

# Curriculum vitae: **David J. Zywina**

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## Education

University of California, Berkeley, 2003–2008  
Ph.D. in Mathematics  
Advisor: Bjorn Poonen

McMaster University, 1999–2003  
B.Sc. (Honours) in Mathematics

## Employment

Cornell University, Assistant Professor 2013–present  
Institute for Advanced Study, Member 2012–2013  
Queen’s University, Postdoctoral fellow 2011–2012,  
University of Pennsylvania, Lecturer 2008–2011

## Research Interests

Arithmetic geometry with strong influences from Galois theory and computational number theory;  
Galois representations, abelian varieties, equidistribution, monodromy.

## Publications/Preprints

- Torsion bounds for a fixed abelian variety and varying number field, preprint
- Modular curves of prime-power level with infinitely many rational points (with Andrew Sutherland), accepted *Algebra & Number Theory* *Algebra & Number Theory*, **11** (2017), no. 5, p. 1199–1229.
- Possible indices for the Galois image of elliptic curves over  $\mathbb{Q}$ , [arXiv:1508.07663](https://arxiv.org/abs/1508.07663)
- On the possible images of the mod  $\ell$  representations associated to elliptic curves over  $\mathbb{Q}$ , [arXiv:1508.07660](https://arxiv.org/abs/1508.07660)
- Modular forms and some cases of the inverse Galois problem, [arXiv:1508.07916](https://arxiv.org/abs/1508.07916)

- An explicit Jacobian of dimension 3 with maximal Galois action, [arXiv:1508.07655](#)
- On the surjectivity of mod  $\ell$  representations associated to elliptic curves, [arXiv:1508.07661](#)
- The inverse Galois problem for orthogonal groups, [arXiv:1409.1151](#)
- Bounds for the Lang-Trotter conjectures, [arXiv:1508.07682](#)  
*Contemporary Mathematics* **655** (2015), p. 235–256.
- The inverse Galois problem for  $\mathrm{PSL}_2(\mathbb{F}_p)$ , [arXiv:1303.3646](#)  
*Duke Mathematical Journal*, **164** (2015), no. 12, 225–2292.
- The Sato-Tate law for Drinfeld modules, [arXiv:1110.4098](#)  
*Transactions of the American Mathematical Society*, **368** (2016), p. 2185–2222.
- Abelian varieties over large algebraic fields with infinite torsion, [arXiv:1012.2477](#) (to appear, Israel Journal of Mathematics)
- The splitting of reductions of an abelian variety, [arXiv:1111.0624](#)  
*International Mathematics Research Notices*, **18** (2014), p. 5042–5083.
- Splitting fields of characteristic polynomials of random elements in arithmetic groups (with Florent Jouve & Emmanuel Kowalski), [arXiv:1008.3662](#)  
*Israel Journal of Mathematics*, **193** (2013), no. 1, 263–307.
- Explicit class field theory for global function fields, [arXiv:1110.3779](#)  
*Journal of Number Theory* (volume in honor of David Hayes), **133** no. 3 (2013), p. 1062–1078
- The Chebotarev invariant of a finite group (with Emmanuel Kowalski), [arXiv:1008.4909](#)  
*Experimental Mathematics*, **21** no. 1 (2012), p. 38–56.
- A refinement of Koblitz’s conjecture, [arXiv:0909.5280](#)  
*Int. J. Number Theory*, **3**, (2011) 739769.
- Elliptic curves with maximal Galois action on their torsion points, [arXiv:0809.3482](#)  
*Bull. London Math. Soc.*, **42** (2010) 811826.
- Arithmetic  $E_8$  lattices with maximal Galois action  
(with Anthony Várilly-Alvarado), [arXiv:0803.3063](#)  
*LMS J. Comput. Math.* **12** (2009) 144–165.
- An explicit integral polynomial whose splitting field has Galois group  $W(E_8)$  (with Florent Jouve & Emmanuel Kowalski), [arXiv:0801.1733](#)  
*Journal de théorie des nombres de Bordeaux*, **20** no. 3 (2008), p. 761–782.

## Ph.D. Students Supervised

Theodore Hui – Ph.D. Summer 2017, Thesis: *A Radical Characterization of Abelian Varieties*

Rakvi (current)

## Honours

Junior Faculty Teaching Award, 2015

Clay Liftoff Fellow, 2008.

Herb Alexander Prize, for outstanding doctoral dissertation (UC Berkeley), 2008

Outstanding Graduate Student Instructor Award - Berkeley 2006/2007

Natural Sciences and Engineering Research Council of Canada (NSERC) Postgraduate Scholarship  
2004-2006

Governor General's Academic Medal, McMaster 2003

## Teaching Experience

### Assistant professor Cornell University

Math 6370 - Algebraic number theory – Spring 2018

Math 3320 - Introduction to number theory – Fall 2017

Math 1910 - Engineering Calculus – Fall 2016

Math 6320 - Algebra – Spring 2016

Math 3320 - Introduction to number theory – Fall 2015

Math 6370 - Algebraic number theory – Fall 2015

Math 6490 - Lie algebras – Fall 2014

Math 1120 - Calculus II – Spring 2014, Spring 2015

Math 7390 - Topics in algebra (arithmetic of curves) – Fall 2013

### Lecturer Queen's University

Math 121: Calculus, Fall 2011–Winter 2012

Applied Science 171J: Calculus I, Winter 2012

### Lecturer University of Pennsylvania

Math 503: Abstract algebra, Spring 2011

Math 724: Topics in algebraic geometry, Fall 2010

Math 350: Number theory, Fall 2009, 2010

Math 240: Calculus III, Spring 2010

Math 170: Ideas in Mathematics, Fall 2009

Math 114: Calculus II, Fall 2008 & Spring 2009

Math 103: Introduction to Calculus, Fall 2008

## Conferences organized

Upstate New York Number Theory Conference.

Cornell, April 10–12th 2015. (Co-organized with Nicolas Templier)

NSF funding: \$15,000.

University of Rochester, 2016; University of Binghamton, 2017; University of Buffalo, 2018

## Invited seminar and conference talks

University of Michigan, February 2018, Group, Lie and Number Theory Seminar  
Adam Mickiewicz University, Poznań, Poland, July 2017, Abelian Varieties & Galois actions  
Banff, May 2017, Arithmetic Aspects of Explicit Moduli Problems  
NYU, December 2016, NYC Joint Number Theory Seminar  
Fields Institute, May 2016, Montreal-Number Number Theory Workshop  
MIT, March 2016, BC-MIT Number Theory  
ICERM, September 2015, Modular Forms and Curves of Low Genus: Computational Aspects  
Banff, September 2015, The Use of Linear Algebraic Groups in Geometry and Number Theory  
University of Chicago, January 2015, Number theory seminar  
Northwestern, January 2015, Number theory seminar  
University of Luxembourg, November 2014, Workshop on Galois representations  
Montreal, September 2014, CRM workshop: Statistics and number theory  
Stanford University, May 2014, Number theory seminar  
SUNY Buffalo, April 2014, Upstate New York Number Theory Conference  
University of Connecticut, April 2013, Algebra seminar  
ETH Zürich, March 2013, Number Theory Days  
CIRM Luminy, February 2013, Workshop: Frobenius distributions  
Oberwolfach, June 2013, Workshop: The Arithmetic of Fields  
University of Colorado Boulder, April 2013, AMS Spring Western Section  
Binghamton University, April 2013, Upstate New York Number Theory Conference  
University of Pennsylvania, March 2013, Algebra seminar  
Harvard University, March 2013, Number theory seminar  
MIT, March 2013, Number theory seminar  
Boston University, March 2013, Number theory seminar  
Cornell University, January 2013, The Oliver Club  
Princeton, January 2013, IAS and Princeton number theory seminar  
University of Illinois at Urbana–Champaign, January 2013, Colloquium  
Penn State, January 2013, Colloquium  
McGill, December 2012, Colloquium  
Montreal, December 2012, CMS Winter meeting  
Michigan State, December 2012, Colloquium  
University of Illinois at Urbana–Champaign, November 2012, Number theory seminar  
New York, October 2012, Joint Columbia-CUNY-NYU number theory seminar  
Institute for Advanced Study, October 2012, Postdoctoral talk  
Queen’s University, October 2011, Number theory seminar  
Emory University, February 2011, Colloquium  
McMaster University, January 2011, Colloquium  
Emory University, December 2010, Algebra and number theory seminar  
University of Maryland, College Park, October 2010, Algebra and number theory seminar  
University of Wisconsin-Madison, October 2010, Number theory seminar  
Princeton University, April 2010, IAS and Princeton Number theory seminar  
MIT, December 2009, Number theory seminar  
Montréal, March 2009, Québec-Vermont number theory seminar  
University of Pennsylvania, February 2009, Algebra seminar.  
Oberwolfach, February 2009, Workshop on field arithmetic  
Waterloo, July 2008, Canadian Number Theory Association X meeting

ETH Zürich, March 2008, Number theory seminar.  
MIT, October 2007, Seminar on Topics in Arithmetic, Geometry, Etc. (STAGE)  
UC Berkeley, May 2007, Number theory seminar

## Selected conferences/workshops not mentioned above

*Explicit Methods in Number Theory*, Oberwolfach, July 2015.  
*Explicit Methods in Number Theory*, Oberwolfach, July 2013.  
*AMS Spring western sectional meeting*, University of Colorado Boulder, April 2013  
*CMS Winter meeting*, Montreal, December 2012  
*CMI Summer School on Galois representations, University of Hawai'i at Mānoa, June-July 2009*  
*Workshop on field arithmetic*, Oberwolfach, February 2009  
*Summer School in Analytic Number Theory and Diophantine Approximation*, University of Ottawa, July 2008.  
*Arizona Winter School: Special Functions and Transcendence*, University of Arizona, March 2008.  
*Iwasawa Summer School*, McMaster University, August 2007.  
*Arizona Winter School: p-adic Geometry*, University of Arizona, March 2007.  
*CMI Summer School on Arithmetic Geometry*, Georg-August-Universität, July-August 2006.  
*Canadian Number Theory Association IX*, University of British Columbia, July 2006.  
*Number theory and random matrix theory*, University of Rochester, June 2006.  
*Analytic Methods for Diophantine Equations*, Banff International Research Station, May 2006.  
*Cohomological Approaches to Rational Points*, MSRI, March 2006.  
*Arizona Winter School: Computational and Algorithmic aspects of Algebra and Arithmetic*, University of Arizona, March 2006.  
*Introductory Workshop in Rational and Integral Points on Higher-Dimensional Varieties*, MSRI, January 2006.  
*Deligne Conference*, Institute for Advanced Study, October 2005.  
*Arizona Winter School: Fundamental Groups in Arithmetic*, University of New Mexico, March 2005.  
*Canadian Number Theory Association XIII*, University of Toronto, June 2004.

## Department service

- Engineering Placement Exam Committee, 2016–2017 & 2017–2018
- Graduate admissions committee, 2014–2015 & 2015–2016 & 2017–2018
- Math Majors Committee, 2014–2015 & 2015–2016
- Oliver Club Secretary, 2013–2014 & 2016–2017
- Library Committee, 2013–2014