Curriculum Vitae

Full Name: Mark James Watkins
Date and Place of Birth: September 12, 1975 in Chico, California, USA.
Nationality: United States
Current Address: School of Mathematics, University of Bristol, University Walk, Bristol BS8 1TW, UNITED KINGDOM

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.
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.
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, *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, *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, IMRN 2004, no. 27, 1395–1405.

7. *Elliptic curves of large rank and small conductor*, joint with Noam D. Elkies, *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*, in preparation, joint with Phil Martin, *Algorithmic Number Theory,* Seventh International Symposium, ANTS-VII (Berlin 2006), F. Hess, S. Pauli, M. Pohst (ed.), ???-???, Lecture Notes in Computer Science, **????**, 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, 189–194, 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 Bektemirov, Barry Mazur, and William Stein, Bulletin of the American Mathematical Society, to appear.

14. *Some remarks on Heegner point computations*, submitted.

15. *A note on large integral points*, to appear in JTNB.

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 Phil Martin, submitted.

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 Cremona.
2. *Practical uses of the Elkies ANTS-IV point-finding methods*, in preparation.
3. *Some heuristics on elliptic curves*, preprint.
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.*

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. Millenial 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. Algorithmic Number Theory Workshop, Dagstuhl, Germany, May 2001, *Computing the modular degree of an elliptic curve.*
6. Americal Mathematical Society Special Session, Ohio State, OH, September 2001, *Special values of L-functions.*
7. Fifth International Algorithmic Number Theory Symposium (ANTS-V), University of Sydney, Australia, July 2002, *A New Database of Elliptic Curves.*
8. Computational Arithmetic Geometry Workshop, University of Sydney, Australia, June 2003, *Elliptic Curves with lots of integral points.*
9. Pure Maths Seminar, Isaac Newton Institute, Cambridge, England, UK, February 2004, *Techniques to solve polynomial equation systems.*
10. Elliptic Curves and Random Matrix Theory Workshop, Isaac Newton Institute, Cambridge, England, UK, February 2004, *Vanishing data for cubic twists.*
11. Elliptic Curves and Random Matrix Theory Workshop, Isaac Newton Institute, Cambridge, England, UK, February 2004, *Rank versus conductor.*
12. Computational Algebra Seminar, University of Sydney, Australia, August 2004, *Avoiding Computational Algebra.*
13. 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.
14. Special Number Theory Trimester Short Course, Institut Henri Poincaré, Paris, France, December 2004, *Some remarks regarding Heegner point computations.*
15. Elliptic Curves and Higher Dimensional Analogues Conference II, University of Sydney, Australia, January 2005, *Heegner points.*

16. Computational Algebra Seminar, University of Sydney, Australia, May 2005, *Some new features in MAGMA v2.12 related to number theory.*
17. Pohst Birthday Conference, Technische Universität, Berlin, Germany, June 2005, *Indefinite LLL.*
18. Rational Points on Curves Workshop, International University of Bremen, Germany, July 2005, *Descent and Heegner Points.*
19. Explicit Methods in Number Theory Workshop, Oberwolfach, Germany, July 2005, *Random Matrix Theory and Heegner Points.*
20. MAGMA Workshop on Group Theory and Algebraic Geometry, University of Warwick, Coventry, England, August 2005, *Loci of curves with prescribed automorphism group.*
21. Number Theory Seminar, University of Bristol, Bristol, England, October 2005, *Random matrix theory and arithmetical properties of geometric objects.*
22. 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.*
23. Number Theory Seminar, Université de Montréal, Montréal, QC, Canada, February 2006, *Symmetric power L-functions of elliptic curves.*
24. MAGMA Workshop on Computational Number Theory, University of Sydney, Australia, March 2006, *Elliptic curve counting problems.*
25. Seventh International Algorithmic Number Theory Symposium (ANTS-VII), Technische Universität, Berlin, Germany, July 2006, *Computations with symmetric power L-functions.*
26. Computational Algebra seminar, University of Sydney, Australia, December 2006, *Heuristics for elliptic curves.*
27. Conference on Random Phenomena, University of Bristol, England, March 2007, *Counting elliptic curves heuristically.*

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

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