

Curriculum Vitae

Full Name: Mark James Watkins

Date and Place of Birth: September 12, 1975 in Chico, California, USA.

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Education

B.S. Mathematics, Harvey Mudd College, Claremont, CA, 1996.

Ph.D. Mathematics, University of Georgia (Athens, GA), 2000. Advisor: Carl Pomerance.

Research Interests

Computational and Analytic Number Theory.

Teaching Experience

I have taught Precalculus, Introduction to Proofs (twice), Mathematics for Humanities Majors, Complex Analysis, Number Theory, and Abstract Algebra, all at the undergraduate level.

Professional Experience

- Teaching Assistant, University of Georgia (UGA), 08/96-5/97, 09/99-05/00.
- Graduate Research Assistant, University of Georgia, 05/97-08/99, 05/00-07/00.
- Visitor, Center for Discrete Mathematics and Theoretical Computer Science, 01/00-05/00.
- Member, Mathematical Sciences Research Institute, 08/00-12/00.
- Chowla Research Assistant Professor, The Pennsylvania State University, 01/01-12/03.
- Visiting Scholar, MAGMA Computer Algebra group, University of Sydney, 05/03-08/03, 08/04-10/04, 01/05-05/05, 03/06-04/06, 11/06-02/07.
- Research Fellow, Isaac Newton Institute, Cambridge, England, 01/04-03/04, 04/04-06/04.
- Visiting Scholar, Institut Henri Poincaré, Paris, France, 10/04-01/05.
- Visiting Scholar, Centre de Recherches Mathématiques, Université de Montréal, Montréal, Québec (Canada), 02/06-03/06.
- Postdoctoral Researcher, University of Bristol, Bristol, England, 06/05-current.

Departmental Service

08/98-01/00 Ran the Graduate Student Number Theory seminar at UGA.

08/98-05/99 Was treasurer of Math Club at UGA.

March 1999 Wrote the High School Math Test for UGA.

Various Refereed papers for journals such as *Journal of Number Theory*, *Experimental Mathematics*, *Journal of the LMS*, *Mathematics of Computation*, *Transactions of the AMS*, etc.

Refereed Publications

1. *A database of elliptic curves — first report*, joint with William A. Stein, in *Algorithmic Number Theory*, Fifth International Symposium, ANTS-V (Sydney 2002), C. Fieker and D. R. Kohel (ed.), 267–275, Lecture Notes in Computer Science, **2369**, Springer, 2002.
2. *Computing the modular degree of an elliptic curve*, *Experiment. Math.* **11** (2002), no. 4, 487–502.

3. *Real zeros of real odd Dirichlet L-functions*, Math. Comp. **73** (2004), no. 245, 415–423.
4. *Class Numbers of Imaginary Quadratic Fields*, Math. Comp. **73** (2004), no. 246, 907–938.
5. *Constructing Elements in Shafarevich-Tate Groups of Modular Motives*, joint with Neil Dummigan and William A. Stein, in *Number Theory and Algebraic Geometry*, M. Reid and A. Skorobogatov (ed.), 91–118, London Mathematical Society Lecture Note Series, **303**, Cambridge University Press, 2004.
6. *Modular Degrees of Neumann–Setzer Elliptic Curves*, joint with William A. Stein, Int. Math. Res. Not. **2004**, no. 27, 1395–1405.
7. *Elliptic curves of large rank and small conductor*, joint with Noam D. Elkies, in *Algorithmic Number Theory*, Sixth International Symposium, ANTS-VI (Burlington 2004), D. Buell (ed.), 42–56, Lecture Notes in Computer Science, **3076**, Springer, 2004.
8. *Symmetric powers of elliptic curve L-functions*, joint with Phil Martin, in *Algorithmic Number Theory*, Seventh International Symposium, ANTS-VII (Berlin 2006), F. Hess, S. Pauli, M. Pohst (ed.), 377–392, Lecture Notes in Computer Science, **4076**, Springer, 2006.
9. *The powers of logarithm for quadratic twists*, joint with Christophe Delaunay, in *Ranks of Elliptic Curves and Random Matrix Theory*, edited by J. B. Conrey, D. W. Farmer, F. Mezzadri, and N. C. Snaith, 189–193, London Mathematical Society Lecture Note Series **341**, Cambridge University Press, 2007.
10. *Discretisation for odd quadratic twists*, joint with J. Brian Conrey, Michael O. Rubinstein, and Nina C. Snaith, in *Ranks of Elliptic Curves and Random Matrix Theory*, edited by J. B. Conrey, D. W. Farmer, F. Mezzadri, and N. C. Snaith, 201–214, London Mathematical Society Lecture Note Series **341**, Cambridge University Press, 2007.
11. *Secondary terms in the number of vanishings of quadratic twists of elliptic curve L-functions*, joint with J. Brian Conrey, Atul Pokharel, and Michael O. Rubinstein, in *Ranks of Elliptic Curves and Random Matrix Theory*, edited by J. B. Conrey, D. W. Farmer, F. Mezzadri, and N. C. Snaith, 215–232, London Mathematical Society Lecture Note Series **341**, Cambridge University Press, 2007.
12. *Rank distribution in a family of cubic twists*, in *Ranks of Elliptic Curves and Random Matrix Theory*, edited by J. B. Conrey, D. W. Farmer, F. Mezzadri, and N. C. Snaith, 237–246, London Mathematical Society Lecture Note Series **341**, Cambridge University Press, 2007.
13. *Average ranks of elliptic curves tension between data and conjecture*, joint with Baur Bekturov, Barry Mazur, and William Stein, Bull. Amer. Math. Soc. **44** (2007), 233–254.
14. *A note on large integral points*, Journal de Théorie des Nombres Bordeaux **18** (2007), no. 3, 707–720.
15. *Some remarks on Heegner point computations*, submitted.
16. *Euler factors and local root numbers for symmetric powers of elliptic curves*, joint with Neil Dummigan and Phil Martin, submitted.
17. *Critical values of symmetric power L-functions*, joint with Neil Dummigan, submitted.
18. *Some heuristics on elliptic curves*, accepted to Experimental Mathematics.

Non-Refereed Publications (www.maths.bris.ac.uk/~mamjw/papers/papers.html)

1. *Explicit lower bounds on the modular degree of an elliptic curve*. Technical report, Issac Newton Institute preprint NI-04026.
2. *The Green-Tao Theorem*. Expository.

3. *On Sums of Four Cubes*. Expository.

Papers in Progress

1. *Computing Isogenies of Elliptic Curves*, in preparation, joint with John E. Cremona.
2. *Practical uses of the Elkies ANTS-IV point-finding methods*, in preparation.
3. *Extra rank for odd parity quadratic twists*, in preparation.
4. *Polynomial and Fermat-Pell families that attain the Davenport-Mason bound*, in preparation, joint with Noam D. Elkies.

Computer programmes available (written in C)

qisearch: A programme to search for points on the intersection of two quadrics.

cubicmodelsearch: Similar to the previous, but for cubic models.

heegner4d: A programme to compute Heegner points, possibly using 4-descent info.

sympow: A programme to compute special values of symmetric power L -functions.

Invited Talks

1. Number Theory Seminar, Lucent Technologies, Murray Hill, NJ, November 1999, *Small class numbers*.
2. Number Theory Seminar, Institute for Defense Analyses, Bowie, MD, November 1999, *Class numbers of imaginary quadratic fields*.
3. Number Theory Seminar, The Pennsylvania State University, State College, PA, January 2000, *Sizes of class groups*.
4. London Math Symposium, Durham, UK, August 2000, *Class number sixteen for imaginary quadratic fields*.
5. Foundations of Computational Mathematics Conference, University of Minnesota, MN, August 2002, *Computational Questions in Elliptic Curves*.
6. Primes in P Workshop, American Institute of Mathematics, Palo Alto, CA, March 2003, *Practical and Theoretical Algorithms for Curves*.
7. Number Theory Seminar, Institute for Defense Analyses, Bowie, MD, December 2003, *On the solution of polynomial systems of equations*.
8. Number Theory Seminar, Simon Fraser University, Burnaby, BC, Canada, January 2004, *Solving Systems of Polynomial Equations via Multidimensional p -adic Newton iteration*.
9. Number Theory Seminar, Nottingham, England, UK, February 2004, *Integral points on elliptic curves and large ranks*.
10. Séminaire Algorithmique Arithmétique, Bordeaux, France, April 2004, *Methods to solve systems of polynomial equations*.
11. Sixth International Algorithmic Number Theory Symposium (ANTS-VI), University of Vermont, Burlington, VT, June 2004, *Elliptic curves of large rank and small conductor*.
12. Number Theory Seminar, Universitat Politècnica de Catalunya, Barcelona, Spain, October 2005, *Elliptic curves in theory and practise*.
13. Number Theory Seminar, Oxford University, Oxford, England, October 2005, *Applications of multi-dimensional p -adic Newton iteration*.
14. Number Theory Seminar, Center for Communications Research, La Jolla, CA, October 2005, *Modern computational methods for elliptic curves*.

15. Faculty seminar, University of California at San Diego, La Jolla, CA, October 2005, *Relations between L-functions and arithmetic*.
16. Number Theory Seminar, University of California at San Diego, La Jolla, CA, October 2005, *Special values of symmetric power L-functions*.
17. Pure Maths Colloquium, University of Sheffield, Sheffield, England, November 2005, *Special values of L-functions: a meeting place of algebra and analysis*.
18. Number Theory Seminar, University de Waterloo, Waterloo, ON, Canada, March 2006, *Symmetric powers of elliptic curve L-functions*.
19. Séminaire on random matrices, Université Bordeaux I, France, October 2006, *Elliptic curves and random matrix theory*.
20. Number theory seminar, Université Claude Bernard Lyon 1, France, October 2006, *Random matrix theory and ranks of elliptic curves*.
21. Number theory seminar, University of Georgia, Athens, GA, September 2007, *Ranks of elliptic curves*.
22. Colloquium, University of Georgia, Athens, GA, September 2007, *Points near curves using lattice reduction*.
23. Combinatorics seminar, Georgia Institute of Technology, Atlanta, GA, September 2007, *Polynomial families that meet the Davenport-Mason bound*.
24. SAGE Days 5 Workshop on Computational Arithmetic Geometry, Clay Mathematics Institute, Cambridge, MA, October 2007, *SYMPOW - a programme to compute with symmetric power L-functions*.

Contributed Talks

1. Southeast Regional Meeting on Numbers, Greensboro, NC, Spring 1998, *Real zeros of real odd Dirichlet L-functions*.
2. Southeast Regional Meeting on Numbers, Columbia, SC, Spring 1999, *Resolution of class number eight*.
3. Millennial Number Theory Conference, Urbana-Champaign, IL, May 2000, *Resolution of class number 16*.
4. Number Theory Seminar, Mathematical Sciences Research Institute, Berkeley, CA, December 2000, *Explicit theorems on class numbers*.
5. Algebra and Number Theory Seminar, The Pennsylvania State University, State College, PA, February 2001, *Special values of L-functions and modular parametrisations of elliptic curves*.
6. Algorithmic Number Theory Workshop, Dagstuhl, Germany, May 2001, *Computing the modular degree of an elliptic curve*.
7. American Mathematical Society Special Session, Ohio State, OH, September 2001, *Special values of L-functions*.
8. Algebra and Number Theory Seminar, The Pennsylvania State University, State College, PA, September 2001, *The work of Alain Connes on the Riemman Hypothesis*.
9. Fifth International Algorithmic Number Theory Symposium (ANTS-V), University of Sydney, Australia, July 2002, *A New Database of Elliptic Curves*.
10. Computational Arithmetic Geometry Workshop, University of Sydney, Australia, June 2003, *Elliptic Curves with lots of integral points*.

11. Pure Maths Seminar, Isaac Newton Institute, Cambridge, England, UK, February 2004, *Techniques to solve polynomial equation systems*.
12. Elliptic Curves and Random Matrix Theory Workshop, Isaac Newton Institute, Cambridge, England, UK, February 2004, *Vanishing data for cubic twists*.
13. Elliptic Curves and Random Matrix Theory Workshop, Isaac Newton Institute, Cambridge, England, UK, February 2004, *Rank versus conductor*.
14. Computational Algebra Seminar, University of Sydney, Australia, August 2004, *Avoiding Computational Algebra*.
15. Explicit Methods in Number Theory Workshop, Banff International Research Station, Banff, AL, Canada, November 2004, *The future of the elliptic curve database*, an addendum to a talk by William A. Stein.
16. Special Number Theory Trimester Short Course, Institut Henri Poincaré, Paris, France, December 2004, *Some remarks regarding Heegner point computations, I*.
17. Special Number Theory Trimester Short Course, Institut Henri Poincaré, Paris, France, December 2004, *Some remarks regarding Heegner point computations, II*.
18. Elliptic Curves and Higher Dimensional Analogues Conference II, University of Sydney, Australia, January 2005, *Heegner points*.
19. Computational Algebra Seminar, University of Sydney, Australia, May 2005, *Some new features in MAGMA v2.12 related to number theory*.
20. Pohst Birthday Conference, Technische Universität, Berlin, Germany, June 2005, *Indefinite LLL*.
21. Rational Points on Curves Workshop, International University of Bremen, Germany, July 2005, *Descent and Heegner Points*.
22. Explicit Methods in Number Theory Workshop, Oberwolfach, Germany, July 2005, *Random Matrix Theory and Heegner Points*.
23. MAGMA Workshop on Group Theory and Algebraic Geometry, University of Warwick, Coventry, England, August 2005, *Loci of curves with prescribed automorphism group*.
24. Number Theory Seminar, University of Bristol, Bristol, England, October 2005, *Random matrix theory and arithmetical properties of geometric objects*.
25. Workshop on L -functions and related themes, Centre de Recherches Mathématiques, Université de Montréal, Montréal, QC, Canada, February 2006, *Counting elliptic curves, with rank 2*.
26. Number Theory Seminar, Université de Montréal, Montréal, QC, Canada, February 2006, *Symmetric power L -functions of elliptic curves*.
27. MAGMA Workshop on Computational Number Theory, University of Sydney, Australia, March 2006, *Elliptic curve counting problems*.
28. Seventh International Algorithmic Number Theory Symposium (ANTS-VII), Technische Universität, Berlin, Germany, July 2006, *Computations with symmetric power L -functions*.
29. Computational Algebra seminar, University of Sydney, Australia, December 2006, *Heuristics for elliptic curves*.
30. Conference on Random Phenomena, University of Bristol, England, March 2007, *Counting elliptic curves heuristically*.

31. Random Matrix Theory and Number Theory Workshop, Banff International Research Station, Banff, AL, Canada, July 2007, *Extra rank for odd parity twists*.
32. Random Matrix Theory and Number Theory Workshop, Banff International Research Station, Banff, AL, Canada, July 2007, *Random matrix models for extra rank in twist families of symmetric power L -functions*.
33. Explicit Methods in Number Theory Workshop, Oberwolfach, Germany, July 2007, *Probabilistic models for L -functions, I*, first talk of a short course.
34. Explicit Methods in Number Theory Workshop, Oberwolfach, Germany, July 2007, *Probabilistic models for L -functions, II*, second talk of a short course.
35. Rational Points Workshop, Jacobs University, Bremen, Germany, July 2007, *Quadratic twists of rank 3*.
36. Graduate Lecture Series, University of Bristol, Bristol, UK, September 2007, *A trace formula and the Riemann Hypothesis, I*.
37. Graduate Lecture Series, University of Bristol, Bristol, UK, September 2007, *A trace formula and the Riemann Hypothesis, II*.
38. Graduate Lecture Series, University of Bristol, Bristol, UK, September 2007, *A trace formula and the Riemann Hypothesis, III*.
39. Number Theory Seminar, Harvard University, Cambridge, MA, October 2007, *Ranks of elliptic curves*.

References (all may be contacted w/o notifying me)

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