

Karl Mahlburg

316 Fine Hall
Department of Mathematics
Princeton University
Washington Road
Princeton, NJ 08544

e-mail: mahlburg@math.princeton.edu
Homepage: www.math.princeton.edu/~mahlburg
Cellular phone: (608)345-0168

Positions and Affiliations:

- NSF Math Institute Postdoctoral Fellow (administered by Mathematical Sciences Research Institute); Visiting Research Fellow, Princeton University, 2009 – 2011.
- Research Affiliate, Massachusetts Institute of Technology, 2009 – .
- C.L.E. Moore Instructor, Massachusetts Institute of Technology, 2006 – 09.

Education:

- Ph.D., Mathematics, University of Wisconsin-Madison, 2006.
Advisor: Ken Ono
Thesis: *Congruences for the coefficients of modular forms and applications to number theory*
- M.A., Mathematics, University of Wisconsin-Madison, 2003.
- B.S., Mathematics with Highest Distinction, Harvey Mudd College, 2001.

Research Interests:

- Number theory
- Modular forms
- Integer partitions
- Hypergeometric q -series
- Enumerative combinatorics
- Percolation models and probability

Publications:

1. (with K. Bringmann) *An extension of the Hardy-Ramanujan method and applications to partitions without sequences*, to appear in Amer. Jour. of Math.
2. (with K. Bringmann) *Inequalities between crank and rank moments*, Proc. Amer. Math. Soc. **137** (2009), 2567–2574.
3. (with K. Bringmann and F. Garvan) *Partition statistics and quasiharmonic Maass forms*, Int. Math. Res. Not., 2009, no. 1, 63–97.
4. *Partition congruences and the Andrews-Garvan-Dyson crank*, Proceedings of the National Academy of Sciences **102** (2005), no. 43, 15373–76.

5. *More congruences for the coefficients of quotients of Eisenstein series*, Journal of Number Theory **115** (2005), no. 1, 89–99.
6. *The overpartition function modulo small powers of 2*, Discrete Mathematics **286** (2004), no. 3, 263–267.
7. (with K. Ono) *Arithmetic of certain hypergeometric modular forms*, Acta Arithmetica **113** (2004), no. 1, 39–55.
8. (with J. Getz) *Partition identities and a theorem of Zagier*, Journal of Combinatorial Theory (A) **100** (2002), 27–43.
9. (with A. Benjamin, G. Levin, and J. Quinn) *Random approaches to Fibonacci identities*, The American Mathematical Monthly **107** (2000), 511–16.

Submitted papers and preprints:

- (with T. Kemp, A. Rattan and C. Smyth) *Enumeration of non-crossing pairings on bit strings*, submitted.
- (with K. Bringmann and R. Rhoades) *Asymptotics for crank and rank moments*, submitted.
- (with K. Bringmann) *Improved bounds on metastability thresholds and probabilities for generalized bootstrap percolation*, preprint.
- (with K. Bringmann and R. Rhoades) *Asymptotic expansions for crank and rank moments*, preprint.

Selected Invited Talks and Seminars:

- *Asymptotics for crank and rank moments*, International Conference: Mock theta functions and applications in combinatorics, algebraic geometry, and mathematical physics; Max Planck Institute for Mathematics, Bonn, May 26, 2009.
- *The arithmetic of the coefficients of automorphic forms and applications in number theory*, Colloquium, University of Talca, Chile, March 3, 2009.
- *Arithmetic of the coefficients of automorphic forms*, Number Theory Seminar, Princeton University, October 23, 2008.
- *Asymptotics for partitions without sequences*, Quebec-Vermont Number Theory Seminar, McGill University, April 17, 2008.
- *Partitions statistics and weak Maass forms*, Number Theory Seminar, M.I.T., October 11, 2007.
- *Modular forms in number theory*, Mathematics Colloquium, Harvey Mudd College, December 7, 2006.
- *The Andrews-Garvan-Dyson crank and partition congruences*, Colloquium, Temple University, January 23th, 2006.

- *The Andrews-Garvan crank and partition congruences*, Plenary address, International Conference on Number Theory and Mathematical Physics and SASTRA Ramanujan Award Presentation, Kumbakonam, India, December 20-22, 2005.
- *The Andrews-Garvan crank and partition congruences*, Combinatorics/Number Theory Seminar, Ohio State University, May 13th, 2005.
- *Partition identities and a theorem of Zagier*, Number Theory Seminar, University of Wisconsin-Madison, Fall 2001.

Teaching Activities:

- Lecturer for Math 18.01 (Single Variable Calculus), MIT, Spring 2009.
- Lecturer for Math 18.781 (Introduction to the Theory of Numbers), MIT, Fall 2008.
- Lecturer for Math 18.786 (Algebraic Number Theory), MIT, Spring 2008.
- Recitation Instructor for Math 18.02 (Multivariable Calculus) Recitations, MIT, Fall 2007.
- Lecturer for Math 18.02A (Multivariable Calculus), MIT, Spring 2007.
- Recitation Instructor for Math 18.01A/18.02A (Calculus), M.I.T., Fall 2006.
- Teaching Assistant for Math 171, 217 (Calculus), UW-Madison, 2004 – 2005.

Directed Research and Advising:

- Ethan Sterling, Directed Research: *The Bounded Thrackle Conjecture*, Undergraduate Research Opportunities Program, MIT, Summer 2008.
- Matthew Garcia, Directed Reading: *An Adelic Approach to Class Field Theory*, Undergraduate Research Opportunities Program, MIT, Spring 2008.
- Alex Arkhipov, Directed Reading/Research: *Combinatorial Partition Theory*, Undergraduate Research Opportunities Program, MIT, Summer 2007.
- Assistant Instructor for UW-Madison Research Experience for Undergraduates, Summer 2005, 2006.

Grants and Fellowships:

- Humboldt Research Fellowship for Postdoctoral Researchers, 2010–12.
- National Science Foundation Mathematical Institute Postdoctoral Research Fellowship, 2009–11.
- NSA Young Investigator Award, 2008–2010. \$34,000.
- Recommended for National Science Foundation Postdoctoral Research Fellowship, 2006.
- Clay Mathematics Institute Liftoff Fellow, Summer 2006. \$5,000.
Host: George Andrews at Pennsylvania State University.

- NSF Graduate Fellowship, 2002–2005.
- UW-Madison VIGRE Fellowship, 2001–02, 2005–2006.

Awards and Honors:

- Inaugural Proceedings of the National Academy of Sciences *Paper of the Year Award*, presented at the National Academy of Sciences, 2006.
- UW-Madison Excellence in Mathematical Research Award, Spring 2005.

Professional Activities:

- Referee Work for:
Advances in Mathematics, Annals of Combinatorics, Ars Combinatoria, Discrete Mathematics, Electronic Journal of Combinatorics, European Journal of Combinatorics, Journal of Combinatorial Theory Series A, INTEGERS - Electronic Journal of Combinatorial Number Theory, Journal fur die Reine und Angewandte Mathematik, Journal of the London Mathematical Society, Mathematical Research Letters, Proceedings of the American Mathematical Society, Proceedings of the National Academy of Sciences, The Ramanujan Journal, Transactions of the American Mathematical Society; (19 total papers refereed).
- Reviewer for AMS Mathematical reviews; (13 reviews written).
- Member of the American Mathematical Society, 2002 – .
- Member of Graduate Program Committee, UW-Madison, 2005.
- Member of the Wisconsin Teaching Assistants' Association, 2005.

Other Interests:

- Volunteer pianist at Wisconsin Governor's Mansion, 2003 – 2005.
- Classical and jazz music.
- Distance running, biking, skiing, trekking, endurance sports.
- Vegetarian cooking.