elliptic curves (2004–2005).
Ohio State	Program Director, Vertically Integrated Summer Program in Computational Number Theory (2004); Number Theory Working Group (with Vitaly Bergelson and Warren Sinnott, 2003–2004). Instructor, one week course on the circle method at the Ross Program, Summer 2004.
AIM	Vertically Integrated Summer Program in Computational Number Theory (with Brian Conrey, David Farmer, Chris Hughes & Michael Rubinstein, 2003).
Princeton	Designing and running the VIGRE Junior Research Seminar / Undergraduate Math Lab (with Peter Sarnak, Andrew Wiles, Ramin Takloo-Bighash, Yakov Sinai, 2000–2003).
NYU	Designing and running the VIGRE Undergraduate Math Lab at the Courant Institute, NYU (with Peter Sarnak and Alex Barnett, 2002).

### Representative examples of my activities.

2016	Faculty mentor to 15 undergraduates in SMALL math research program (summer, Williams).
2015	Faculty mentor to 12 undergraduates in SMALL math research program (summer, Williams).
2014 - present	Led an REUF group at the American Institute of Mathematics, mentoring faculty in guiding undergraduates in research, have already presented results at one conference, submitted one paper, and have invitations to the other faculty to speak at several conferences.
2008 - present	Faculty advisor to the Green Chicken / Math Puzzle Night / Math Team / Mathematical Contest team at Williams.
2014	Faculty mentor to 20 undergrads (14 SMALL, 2 at homes, 4 from PROMYS summer, Williams) Faculty mentor to 1 post-doc, 1 grad student, 1 junior faculty (all affiliated with SMALL)
2013	Faculty mentor to 12 undergraduates in SMALL math research program (summer, Williams) Faculty mentor to 1 post-doc, 1 research student shared with Strauch in physics, worked with two students on book projects.
2012	Faculty mentor to 9 undergraduates in SMALL math research program (summer, Williams).
2011	Faculty mentor to 9 undergraduates in SMALL math research program (summer, Williams).
2010	Faculty mentor to 6 undergraduates in SMALL math research program (summer, Williams).
2010	Research mentor to 6 PROMYS students (summer, Boston University).
2010	Faculty mentor to 3 students for WIT under OIT's auspices (summer, Williams).
2009	Faculty mentor to 6 undergraduates in SMALL math research program (summer, Williams).
2009	Research mentor to 7 PROMYS students (summer, Boston University).
2004 - 2008	Advisor to the Brown University Undergraduate Mathematics Club and faculty advisor for Brown University's Symposium for Undergraduates in Mathematical Sciences.
2003 - 2004	Advisor to the Ohio State Undergraduate Mathematics Club and the Putnam team.

- 2016 - 2017 Thesis Advisor: Becky Durst (Benford's law), David Burt (machine learning), Anand Hemmady (number theory), Aadi Sharma (random matrix theory).  
Faculty advisor to 4 colloquia: Intekhab Hossain (Game Theory), Matthew Thomas (Isoperimetric), Kimthanh Nguyen (Number Theory), Reidar Riveland (mathematical neuroscience).
- 2015 - 2016 Thesis Advisor: Lawrence Luo (MSTD sets).  
Faculty advisor to 6 colloquia: Joel Lee (Digits of  $\pi$ ), Blake Mackall (Uncertainty Principle), Willem Humes (Lagrange's 4 Square Theorem), Amanda Siedem (Markov Processes and Optimization), Jester Logan (Markov Monkeys), Michael Stone.
- 2014 - 2015 Thesis Advisor: Weng-Him Cheung (joint with Fred Strauch) and Jesse Freeman.  
Faculty advisor to 6 colloquia: Lily An (Ramsey Theory), Jeewon Yoo (Markov Processes), Shannon Hsu (Riemann Zeta Fn), Carrie Chu (Graph Theory), Elliott Chester (number theory), Stephanie Neul (rowing).
- 2013 - 2014: Williams College: Thesis advisor: Carson Eisenach (operations research / sabermetrics), Joe Iafrete (Benford's law; joint with Fred Strauch), Jared Hallett (Number Theory and Random Matrix Theory), Victor Luo (sabermetrics), Yang Lu (Benford's law), David Stevens (Mathematical Biology; joint with Julie Blackwood), Kirk Swanson (Random Matrix Theory).  
Faculty advisor to 9 colloquia (in addition to 6 senior theses): Daniel Seita (learning theory), Caroline Miller (sudoku), Will Edwards (graph theory), Chris Chandler (Platonic Solids), Cotton Engleby (Fixed point theorems), Alex Albright (Benford's law), Daudi K. Ng'eno (Gale-Shapley), Kaije Zheng (Non-negative Matrix factorizations), Gabor Gurbacs (dynamical systems), Joe Iafrete (mathematical modeling).
- 2012 - 2013: Williams College: Thesis advisor: Chris Picardo (statistics, joint with Dick DeVaux), Joy Jing (Benford). Second reader for Scott Sanderson (complexity theory).  
Research mentor: Jared Hallett (arithmetic dynamics), Philippe Demontigny (additive number theory).  
Faculty advisor to 13 colloquium talks: Jen Gossels (linear programming and sabermetrics), Chris Picardo (Order Statistics), Phil Tosteson (Dirichlet's theorem), Chance Rueger (sabermetrics), Wei Sun (Huffman codes), Evan Dedominicis (game theory), Andrew Bishop (graph theory), Julio Luquin (cartography), Katy Golvala and Wen Han (auto-correlation and Buffon's needle, 2nd advisor, joint with De Veaux), Ben Seiler (fractals in finance), Casey Jones (random generation), Kush Fanikiso (probability and magic), Megan Landers (probability/RMT).
- 2010 - 2011: Williams College: Thesis advisor: Ari Binder (graph theory), Jake Levinson (number theory and random matrix theory), Wentao Xiong (random matrix theory); secondary advisor to Dan Costanza (economics). Faculty advisor to 6 colloquium talks: Dan Costanza (statistics); Elliot Schrock (number theory); David Phillips (juggling); Leah Hurwich (number theory); Ari Binder (probability); Vincent Pham (linear programming).
- 2009 - 2010: Williams College: Thesis advisor: Ralph Morrison (number theory and random matrix theory).  
Ran an independent study (5 students) on sabermetrics. Faculty advisor to 7 colloquium talks: Christophe Dorsey: graph theory; Corey Watts: chaos theory; Noel MacNaughton: Ramsey theory. Crosby Fish: Benford's law; Adam Capulong: Kelly criterion for optimal gambling; Michael Grover: Josephus problem (probability); Jaehong Cho: Zipf's law (probability).
- 2008 - 2009: Williams College: Advised one undergraduate investigation in sabermetrics and two in differential equations. Advisor to 6 colloquium talks: Chris Chiang: sabermetrics; Rich McDowell: Benford's law; Mary Feeley: linear programming; David Aitoro: Monster Group; Eric Moore: Probability; Jake Gorelov: Game Theory.
- 2007 - 2008: Brown University: Advised one undergraduate investigation on elliptic curves and  $L$ -functions, one on random graphs, four on Benford's Law, ten on sabermetrics, and one senior on the mathematics of bridge bidding conventions. Faculty advisor to 24 undergraduates (5 juniors, 14 sophomores, 5 freshmen). Over the summer advised one undergraduate research project in additive number theory (which was given a named grant by Brown), and two students in a mathematics education project to design handouts and web applets for introductory calculus (joint with Professor Tom Banchoff).
- 2006 - 2007: Brown University: On the dissertation defense committee for Michelle Manes (Number Theory). Advised five undergraduate investigations in the circle method, continued fractions, dynamical systems, random graphs and probability. Faculty advisor to 18 undergraduates.
- 2005 - 2006: Brown University: On the dissertation defense committee for Alina Bucur (Number Theory) and Minh Quang (Analysis).  
Advised four undergraduate investigations in random matrix theory, prime numbers, iterative functions and probability. Faculty advisor to 5 undergraduates.



- 2004 - 2005: Princeton University: co-advised 1 senior dissertation.  
Brown University: advised five undergraduate investigations in elliptic curves and random matrix theory.
- 2003 - 2004: Princeton University: co-advised 1 senior dissertation.  
American Institute of Mathematics: co-advised 8 summer undergraduate research projects.  
The Ohio State University: co-advised 7 undergraduate / graduate research projects during the year, 10 over the summer.
- 2002 - 2003: Princeton University: co-advised 17 junior research projects in fall, 16 in spring; co-advised 3 senior dissertations.  
Courant Institute, NYU: co-advised 3 junior research projects.
- 2001 - 2002: Princeton University: co-advised 11 junior research projects, co-advised 1 senior dissertation.
- 2000 - 2001: Princeton University: co-advised 8 junior research projects.

## Other

### Miscellaneous

- 2017 - 2020 Member of the Arnold Ross Lecture Series Committee.
- 2015 - present Member of the Pure and Applied Undergraduate Texts Editorial Committee of the AMS.
- 2015 - present Member of the Carus Editorial Board for the MAA.
- 2015 - present Editor, American Mathematical Monthly (problem section).
- 2015 - present Editor, Notices of the AMS.
- 2015 - present Member of the Mount Greylock Regional School Committee; duties included developing and help convince the two member towns on switching the formula to assign costs for capital projects.
- 2014 - present Editor, Journal of Number Theory.
- 2013 - present Problem Editor for Pi Mu Epsilon journal.
- 2013 - present Problem editor / contributor for 'Slice of Pi', Palmdale High School Math Department News letter.
- 2006 - present: Contacted by an instructor at the Internal Revenue Service Criminal Investigation's National CI Training Academy to discuss applications of Benford's law to corporate fraud detection. Talked (2008) to agents of the IRS's Boston office on the theory & application of Benford's law. Currently have the IRS reviewing a new method to detect tax fraud.
- 2009 - present: Maintaining webpage with extensive notes, talks and programs for graduate students interested in  $L$ -functions and Random Matrix Theory.  
[http://www.williams.edu/Mathematics/sjmillier/public\\_html/ntandrmt/index.htm](http://www.williams.edu/Mathematics/sjmillier/public_html/ntandrmt/index.htm)
- 2008 - present: Wrote problems for AMC 8 math competition (four times), AMC 12 (six times); Proof-read problems for the AMC 12 math competition.
- 2012 - present: Working with OIT at Williams on short academic videos; see  
<http://www.youtube.com/watch?v=Esa2TYwDmWA&feature=g-upl> and  
<http://www.youtube.com/watch?v=aMorr1h4Egs&feature=g-upl>.
- 2004 - 2008: Frequent panelist in graduate teaching workshops at Brown.
- 1998 - present: Maintain math riddles website, consistently in top ten when googling 'math riddles':  
<http://mathriddles.williams.edu/>

### Computer Skills

- (1) Ran the VIGRE Undergraduate Mathematics Laboratory four times at Princeton, once at the Courant Institute, NYU, twice at Ohio State, and a similar program at the American Institute of Mathematics (summer 2003). Duties included helping undergraduates and graduate students investigate hot conjectures numerically and theoretically; responsible for coding and algorithm help in C, PARI, Mathematica, Maple, Matlab.
- (2) Graduate Liaison and Residential Computer Consultant for Computer and Information Technology at Princeton (two years).
- (3) I am able to LaTeX mathematical lectures in real-time. This has allowed me to post complete course notes for several undergraduate and graduate classes at Princeton, NYU and Ohio State, as well as many conferences; see, for example, the 2009 Graduate Workshop on Zeta Functions, L-Functions and their Applications:  
[http://www.williams.edu/Mathematics/sjmillier/public\\_html/ntandrmt/index.htm](http://www.williams.edu/Mathematics/sjmillier/public_html/ntandrmt/index.htm)

**Williams College Service**

- 2016 - present Director, Williams College SMALL REU, co-wrote pending grant proposal.
- 2014 - present Faculty Program Director (All Neighborhoods).
- 2013 - present Faculty Program Advisor (Spencer Neighborhood).
- 2014 - 2015 Director, Williams College SMALL REU.
- 2013 - 2014: Director, Williams College SMALL REU, co-wrote successful grant proposal.
- 2013 - present: Member, Upperclass Residential Life Ad-hoc Advisory Committee.
- 2013 - present: President of Williams College's Phi Beta Kappa chapter.
- 2012 - 2013: Secretary and Treasurer of Williams College's Phi Beta Kappa chapter.
- 2012 - present: Faculty Programming Director (Spencer Neighborhood).
- 2010 - present: Williams College Children's Center Advisor Committee (secretary).
- 2010 - 2011: Member Ad Hoc Dining Committee (chair of Whitmans subcommittee).
- 2010 - 2011: Faculty Programming Director (Spencer Neighborhood, except for 2011-2012).
- 2010 - 2011: Faculty mentor to a WIT group (under OIT's auspices).
- 2009 - 2010: Member Ad Hoc Advising Committee (chair of transfer student subcommittee).
- 2008 - 2009: Member of Math/Stats Department Search Committee (3 times, also technology czar).
- 2008 - present: Frequent participant in recruiting activities, worked with Admissions.

**Representative Community Service**

- 2015 - present Member, Mount Greylock Regional School Committee (elected position).
- 2013 - present Treasurer, Williamstown Cal Ripken Baseball.
- 2013 - present Advisor, Glocal Remedies Resource Development Corporation.
- 2010 - present Member, Williams College Children Center Advisory Committee.

**Recent Consulting Experience**

- 2016 - present Working with a regional healthcare provider on service questions.
- 2016 - present Mathematical modeling for a medical malpractice case.
- 2016 Consultant to a financial firm on effectiveness of assignments.

## Referee Service

### Referee Service (234 papers, 83 journals, 2 conference proceedings, 2 books)

- (1) Abstract and Applied Analysis (3)
- (2) Acta Arithmetica (3)
- (3) Acta Mathematica (1)
- (4) Advances in Difference Equations (2)
- (5) Albanian Journal of Mathematics (1)
- (6) Algebra & Number Theory (1)
- (7) American Mathematical Monthly (16)
- (8) Analytic Number Theory: In honor of Helmut Maier's 60th birthday, Springer-Verlag (2: book chapters, one with a student)
- (9) Annals of Combinatorics (2)
- (10) Annals of Mathematics (2)
- (11) Applied Mathematics and Computation (1)
- (12) Ars Combinatoria (2)
- (13) Aquatic Botany (1)
- (14) British Journal of Mathematics & Computer Science (4) (once with students)
- (15) Canadian Journal of Mathematics (2)
- (16) Central European Journal of Mathematics (1)
- (17) College Math Journal (1)
- (18) Communications in Algebra (1)
- (19) Communications in Number Theory and Physics (1)
- (20) Compositio Mathematica (6)
- (21) Contemporary Mathematics (1; Proceedings of the Constructive Functions 2014 Conference)
- (22) Crelle's journal: Journal für die reine und angewandte Mathematik (1)
- (23) Duke Mathematical Journal (2)
- (24) Econometrics (1)
- (25) Electronic Communications in Probability (1)
- (26) Electronic Journal of Probability (1)
- (27) Experimental Mathematics (3)
- (28) Far East Journal of Mathematical Sciences (1)
- (29) Fibonacci Quarterly (22, 10x with students)
- (30) GAFA (1)
- (31) Hacettepe Journal of Mathematics and Statistics (1)
- (32) INTEGERS (1)
- (33) International Journal of Mathematics and Mathematical Research (1)
- (34) International Journal of Number Theory (5)
- (35) International Mathematics Research Notes (4)
- (36) ISRN Computational Mathematics (1)
- (37) Journal of Applied Probability/Advances in Applied Probability (1)
- (38) Journal of Approximation Theory (1)
- (39) Journal of the American Mathematical Society (1)
- (40) Journal of Combinatorial Mathematics and Combinatorial Computing
- (41) Journal of Economic Behavior & Organization (1)
- (42) Journal of the European Math Society (1)
- (43) Journal of the Indian Statistical Association (1)
- (44) Journal of the London Mathematical Society (1)
- (45) Journal of Mathematical Analysis and Applications (1)
- (46) Journal of Mathematical Physics (1)
- (47) Journal of Number Theory (57, four times with students)
- (48) Journal of Physics A: Mathematical and General (2)
- (49) Journal of Quantitative Analysis of Sports (4)
- (50) Journal of the Ramanujan Mathematical Society (3)
- (51) Journal of Sports Economics (1)
- (52) Journal of Theoretical Probability (4)
- (53) Linear Algebra and its Applications (1)

- (54) London Mathematical Society (1)
- (55) Mathematical Physics (1)
- (56) Mathematics of Computation (2)
- (57) Mathematical Physics, Analysis and Geometry (1)
- (58) Mathematics Magazine (13)
- (59) Mathematical Proceedings of the Cambridge Philosophical Society (1)
- (60) Mathematical Research Letters (1)
- (61) Monatshefte für Mathematik (1)
- (62) Notices of the AMS (2)
- (63) OALib (1, with students to show the dangers of open access pay journals)
- (64) Pacific Journal of Mathematics (1)
- (65) Physica A: Statistical Mechanics and its Applications (1)
- (66) Physical Review & Research International (1)
- (67) Proceedings for a 60th Birthday Conference (1)
- (68) Proceedings of the XIVth International Conference on Fibonacci numbers (1)
- (69) Proceedings of the National Academy of Sciences of the United States of America (1)
- (70) Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences (2)
- (71) Ramanujan Journal (4)
- (72) Random Matrices: Theory and Applications (2)
- (73) Research in Number Theory (1)
- (74) Revista de la Real Academia de Ciencias Exactas, Físicas y Naturales. Serie A. Matemáticas (1)
- (75) Rocky Mountain Journal of Mathematics (1)
- (76) ScienceAsia - Journal of the Science Society of Thailand (1)
- (77) S  $\vec{e}$  MA Journal (2, 1 with students)
- (78) SIAM Journal on Discrete Mathematics (1)
- (79) Social Networks and the Economics of Sports (1: book chapter)
- (80) SpringerPlus (2)
- (81) Statistical Science (1)
- (82) Statistics and Probability Letters (4)
- (83) Uniform Distribution Theory (1)

### Review Service: 6 research proposals

- (1) Panelist for the Conference Board of the Mathematical Sciences.
- (2) Panelist for NSF Research Proposals in Analysis, Combinatorics and Number Theory (four times), also reviewed proposal in applied math, also reviewed postdoc fellowship proposals.
- (3) Research proposals for CUNY.
- (4) Research proposals for the Natural Sciences and Engineering Research Council of Canada.
- (5) Research proposals for the NSA (five times).
- (6) Research proposals for the Swiss National Science Foundation.

### Editorial Service

- (1) Journal of Number Theory: 29 papers.
- (2) AMSTEXT Editorial Committee: 10 books.
- (3) AMS: 2 books
- (4) Carus Editorial Committee: 4 books.
- (5) Editor, Notices of the AMS.
- (6) Problem Editor, Pi Mu Epsilon.
- (7) Problem Editor, American Mathematical Monthly.

**Review Service: 251 papers for Mathematical Review (MathSciNet), and had two journals banned from MathSciNet for publishing incorrect proofs of the Riemann Hypothesis**

### Review Service: Book Reviews

- (1) E. Bombieri and W. Gubler, *Heights in Diophantine Geometry*, book review for Siam Review.

- (2) P. Borwein, S. Choi, B. Rooney and A. Weirathmueller (editors). The Riemann hypothesis. A resource for the aficionado and virtuoso alike. CMS Books in Mathematics/Ouvrages de Mathématiques de la SMC. Springer, New York, 2008, book review for MathSciNet.
- (3) P. Forrester, *Log-gases and random matrices*, London Mathematical Society Monographs Series, 34. Princeton University Press, Princeton, NJ, 2010. xiv+791 pp. Book review for MathSciNet (review joint with Eduardo Dueñez).
- (4) T. Tao, *Topics in Random Matrix Theory*, Graduate Studies in Mathematics, volume 132, American Mathematical Society, Providence, RI 2012.

**Review Service: (12) Book Proposals**

- (1) S. S. Epp, *Discrete Mathematics with Applications*, third edition, Thomson \* Brooks/Cole, review to help revise the book for the fourth edition.
- (2) J. E. Marsden and A. J. Tromba, *Vector Calculus*, fifth edition, W. H. Freeman, review of content and presentation.
- (3) Book proposal for the AMS (twice).
- (4) Book proposal for Cambridge University Press.
- (5) Book proposal for CRC Press (twice).
- (6) Book proposal for John Wiley & Sons.
- (7) Book proposal for McGraw-Hill.
- (8) Book proposal for Princeton University Press (thrice, as well as a chapter for another proposal).
- (9) Book proposals for Saylor.org: (i) Probability; (ii) Statistics.
- (10) Book proposal for Springer-Verlag.