

CURRICULUM VITAE: STEVEN J. MILLER

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Department of Mathematics and Statistics
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Nationality: American.

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

Society Memberships: American Mathematical Society (AMS Fellow), Fibonacci Association, Math Alliance (Mentor), Mathematical Association of America, Phi Beta Kappa (At-Large Senator: 2018–2024), Pi Mu Epsilon (Honorary Member: Michigan Iota Chapter at Grand Valley State University), Sigma Xi. Faculty Fellow, The Erdős Institute <https://www.erdosinstitute.org/>

Mentoring Awards: CUR-Goldwater Scholars Faculty Mentor Award (2020), Churchill Advisor Award (2021).

Homepage: http://web.williams.edu/Mathematics/sjmillier/public_html/index.htm

Research and Applied 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, Cryptography, Sabermetrics, Linear Programming and Operations Research.

Education

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

Positions

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| Professor | Williams College | 2018 - |
| Remote Professor | Michigan | 2021 - 2022 (remote research class) |
| Senator-at-Large | PBK | 2018 - 2024 |
| Visiting Researcher | Carnegie Mellon | 2016, 2019 |
| Associate Professor | Williams College | 2012 - 2018 |
| 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 |

Consulting / Applied Experience

I have consulted on a variety of projects (in finance, medicine, baseball to name a few), and serve as an elected member of the Mount Greylock Regional School Committee (where I am responsible for the mathematics used to allocate capital costs and credit state funds across the member towns). I teach a variety of applied mathematics classes (especially probability and operations research), where my students and I work with many local firms.

Date: October 15, 2022.

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 (relabelled 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 DMS2218374: Polymath REU: \$47,728 for 1 year: April 1, 2022 - March 31, 2023.
- (2) NSF Grant DMS2113535: Polymath REU: \$30,000 for 1 year: May 15, 2021 - April 30, 2022.
- (3) NSF Grant DMS1947438: PI for: REU Site: The Williams College SMALL REU program: \$416,100 for 3 years, June 1, 2020 – May 31, 2023.
- (4) NSF Grant DRL1812982: Integrating Computational Thinking in Mathematics and Science High School Teacher Professional Development: \$2,276,369 for 4 years, September 2018 – August, 2022.
- (5) Grants to support the 32nd Automorphic Forms Workshop, March 18 - 22, 2018, at Tufts University with Michael Chou, Amanda Folsom, and Robert J. Lemke Oliver.
Elsevier: \$2000.
NSA: \$12,500.
NSF: \$21,400 (DMS1802058).
Number Theory Foundation: \$4000.
- (6) NSF Grant DMS1659037: PI for: REU Site: The Williams College SMALL REU program: \$360,000 for 3 years, June 2017 - June 2020.
- (7) NSF Grant DMS1347804: PI for: REU Site: The Williams College SMALL REU program: \$360,000 for 3 years, June 2014 - June 2017.
- (8) 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.
- (9) NSF Grant DMS0850577 (The Williams College SMALL REU Project), summer support in 2009 and, with Williams College, support for summer REU students.
- (10) NSF Grant DMS536991 (MAA Regional Undergraduate Mathematics Conferences program): *Brown University Symposium for Undergraduates in the Mathematical Sciences*, March 8, 2008, \$1,500.
- (11) 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.
- (12) NSF Grant DMS0753043 (Probability program), Conference on the Theory and Applications of Benford's Law (December 16th - 18th, 2007, Santa Fe, NM), \$13,368.
- (13) 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 skypeing 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.

- (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.
- (9) 32nd Automorphic Forms Workshop (with Michael Chou, Amanda Folsom and Robert J. Lemke Oliver), Tufts University, March 18 - 22, 2018.
- (10) 19th International Fibonacci Conference (with Lejla Smajlovic), University of Sarajevo, July 2020.

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.

Bibliography

Papers and Talks available online at https://web.williams.edu/Mathematics/sjmiller/public_html/

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 π* , *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, and an appendix joint with Peter Hegarty), *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’Byrant), *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, Ron Evans and Victor Luo), *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) *Special Sets of 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) *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.
- (94) *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.
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- (96) *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.
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- (175) *The limiting spectral measure for an ensemble of generalized checkerboard matrices* (with Fangu Chen, Yuxin Lin and Jiahui Yu), *The PUMP Journal of Undergraduate Research* **4** (2021), 202–221.
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- (3) *Theory and Applications of Benford's Law*, Princeton University Press, 2015, 438 pages.
- (4) *The Probability Lifesaver*, Princeton University Press, 2017, 752 pages.
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Papers under Review

- (1) *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).
- (2) *Avoiding 3-Term Geometric Progressions in Non-Commutative Settings* (with Megumi Asada, Eva Fourakis, Eli Goldstein, Sarah Manski, Nathan McNew and Gwyneth Moreland), submitted June 2019 to the *Journal of Integer Sequences*.
- (3) *The Explicit Sato-Tate Conjecture For Primes In Arithmetic Progressions* (with Trajan Hammonds, Casimir Kothari, Noah Luntzlara, Jesse Thorner, Hunter Wieman), submitted May 2019 to *IJNT*.
- (4) *Distribution of Eigenvalues of Matrix Ensembles arising from Wigner and Palindromic Toeplitz Blocks* (with Keller Blackwell, Neelima Borade, Arup Bose, Charles Devlin VI, Noah Luntzlara, Renyuan Ma, Steven J. Miller, Soumendu Sundar Mukherjee, Mengxi Wang, Wanqiao Xu), submitted February 2021 to *Random Matrices: Theory and Applications*. (Revised September 2022)
- (5) *Tinkering with Lattices: A New Take on the Erdos Distance Problem* (with E. Boldyriev, E. Kim, E. Palsson, S. Sovine, F. Trejos Suarez and J. Zhao), submitted September 2020 to *Integers*.
- (6) *Walking to Infinity Along Some Number Theory sequences* (with Fei Peng, Tudor Popescu, Joshua M. Siktar, Nawapan Wattanawanichkul, and the Polymath REU Program), submitted November 2020 to the *Journal of Integer Sequences*.
- (7) *Optimal Point Sets Determining Few Distinct Angles* (with Henry L. Fleischmann, Eyvindur A. Palsson, Ethan Pesikoff, Charles Wolf), submitted August 2021 to *The Electronic Journal of Combinatorics*.
- (8) *Completeness of Positive Linear Recurrence Sequences* (with Ela Boldyriev, John Haviland, Phuc Lam, John Lentfer, Fernando Trejos Suarez), submitted August 2021 to *Acta Arithmetica*.
- (9) *The Generalized Bergman Game* (with Benjamin Baily, Justine Dell, Irfan Durmic, Henry Fleischmann, Faye Jackson, Isaac Mijares, Ethan Pesikoff, Luke Reifenberg, Alicia Smith Reina, Yingzi Yang), submitted to the *Fibonacci Quarterly* (arXiv link: <https://arxiv.org/abs/2109.00117>).
- (10) *Irreducibility Over the Max-Min Semiring* (with Ben Baily, Justine Dell, Henry L. Fleischmann, Faye Jackson, Ethan Pesikoff, Luke Reifenberg). Submitted to the *International Journal of Algebra and Computation*.
- (11) *The Real Schwarz Lemma: The Sequel* (with Ben Baily, Jonathan Geller), submitted to the *American Mathematical Monthly*.
- (12) *Connections of Class Numbers to the Group Structure of Generalized Pythagorean Triples* (with Thomas Jaklitsch, Thomas Martinez, and Sagnik Mukherjee), submitted to the *Rocky Mountain Journal of Mathematics*.
- (13) *Class Numbers and Pell's Equation $x^2 + 105y^2 = z^2$* (with Thomas Jaklitsch, Thomas Martinez, and Sagnik Mukherjee), submitted to *Proceedings of ICCGNFRT - 2021*.
- (14) *Sums of Reciprocals of Recurrence Relations* (with Hao Cui, Xiaoyu Cui, Sophia C. Davis, Irfan Durmic, Qingcheng Hu, Lisa Liu, Fengping Ren, Alicia Smith Reina, and Eliel Sosis) submitted to the *Fibonacci Quarterly*.
- (15) *Winning Strategies for the Generalized Zeckendorf Game*, Steven J. Miller, Eliel Sosis, Jingkai Ye, submitted to the *Fibonacci Quarterly*.
- (16) *Distinct Angles and Angle Chains in Three Dimensions* (Ruben Ascoli, Livia Betti, Jacob Lehmann Duke, Xuyan Liu, Wyatt Milgrim, Steven J. Miller, Eyvindur A. Palsson, Francisco Romero Acosta, Santiago Velazquez Iannuzzelli).

Preprints (in addition to many works in progress from most recent SMALL REU, which are not listed below)

- (1) *The Ratios Conjecture and Convolving Families of L-functions* (with Minh-Tam Trinh).
- (2) *Moment Formulas for Ensembles of Classical Compact Groups* (with Alan Chang, Geoffrey Iyer, Kyle Pratt, Nicholas Triantafyllou and Minh-Tam Trinh).
- (3) *When Generalized Sumsets are Difference Dominated* (with Virginia Hogan).
- (4) *m-paths and the $(3x + 1)$ Problem* (with Bruce Adcock, Carlos Dominguez and Sucheta Soundarajan), in preparation.

- (5) *Extending support for the centered moments of the low lying zeroes of cuspidal newforms* (P. Cohen, J. Dell, G. Iyer, S. Khunger, K. Kwan, S. J. Miller, A. Shashkov, A. Smith Reina, N. Triantafyllou, N. Truong, C. Sprunger, R. Van Peski, S. Willis, and Y. Yang, preprint).

Books under contract and development

- (1) *Operations of Order* (with Stephan Garcia).
- (2) *L-functions and sphere packing* (with Stephen D. Miller).

Selected Talks and Posters (555 total)

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

L-Functions and Random Matrix Theory (70)

- (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. Brown University, April 2, 2018.
- (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. University of Rochester, November 5, 2021.
 - (30) *The Langlands Program: Beyond Endoscopy*, given by Oscar Gonzalez and Chung Hang Kwan, Young Mathematicians Conference, Ohio State, August 2016.
 - (31) *One-level density for holomorphic cusp forms of arbitrary level*, 31st Annual Workshop on Automorphic Forms, ETSU, Mar 6, 2017.
 - (32) *Bounds for High Vanishing in Families of L-Functions* (given by Eric Winsor and Ryan Chen), Young Mathematicians Conference, Ohio State, August 2017.
 - (33) *Lower order biases in Fourier coefficients of elliptic curve and cuspidal newform families* (given by Jianing Yang and Jared Lichtman), Young Mathematicians Conference, Ohio State, August 2017.
 - (34) *Lower Order Biases in Fourier Coefficients of Elliptic Curve and Cuspidal Newform families* (with Jared Lichtman, Eric Winsor and Jianing Yang), Maine-Québec Number Theory Conference, October 14, 2017.
 - (35) *The Explicit Sato-Tate Conjecture in Arithmetic Progressions* (given by Casimir Kothari, Trajan Hammonds, Hunter Weiman), Québec-Maine Number Theory Conference, October 7, 2018. Poster at the Joint Math Meetings, Baltimore, January 18, 2019 (JMM Outstanding Poster Award).
 - (36) *Zeros of L-Functions near the Central Point and Optimal Test Functions*, given by Charles Devlin, Conference for New England REUs, 7/23/19.
 - (37) *Zeros of L-Functions near the Central Point and Optimal Test Functions*, given by Charles Devlin VI, Young Mathematicians Conference, August 10, 2019.
 - (38) *Optimal Test Functions for n-Level Densities and Applications to Central Point Vanishing* (with Charles Devlin VI), Maine-Québec Number Theory Conference, October 5, 2019.
 - (39) *Determining optimal test functions for 2-level densities* (Ela Boldyriew, Fangu Chen, Jason Zhao), Young Mathematicians Conference, August 2020. (Jason Zhao) Quebec-Maine Number Theory Conference, September 26, 2020.
 - (40) *How Low Can We Go? Understanding Zeros of L-Functions Near The Central Point*, New York Number Theory Seminar, February 18, 2021.
 - (41) *Extending Support in calculating the n-level density of low lying zeros of families of L-functions* (given by Justine Dell, Simran Khunger, Alexander Shashkov, Stephen Willis), Young Mathematicians Conference, Ohio State, August 2021. Maine-Quebec, October 5, 2021. Upstate Number Theory Conference, Union College, October 24, 2021.
 - (42) *One-level density of a family of L-functions over function fields* (given by Dang Dang, Hari Iyer, Sanford Lu), Young Mathematicians Conference, Ohio State, August 2021.

- (43) *The Katz-Sarnak Density Conjecture and Bounding Central Point Vanishing of L-Functions*, Second Int'l Webinar: Recent Developments in Number Theory, School of Applied Sciences (Mathematics), Kalinga Institute of Industrial Technology University, Bhubaneswar, India, October 3, 2021.
- (44) *Bounding ranks of cuspidal newforms through excised orthogonal ensembles* (given by Astrid Lilly and Xuyan Liu), Young Mathematicians Conference August 13, 2022.
- (45) *An alternative method for calculating Bessel integrals appearing in L-function zero statistics* (given by Astrid Lilly and Santiago Velazquez), Young Mathematicians Conference August 13, 2022.
- (46) *Generalized harmonic estimates for the n -level density of L-functions* (given by Annika Mauro and Jack Miller), Young Mathematicians Conference August 13, 2022.
- (47) *An excised orthogonal model for families of cusp forms* (Andrew Keisling, Xuyan Lu, Annika Mauro Zoe McDonald, Santiago Miguel Jack Miller), Quebec-Maine Number Theory Conference, October 15, 2022.
- (48) *Extending the support of 1- and 2-level densities for cusp form L-functions under square-root cancellation hypotheses* (Annika Mauro and Jack Miller), Quebec-Maine Number Theory Conference, October 15, 2022.

Elliptic Curves and Random Matrix Theory (37)

- (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. Conference on Modular Forms and Related Topics, Beirut, May 28, 2018. CNTA XV, Université Laval, July 9, 2018.
- (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. MASON IV, March 7, 2020. Michigan Math Club, January 21, 2021.
- (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. AMS Special Session on Analytic Number Theory and Automorphic Forms, Washington State University, April 23, 2017.
- (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.
- (15) *Rank and Bias in Families of Curves via Nagao's Conjecture*, AMS Special Session on A Showcase of Number Theory at Undergraduate Institutions, JMM, Baltimore (1/17/19); 33rd Automorphic Forms Workshop (with Trajan Hammonds), Duquesne University (3/8/19).

***L*-Function Ratios Conjecture (9)**

- (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.
- (4) *Variance of Gaussian Primes Across Sectors and the Hecke L -Function Ratios Conjecture* (given by Jared Lichtman and Shannon Sweitzer), Young Mathematicians Conference, Ohio State, August 2017.

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.
- (3) *Variance of Gaussian Primes Across Sectors and The Hecke L -Function Ratios Conjecture* (with Yujin Kim and Shannon Sweitzer), Maine-Québec Number Theory Conference, October 14, 2017.

Benford's Law (45)

- (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. Washington State University, April 21, 2017. Cross-domain Conference on Benford's Law application, Stresa, Italy, July 2019. Vassar College, December 10, 2019. UConn Math Club, September 16, 2020. New York Number Theory Seminar, June 16, 2022. Texas State REU, July 1, 2022. University of Pittsburgh, 11/11/22.
- (13) *Can math detect fraud? CSI: Math: The natural behavior of numbers*, Science Cafe, Northampton (Mt Holyoke), September 26, 2016.
- (14) *Benford's Law and the $3x+1$ Problem, or: Why the IRS cares about Discrete Dynamical Systems*, AMS Northeastern Sectional, Discrete Dynamical Systems, April 22, 2018.
- (15) *Benford's Law, or, Why the IRS and others care about Number Theory*, Conference on Benford's Law for fraud detection, European Commission: Joint Research Centre, Stresa, Italy, July 11, 2019.
- (16) *Benfordness of the Riemann Mapping Function for the Reciprocal of the Mandelbrot Set* (given by Filippo Beretta, Jesse Dimino, Weike Fang), Young Mathematicians Conference, Ohio State, August 2021.
- (17) *Benfordness of lower-dimensional spaces resulting from hyper-box fragmentation* (given by Livia Betti and Zoe McDonald), Young Mathematicians Conference August 14, 2022.
- (18) *Benfordness of measurements resulting from box fragmentation* (given by Livia Betti and Zoe McDonald), The International Conference on Advances in Interdisciplinary Statistics and Combinatorics, October 8, 2022.
- (19) *A New Benford Test for Clustered Data with Applications to American Elections* (given by Katie Anderson), International Conference on Advances in Interdisciplinary Statistics and Combinatorics, October 8, 2022.

Eigenvalue Statistics (31)

- (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.
- (14) *Random Matrix Ensembles with Split Limiting Behavior* (joint with Peter Cohen, Yen Nhi Truong Vu and Roger Van Peski), International Conference of The Indian Mathematics Consortium in cooperation with American Mathematical Society, Banaras Hindu University, December 15, 2016.
- (15) *Random Matrix Ensembles with Split Limiting Behavior*, AMS Special Session on Graphs and Matrices, Joint Mathematical Meetings, January 5, 2017.
- (16) *Spectral Statistics of Non-Hermitian Random Matrix Ensembles* (given by Ryan Chen and Eric Winsor), Young Mathematicians Conference, Ohio State, August 2017.
- (17) *Of the Origin and Design of Eigenvalues in General, With Concise Remarks on the English Constitution*, University of Michigan - Dearborn, June 27, 2019. Williams College, July 3, 2019.
- (18) *ABBA and the Random Matrix Discotheque*, given by Keller Blackwell and Wanqiao Xu, Conference for New England REUs, 7/23/19, and AMS-MAA-SIAM Special Session on Research in Mathematics by Undergraduates and Students in Post-Baccalaureate Programs, I, Joint Math Meetings, January 15, 2020.
- (19) *Spies and Traitors: Random Matrix Kaleidoscopes and their Turncoat Eigenvalues*, given by Neelima Borade and Renyuan Ma, Conference for New England REUs, 7/23/19. Young Mathematicians Conference, August 11, 2019. Poster given by Neelima Borade, Joint Math Meetings, Denver, January 17, 2020 (outstanding poster award).
- (20) *When Bands Play in Random Matrix Theory*, Leticia Da Matos and Charles Devlin VI, Young Mathematicians Conference, August 9, 2019.
- (21) *Split limiting behavior of random matrices with prescribed discrete spectra* (Yuxin Lin, Jiahui Yu, Fangu Chen), Young Mathematicians Conference, August 2020.
- (22) *Closed form densities for the limiting spectral measure of random circulant Hankel matrices* (given by Teresa Dunn, Henry Fleischmann, Alexander Shashkov), Young Mathematicians Conference, Ohio State, August 2021.

Zeckendorf Decompositions (89)

- (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. Mmmmm - 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). Math Club, Michigan University (11/30/17). Williams and Texas State REUs (7/8/20).

- (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; 16th 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 Edelsbrunner, 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 Edelsbrunner, 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), 17th 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.
- (25) *On Summand Minimality of Generalized Zeckendorf Decompositions* (given by Chi Huynh, Carsten Peterson and Nhi Truong), AMS Contributed Paper Session on Undergraduate Research, JMM Atlanta, Jan 5, 2017.
- (26) *Limiting Distributions in Generalized b -bin Zeckendorf Decompositions* (given by Shannon Sweitzer and Jianing Yang), Young Mathematicians Conference, Ohio State, August 2017.
- (27) *Generalizations of Zeckendorf's Theorem to Two-Dimensional Sequences* (with Joshua Siktar), AMS Special Session on Discrete Neural Networking and Applications, I, JMM, San Diego, January 11, 2018.
- (28) *Distributions in Generalized Zeckendorf Decompositions* (with Yujin Kim, Shannon Sweitzer, Eric Winsor and Jianing Yang), AMS Special Session on Discrete Neural Networking and Applications, I, JMM, San Diego, January 11, 2018.
- (29) *From Monovariants to Zeckendorf Decompositions and Games*, The Eighteenth International Conference on Fibonacci Numbers and Their Applications, Dalhousie University, July 2, 2018.
- (30) *Rank and Bias in Families of Hyperelliptic Curves* (given by Trajan Hammonds and Ben Logsdon), Quebec-Maine Number Theory Conference, October 7, 2018.
- (31) *Fibonacci Quilt Game*, given by Alexandra Newlon, Neelima Borade, Annie Xu, Catherine Wahlenmayer, Conference for New England REUs, 7/23/19. Poster at Joint Math Meetings, January 2020.
- (32) *Generalizing Zeckendorf's Theorem to Homogeneous Linear Recurrences Speakers*, given by Clayton Mizgerd, Thomas Martinez and Chenyang Sun, Conference for New England REUs, 7/23/19.
- (33) *Fibonacci Quilt Game*, poster presented by Alexandra Newlon, Neelima Borade, Annie Xu, and Catherine Wahlenmayer, Young Mathematicians Conference, August 10, 2019. Poster at Joint Math Meetings, January 2020.
- (34) *Distribution of gaps in Zeckendorf Decompositions from d -dimensional Lattices*, given by Neelima Borade and Annie Xu, Young Mathematicians Conference, August 10, 2019.
- (35) *Gaps Of Summands of The Zeckendorf Lattice*, presented by SMALL 2019 and Eureka 2018, 19th International Fibonacci Conference, July 21, 2020.
- (36) *Completeness of Positive Linear Recurrence Sequences*, presented by SMALL 2020, 19th International Fibonacci Conference, July 21, 2020.
- (37) *Generalizing Zeckendorf's Theorem to non-constant coefficient recurrences*, presented by Eureka 2020 and Polymath REU, 19th International Fibonacci Conference, July 22, 2020.
- (38) *Asymptotic Analysis For Lattice Walks Derived From Zeckendorf Decompositions*, presented by CMU students and Eureka 2019, 19th International Fibonacci Conference, July 23, 2020.
- (39) *Generalizing Zeckendorf's Theorem to Homogeneous Linear Recurrences*, presented by Thomas Martinez, 19th International Fibonacci Conference, July 23, 2020.
- (40) *Completeness of Positive Linear Recurrence Sequences* (Fernando Trejos, John Lentfer, John Haviland, Ela Boldyriew, Phuc Lam), Northeast REU Math Conference, July 2020.
- (41) *Juggling Coefficients in Complete Recurrent Sequences* (Ela Boldyriew, Phuc Lam, John Lentfer), Young Mathematicians Conference, August 2020.
- (42) *Analytic Approaches to Completeness of Generalized Fibonacci Sequences* (Fernando Trejos Suarez, John Lentfer, John Haviland, Ela Boldyriew, Phuc Lam), Young Mathematicians Conference, August 2020.
- (43) *Bounding the Zeroing Algorithm: A Tool for Investigating Linear Recurrence Relations* (Jack Murphy), Young Mathematicians Conference, August 2020.

- (44) *Zeckendorf Games* (Kevin Ke, Carl Ye, Vashisth Tiwari), Northeast REU Math Conference, July 2020 and Young Mathematicians Conference, August 2020.
- (45) *Juggling Coefficients in Complete Recurrent Sequences* (given by Elzbieta Boldyriew, John Haviland, Phuc Lam, John Lentfer and Fernando Trejos Suarez), CANT 2021, 5/26/21.
- (46) *Complexity of the Zeckendorf Graph Game* (given by Ben Baily, Faye Jackson, Ethan Pesikoff), Young Mathematicians Conference, Ohio State, August 2021.
- (47) *A Stochastic Central Limit Theorem and Applications to Integer Decompositions* (given by Ben Bailey, Alicia Smith-Reina, Yingzi Yang), Young Mathematicians Conference, Ohio State, August 2021.
- (48) *The Bergman Game* (given by Faye Jackson, Ethan Pesikoff, Luke Reifenberg), Young Mathematicians Conference, Ohio State, August 2021; 20th International Fibonacci Conference, July 26, 2022.
- (49) *Winning Strategy of Two-Player, Multiplayer and Multialliance Generalized Zeckendorf Game* (given by Polymath 2021), Young Mathematicians Conference, Ohio State, August 2021.
- (50) *The Generalized Bergman game* (given by Faye Jackson and Luke Reifenberg), Combinatorial and Additive Number Theory, May 2022.
- (51) *The Far Difference Game* (given by SMALL 2022), 20th International Fibonacci Conference, July 25, 2022.
- (52) *Short-Range and Random Differences in the Number of Summands of Zeckendorf Decompositions* (given by SMALL 2022), 20th International Fibonacci Conference, July 25, 2022.
- (53) *On Zeckendorf Related Partitions Using the Lucas Sequence* (given by David Luo), 20th International Fibonacci Conference, July 28, 2022.
- (54) *Sums of Reciprocals of Recurrence Relations* (given by Sophia Davis, Alicia Reina Smith and Eliel Sosis), 20th International Fibonacci Conference, July 28, 2022.
- (55) *Continuing Analysis of the Zeckendorf Game* (given by SMALL 2022), 20th International Fibonacci Conference, July 28, 2022.
- (56) *S-Legal Index Difference Decompositions* (given by SMALL 2022), 20th International Fibonacci Conference, July 28, 2022.
- (57) *Generalizing Zeckendorf's Theorem to Homogeneous Linear Recurrences* (given by Clayton Mizgerd), 20th International Fibonacci Conference, July (pre-recorded), 2022.
- (58) *Generalized (c-k)-nacci Zeckendorf Game* (given by Carl Ye), 20th International Fibonacci Conference, July (pre-recorded), 2022.
- (59) *Walking to Infinity on the Fibonacci Sequence* (given by Nawapan Wattanawanichkul), 20th International Fibonacci Conference, July (pre-recorded), 2022.
- (60) *Generalizing Minimality Properties of Far-Difference Fibonacci Decompositions* (given by Andrew Keisling and Jacob Lehmann), Young Mathematicians Conference August 13, 2022.
- (61) *Random and Maximal Lengths of Zeckendorf Games* (given by Guilherme Dantas and Prakod Ngamlamai), Young Mathematicians Conference August 14, 2022.
- (62) *Short-Range Differences of the Number of Summands of Zeckendorf Decompositions* (given by Guilherme Dantas, Xuyan Liu and Jack Miller, Young Mathematicians Conference August 14, 2022.

More Sum Than Difference Sets (40)

- (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.
- (17) *Phase Transitions in the Distribution of Missing Sums and a Powerful Family of MSTD Sets* (with Hung Viet Chu, Noah Luntlaza, Lily Shao and Victor Xu), Integers 2018, Augusta, Georgia, October 4, 2018.
- (18) *Distribution of Missing Sums in Correlated Sumsets*, given by Thomas Martinez, Dylan King and Chenyang Sun, Conference for New England REUs, 7/23/19 and the Young Mathematicians Conference, August 10, 2019. Poster given by Dylan King, Joint Math Meetings, January 17, 2020 (won an Outstanding Poster award) and also at CANT, June 5, 2020.
- (19) *Distribution of missing differences in diffsets* (given by Fei Peng), CANT June 5, 2020.
- (20) *Constructions of Generalized MSTD Sets in Higher Dimensions* (Elena Kim, John Lentfer, John Haviland, Phuc Lam, Fernando Trejos Suarez), Young Mathematicians Conference, August 2020.
- (21) *More Sums Than Differences Sets in Finite Non-Abelian Groups* (John Haviland, John Lentfer, Elena Kim, Phuc Lam, Fernando Trejos Suarez), Young Mathematicians Conference, August 2020.
- (22) *Large sets are sumsets* (given by Ben Baily and Henry Fleischmann), Combinatorial and Additive Number Theory, May 2022.
- (23) *Sum and Difference Sets in Semidirect Products of Groups* (given by Matthew Phang and Andrew Keisling), Young Mathematicians Conference August 13, 2022.

Ramsey Theory (7)

- (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.
- (6) *Ramsey Theory over Number Fields, Finite Fields and Quaternions*, CANT, May 26, 2017.
- (7) *Avoiding 3-term Geometric Progressions in Non-Commutative Settings* (Polymath Ramsey Group), Polymath REU Conference, August 13, 2022.

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.

Erdos Distance Problems (11)

- (1) *Sharpness Of Falconer's Incidence Theorem In Higher Dimensions* (given by Eli Goldstein and Jonathan DeWitt), Young Mathematicians Conference, Ohio State, August 21, 2015.
- (2) *Classification of All Crescent Configurations on Four and Five Points*, given by Rebecca Durst and Magda Hlavacek (and Chi Huynh at JMM), Young Mathematicians Conference, Ohio State, August 2016; AMS-MAA-SIAM Special Session on Research in Mathematics by Undergraduates and Students in Post-Baccalaureate Programs, III, JMM, Atlanta, Jan 7, 2017.
- (3) *Classification of Crescent Configurations on Four and Five Points* (given by Chi Huynh), University of West Georgia, October 8, 2016.
- (4) *Crescent Configurations In Non-Euclidean Norms*, given by Sara Fish, Dylan King, Catherine Wahlenmayer, Conference for New England REUs, 7/23/19. Young Mathematicians Conference, August 9, 2019. Maine-Québec Number Theory Conference, October 5, 2019.
- (5) *Tinkering with Lattices: A New Take on the Erdos Distance Problem* (Elena Kim, Fernando Trejos Suarez, Jason Zhao), Young Mathematicians Conference, August 2020. Quebec-Maine Number Theory Conference, September 26, 2020.
- (6) *Thresholds for the Existence of Similar Area Configurations* (given by Ben Bailey and Arian Nadjimzadah), Young Mathematicians Conference, Ohio State, August 2021.
- (7) *Extending Erdos Distinct Distance Problems to Angles* (given by Henry Fleischmann Hongyi Hu), Young Mathematicians Conference, Ohio State, August 2021.
- (8) *Angle variants of the Erdos distinct distance problem* (given by Henry Fleischmann and Ethan Pesikof), Combinatorial and Additive Number Theory, May 2022.
- (9) *Distinct Angles and Angle Chains in Three Dimensions* (given by Ruben Ascoli and Jacob Lehmann Duke), Young Mathematicians Conference August 14, 2022.
- (10) *Learning Spheres and Chains in \mathbb{F}_q^d* (given by Wyatt Milgrim and Ryan Jeong), Young Mathematicians Conference August 14, 2022. Symposium for Undergraduate Mathematics Research (SUMR), SUNY New Paltz, September 10, 2022.

Miscellaneous Number Theory and Harmonic Analysis (15)

- (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) *Near-perfect, within-perfect, and order-a-abundant numbers*, given by Adam Lott Chung and Hang Kwan, Young Mathematicians Conference, Ohio State, August 2016.

- (7) *Within-perfect & near-perfect numbers* (with Kevin Kwan), Combinatorial and Additive Number Theory (CANT) 2018, May 22, 2018.
- (8) *Recent progress in sumsets, generalized Schreier sets, generalized Zeckendorf decompositions, and prime and square-free walks* (with Joshua Ackerman, Tudor Popescu, Zimu Xiang), CANT May 23, 2019.
- (9) *Extensions of Autocorrelation Inequalities with Applications to Additive Combinatorics*, given by Sara Fish and Dylan King, Young Mathematicians Conference, August 10, 2019.
- (10) *Prime walk (Walking to Infinity Along Some Number Theory Sequences)* (given by Fei Peng, Tudor Popescu), Young Mathematicians Conference, Ohio State, August 2021.
- (11) *A Novel Generalization of Diophantine m -tuples in Finite Fields* (given by Arjun Nigam, Kyle Onghai, Dishant Saikia, Lalit Sharma), Young Mathematicians Conference, Ohio State, August 2021.
- (12) *Reducibility of Sets in Generalized Settings* (given by Justine Dell, Henry Fleischmann, Faye Jackson), Young Mathematicians Conference, Ohio State, August 2021.

Sabermetrics (21)

- (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, August 12, 2016, and August 10, 2018. University of Vermont, December 2, 2016. Developer Thursdays at Cloud85, Lever, North Adams, June 8, 2017. University of Michigan, November 29, 2017. Greylock Talks, December 19, 2017.
- (2) *Pythagoras on the Ice*, Babson Hockey Analytics Conference, Babson, October 1, 2016.

Colloquium / General Talks (mostly Random Matrix Theory and Number Theory) (67)

- (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. Yale University, October 8, 2018.
- (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. Virginia Tech, April 6, 2018.
- (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. SMALL Faculty Talk, Williams College, July 27, 2016 and July 5, 2017. SUMS, Brown University, March 18, 2017.
- (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. Williams SMALL REU, July 26, 2017. TCNJ Math Camp, July 29, 2017. Williams College March 9, 2020.
- (24) *Egg Drop Mathematics: It *IS* all it's cracked up to be*, TCNJ Math Camp, July 17, 2017 and July 29, 2017; July 14, 2019. Math Circle, Ann Arbor, Michigan, November 30, 2017.
- (25) *From \mathbb{C} to Shining Sea: Complex Dynamics from Combinatorics to Coastlines*, Williams in Mystic Program, October 20, 2017. Michigan Math Club, April 30, 2020.
- (26) *The German Tank Problem: Math/Stats At War*, University of Connecticut Math Department Awards Dinner, April 26, 2019. Hampshire College, July 8, 2019. PROMYS, August 7, 2020. Penn State, October 29, 2020. UNC Greensboro REU, June 9, 2022. *Generalizing the German Tank Problem: Math/Stats at War!* (given by Anthony Lee), AISC Conference at UNC Greensboro, October 8, 2022.
- (27) *Introduction to Error Detection and Correction*, TCNJ Math Camp, July 14, 2019; MathFest, August 1, 2019. TCNJ Math Camp, July 28, 2019. Hampshire College, June 30, 2021. University of Michigan Math Club, October 1, 2021.
- (28) *Extending Virus Dynamics to k-level Star-Like Graphs* (Akihiro Takigawa, Jack Murphy, Rodrigo Bravo), Young Mathematicians Conference, August 2020.
- (29) *Prime Walks to Infinity in $\mathbb{Z}[\sqrt{2}]$* (Daniel Sarnecki and Bencheng Li), Northeast REU Math Conference, July 2020, and Young Mathematicians Conference, August 2020.
- (30) *Analyzing Virus Dynamics on k-level Starlike Graphs* (with Akihiro Takigawa), Spring 2021 AMS Eastern Sectional Meeting: Special Session on Applications and Asymptotic Properties of Discrete Dynamical Systems: A Session in Honor of the Retirement of Orlando Merino.
- (31) *Lessons I've learned (many the hard way)*, Baruch REU July 6, 2021 and Polymath Jr REU July 8, 2021.
- (32) *From Monovariants to Zeckendorf Decompositions and Games, and Random Matrix Theory*, Williams College, July 14, 2021.
- (33) *From Monovariants to Zeckendorf Decompositions and Games, and Random Matrix Theory*, Texas Tech, July 29, 2021.
- (34) *Connections of Class Numbers to the Group Structure of Generalized Pythagorean Triples* (with Thomas Jaklitsch, Thomas Martinez, and Sagnik Mukherjee), International Conference on Class Groups of Number Fields 2021, October 21, 2021.

Education (64)

- (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 and July 30, 2017. Prospective Days, Williams College, August 11, 2017. Williamstown Elementary School, October 1, 2018. TCNJ Math Camp, July 29, 2019.
- (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.
- (23) *Portable Lecture Capture*, LACOL Teaching with Tech 2017 Lightning Round, Vassar College, June 15, 2017.
- (24) *Where's my remote? Shared upper level math courses across schools*, LACOL 2017 Session 7, Vassar College, June 16, 2017.

- (25) *Continuing High School Math Education Lectures*, Wellesley High School, Part I 10/13/17, Part II 12/15/17, Part III 1/29/17.
- (26) *Where's my remote? Shared upper level math courses across schools*, AMS-MAA Special Session: Novel Methods of Enhancing Success in Mathematics Classes, Joint Mathematics Meeting, San Diego, January 10, 2018.
- (27) *SNAP DECISIONS: Management Lessons Learned from Legos*, Lever, North Adams, January 25, 2018.
- (28) *Where's the Remote? Upper-Level Math/Stats Hybrid Course Sharing for the Liberal Arts* (with Jingchen (Monika) Hu), EDUCAUSE Learning Initiative (ELI) Annual Meeting, New Orleans, January 30, 2018.
- (29) *Solving the Rubik's cube*, Pittsfield Public Library, May 19, 2018.
- (30) *Exploration into a Framework for Digitally Shared Courses* (with Liz Evans, Lioba Gerhardi and Monika Hu), LACOL Workshop, Carlton College, June 1, 2018.
- (31) *From Zombies to Fibonacci: An Introduction to the Theory of Games*, TCNJ Math Camp, July 16 and 29 (Part I) and 17 and 30 (Part II), 2018. Hampshire College, July 24, 2018.
- (32) *Better Together: Chapters and Associations of PBK*, 45th PBK Triennial, Boston, August 4, 2018.
- (33) *REU: The Value of a Research Experience*, panelist at the Math Alliance Field of Dreams Conference, St Louis, November 3, 2018.
- (34) *Summer Data Science (online): By and for the liberal arts*, panelist in discussion on an online class co-teaching, LACOL Data Science Workshop, June 6, 2019.
- (35) *Introduction to Cryptography: Alphabet codes*, VCTAL, Champlain College, June 19, 2019.
- (36) *Introduction to Cryptography: RSA*, VCTAL, Champlain College, June 19, 2019.
- (37) *Introduction to Error Detection and Error Correction*, VCTAL, Champlain College, June 19, 2019.
- (38) *Computational Mathematics Lectures*, Continuing Education Session, Albany, November 9, 2019.
- (39) *Funding Opportunities for Research*, panelist at the Field of Dreams Conference, St Louis, November 15, 2019.
- (40) *Engaging students in research in the covid pandemic*, Cross Atlantic Representation Theory and Other Topics Online (CARTOON), May 30, 2020.
- (41) *The role of Academia in Entrepreneurship*, Techpreneur Radio, June 1, 2020.
- (42) *All I need to know about probability I learned from Darth Vader and James Bond*, Hampshire College Institute for Summer Studies in Mathematics, August 3, 2020.
- (43) *Why I love Monovariants: From Zombies to Conway's Soldiers via the Golden Mean*, Math Club, University of Michigan, September 10, 2020. Williams College, October 13, 2021.
- (44) *CUR-Goldwater Faculty Mentor Award*, May 12, 2021, Expanded Version.
- (45) *Computational Thinking Modules: From Data to Results (through chocolate!)*, STANYS (Science Teachers of New York State) Conference: November 7, 2021.
- (46) *The Fibonacci Sequence and Math Outreach*, 20th International Fibonacci Conference, July 29, 2022.
- (47) *Why I love Monovariants: From Zombies to Conway's Soldiers via the Golden Mean*, Baruch College, August 4, 2022.
- (48) *Modeling Beyond the Classroom: Linking Students and Industry*, Integrating Math Modeling and Interdisciplinarity into Your Classroom, MathFest, August 5, 2022.
- (49) *Why I love Monovariants: From Zombies to Conway's Soldiers to Fibonacci Games*, AMS Eastern Sectional, UMass Amherst 10/1/22. University of Pittsburgh, 11/10/22.

Programming (4)

- (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.
- (3) *YouTube University II: Shared upper level math courses across schools*, Joint Math Meetings, AMS Special Session on Pedagogical Innovations That Lead to Successful Mathematics, Denver, Jan 16, 2020. (online: <https://youtu.be/rjn1sn3WLZg>)
- (4) *From Zombies to Fibonacci: An Introduction to the Theory of Games I and II*, Michigan Math Circle, April 23 and 30, 2020.

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) Serving on the Mt Greylock Regional School Committee and the Transition Committee. Successfully changed the formula for capital project assessments b/w Lanesborough and Williamstown, which helped get the high school building project passed. Also figured out a way to fairly divide state aid in our full regionalization. Previously had three school districts: an elementary school in each town, and the high school; interestingly this results in FOUR committees! We are now at 1, but we want each town to have control of its elementary school’s budget. Right now about \$3.5 million of the \$21 million budgets of the three schools come from Chapter 70 aid from the state; however, upon regionalizing the state no longer tells us how much goes to each school, as they want us to treat all buildings equally. Doing this means, for the same level of service, Williamstown would pay about \$360,000 more and Lanesborough \$480,000 less for the same services; this would not have passed (nor should it!). I figured out how to well-approximate the state’s hidden formula; my predictions for 2018 were off by less than \$10,000 per school, well within the \$200,000 in additional savings we expect to get.
- (5) For years I have recorded all my classes and posted on YouTube, and have occasionally had students from other schools, alumns, or even Williams students who wanted to take something else at the same time slot as well take my classes remotely. I am working with LACOL (the Liberal Arts Consortium for Online Learning) to modify this program and expand it to include many classes at our schools. I led the first beta test, integrating new technology to have the remote students having as good an experience as possible, and am currently the chair of the sub-group.
- (6) 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; (2) a module on streaming information; (3) a module on randomness.
- (7) Invited participant: Institute for Mathematics & Education: Mathematicians in Mathematics Education Workshop: March 20-22, 2008 and April 25-27, 2010.
- (8) 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.
- (9) Wrote and reviewed exam questions for the American Mathematics Competitions, 2008 – present.
- (10) 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.
- (11) Judge of a math competition at the Berkshire Hills Regional School District (2012).
- (12) Visited and gave lectures at Norwood Middle School in Massachussets (2012).
- (13) Visited and gave lectures at the Brooks School in North Andover, Massachussets, and was a one-man visiting committee for their math department (2012).
- (14) 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.
- (15) 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.
- (16) Wrote a problem for Math Horizons with Stan Wagon (Self-referential probability, 23:2 (Nov 2015) 30).
- (17) 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).

- (18) 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.
- (19) Run numerous undergraduate research sessions at AMS Sectional Meetings and a Joint Meetings.
- (20) SMALL REU Director at Williams (2013 - 2014, 2016 - present), wrote the current and pending grant proposals with Cesar Silva.
- (21) Designing math courses to accelerate middle and high school students, including Algebra II and a Calculus sequence to be completed concurrent with pre-Calculus.

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

Standard Classes and Winter Study Classes

| | |
|--|--|
| Graduate Linear Algebra | Ohio State (Summer 2004) |
| Advanced Analysis | Williams College (Fall 2014) |
| <i>L</i> -Functions and Sphere Packing (Fall 2020) | |
| Advanced Applied Analysis | Williams College (Fall 2017) |
| Analysis and Number Theory | Williams College (Spring 2009, Fall 2010) |
| Complex Analysis | Williams (Fall 2010, 2013, 2015, 2017, 2020, 2021) |
| Operations Research | Williams (Fall 2014, Fall 2016, Fall 2019) |
| Advanced Applied Linear Algebra | Williams College (Fall 2012) |
| Linear Programming | Mount Holyoke College (Spring 2012) |
| Probability | Williams (Fall '09, '12, '13, '15, '16, '19, Spring '15) |
| | 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) |
| Mathematics of Pandemics (Fall 2020) 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 (Springs 2010, '11 – '14, '18, '20 – '22) |
| Freshman Seminar | Brown (Spring 2006) |
| (From Riddles to Modern Mathematics) | |
| Reading Classics Working Group | Ohio State (with V. Bergelson & W. Sinnott, '03–'04) |
| 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) |
| The Mathematics of Lego Bricks (Winter 2014, 2015, 2016, 2017) | |
| The Science of Star Trek (Winter 2015, 2017) | |
| Student Run College Coffee Houses (Winter 2017) | |

Advising Experience

I have supervised 400+ 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; I have also guided numerous high school students in research, usually leading to publications. I have mentored many graduate students and post-docs in designing undergraduate research programs, having them run REU groups with me. In 2020 I was honored with the CUR-Goldwater Scholars Faculty Mentor Award and in 2021 the Churchill Advisor Award, and in 2020 with several colleagues I created the first ever Polymath REU program (and ran two groups). Below are some representative examples of activities.

Graduate dissertations: Committee member. 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). Committee member for Ezra Waxman (Tel Aviv).

Undergraduate dissertations (Williams): Supervised (25) 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), Irfan Durmic (Benford's law), Becky Durst (Benford's law), Cameron Edgar (sabermetrics), Carson Eisenach (operations research / sabermetrics), Alyssa Epstein (Game Theory), 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), Akihiro Takigawa (virus propagation), Hallee Wong (Medical Statistics), Wentao Xiong (Random Matrix Theory). Second reader for many dissertations, advised many others at Princeton.

Guided Research Classes / Programs / Independent Studies

| | |
|------------|---|
| Williams | Independent study in Complex Analysis (3 students, Fall 2020) |
| Williams | Independent study in Multivariable Calculus (2 students, Fall 2020) |
| Williams | Independent study in Statistics and Medical Modeling (1 student, Spring 2020) |
| Williams | Independent study in Operations Research (1 student, Spring 2019) |
| Williams | Independent study in Number Theory (1 student, Winter 2019) |
| Williams | Independent study on Solution Design / consulting (1 student, Winter 2018) |
| Williams | Independent study on student run businesses (1 student, Winter 2017) |
| 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.

- 2021 Faculty mentor to 16 undergraduates in SMALL math research program (summer, Williams).
Faculty mentor to 20 students from Purdue in applied math consulting projects.
Ran 10 Polymath Jr REU projects with 40+ students.
- 2020 Faculty mentor to 14 undergraduates in SMALL math research program (summer, Williams).
Faculty mentor to 12 high school research students, 45 Polymath Jr REU students.
- 2020 - present Created with colleagues the Polymath Jr REU:
<https://geometrynyc.wixsite.com/polymathreu>
- 2019 - present Created and helped run summer online Introduction to Data Science class (LACOL).
- 2019 Faculty mentor to 13 undergraduates in SMALL math research program (summer, Williams).
Faculty mentor to 11 high school students in math research (summer, Williams).
- 2019 Volunteered for one week at the University of Michigan Math Corps for middle and high school summer students.
- 2018 Faculty mentor to 10 undergraduates in SMALL math research program (summer, Williams).
Faculty member to one post-doc and one graduate student assisting in summer program.
Faculty research mentor to 10 high school students in program.
- 2017 Mentor to 9 undergraduates, 1 graduate student in SMALL math research program (summer, Williams).
- 2016 - 2019 Created problems for the Newsletter of the European Mathematical Society (3x).
- 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.

- 2022 - 2023 Thesis advisor to Sasha Shashkov (analytic number theory), Chenyang Sun (operations research).
Faculty advisor to 3 colloquia: Jack Murphy (Fibonacci numbers), Rachel Nguyen (quantum computing), Maria Chapman (mathematics of sports).
- 2021 - 2022 Thesis advisor to Irfan Durmic (Benford's law), Palak Prashant (Purdue; Linear Programming).
Faculty advisor to 2 colloquia: Brianna Hill (hockey implicit bias), Zawwad Maan (Cantor meets Fibonacci).
- 2020 - 2021 Thesis advisor to Cameron Edgar (sabermetrics) and Akihiro Takigawa (virus modeling).
Faculty advisor to 2 colloquia: Bryan Wooley (signed statistics), Aayushi Pramanik (covid), Evan Kauffman.
- 2020 Advisor to Roger Weng and Nancy Jiang in Yao High School Math Competition.
- 2019 - 2020 Masters thesis advisor of Trajan Hammonds (Carnegie Mellon).
Advisor to Michelle Wu in Yao High School Math Competition (2nd place in US, honorable mention overall).
Faculty advisor to 5 colloquia: Matt Zappe (virus on graphs), Will Howie (Arrow's Theorem), Gyung Hyun Je (Multi-armed Bandits), Giebien Na (irrationality), Andrew Matthew (Monte Carlo).
- 2018 - 2019 Faculty advisor to 4 colloquia: Katherine Blake (Sudoku), Jianing Tu (Benford's Law), Ryan Taylor (sabermetrics), George Clark (German Tank Problem), Kellen Hatheway (Museum Guard).
External reviewer, dissertation at Addis Ababa University.
- 2017 - 2018 Thesis Advisor: Alyssa Epstein (Zeckendorf Games), Hallee Wong (Machine Learning).
Faculty advisor to 6 colloquia: Jahangir Habib (Benford's Law), Tim Randolph (Ramsey Theory), Sean Wang (shuffling), Karan Tibrewal (Twin Primes), Nathan Anderson (randomness), Thomas Rosal (finance).
- 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 6 colloquia: Intekhab Hossain (Game Theory), Matthew Thomas (Isoperimetric), Kimthanh Nguyen (Number Theory), Reidar Riveland (mathematical neuroscience), Alex Gonye (German tank problem), Kathryn Leinbach (Gale-Shapley), Jamie Lesser (Buffon's needle), Phillip Oung (Lagrange 4 squares).
- 2015 - 2016 Thesis Advisor: Lawrence Luo (MSTD sets).
Faculty advisor to 6 colloquia: Joel Lee (Digits of π), 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 Iafrate (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 Iafrate (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;

- 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

- 2020 - present Editor, Involve
- 2019 - present Editor, The PUMP Journal of Undergraduate Research
- 2018 - present Member of the Fibonacci Association Board
- 2018 - present Managing Editor, Journal of Number Theory
- 2017 - present Member of the LACOL math/stat steering group.
- 2017 - 2020 Member of the Arnold Ross Lecture Series Committee (chair 2019).
- 2017 - 2018 Interim Editor-in-Chief, Journal of Number Theory
- 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 - 2017 Editor, American Mathematical Monthly (problem section).
- 2015 - 2018 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 - 2017 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
- 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=aMorrih4Egs&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/sjmiller/public_html/ntandrmt/index.htm

Williams College Service

- 2016 - present Director, Williams College SMALL REU, co-wrote pending grant proposal.
- 2016 Math representative on DRFC.
- 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 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 Advisory 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 Multiple lawsuits involving sabermetrics / baseball.
- 2016 - present Working with a regional healthcare provider on service questions.
- 2016 Consultant to a financial firm on effectiveness of assignments.

Referee Service

Referee Service (398 papers, 121 journals / book series, 4 conference proceedings, 2 books)

- (1) 2020 ACM-SIAM Symposium on Discrete Algorithms (SODA)
- (2) Abstract and Applied Analysis (3)
- (3) Acta Arithmetica (4)
- (4) Acta Mathematica (1)
- (5) Advances in Difference Equations (2)
- (6) Advances in Pure Mathematics (1)
- (7) AIMS Mathematics (1)
- (8) Albanian Journal of Mathematics (1)
- (9) Algebra & Number Theory (5)
- (10) American Mathematical Monthly (23)
- (11) Analytic Number Theory: In honor of Helmut Maier's 60th birthday, Springer-Verlag (2: book chapters, one with a student)
- (12) Annals of Combinatorics (2)
- (13) Annals of Mathematics (2)
- (14) Annals of Applied Statistics (2)
- (15) Applied Mathematics and Computation (1)
- (16) Ars Combinatoria (2)
- (17) Aquatic Botany (1)
- (18) British Journal of Mathematics & Computer Science (4) (once with students)
- (19) Bulletin of the Australian Mathematical Society (1)
- (20) Bulletin of the Institute of Combinatorics and its Applications (1)
- (21) Canadian Journal of Mathematics (2)
- (22) Canadian Mathematical Bulletin
- (23) Carpathian Journal of Mathematics (1)
- (24) Central European Journal of Mathematics (2)
- (25) Chaos, Solitons & Fractals (1)
- (26) College Mathematics Journal (10)
- (27) Colloquium Mathematicum (1)
- (28) Communications in Algebra (1)
- (29) Communications in Number Theory and Physics (1)
- (30) Compositio Mathematica (9)
- (31) Contemporary Mathematics (1; Proceedings of the Constructive Functions 2014 Conference)
- (32) Crelle's journal: Journal für die reine und angewandte Mathematik (1)
- (33) Cryptography and Communications (1)
- (34) Discrete Mathematics (1)
- (35) Discrete Mathematics & Theoretical Computer Science (1)
- (36) Duke Mathematical Journal (2)
- (37) Econometrics (1)
- (38) Electronic Communications in Probability (1)
- (39) Electronic Journal of Probability (1)
- (40) Experimental Mathematics (7)
- (41) Far East Journal of Mathematical Sciences (1)
- (42) Fibonacci Quarterly (35, 10x with students)
- (43) Forum Mathematicum (1)
- (44) Foundations for Undergraduate Research in Mathematics (1 chapter)
- (45) Functiones et Approximatio (1)
- (46) GAFA (1)
- (47) Hacettepe Journal of Mathematics and Statistics (1)
- (48) INTEGERS (4)
- (49) International Journal of Mathematics and Mathematical Research (1)
- (50) International Journal of Number Theory (8)
- (51) International Mathematics Research Notes (4)
- (52) International Journal of Textile Science and Engineering (1)
- (53) Involve (1)

- (54) ISRN Computational Mathematics (1)
- (55) Journal of Applied Probability/Advances in Applied Probability (2)
- (56) Journal of Approximation Theory (1)
- (57) Journal of the American Mathematical Society (1)
- (58) Journal of Combinatorial Mathematics and Combinatorial Computing
- (59) Journal of Economic Behavior & Organization (1)
- (60) Journal of the European Math Society (1)
- (61) Journal of the Indian Statistical Association (1)
- (62) Journal of the Indian Mathematical Society (1)
- (63) Journal of Information Security and Applications (1)
- (64) Journal of the London Mathematical Society (3)
- (65) Journal of Mathematical Analysis and Applications (2)
- (66) Journal of Mathematical Physics (1)
- (67) Journal of Number Theory (77, 7x times with students)
- (68) Journal of Physics A: Mathematical and Theoretical (3)
- (69) Journal of Quantitative Analysis of Sports (5)
- (70) Journal of the Ramanujan Mathematical Society (3)
- (71) Journal of Sports Economics (2)
- (72) Journal of Theoretical Probability (5)
- (73) Journal of Universal Computer Science (1)
- (74) Linear Algebra and its Applications (1)
- (75) London Mathematical Society (1)
- (76) Mathematica Slovaca (1)
- (77) Mathematical Physics (1)
- (78) Mathematics (3)
- (79) Mathematics of Computation (3)
- (80) Mathematical Physics, Analysis and Geometry (1)
- (81) Mathematics Magazine (20)
- (82) Mathematical Proceedings of the Cambridge Philosophical Society (1)
- (83) Mathematical Research Letters (1)
- (84) Memoirs of the AMS (1)
- (85) Michigan Math J. (1)
- (86) Monatshefte für Mathematik (1)
- (87) New York Journal of Mathematics (4)
- (88) Notes on Number Theory and Discrete Mathematics (1)
- (89) Notices of the AMS (2)
- (90) OALib (1, with students to show the dangers of open access pay journals)
- (91) Pacific Journal of Mathematics (1)
- (92) Physica A: Statistical Mechanics and its Applications (4)
- (93) Physical Review & Research International (1)
- (94) Pi Mu Epsilon (7)
- (95) Plus One (2)
- (96) Proceedings for a 60th Birthday Conference (1)
- (97) Proceedings of the XIVth International Conference on Fibonacci numbers (1)
- (98) Proceedings of the AMS (4)
- (99) Proceedings of the National Academy of Sciences of the United States of America (1)
- (100) Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences (2)
- (101) Proceedings of a Thematic Semester at CRM (1)
- (102) PUMP Journal of Undergraduate Research (4)
- (103) Punjab University Journal of Mathematics
- (104) Pure and Applied Mathematics Quarterly (1)
- (105) Quarterly Journal of Mathematics (1)
- (106) Ramanujan Journal (4)
- (107) Random Matrices: Theory and Applications (5)
- (108) Research in Number Theory (3)
- (109) Revista de la Real Academia de Ciencias Exactas, Físicas y Naturales. Serie A. Matemáticas (1)
- (110) Rocky Mountain Journal of Mathematics (4)

- (111) Rose-Hulman Undergraduate Mathematics Journal (1)
- (112) ScienceAsia - Journal of the Science Society of Thailand (1)
- (113) Selecta Mathematica (1)
- (114) S \vec{e} MA Journal (2, 1 with students)
- (115) SIAM Journal on Discrete Mathematics (1)
- (116) Simons Collection (1)
- (117) Social Networks and the Economics of Sports (1: book chapter)
- (118) SpringerPlus (2)
- (119) Statistical Science (1)
- (120) Statistics and Probability Letters (5)
- (121) Stats (2)
- (122) Stochastic Processes and their Applications (1)
- (123) Transactions of the American Mathematical Society (3)
- (124) 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 (five times), also reviewed proposal in applied math, also reviewed postdoc fellowship proposals.
- (3) Research proposals Austrian Science Fund.
- (4) Research proposals for CUNY.
- (5) Research proposals for the Natural Sciences and Engineering Research Council of Canada.
- (6) Research proposals for the NSA (five times).
- (7) Research proposal for NOW Domain Science.
- (8) Research proposals for the Swiss National Science Foundation.
- (9) Research proposals for Nazarbayev University.

Editorial Service

- (1) Journal of Number Theory: Managing Editor (Interim Editor-in-Chief Emeritus).
- (2) AMSTEXT Editorial Committee: 45 books.
- (3) Carus Editorial Committee: 5 books.
- (4) Problem Editor, Pi Mu Epsilon.
- (5) Editor, Involve.
- (6) Editor, The PUMP Journal of Undergraduate Research
- (7) AMS: 2 books
- (8) Cambridge University Press: 2 book.
- (9) CRC: 3 books
- (10) Taylor and Francis: 1 book.
- (11) Springer: 1 book.
- (12) Former Editor, Notices of the AMS (2016–2018).
- (13) Problem Editor, American Mathematical Monthly (2015 – 2017).

Review Service: 284 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) B. Bajnok, *Additive Combinatorics: A Menu of Research Problems*, CRC Press, Boca Raton, FL, 2018, 390 pages; joint with Dylan A. King, Thomas C. Martinez, and Chenyang Sun, book review for The American Mathematical Monthly.
- (2) E. Bombieri and W. Gubler, *Heights in Diophantine Geometry*, book review for Siam Review.
- (3) 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.
- (4) F. Dyson, *Maker of Patterns (An Autobiography Through Letters)*, Liveright, 2018, 416 pages, book review for the Notices of the American Mathematical Society.

- (5) 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).
- (6) 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 (thrice).
- (4) Book proposal for Cambridge University Press.
- (5) Book proposal for CRC Press (thrice).
- (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 (twice).