

## David Corwin

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- CONTACT INFORMATION MIT Department of Mathematics *Phone:* (978) 257-6784  
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Cambridge, MA USA 02139 *Website:* mit.edu/~corwind  
*Citizenship:* USA *Languages:* English, French (Fluent)  
*Programming languages:* SAGE German, Hebrew, Dutch (Conversational), Japanese (Basic)
- EDUCATION **A.B.**, Mathematics 2013  
*Princeton University*, Princeton, NJ, USA.  
**Ph.D. Candidate**, Mathematics 2018  
*Massachusetts Institute of Technology*, Cambridge, MA, USA.  
**Study Abroad**, Mathematics Spring 2012  
*Université de Paris VI - Jussieu*, Paris, France.  
**Chateaubriand Fellowship**, Mathematics Spring 2017  
*Ecole Normale Supérieure*, Paris, France.
- RESEARCH PAPERS *Elliptic Curves with Full 2-Torsion and Maximal Adelic Galois Representation*, joint with T. Feng, S. Trebat-Leder, and Z. Li, *Math. Comp.*, **83** (2014), pages 2925-2951.  
*On Cohen-Macaulayness of  $S_n$ -invariant subspace arrangements*, joint with A. Brookner, P. Etingof, and S. Sam, *International Mathematics Research Notices IMRN* 2016, **no. 7**, pages 2104-2126.  
*A Generalized Obstruction to Rational Points*, joint with T. Schläpke. Preprint available at [www.mit.edu/~corwind/CorwinSchläpke2017.pdf](http://www.mit.edu/~corwind/CorwinSchläpke2017.pdf).  
*Cuspidal Sections of Algebraic Fundamental Groups of Higher-Dimensional Varieties*. In preparation.  
*Adelic Galois Representations of Abelian Surfaces with Real Multiplication*, joint with T. Feng, S. Trebat-Leder, and Z. Li. In preparation.
- ONGOING AND FUTURE RESEARCH PROJECTS Explicit Motivic Chabauty-Kim Theory, with Ishai Dan-Cohen. Found a new equation for  $\mathbb{Z}[1/3]$ , working on verifying a case of Kim's conjecture and formulating a general algorithm.  
Etale and Motivic Homotopy Types of Rational Surfaces, with Ambrus Pal. Found rational surfaces that are homotopy equivalent over every completion of  $\mathbb{Q}$  but not over  $\mathbb{Q}$ , working on finding two surfaces that are etale homotopy equivalent but not  $\mathbb{A}^1$ -homotopy equivalent over  $\mathbb{Q}$ .  
Etale Homology and Homotopy Obstructions for Del Pezzo Surfaces over  $\mathbb{Q}_p(t)$ , with Tomer Schläpke.
- MATHEMATICAL INTERESTS *Primary interests:* number theory and its connections to algebraic geometry and topology  
*Secondary interests:* logic, representation theory, physics
- RESEARCH TALKS GIVEN *Etale Homotopy Obstructions for Rational Points Applied to Open Subvarieties*, Harvard Number Theory Seminar, Harvard University, October 2017.  
*Cohen-Macaulayness of  $S_n$ -invariant subspace arrangements*, The Prospects for Commutative Algebra, Osaka, July 2017.  
*Motivic Periods and Coleman Functions*, Algophant 2017, Bordeaux, June 2017.  
*Beyond the Etale-Brauer Obstruction*, Universität Duisburg-Essen, January 2016.  
*Surjectivity of Adelic Galois Representations Associated to Elliptic Curves*, Bar Ilan University, May 2015.

EXPOSITORY TALKS  
GIVEN

*Class Groups of Cyclotomic Fields, continued.*, MIT STAGE, September 2017.  
*Reconstruction of Cusps and Inertia Subgroups*, Paris Anabelian Seminar, March 2017.  
*Multizeta Values*, MIT PUMGRASS, October 2016.  
*From Quadratic Reciprocity to the Langlands Program*, MIT PUMGRASS, March 2016.  
*Mumford's On Equations Defining Abelian Varieties II*, MIT STAGE, November 2015.  
*Nilpotent Thickenings and Differential Calculus*, MIT PUMGRASS, November 2015.  
*Fontaine's Il n'y a pas de variété abélienne sur  $\mathbb{Z}$  Part 3*, MIT STAGE, April 2015.  
*The Mysterious Relationship Between Number Theory and Topology*, MIT PUMGRASS, February 2015.  
*Reduction of Brown's Proof*, MIT STAGE, Fall 2014.  
*The de Rham Period Ring I*, Learning seminar on  $p$ -adic Hodge theory, Fall 2014.  
*Milnor  $K$ -Theory*, Seminar on higher dimensional class field theory, Fall 2014.  
*Survey of Algebraic  $K$ -Theory*, Seminar on higher dimensional class field theory, Fall 2014.  
*Topological aspects of the fundamental group of the projective line minus three points*, MIT STAGE, Fall 2014.  
*Purity Theorem Implies Target Theorem*, MIT STAGE, Spring 2014.  
*Henriart's Proof of Local Langlands*, BU Seminar on Local Langlands, Spring 2014.  
*The Nisnevich Site*, MIT Juvitop, Spring 2014.  
*Admissible  $p$ -adic Representations*, BU Seminar on Local Langlands, Spring 2014.  
*Etale Homotopy Theory*, 18.915: MIT Graduate Seminar in Topology, Fall 2013.  
*Topological  $K$ -Theory*, 18:915: MIT Graduate Seminar in Topology, Fall 2013.  
*Valuation Spectra*, MIT STAGE, Fall 2013.  
*Cohomology of Eilenberg-MacLane Spaces*, 18.915: MIT Graduate Seminar in Topology, Fall 2013.  
*Model Theory and the Ax-Grothendieck Theorem*, Princeton University Undergraduate Math Colloquium, Fall 2012.  
*Introduction to Riemann Surfaces*, Canada/USA Mathcamp, Summer 2009.

TEACHING  
EXPERIENCE

*AoPS Online Instructor*, Art of Problem Solving, 2016-2017.  
Taught online math classes through the Art of Problem Solving (AoPS).

*HCSSiM Junior Counselor*, Hampshire College, 2016.  
Taught and assisted in classes for advanced high school students at the Hampshire College Summer Studies in Mathematics (HCSSiM).

*Recitation Instructor*, MIT, 2016.  
Teaching a recitation at MIT for the course 18.03: Differential Equations.

*PRIMES Mentor*, MIT, 2016.  
Mentoring a high school student on a research project in number theory.

*MIT Splash*, MIT, 2015.  
Taught five diverse math classes for high school students over the course of a weekend.

*PRIMES Mentor*, MIT, 2015.  
Mentoring a high school student on a research project in number theory.

*Directed Reading Program Mentor*, MIT, January 2015.  
Directing one student in learning  $p$ -adic zeta functions during MIT's Independent Activities Period (IAP).

*SPUR Mentor*, MIT, Summer 2014.  
Mentored MIT undergrads on research projects in mathematics.

*PRIMES-USA Mentor*, MIT, 2014.  
Mentored a high school student long-distance on a research project in number theory.

*Directed Reading Program Mentor*, MIT, January 2014.

Directed two students in learning class field theory during MIT's Independent Activities Period (IAP).

*PROMYS Counselor*, Boston University, Summer 2013.

Counseled high school students in the Program in Mathematics for Young Scientists (PROMYS) program at BU.

*Course Assistant for Commutative Algebra*, Princeton University, Fall 2012.

Ran weekly problem sessions for students in commutative algebra taught by Dr. Kevin Tucker at Princeton.

CONFERENCE AND  
WORKSHOP  
PARTICIPATION

*Motives for Periods*, Berlin, August 2017.

*The Prospects for Commutative Algebra*, Osaka, July 2017.

*Journées Algophantiennes Bordelaises 2017*, Bordeaux, June 2017.

*ECHoRaP: Emory Conference on Higher Obstructions to Rational Points*, Atlanta, May 2017.

*Galois Theory of Periods and Applications*, MSRI, Berkeley, March 2017.

*3rd Workshop on Interactions between Arithmetic and Homotopy*, London, February 2017.

*Super QVNTS: Kummer Classes in Anabelian Geometry*, Burlington, VT, September 2016.

*Analogies Between Number Fields and Function Fields*, Lyon, June 2016.

*Algebra and Number Theory, Conference Lyon/Ottawa*, Lyon, June 2016.

*Fundamental Groups in Arithmetic Geometry*, Paris, June 2016.

*AGNES*, Yale, April 2016.

*Georgia Algebraic Geometry Symposium*, Atlanta, October 2015.

*Workshop: Local-Global Principles and Their Obstructions*, Philadelphia, October 2015.

*LMS-CMI Summer School on Diophantine Equations*, Hay-on-Wye, Wales, September 2015.

*Algebraic Geometry Summer Institute*, Salt Lake City, July 2015.

*Grothendieck 2015*, Montpellier, France, June 2015.

*Algebraic Varieties and Their Moduli*, Pisa, Italy, May 2015.

*Three-Day Workshop in Homotopy Theory: Goodwillie Calculus*, Caesaria, Israel, May 2015.

*Arizona Winter School*, Tucson, March 2015.

*Workshop on Fundamental Groups and Periods*, IAS, Princeton, October 2014.

*Spring School on Classical and  $p$ -adic Hodge Theories*, Rennes, France, May 2014.

*Arizona Winter School: Arithmetic Statistics*, Tucson, March 2014.

*Hot Topics: Perfectoid Spaces and Applications*, MSRI, Berkeley, February 2014.

*Joint Mathematics Meetings*, Baltimore, January 2014.

*Fundamental Groups in Arithmetic and Algebraic Geometry*, Pisa, Italy, December 2013.

*Cohomology of Arithmetic Groups*, Chicago, May 2013.

*Arizona Winter School: Modular Forms and Modular Curves*, Tucson, March 2013.

*Joint Mathematics Meetings*, San Diego, January 2013.

*Joint Mathematics Meetings*, Boston, January 2012.

GRADUATE  
COURSEWORK

Math 229x (Harvard): Analytic Number Theory	Dr. Arul Shankar
18.715: Representation Theory	Prof. Pavel Etingof
Math 268 (Harvard): Pure Motives and Rigid Local Systems	Dr. Stefan Patrikis
18.786: Number Theory II: Galois Representations	Prof. Sug Woo Shin
18.726: Algebraic Geometry II	Prof. François Charles
Math 255x (Harvard): Topics in Diophantine Geometry (audit)	Dr. Arul Shankar
18.S097: Special Subject in Mathematics: Etale Homotopy	Dr. Tomer Schlank
18.787: Topics in Number Theory: Rational Points on Algebraic Varieties	Prof. Bjorn Poonen
18.915: Graduate Seminar in Topology	Prof. Mark Behrens
18.965: Geometry of Manifolds	Prof. Paul Seidel
18.769: Topics in Lie Theory: D-Modules (audit)	Prof. Pavel Etingof
MA843 (BU): Advanced Number Theory: Shimura Varieties (audit)	Prof. Jared Weinstein

SUMMER PROGRAMS  
ATTENDED

*Emory Research Experience for Undergraduates*, Emory University, 2012.

Participated in the REU at Emory University led by Prof. Ken Ono under the supervision of Prof. David Zureick-Brown.

*Kupcinet-Getz Undergraduate Summer Program*, Weizmann Institute of Science, 2011.

Learned mathematics under Prof. Stephen Gelbart.

*Grader and Problem Writer*, Art of Problem Solving Foundation, 2009-2010.

Gave students feedback on problems written for AoPS online classes and helped write problems for their alculus system.

*Canada/USA Mathcamp*, 2007-2009.

Spent three summers as a camper.

OTHER  
EMPLOYMENT

*Summer Intern, SolidWorks, Summer 2011.*  
Worked as a summer undergrad intern for the software company SolidWorks.

CONTEST AWARDS

*Putnam Exam*  
Honorable Mention, 2012.

*USA Mathematical Olympiad*  
Three-time qualifier, 2006-2008.  
Score of 15, 2008.

*US Physics Team*  
Two-time semifinalist, 2008-2009.

*National French Exam*  
First place, 2006, 2008.

REFERENCES

Prof. Bjorn Poonen  
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Massachusetts Institute of Technology  
Cambridge, Massachusetts  
USA 02139  
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Einstein Institute of Mathematics  
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