

William A. Stein Curriculum Vitae – March 2010

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<http://wstein.org>

Employment

- **University of Washington:** Assoc. Prof. of Math. (tenured), 2006–present.
- **UC San Diego:** Assoc. Prof. of Math. (tenured), 2005–2006.
- **Harvard:** Benjamin Peirce Asst. Prof. of Math., 2001–2005.
- **Harvard:** NSF Postdoctoral Fellow, 2000–2004.

Education

- **University of California at Berkeley,** Ph.D. in Mathematics, 2000, *Explicit Approaches to Modular Abelian Varieties*, under H. W. Lenstra.
- **Northern Arizona University,** B.S. in Mathematics, 1994.

Prizes

- **Tropheés du Libre**, 2007. The Sage project won first prize in the Scientific Software category (3000 euros, a laptop, books, server space, etc.). Sage is a software project I started and direct.

Grants

- UW Royalty Research Fellow (1-quarter teaching buyout)
- PI on **NSF Grant** DMS-0821725, SCREMS grant for number theory, geometry, and software research (\$100K, purchased high end computers for UW).
- PI on **Google Grant**, for Sage development, Summer 2008 (amount: \$18K).
- PI on **Microsoft Grant**, port Sage to Windows, 2008–2009 (amount: \$32K).
- PI on **NSF Grant** DMS-0757627, *FRG: Collaborative Research: L-functions and Modular Forms*, 2008–2012 (amount: \$1.2 million).
- co-PI on **NSF Grant** DMS-0754486, *REU Site: Inverse Problems for Electrical Networks*, 2008–2011.
- PI on **NSF Grant** DMS-0713225, *SAGE: Software for Algebra and Geometry Experimentation*, 2007–2010.
- PI on **NSF Grant** DMS-0555776, *Explicit Approaches to the Birch and Swinnerton-Dyer Conjecture*, 2007–2010.
- co-PI on **NSF Grant** DMS-0602287, *Southwest Center for Arithmetic Geometry*, 2006–2009.
- PI on **NSF Grant**, DMS-0400386, *Explicit Approaches to Modular Forms and Modular Abelian Varieties*, 2004–2007.
- PI on **Sun Academic Education Grant** (\$70K Sun Fire V480 server), 2003.
- From W. R. Hearst III and Harvard (\$20K for 12 Processor Cluster), 2002.
- Clay Mathematics Institute Liftoff Fellowship, Summer 2000.
- Berkeley Vice Chancellor Research Grant (6 Processor Cluster), 1999.

Publications

All papers are available at <http://wstein.org/papers/>.

34. *Toward a Generalization of the Gross-Zagier Conjecture* (17 pages), 2010, to appear in Int. Math. Res. Notices.
33. *Fast Computation of Hermite Normal Forms of Random Integer Matrices* (16 pages), with Clement Pernet, 2010, to appear in J. Number Theory.
32. *Computations About Tate-Shafarevich Groups Using Iwasawa Theory* (37 pages), with Christian Wuthrich, 2008, submitted.
31. *Verification of the Birch and Swinnerton-Dyer Conjecture for Specific Elliptic Curves*, with G. Grigorov, A. Jorza, S. Patrikis, and C. Patrascu (26 pages), 2009, to appear in Mathematics of Computation.

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30. *The Modular Degree, Congruence Primes and Multiplicity One* (16 pages), with Amod Agashe and Ken Ribet, 2009, to appear in a volume in honor of Serge Lang.
29. *Explicit Heegner points: Kolyvagin's conjecture and non-trivial elements in the Shafarevich-Tate group*, with Dimitar Jetchev and Kristin Lauter (18 pages), 2008, Journal of Number Theory.
28. *On the generation of the coefficient field of a newform by a single Hecke eigenvalue, with Koopa Koo and Gabor Wiese* (11 pages), 2008, J. Théor. Nombres Bordeaux.
27. *Open Source Mathematical Software (opinion piece)* (1 page), with David Joyner, Notices of the AMS, November 2007.
26. *Average Ranks of Elliptic Curve*, with Baur Bektemirov, Barry Mazur and Mark Watkins (19 pages), May 2007, Bulletins of the AMS.
25. *Visibility of Mordell-Weil Groups* (20 pages), 2008, Documenta Mathematica.
24. *Visualizing Elements of Shafarevich-Tate Groups at Higher Level*, with D. Jetchev (28 pages), 2008, Documenta Mathematica.
23. *The Manin Constant*, with A. Agashe and K. Ribet (22 pages), 2006, in the World Scientific Coates Memorial Volume.
22. *Computation of p -Adic Heights and Log Convergence*, with B. Mazur and J. Tate (36 pages), 2006, in the Documenta Mathematica Coates Memorial Volume.
21. *SAGE: System for Algebra and Geometry Experimentation* with D. Joyner, (3 pages), in the SIGSAM Bulletin, 2005.
20. *Modular Parametrizations of Neumann-Setzer Elliptic Curves*, with M. Watkins, in IMRN 2004, no. 27, 1395–1405.
19. *Studying the Birch and Swinnerton-Dyer Conjecture for Modular Abelian Varieties Using MAGMA* (23 pages), 2006, chapter in Springer-Verlag book edited by J. Cannon and W. Bosma.
18. *Conjectures about Discriminants of Hecke Algebras of Prime Level* (16 pages), with F. Calegari, in ANTS VI, Vermont, 2004.
17. *Constructing Elements in Shafarevich-Tate Groups of Modular Motives*, with N. Dummigan and M. Watkins, in “Number theory and algebraic geometry—to Peter Swinnerton-Dyer on his 75th birthday”, Ed. M. Reid and A. Skorobogatov, pages 91–118.
16. *Approximation of eigenforms of infinite slope by eigenforms of finite slope*, with R. Coleman, Geometric aspects of Dwork theory. Vol. I, II, Walter de Gruyter GmbH & Co. KG, Berlin, 2004, pp. 437–449.
15. *$J_1(p)$ has connected fibers*, with B. Conrad and B. Edixhoven, Documenta Mathematica, **8** (2003), 331–408.
14. *Shafarevich-Tate Groups of Nonsquare Order*, in Progress in Math., **224** (2004), 277–289, Birkhauser.
13. *Visible Evidence for the Birch and Swinnerton-Dyer Conjecture for Rank 0 Modular Abelian Varieties* (30 pages), with A. Agashe, appeared in Mathematics of Computation.

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12. *A Database of Elliptic Curves—First Report* (10 pages) with M. Watkins, in ANTS V proceedings, Sydney, Australia, 2002.
11. *Visibility of Shafarevich-Tate Groups of Abelian Varieties*, with A. Agashe, J. Number Theory, **97** (2002), no. 1, 171–185.
10. *Cuspidal Modular Symbols are Transportable*, with H. Verrill, LMS J. Comput. Math., **4** (2001), 170–181.
9. Appendix to Lario and Schoof’s *Some computations with Hecke rings and deformation rings*, with A. Agashe, Experiment. Math. **11** (2002), no. 2, 303–311.
8. *There are genus one curves over \mathbf{Q} of every odd index*, J. Reine Angew. Math. **547** (2002), 139–147.
7. *Component groups of purely toric quotients of semistable Jacobians*, with B. Conrad, Math. Res. Lett., **8** (2001), no. 5–6, 745–766.
6. *The field generated by the points of small prime order on an elliptic curve*, with L. Merel, Int. Math. Res. Notices, 2001, no. 20, 1075–1082.
5. *An introduction to computing modular forms using modular symbols* (12 pages), in MSRI Publications (Volume 44), Algorithmic Number Theory: Lattices, Number Fields, Curves and Cryptography, Cambridge University Press, 2008.
4. *A mod five approach to modularity of icosahedral Galois representations*, with K. Buzzard, Pac. J. Math., **203** (2002), no. 2, 265–282.
3. *Lectures on Serre’s conjectures*, with K. A. Ribet, in Arithmetic Algebraic Geometry, IAS/Park City Math. Inst. Series, Vol. 9, 143–232.
2. *Component groups of quotients of $J_0(N)$* , with D. Kohel, Proceedings of the 4th International Symposium (ANTS-IV), 2000, 405–412.
1. *Empirical evidence for the Birch and Swinnerton-Dyer conjectures for modular Jacobians of genus 2 curves*, with E. V. Flynn, F. Leprévost, E. F. Schaefer, M. Stoll, J. L. Wetherell, Math. of Comp. **70** (2001), no. 236, 1675–1697.

Books

5. *What is Riemann’s Hypothesis* (100 pages), with B. Mazur, (in progress), draft at <http://wstein.org/rh/>.
4. *Modular Forms, a Computational Approach*, (268 pages), published as AMS Graduate Studies in Mathematics, Volume **79**, 2007, and freely available at <http://wstein.org/books/modform/>.
3. *Elementary Number Theory* (185 pages), published in the Springer-Verlag UTM series, 2008, <http://wstein.org/ent/>.
2. *A Brief Introduction to Classical and Adelic Algebraic Number Theory* (190 pages), <http://wstein.org/papers/ant/>.
1. *Lectures on Modular Forms and Galois Representations* (200 pages), with K. A. Ribet (in progress).

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Computation

- Founder and director of the Sage (<http://www.sagemath.org>) open source mathematical software project.
- The modular forms, modular symbols, and modular abelian varieties parts of Magma (over 25000 lines of code).
- The Modular Forms Database: <http://wstein.org/tables/>.
- Extensive experience with Python, C/C++, Magma, and web programming.

Teaching

Student Conference Organization

- *Arizona Winter School*, 2007–2009, co-organizer (over 100 attendees each year).
- *Computing with Modular Forms*, MSRI Summer Workshop, July 31–August 11, 2006. Graduate student workshop (about 35 attendees).

University of Washington

- *Math 582: Galois Cohomology*, Winter 2010.
- *Math 414: Elementary Number Theory*, Winter 2010.
- *Math 583e: Graduate Computational Number Theory, part 2*, Spring 2009.
- *Math 480: Open Source Mathematical Software*, Spring 2009.
- *Math 582e: Graduate Computational Number Theory*, Winter 2009.
- *SIMUW: Mathematical Finance*, Summer 2008.
- *Math 480: Open Source Mathematical Software*, Spring 2008.
- *Math 581f: Graduate Algebraic Number Theory*, Fall 2007.
- *SIMUW: The Riemann Hypothesis*, Summer 2007.
- *Math 583: The Birch and Swinnerton-Dyer Conjecture*, Spring 2007.
- *Math 480: Elementary Number Theory*, Spring 2007.
- *SIMUW: The Congruent Number Problem*, Summer 2006.
- *Math 583: Computing with Modular Forms*, Spring 2006.

UC San Diego

- *Elliptic Curves and Modular Forms*, Fall 2005.
- *Calculus For Scientists and Engineers*, Winter 2006.

Harvard University

- *Freshman Seminar on Fermat's Last Theorem*, Fall 2004.
- *Computing With Modular Forms*, Fall 2004.
- *Algebraic Number Theory*, Spring 2004.
- *Modular Abelian Varieties*, Fall 2003.
- *Freshman Seminar on Elliptic Curves*, Spring 2003.
- *Elementary Number Theory*, Fall 2001 and Fall 2002.
- *Linear Algebra*, Fall 2001 and Spring 2002.
- Advised 6 senior honors theses.
- Directed 8 funded undergraduate research projects.
- Participated in first *Clay Mathematics Research Academy*, 2001.
- Seminar Organization:
 - *The Basic Notions Seminar*, 2003–present.
 - *The Modular Curves Seminar*, 2000–present.
 - *Harvard Colloquium*, 2001–2002.

IAS/Park City Mathematics Institute

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- *Teaching Assistant*, Summer 1999, K. Ribet's course on Serre's conjectures.

University of California at Berkeley

- *Curriculum Development*, 1997–1998, wrote instructional software.
- *Discrete Mathematics*, Summer 1997.
- *Calculus*, Fall 1995–Spring 1997, teaching assistant.

Northern Arizona University

- *College Mathematics With Applications*, Spring 1995.
- *College Algebra*, Fall 1994.

Students

- **Robert Bradshaw**, Ph.D. expected June 2010 on *Provable Computation of Motivic L-function*. Bradshaw has already been hired by Google as a Software Engineer starting June 2010, partly due to his extensive experience with the Sage project.
- **Robert Miller**, Ph.D. expected June 2010 on *Verification of the Birch and Swinnerton-Dyer conjecture for individual elliptic curves*.
- **Alyson Deines**, Ph.D. expected June 2012.

Seminars

For a complete list, see <http://wiki.wstein.org/schedule>.

Other Activities

Workshop and Conference Organization: I (co-)organized all of the following workshops and conferences.

26. *Sage Days 17: Computing with Modular forms and L-functions*, Sep. 2009, on Lopez Island.
25. *Sage Days 16: Computational Number Theory*, June 2009, in Barcelona, Spain.
24. *Sage Days 15*, May 2009.
23. *Arizona Winter School: Quadratic Forms*, March 2009.
22. *Sage Days 14: Sage and Macaulay2 for Algebraic Geometry Experimentation*, March 2009, MSRI (Berkeley).
21. *Sage Days 13: Quadratic Forms and Lattices*, March 2009, Athens, Georgia.
20. *Sage Days 12: Bug Smash*, Jan. 2009, San Diego, CA.
19. *Sage Days 11: Special functions and computational number theory meet scientific computing*, Nov. 2008, Austin, Texas.
18. *Sage Days 9: Mathematical graphics and visualization*, Aug. 2009, Vancouver.
17. *Workshop on L-functions and Modular Forms*, June 2008, UW.
16. *L-functions Summer School and Coding Sprint*, June 2008, UW.
15. *Sage Developer Coding Days*, June 2008, UW.
14. *Arizona Winter School: Special Functions and Transcendence*, March 2008, Univ. of Arizona.
13. *Sage Days 8: Number Theory and High Performance Numerical Computation*, March 2008, at UT Austin.
12. *Sage Days 7*, Feb 2008, IPAM (UCLA).
11. *SAGE Days 6*, Nov. 2007, Bristol, UK.

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10. *SAGE Days 5 – Computational Arithmetic Geometry*, Oct 2007 at the Clay Math Institute in Cambridge, MA.
9. *Workshop on Modular Forms and L-functions*, Aug. 2007 at AIM (Palo Alto).
8. *Sage Days 4*, June 2007 at UW.
7. *Modular Forms: Arithmetic and Computation*, June 2007 at Banff.
6. *Arizona Winter School: p-adic Geometry*, March 2007 at Univ. of Arizona.
5. *Sage Days 3*, Feb. 2007 at IPAM (UCLA).
4. *Interactive Parallel Computation in Support of Research in Algebra, Geometry and Number Theory*, Feb 2007 at MSRI (Berkeley).
3. *Sage Days 2*, Oct. 2006 at UW.
2. *Summer Graduate Workshop on Computing with Modular Forms*, July 2006 at MSRI (Berkeley).
1. *Sage Days 1*, Feb 2006 at UC San Diego.

Upcoming Workshop Organization: I am (co-)organizing the following upcoming events.

- *MSRI Program in Arithmetic Statistics*, Spring 2011, at MSRI in Berkeley.
- *Sage Days 25: Numerical computation*, August, 2010, in Mubmai, India.
- *Sage Days 24: Symbolic computation*, July, 2010 at RISC in Linz, Austria.
- *Sage Days 23: Number theory*, July, 2010 in Leiden, Netherlands.
- *Sage Days 22: MSRI Summer Graduate Student Workshop on Elliptic Curves*, June 2010 in MSRI (Berkeley, CA).
- *Sage Days 21: Function fields*, May 2010 at UW.
- *Sage Days 19: Bug Smash*, January 2010 in Seattle.
- *Sage Days 18: Computations related to the Birch and Swinnerton-Dyer Conjecture*, Dec 2009, at the Clay Mathematics Institute in Cambridge, MA.

Personal

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