DANIEL MILLER

(+1) 402.512.4475 | daniel.keegan.miller@gmail.com | www.math.cornell.edu/~dkmiller

Research interests

Statistics on compact Lie groups and its connections to the analytic properties of Dirichlet series. The recently-proved Sato–Tate Conjecture predicts the distribution of the set of Frobenius eigenvalues of an elliptic curve, but not the rate at which the set of Frobenii converges to the predicted distribution. I am working on providing strong computational evidence for a stronger conjecture, due to Akiyama–Tanigawa, that predicts this rate of convergence. This involves creating and implementing new algorithms for computing the discrepancy of large sequences of points in low dimensions. I am also linking their conjecture to the analytic properties of Dirichlet series that can be constructed from arbitrary equidistributed sequences in compact Lie groups. This involves using Diophantine approximation to construct sequences with slowly decaying discrepancy, but very small exponential sums.

Education

Ph.D. in Mathematics, Cornell University *August 2012–May 2017*

- Dissertation topic: Discrepancy on compact Lie groups, Dirichlet series, and the strong Sato–Tate conjecture
- Adviser: Ravi Ramakrishna
- Won the Eleanor Norton York Award for excellent collaboration and rapid research progress.

M.S. in Computer Science, Cornell University *August 2015–May 2017*

- Managed the creation of a location-centric auction site written in C# and hosted on Azure.
- Collaborated in writing a CPU scheduler and gossip-based networking protocol in C.

B.S. in Mathematics, University of Nebraska Omaha *August 2009–August 2012*

- Minored in Computer Science, graduated *summa cum laude*, GPA 4.0.
- Dean's List all semesters, Highest Honors in Mathematics, with senior thesis.

Publications

Casey Kelleher, Daniel Miller, Trenton Osborn, and Anthony Weston. *Strongly non-embeddable metric spaces*. Topology Appl. **159** (2012), no.3, 749–755.

Casey Kelleher, Daniel Miller, Trenton Osborn, and Anthony Weston. *Polygonal equalities and virtual degeneracy in L_p spaces*. J. Math. Anal. Appl. **415** (2014), no.1, 247–268.

Conference talks

2013	Modular curves of infinite level [after Jared Weinstein]	SUNY Binghamton
2013	Perfectoid spaces	University of Nebraska
2014	Average ranks of Selmer groups and maximal isotropic subspaces [after Bjorn Poonen]	SUNY Buffalo

Teaching experience

2013	Teaching assistant for MATH 1220: Honors Calculus II
2014	Teaching assistant for MATH 2220: Multivariable Calculus
2014	Teaching assistant for MATH 1220: Honors Calculus II
2015	Grader for MATH 6320: Graduate Algebra II
2015	Grader for MATH 6310: Graduate Algebra I
2016	Czar's assistant for MATH 1110/1120: Calculus I/II
2016	Grader for MATH 3040: "Prove it!"

Other talks

2012	Algebraic topology in positive characteristic	Cornell University
2013	Taniyama-Shimura, the $R = \mathbf{T}$ theorem and Fermat–Wiles	Cornell University
2013	Towards perfectoid spaces	Cornell University
2013	A bestiary of Frobenii	Cornell University
2013	Sheaves and forcing	Cornell University
2013	The Weil Conjectures for dummies	Cornell University
2013	Taniyama–Shimura revisited	Cornell University
2014	L-functions and equidistribution in number theory	Cornell University
2014	Perfectoid spaces I: history and motivation	Cornell University
2014	Perfectoid spaces II: recent applications	Cornell University
2014	Automorphic representations and deformation theory in arithmetic geometry	Cornell University
2014	A brief tour of Grothendieck–Teichmüller theory	Cornell University
2014	Local Langlands for GL(n) over p-adic fields [after Peter Scholze]	Cornell University
2015	(p-adic) Hodge theory and period rings	Cornell University
2015	Torsion in the cohomology of arithmetic groups	Cornell University

Graduate Coursework

Algebraic number theory, Algebra I&II, Algebraic geometry, Algebraic topology, Arithmetic of curves, Automorphic forms, Cloud computing, Commutative algebra, Lie algebras, Non-Archimedean geometry, Toric varieties, Perverse sheaves, Ranks of elliptic curves, Real analysis, Smooth manifolds, Homological algebra, Linear algebraic groups, Principles of distributed systems.

Relevant skills

Code: Python, Sage, LaTeX, Java, C#, ASP.NET, and C.

Reference

Ravi Ramakrishna, Chair of Cornell University Mathematics Department, (+1) 607.257.6972, ravi@math.cornell.edu.