

CURRICULUM VITAE

Will Sawin

ETH Institute for Theoretical Studies
ETH Zurich
8092 Zurich
william.sawin@math.ethz.ch

PROFESSIONAL EXPERIENCE

- Clay Foundation** *July 2018 - present*
Clay Fellow
- Columbia University** *July 2018 - present*
Assistant Professor
(tenure-track)
- Institute for Theoretical Studies – ETH Zurich** *September 2016 - June 2018*
Junior Fellow
(postdoctoral research position)

EDUCATION

- Princeton University** *June 2016*
Ph.D. in Mathematics
Advisor: Nicholas M. Katz
Topic: A Tannakian Category and a Horizontal Equidistribution Conjecture for Exponential Sums
- Yale University** *June 2011*
B. S. in Mathematics and Economics with Honors

Awards

- NSF Graduate Research Fellowship**
awarded September 2013
- Clay Fellowship**
awarded July 2018

PUBLICATIONS

- *The Growth Rate of Tri-Colored Sum-Free Sets*, Discrete Analysis:13 (2018) (with Robert Kleinberg and David E. Speyer)
- *Ramanujan Coverings of Graphs*, Advances in Mathematics, **323**, (2018) (with Chris Hall and Doron Puder) (also appearing in STOC 2016)
- *Bilinear Forms with Kloosterman Sums and Applications* Annals of Mathematics, **186**, (2017) (with Emmanuel Kowalski and Philippe Michel)
- *Upper Bounds for Sunflower-Free Sets*, Forum of Mathematics Sigma, **5**, (2017) (with Eric Naslund)
- *On Capsets and the Group-Theoretic Approach to Matrix Multiplication*, Discrete Analysis (2017) (with Jonah Blasiak, Thomas Church, Henry Cohn, Joshua A. Grochow, Eric Naslund, and Chris Umans)
- *Non-Existence of Smooth Rational Cohomology Tori of General Type* – appendix to *Rational Cohomology Tori* by Olivier Debarre, Zhi Jiang, and Martí Lahoz, Geometry & Topology, **21**, (2017)

- *Kloosterman Paths and the Shape of Exponential Sums*, *Compositio Mathematica*, (2016) (with Emmanuel Kowalski)
- *Ordinary Primes for Abelian Surfaces*, *Comptes Rendus Mathématique*, **354**, No. 6 (2016)
- *Notes on Commutation of Limits and Colimits*, *Theory and Applications of Categories*, **30** (2015) (with Marie Bjerrum, Peter Johnstone, and Tom Leinster)
- *Certifying the Restricted Isometry Property is Hard*, *IEEE Transactions on Information Theory*, **59**, No. 6 (June 2013) (with Afonso S. Bandeira, Edgar Dobriban, and Dustin G. Mixon)

To Appear:

- *Bounds for Matchings in Nonabelian Groups* (to appear in *Electronic Journal of Combinatorics*)
- *Improved Estimates for Polynomial Roth Type Theorems in Finite Fields* (to appear in *Journal d'Analyse Mathématique*) (with Dong Dong and Xiochun Li)

Submitted:

- *A Geometric Version of the Circle Method* (with Tim Browning)
- *A Representation Theory Approach to Integral Moments of L-functions over Function Fields*
- *The Second Moment Theory of Families of L-functions* (with Valentin Blomer, Étienne Fouvry, Emmanuel Kowalski, Philippe Michel, and Djordje Milićević)
- *Free Rational Curves on Low Degree Hypersurfaces and the Circle Method* (with Tim Browning)
- *Bilinear Forms with Generalized Kloosterman Sums* (with Emmanuel Kowalski and Philippe Michel)
- *Dynamical Models for Liouville and Obstructions to Further Progress on Sign Patterns*
- $\overline{M}_{1,n}$ is Usually not Uniruled in Characteristic p
- *Irreducibility of Polynomials with Large Gap* (with Mark Shusterman and Michael Stoll)
- *Chebotarev Density Theorem in Short Intervals for Extensions of $\mathbb{F}_q(T)$* (with Lior Bary-Soroker, Ofir Gorodetsky, and Taelin Karidi)

Preprints:

- *Square-root Cancellation for Sums of Factorization Functions over Short Intervals in Function Fields*
- *The Equidistribution of L-functions of Twists by Witt Vector Dirichlet Characters over Function Fields*
- *On the Support of the Kloosterman Paths* (with Emmanuel Kowalski)

CONFERENCE TALKS

- **Trace Functions winter school** – January 2019 – ETH Zurich Congressi Stefano Franscini – mini-course on *Advanced formalism of trace functions*
- **Explicit Methods in Number Theory** – July 2018 – MFO, Oberwolfach – *New invariants on class groups and Cohen-Lenstra heuristics in the presence of roots of unity*
- **Canadian Number Theory Association XV** – July 2018 – Université Laval – *L-functions of Dirichlet Character Twists over Function Fields*
- **Perspectives on the Riemann Hypothesis** – June 2018 – University of Bristol / Heilbronn Institute – *More on Zeroes of L-functions over Function Fields*

- **Workshop on Additive Combinatorics** – October 2017 – Harvard – *Constructions of Additive Matchings*
- **Analytic Number Theory** – September 2017 – MFO, Oberwolfach – *On the Ramanujan Conjecture for Automorphic Forms over Function Fields*
- **Recent Developments in Analytic Number Theory** – May 2017 – MSRI – *Applications of Exponential Sums*
- **Introductory Workshop on Analytic Number Theory** – February 2017 – MSRI – *Trace Functions and Special Functions*
- **Workshop on Expanders and Extractors** – January 2017 – UC Berkeley – *Ramanujan Covers*
- **4th Israeli Algebra and Number Theory Day** – December 2016 – Tel Aviv University – *The Distribution of L-functions of Character Twists*
- **Recent Breakthroughs in the Polynomial Method** – September 2016 – Heilbronn Institute – *Slice Rank and Sunflowers and Lower Bounds for Slice Rank* (workshop talks)
- **Geometric and Analytic Number Theory** – September 2016 – ETH Zurich – *The Slice Rank Method in Additive Combinatorics*
- **AMS Summer Institute in Algebraic Geometry** – July 2015 – University of Utah – *Applications of Algebraic Geometry to Analytic Number Theory* (contributed lecture)

SEMINAR TALKS

- **Rutgers (number theory seminar)** – February 2019 – On the Ramanujan conjecture for automorphic forms over function fields
- **IST Austria (number theory and algebraic geometry seminar)** – January 2019 – On the Ramanujan conjecture for automorphic forms over function fields
- **University of Minnesota (department colloquium)** – December 2018 – Number theory over function fields and geometry
- **Princeton University / Institute for Advanced Studies (number theory seminar)** – November 2018 – The Lucky Logarithmic Derivative
- **University of Chicago (number theory seminar)** – November 2018 – The Ramanujan conjecture for automorphic forms over function fields via families
- **Stony Brook University (algebraic geometry seminar)** – October 2018 – What circles can do for you
- **McGill University / Concordia University (Quebec-Vermont number theory seminar)** – October 2018 – Bringing random matrices back to moments
- **University of Gothenburg (algebraic geometry and number theory seminar)** – May 2018 – The circle method and free rational curves on hypersurfaces
- **University of Amsterdam (arithmetic and algebraic geometry seminar)** – April 2018 – The cohomology of the moduli spaces of rational curves on hypersurfaces
- **University of Basel (number theory seminar)** – April 2018 – The circle method and free rational curves on hypersurfaces
- **EPFL (algebraic geometry seminar)** – March 2018 – A geometric version of the circle method
- **University of Zürich (algebraic geometry seminar)** – March 2018 – The geometric circle method and the cohomology of moduli spaces of rational curves

- **University of Bristol (Linfoot number theory seminar)** – December 2017 – Equidistribution of L-functions over function fields
- **Université Paris 13 (séminaires de géométrie arithmétique et motivique)** – November 2017 – Tannakian categories and automorphic forms over function fields
- **Institut Henri Poincaré (Rencontres de théorie analytique et élémentaire des nombres)** – September 2017 – *Relatives of Progression-Free Sets*
- **University of Michigan (algebraic geometry seminar)** – November 2016 – *On the Unirationality of $\overline{M}_{1,n}$ and Modular Forms*
- **EPFL (algebraic geometry and number theory seminar)** – October 2016 – *On the Unirationality of $\overline{M}_{1,n}$ and Modular Forms*
- **EPFL (combinatorics seminar)** – October 2016 – *Slice Rank and Sunflowers*
- **Stanford University (number theory seminar)** – April 2016 – *Exponential Sums and Modular Forms*
- **Yale University (algebraic geometry seminar)** – January 2016 – *Quasi-random Graphs from Varieties over Finite Fields*
- **University of Michigan (algebraic geometry seminar)** – December 2015 – *Frobenius Arithmetic for Frobenius Geometry*
- **MIT (number theory seminar)** – November 2015 – *The Distribution of the Newton Polygon of a K3 Surface*
- **University of Utah (algebraic geometry seminar)** – November 2015 – *Frobenius Arithmetic for Frobenius Geometry*
- **ETH Zurich (number theory seminar)** – October 2014 – *A Tannakian Category and a Horizontal Equidistribution Conjecture for Exponential Sums*
- **EPFL (analytic number theory seminar)** – October 2014 – *A Tannakian Category and a Horizontal Equidistribution Conjecture for Exponential Sums*
- **Columbia University (automorphic forms and arithmetic seminar)** – November 2018 – TBD
- **ETH Zurich (ITS members' seminar)** – October 2016 – *Cap Sets*
- **Princeton University / Institute for Advanced Studies (number theory seminar)** – February 2016 – *Vanishing Cycles and Bilinear Forms*
- **Institute for Advanced Studies (working group on expander graphs and monodromy groups)** – May 2015 – *Exponential sums and expansion of generalized Paley graphs*
- **Princeton University (working group in Diophantine analysis)** – May 2015 – *Ordinary Primes of Abelian Surfaces*
- **Princeton University (working group in Diophantine analysis)** – December 2014 – *Kloosterman Paths*
- **Princeton University (algebraic geometry preprint seminar)** – April 2014 – *Vanishing Theorems for Constructible Sheaves on Abelian Varieties*
- **Princeton University (junior faculty number theory seminar)** – November 2013 – *Equidistribution of Exponential Sums*
- **Princeton University (graduate student seminar)** – four talks, 2011-2015: *Toric Geometry, Belyi's Theorem, Λ -Rings, and Riemann-Hurwitz*