

# JORDAN S. ELLENBERG

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## Contact Information:

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**Employment** Associate Professor, University of Wisconsin (2007-)  
Assistant Professor, University of Wisconsin (2005-)  
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** “Non-simple abelian varieties in a family: geometric and analytic approaches,” (with C. Elsholtz, C. Hall, and E. Kowalski,) submitted.  
“The Diophantine equation  $A^4 + 2^d B^2 = C^n$ ” (with M.A. Bennett and N.C. Ng,) submitted.  
“Points of low height on  $\mathbf{P}^1$  over number fields and bounds for torsion in class groups,” in *Computational Arithmetic Geometry*, to appear.  
“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)  
“A sharp diameter bound for unipotent groups of classical type over  $\mathbf{Z}/p\mathbf{Z}$ ” (with J.Tymoczko,) to appear, *Forum Math.*

“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, to appear 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 and Prizes**

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

Held 2005-2010

**Alfred P. Sloan Research Fellowship**

Awarded 2005

**NSF Grant DMS-0401616**

Held 2004-2005

**NSA Young Investigator Grant**

Held 2001-2004

**National Science Foundation Postdoctoral Fellowship**

Awarded 1998, declined.

**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, “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  
Organizer, Graduate Student Conference In Number Theory, October 2005 and November 2007  
Organizer, AIM workshop on the Birch-Swinnerton-Dyer Conjecture, Fall 2003

**Recent Talks Given** 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  
 Miami Winter School, December 2003  
 Boston University Algebra Seminar, November 2003  
 Wisconsin Colloquium, November 2003  
 Pennsylvania Algebra Seminar, November 2003  
 Stanford Algebraic Geometry Seminar, October 2003  
 Berkeley Number Theory Seminar, October 2003  
 Conference on Noncommutative Aspects of Number Theory, August 2003  
 McGill University, July 2003  
 Columbia University Number Theory Seminar, May 2003  
 Brown Number Theory Conference, Apr 2003  
 Rice University Colloquium, Apr 2003  
 University of Texas Number Theory Seminar, Apr 2003  
 Chinese-American Frontiers of Science, Nov 2002  
 Duke Algebraic Geometry Seminar, Sep 2002  
 Invited Speaker, Euroconference on Modular Curves and Abelian Varieties, Barcelona, July 2002  
 CMS Special Session on Arithmetic Algebraic Geometry, June 2002  
 NSF-CBMS Conference on Modular Elliptic Curves, invited plenary lecture, August 2001

**Ph.D. advising**

**Patrick Rault**  
 (Ph.D. 2008) Assistant Professor, SUNY-Geneseo.  
**Guillermo Mantilla-Soler, Ekin Ozman, Seyfi Turkelli**  
 Ph.D. in progress.

**Teaching Experience**

**Collaborative Undergraduate Research Lab, University of Wisconsin (2005)**  
 Supervised four undergraduates and two high school students in collaborative research in number theory.  
**Course development (2001)**  
 Developed a new course in elementary number theory, Math 214 (Numbers, Equations, and Proofs) for undergraduates interested in majoring in mathematics. Average student rating 4.8/5.  
**Princeton University (1998-2005)**  
 Taught Math 104 (Calculus) and Math 204 (Advanced Linear Algebra) to Princeton undergraduates. Taught Math 509 (Algebraic Number Theory) to Princeton graduate students. Advised three senior theses.  
**Freshman Advisor, Princeton University (2000-05)**  
 Advised incoming freshmen with strong mathematical interests.