

JORDAN S. ELLENBERG

Contact Information:

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Employment Professor, University of Wisconsin (2011-)
Associate Professor, University of Wisconsin (2007-11)
Assistant Professor, University of Wisconsin (2005-07)
Assistant Professor, Princeton University (2001-2005)
Instructor, Princeton University (1998-2001)
MSRI Postdoctoral Fellow (Fall 1999)

Education **Harvard University**, Cambridge, MA.
Ph.D. in Mathematics, June, 1998. Dissertation under the supervision of Prof. Barry Mazur:
Hilbert modular forms and the Galois representations associated to Hilbert-Blumenthal abelian varieties.
Harvard University, Cambridge, MA.
A.B. summa cum laude in Mathematics, June, 1993.

Research Interests Arithmetic algebraic geometry, number theory.

Research Publications “Expander graphs, gonality, and variation of Galois representations,” with C. Hall and E. Kowalski, arXiv 10098.3675, submitted.
“Modeling lambda invariants by p -adic random matrices,” with S. Jain and A. Venkatesh, *Comm Pure Appl. Math.*, vol 64, no. 9 (2011)
“Statistics of number fields and function fields,” with A. Venkatesh, to appear, *Proceedings of the ICM, Hyderabad 2010*
“Homological stability for Hurwitz spaces and the Cohen-Lenstra conjecture over function fields,” with A. Venkatesh and C. Westerland, arXiv preprint 0912.0325, submitted.
“Random pro- p groups, braid groups, and random tame Galois groups,” with N. Boston, *Groups, Geometry, and Dynamics* 5 (2), pp.265–280 (2011)
“Linnik’s ergodic method and the distribution of integer points on spheres,” with P. Michel and A. Venkatesh, submitted.
“Every curve is a Teichmüller curve,” with D.B.McReynolds, to appear, *Duke Math J.*
“Positive motivic measures are counting measures,” with M. Larsen, *Algebra and Number Theory*, 4(1) (2010)
“The Kakeya set and maximal conjectures for algebraic varieties over finite fields,” with R. Oberlin and T. Tao, *Mathematika* Volume 56, Issue 01, January 2010, pp 1-25.
“The Diophantine equation $A^4 + 2^d B^2 = C^n$ ” (with M.A. Bennett and N.C. Ng,) *Int. J. Number Theory* 6(2) (2010).
“A sharp diameter bound for unipotent groups of classical type over $\mathbf{Z}/p\mathbf{Z}$ ” (with J.Tymoczko,) *Forum Math.* vol 22 no. 2, 327–347 (2010)
“Non-simple abelian varieties in a family: geometric and analytic approaches,” (with C. Elsholtz, C. Hall, and E. Kowalski,) *J. Lond. Math. Soc.* (2) 80, no.1, 135–154 (2009)
“Points of low height on \mathbf{P}^1 over number fields and bounds for torsion in class groups,” in *Computational Arithmetic Geometry*, K. Lauter and K. Ribet, eds., AMS Contemp. Math. 463 (2008)

“Local-global principles for representations of quadratic forms,” (with A. Venkatesh,) *Invent. Math.* 171, no. 2, 257–279 (2008)

“Reflection principles and bounds for class group torsion,” (with A. Venkatesh,) *Int. Math. Res. Not.* no.1, Art. ID rnm002 (2007)

“Asymptotics of coinvariants of Iwasawa modules under non-normal subgroups,” (with A. Logan,) *Math. Res. Lett.* 14, no.5, 769–773 (2007)

Appendix to “Counting maximal arithmetic subgroups,” by M. Belolipetsky, (with A. Venkatesh,) *Duke Math. J.* 140, no. 1, 1-33 (2007)

“Selmer groups and Mordell-Weil groups of elliptic curves over towers of function fields,” *Compos. Math.* 142, no. 5, 1215–1230 (2006)

“The number of extensions of a number field with fixed degree and bounded discriminant,” (with A. Venkatesh,) *Ann. of Math.* 163 (2), 723–741 (2006)

“Pro- p groups and towers of rational homology spheres,” (with N. Boston) *Geometry and Topology* 10, 331-334 (2006)

“Serre’s conjecture over \mathbf{F}_9 ,” *Ann. of Math.* 161 (3), 1111-1142 (2005)

“Uniform bounds for rational points on non-rational curves,” (with A. Venkatesh,) *Int. Math. Res. Not.* 35, 2163–2181 (2005)

“Counting extensions of function fields with bounded discriminant and specified Galois group,” (with A. Venkatesh,) in *Geometric Methods in Algebra and Number Theory*, F. Bogomolov and Y. Tschinkel, eds. (2005)

“On the error term in Duke’s estimate for the average special value of L -functions,” *Canad. Math. Bull.* 48, no.4, 535-546 (2005)

“Galois representations attached to \mathbf{Q} -curves and the generalized Fermat equation $A^4 + B^2 = C^p$,” *Amer. J. Math* 126(4), 763–787 (2004)

“K3 surfaces over number fields with geometric Picard number one,” in *Arithmetic of Higher Dimensional Algebraic Varieties*, B. Poonen and Y. Tschinkel, eds. (2004)

“ \mathbf{Q} -curves and Galois representations,” in *Modular Curves and Abelian Varieties*, J. Cremona, J.-C. Lario, J. Quer, K. Ribet, eds. (2004)

“On the average number of octahedral modular forms,” *Math. Res. Lett* 10, 269–273 (2003)

“Galois invariants of dessins d’enfants,” in *Arithmetic Fundamental Groups and Noncommutative Algebra*, M. Fried and Y. Ihara, eds. (2002)

“Endomorphism algebras of Jacobians”, *Adv. Math.* 162, 243–271 (2001)

“On the modularity of \mathbf{Q} -curves” (w. C. Skinner), *Duke Math. J.* 109, no. 1, 97–122 (2001)

“Finiteness of torsion subschemes of Hilbert-Blumenthal abelian varieties,” *J. Reine Angew. Math.* 532, 1–32 (2001)

“Congruence ABC implies ABC,” *Indag. Math., N.S.*, 11 (2), 197–200 (2000)

“The combinatorics of rewritability in finite groups,” *Group theory (Granville, OH, 1992)*, 250–261, World Sci. Publishing, River Edge, NJ, 1993 (with G. Sherman, L. Smithline, C. Sugar, E. Wepsic)

Expository Publications

General-interest articles on mathematical topics for various publications, including *The New York Times Magazine*, *Slate*, *The New York Times Book Review*, *Wired*, *Seed*, the *Washington Post*, and the *Believer*.

“Arithmetic algebraic geometry,” and “Elliptic curves,” articles for lay readers, in *The Princeton Companion to Mathematics*, T. Gowers, ed.

“The idea of a moduli space,” article for high school students, published in *Imagine*, May/June 1998, reprinted in *Math Horizons*, November 1998.

Awards, Prizes, Grants

NSF Grant DMS-1101267, “Geometric Analytic Number Theory.”

Held 2011-2014

H.I. Romnes Faculty Fellowship, 2010-11

Five-year early career fellowship, awarded to thirteen faculty members across UW-Madison

NSF Research Training Grant, “Algebraic Geometry and Number Theory at the University of Wisconsin,”

\$1.6m, held 2009-14, co-PI 2009-11, PI 2011-14.

University Housing Honored Instructor

Fall 2009

NSF-CAREER Grant DMS-0448750, “Rational points on varieties and non-abelian Galois groups”

Held 2005-2011

Alfred P. Sloan Research Fellowship

Awarded 2005

NSF Grant DMS-0401616

Held 2004-2005

NSA Young Investigator Grant

Held 2001-2004

National Science Foundation Graduate Fellow (1994–1997)

Department of Mathematics, Harvard University.

Barry M. Goldwater Scholarship (1991–92)

Received national scholarship for undergraduate study of mathematics.

William Lowell Putnam Competition (1989–92)

Placed in top six on national competition in 1990 and 1992, top ten in 1989 and 1991.

U.S.A. Mathematical Olympiad (1989)

Received first place.

International Mathematical Olympiad (1987–89)

One of six members of U.S. team; received gold medal in 1987 and 1989, silver medal in 1988.

Professional Service

Organizer, “hot topics” session on thin subgroups of arithmetic groups, MSRI, February 2012

Organizer, special session on arithmetic and group theory, AMS Central Section meeting, November 2010

Organizer, workshop on pseudo-Anosovs with low dilatation, April 2010

Organizer, “Math And...” interdisciplinary seminar series, U. of Wisconsin

Editorial Board, Journal de Théorie des Nombres de Bordeaux

Organizer, Miniconference on pro-p groups and pro-p algebras in number theory, April 2007

Organizer, Midwest Algebraic Number Theory Day, October 2005 and November 2009

Organizer, Graduate Student Conference In Number Theory, October 2005, November 2007, November 2009

Organizer, AIM workshop on the Birch-Swinnerton-Dyer Conjecture, Fall 2003

Recent Talks Given

MSRI Workshop on Thin Groups, February 2012

U. Chicago geometry/topology seminar, December 2011

U. Chicago number theory seminar, December 2011

Serge Lang Memorial Lecture, UC-Berkeley, December 2011

UC-Berkeley number theory seminar, November 2011

AIM workshop on the Cohen-Lenstra conjectures, June 2011

Invited talk, FRG conference on Moduli Spaces and Moduli Stacks, May 2011

Ohio State algebraic geometry seminar, April 2011

Columbia-CUNY-NYU number theory seminar, February 2011

Brown number theory seminar, February 2011

BC-MIT number theory seminar, February 2011

MSRI Arithmetic Statistics Intro Workshop, February 2011

Invited Address, AMS Central Section Meeting, Notre Dame, November 2010

Invited Lecture, “Development of Galois-Teichmüller Theory and Anabelian Geometry,” Kyoto, October 2010

Invited Lecture, “Rational Points: Theory and Experiment,” ETH, Zurich, May 2010

Plenary Speaker, Workshop on Zeta Functions in Algebra and Geometry, May 2010
Yale Colloquium, March 2010
U. Chicago Geometric Topology Seminar, March 2010
University of Georgia Colloquium, November 2009
Duke Algebraic Geometry Seminar, November 2009
University of Illinois Urbana-Champaign Colloquium, September 2009
Invited Lecture, “Anabelian Geometry,” Newton Institute, August 2009
Invited Lecture, “Spaces of curves and their interaction with diophantine problems,” Columbia FRG conference, June 2009
Northwestern U. Colloquium, May 2009
Princeton Number Theory Seminar, April 2009
Invited Lecture, Western Algebraic Geometry Seminar, Berkeley, April 2009
Invited Lecture, Southern California Number Theory Day, October 2008
Quebec-Vermont Number Theory Seminar, October 2008
Brandeis-Harvard-MIT-Northeastern Joint Colloquium, September 2008
Conference on current developments in the Langlands program, Northwestern, May 2008
U. Texas Number Theory Seminar, April 2008
Ohio State Colloquium, January 2008
UI-Chicago Number Theory Seminar, December 2007
Penn Galois Theory Seminar, November 2007
Oberwolfach workshop on explicit methods in number theory, July 2007
Brown Colloquium, February 2007
BIRS conference on “Explicit Methods for Rational Points”, February 2007
University of Michigan Arithmetic Seminar, February 2007
AMS Special Session on Arithmetic Geometry, January 2007
University of Minnesota Colloquium, October 2006
University of Chicago Colloquium, October 2006
Canadian Number Theory Association IX, Vancouver, July 2006
Invited lecture, Mini-conference on ergodic theory and diophantine problems, New York, May 2006
Oberwolfach workshop on pro-p extensions of global fields and pro-p groups, May 2006
BIRS workshop on analytic methods for diophantine equations, May 2006
AMS special session on computational arithmetic geometry, April 2006
Invited lecture, Western Algebraic Geometry Seminar, March 2006
Stanford dessins d’enfants seminar, March 2006
Introductory Workshop on Rational and Integral Points, MSRI, January 2006
Invited lecture, 2005 AMS Summer Institute on Algebraic Geometry, Seattle, August 2005
Invited lecture, Coates 60th Birthday Conference, Beijing, August 2005
Penn Algebra Seminar, May 2005
New York Number Theory Seminar, April 2005
Duke Algebraic Geometry Seminar, March 2005
Harvard Number Theory Seminar, February 2005
Brown Algebra Seminar, February 2005
DePrima Memorial Undergraduate Mathematics Lecture, Cal Tech, January 2005
UCLA Number Theory Seminar, January 2005

Cal Tech Number Theory Seminar, January 2005
CMS special session on Arithmetic Geometry, December 2004
Quebec-Vermont Number Theory Seminar, December 2004
BIRS workshop: Diophantine approximation and analytic number theory, November 2004
Canadian Number Theory Association VIII, invited speaker, June 2004
University of Bordeaux Algorithmic Number Theory Seminar, June 2004
AMS special session on Elliptic Surfaces and Elliptic Fibrations, April 2004
University of Pennsylvania Galois Seminar, April 2004
Johns Hopkins Number Theory Seminar, April 2004
University of Utah, February 2004
Ohio State University, February 2004
Cornell University, February 2004
Boston University, February 2004
University of Toronto, February 2004
Columbia University Special Seminar, February 2004
Cal Tech Number Theory Seminar, January 2004
University of Southern California Number Theory Seminar, January 2004
University of Texas Number Theory Seminar, January 2004
Rice University Colloquium, January 2004
Pittsburgh Algebra Seminar, January 2004
AMS special session on Arithmetical Algebraic Geometry, January 2004

Ph.D. advising **Guillermo Mantilla-Soler**
(Ph.D. 2010)
Ekin Ozman
(Ph.D. 2010)
Seyfi Türkelli
(Ph.D. 2009) Assistant Professor, U. Georgia.
Patrick Rault
(Ph.D. 2008) Assistant Professor, SUNY-Geneseo.
Derek Garton, Yongqiang Zhao
Ph.D. expected 2012.