

# Melanie Matchett Wood

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## Positions

**University of Wisconsin-Madison Professor** ..... 2017-present  
**American Institute of Mathematics Five-Year Fellow** ..... 2009-2017  
**University of Wisconsin-Madison Assistant Professor** ..... 2011-2017  
**Stanford University Szegö Assistant Professor** ..... 2009-2011  
**MSRI Research Member, Arithmetic Statistics Program** ..... Spring 2011

## Education

**Princeton University** Ph.D. in Mathematics ..... 2004–2009  
**University of Cambridge** Certificate of Advanced Study in Mathematics, with Distinction 2003–2004  
**Duke University** B.S. with Highest Honors in Mathematics ..... 1999–2003

## Selected Awards

**AWM-Microsoft Research Prize in Algebra and Number Theory** ..... 2018  
**NSF CAREER Grant DMS-1652116** ..... 2017  
**University of Wisconsin-Madison Vilas Early Career Investigator Award** ..... 2017  
**Packard Fellowship for Science and Engineering** ..... 2015  
18 awarded yearly to early career scientists and engineers in the U.S.  
**Sloan Research Fellowship** ..... 2015  
126 awarded yearly to early career scientists in the U.S. and Canada  
**National Science Foundation Grant DMS-1301690** ..... 2013  
**Fellow of the American Mathematical Society** ..... 2012  
inaugural class, the first year there was a fellows program  
**National Science Foundation Grant DMS-1001083** ..... 2010  
**American Institute of Mathematics Five-Year Fellow** ..... 2009  
one or two fellowships awarded yearly for top mathematics Ph.D.'s in U.S.  
**Clay Mathematics Institute Liftoff Fellow** ..... 2009  
seven fellowships awarded that year for top mathematics Ph.D.'s in U.S.  
**American Association of University Women Dissertation Fellowship** ..... 2008  
the competition for these fellowships is among all disciplines  
**Josephine De Kármán Dissertation Fellowship** ..... 2008  
ten fellowships awarded that year to finishing Ph.D. candidates at U.S. institutions, in any discipline, with special consideration given to the humanities  
**National Defense Science and Engineering Graduate Fellowship** ..... 2005

<b>AMS-MAA-SIAM Morgan Prize</b> .....	2003
one given annually for outstanding research in mathematics by an undergraduate student in the U.S. or Canada, given jointly by the three mathematics professional societies	
<b>Leslie Walshaw Prize, Examination Prize, Research Scholarship, and Senior Scholarship</b> (for top results of Part III Mathematics examinations), <b>Trinity College, University of Cambridge</b>	2004
<b>National Science Foundation Graduate Research Fellowship</b> .....	2003
<b>Gates Cambridge Scholarship</b> .....	2003
forty-four full-cost scholarships for U.S. students to University of Cambridge awarded that year in all disciplines	
<b>Fulbright Award to the United Kingdom</b> (declined to accept Gates) .....	2003
all-discipline award	
<b>Alice T. Schafer Prize</b> .....	2002
one or two given yearly to a U.S. undergraduate woman for excellence in mathematics	
<b>Putnam Fellow (top five) and Elizabeth Lowell Putnam Prize (top female)</b> .....	2002
9th place and Elizabeth Lowell Putnam Prize .....	2001
in annual Putnam Mathematical Competition for college students in U.S. and Canada	
<b>International Mathematical Olympiad</b> , 2 silver medals as member of 6 person US team	1998, 1999
<b>U.S.A. Mathematical Olympiad</b> , tied for first place .....	1998

## Papers

34. “**The free group on  $n$  generators modulo  $n+u$  random relations as  $n$  goes to infinity**”, with Yuan Liu, submitted (2017), arXiv:1708.08509.
33. “**Nonabelian Cohen-Lenstra Moments**”, submitted (2016), arXiv:1702.04644.
32. “**Cohen-Lenstra heuristics and local conditions**”, preprint, available on my webpage.
31. “**Coincidences of homological densities, predicted by arithmetic**,” with Benson Farb and Jesse Wolfson, submitted (2016), arXiv:1611.04563.
30. “**A heuristic for boundedness of ranks of elliptic curves**,” with Jennifer Park, Bjorn Poonen, and John Voight, submitted (2016), arXiv:1602.01431.
29. “**Random integral matrices and the Cohen Lenstra Heuristics**,” submitted (2015), arXiv:1504.04391.
28. “**On  $\ell$ -torsion in class groups of number fields**,” with Jordan Ellenberg and Lillian B. Pierce, to appear *Algebra & Number Theory* arXiv:1606.06103 (2016).
27. “**The distribution of sandpile groups of random graphs**,” *Journal of the American Mathematical Society*, **30** (2017), pp. 915-958.
26. “**Nonabelian Cohen-Lenstra Heuristics over Function Fields**,” with Nigel Boston, *Compositio Mathematica* **153** (2017), no. 7, pp. 1372-1390.
25. “**Mass formulas for local Galois representations and quotient singularities II: dualities and resolution of singularities**,” with Takehiko Yasuda, *Algebra & Number Theory* 11-4 (2017), 817–840. DOI 10.2140/ant.2017.11.817
24. “**Gauss Composition for  $\mathbb{P}^1$ , and the universal Jacobian of the Hurwitz space of double covers**,” with Daniel Erman, *Journal of Algebra*, 470 (2017) 320-352.
23. “**Irreducibility of Random Polynomials**,” with Christian Borst, Evan Boyd, Claire Brekken, Samantha Solberg, and Philip Matchett Wood, *Experimental Mathematics* (2017) DOI: 10.1080/10586458.2017.1325790.
22. “**Representations of integers by systems of three quadratic forms**,” with Lillian B. Pierce and Damaris Schindler, *Proceedings of the London Mathematical Society (3)* 113 (2016), no. 3, 289-344.

21. **“Asymptotics for number fields and class groups,”** in *Directions in Number Theory*, Springer (2016) pp. 291–339.
20. **“The distribution of  $\mathbb{F}_q$  points on cyclic  $\ell$ -covers of genus  $g$ ,”** with Alina Bucur, Chantal David, Brooke Feigon, Nathan Kaplan, Matilde Lalín, and Ekin Ozman, *International Mathematics Research Notices* (2016) no. 14, 4297-4340.
19. **“Discriminants in the Grothendieck Ring,”** with Ravi Vakil, *Duke Mathematical Journal* 164 (2015), no. 6, 1139-1185.
18. **“Semiample Bertini theorems over finite fields,”** with Daniel Erman, *Duke Mathematical Journal* 164 (2015), no. 1, 1-38.
17. **“The distribution of points on superelliptic curves over finite fields,”** with GilYoung Cheong and Azeem Zaman, *Proceedings of the American Mathematical Society*, **143** no. 4 (2015), pp. 1365-1375.
16. **“A heuristic for the distribution of point counts for random curves over a finite field,”** with Jeffrey D. Achter, Daniel Erman, Kiran S. Kedlaya, David Zureick-Brown, *Philosophical Transactions of the Royal Society A*, (2015) **373**, no. 2040: 20140310.
15. **“Mass formulas for local Galois representations and quotient singularities I: A comparison of counting functions,”** with Takehiko Yasuda, *International Mathematics Research Notices* (2015) no. 23, 12590-12619.
14. **“On a Cohen-Lenstra Heuristic for Jacobians of Random Graphs”** with Julien Clancy, Nathan Kaplan, Timothy Leake, and Sam Payne, *Journal of Algebraic Combinatorics*, 42 (2015), no. 3, 701-723.
13. **“Parametrization of ideal classes in rings associated to binary forms,”** *Journal für die reine und angewandte Mathematik (Crelle)* 689 (2014), 169-199.
12. **“Counting polynomials over finite fields with given root multiplicities,”** with Ayah Almousa, *Journal of Number Theory*, 136C (2014), pp. 394–402.
11. **“The distribution of the number of points on trigonal curves over  $\mathbb{F}_q$ ,”** *International Mathematics Research Notices* (2012) no. 23, 5444-5456.
10. **“Quartic rings associated to binary quartic forms,”** *International Mathematics Research Notices* (2012) no. 6, 1300–1320.
9. **“Gauss composition over an arbitrary base,”** *Advances in Mathematics* 226 (2011) 1756-1771.
8. **“Rings and ideals parametrized by binary  $n$ -ic forms,”** *Journal of the London Mathematical Society* (2) 83 (2011) 208–231.
7. **“Parametrizing quartic rings over an arbitrary base,”** *Algebra and Number Theory* 5-8 (2011), 1069–1094.
6. **“Mapping Incidences,”** with Van H. Vu and Philip Matchett Wood, *Journal of the London Mathematical Society*. (2) 84 (2011) 433–44.
5. **“On the probabilities of local behaviors in abelian field extensions,”** *Compositio Mathematica* 146 (2010), no. 1, 102–128.
4. **“Mass formulas for local Galois representations to wreath products and cross products,”** *Algebra and Number Theory*, Vol. 2 (2008), No. 4, 391-405.
3. **“The density of discriminants of  $S_3$ -sextic number fields,”** with Manjul Bhargava, *Proceedings of the American Mathematical Society*, 136 (2008), 1581–1587.
2. **“Belyi-extending maps and the Galois action on dessins d’enfants,”** *Publications of the Research Institute for Mathematical Sciences* **42** (2006), no. 3, 721-737.

1. “**P-orderings: a metric viewpoint and the non-existence of simultaneous orderings,**” *Journal of Number Theory* **99** (2003) 36-56.

### Major Invited Lectures

Stanford University Beatrice Yormark Distinguished Lecture.....	2016
John G. Kemeny Lectures, Dartmouth, three lectures.....	2016
Distinguished Women in Mathematics Lecturer, University of Texas at Austin.....	2015
Montreal CRM Summer School, four 1.5 hour lectures.....	2014
Arizona Winter School, five lectures.....	2014
Loeb Lecture, Washington University at St. Louis.....	2014
J. Sutherland Frame Lecture, MAA MathFest.....	2012
Joint Mathematics Meetings MAA Invited Address.....	2011
AMS Western Sectional Meeting Invited Address.....	2010

### Selected Invited Research Talks

Northwestern Colloquium.....	2017
MSRI Recent developments in Analytic Number Theory Workshop.....	2017
Invited Address, MAA Wisconsin Section Meeting.....	2017
University of Chicago Colloquium.....	2017
Caltech Colloquium.....	2016
Princeton University Colloquium.....	2016
Princeton University Number Theory Seminar.....	2016
2016 Fields Medal Symposium.....	2016
Stanford University Number Theory Seminar.....	2016
Stanford University Combinatorics Seminar.....	2016
Rubinfest: L-functions and Arithmetic, Harvard University.....	2016
Conference on Arithmetic Statistics and the Cohen-Lenstra Heuristics, University of Warwick.....	2016
Joint Athens-Atlanta Number Theory Seminar, Georgia Tech.....	2016
Number Theory Seminar, University of Chicago.....	2016
Invited Lecture, AMS Algebraic Geometry Summer Institute, University of Utah.....	2015
Southern California Number Theory Day Invited Speaker.....	2015
Algebraic Geometry Northeastern Series Invited Speaker.....	2015
Brandeis-Harvard-MIT-Northeastern Joint Colloquium.....	2015
Rice University Colloquium.....	2015
Tufts University Colloquium.....	2015
Invited speaker, Northeast Probability Seminar at Columbia University.....	2014
IMA Additive and Analytic Combinatorics Workshop.....	2014
University of Illinois at Urbana-Champaign, Bateman-Halberstam Conference.....	2014
Marquette University Colloquium.....	2014
AIM Workshop: Arithmetic statistics over finite fields and function fields.....	2014
University of Michigan Algebraic Geometry Seminar.....	2013
Boston College-MIT Joint Number Theory Seminar.....	2013
University of North Carolina Number Theory Seminar.....	2013
Johns Hopkins-University of Maryland Algebra & Number Theory Day.....	2013
Collaborative Explorations and Developments in Arithmetic Research Conference.....	2013
Atkin Memorial Workshop on Cohen-Lenstra Heuristics.....	2013
University of Chicago Geometry/Topology Seminar.....	2013
University of Illinois-Chicago Algebraic Geometry Seminar.....	2013
University of Chicago Colloquium.....	2012
Upstate New York Number Theory Conference Invited Speaker.....	2012
Northern Illinois University Colloquium.....	2012
University of Wisconsin-Madison Colloquium.....	2012
Duke University Algebraic Geometry Seminar.....	2011

Women in Numbers 2, Banff International Research Station .....	2011
Western Algebraic Geometry Symposium .....	2011
AWM 40 years and counting Number Theory Session .....	2011
MSRI-Evans Lecture, University of California, Berkeley .....	2011
MSRI-Arithmetic Statistics Workshops, two invited talks .....	2011
Bay Area Algebraic Number Theory and Arithmetic Geometry Day .....	2011
MAA Invited Speaker in The Power and Beauty of Number Theory Session, JMM .....	2011
AWM Alice T. Schafer Mini-symposium, JMM .....	2011
Stanford University Algebraic Geometry Seminar .....	2011
Cornell University Number Theory Seminar .....	2010
University of Wisconsin-Madison Number Theory Seminar .....	2010
Workshop on Elliptic Curves and Computation .....	2010
Northwestern Number Theory Seminar .....	2010
University of California Berkeley Commutative Algebra and Algebraic Geometry Seminar .....	2009
Québec-Vermont Number Theory Seminar at McGill .....	2009
Oberwolfach workshop: Explicit Methods in Number Theory .....	2009
Higher Degree Forms Conference, University of Florida .....	2009
Rutgers University Colloquium .....	2009
Rutgers University Number Theory Seminar .....	2009
Stanford University Number Theory Seminar .....	2009
University of Texas at Austin Algebra, Number Theory, and Combinatorics Seminar .....	2009
Texas A&M Number Theory Seminar .....	2009
University of Wisconsin Madison Number Theory Seminar .....	2008
University of Arizona Number Theory Seminar .....	2007
Rings of Low Rank Workshop, Lorentz Center, University of Leiden, Netherlands .....	2006
Institute for Advanced Study Women's Program .....	2006
University of California-Berkeley Number Theory Seminar .....	2005
University of Pennsylvania Galois Seminar .....	2005
American University Colloquium .....	2004

### Selected Student and Public Talks

U.S. Academic Decathlon Speaker at Welcome Ceremony .....	2017
Young Mathematicians Conference Plenary Speaker.....	2016
Association of Colleges in the Chicagoland Area, 2 talks to undergraduates .....	2013
Duke University Mathematics Union Undergraduate Talk .....	2011
Bay Area Mathematical Adventures .....	2009
Keynote Address, 37th Biennial Convention, Kappa Mu Epsilon .....	2009
Princeton Sigma Xi Public Science Lecture .....	2009
USA Mathematical Olympiad Awards Ceremony Keynote Speaker .....	2008
Lecture at opening of MAA Carriage House Conference Center .....	2007
Colloquium and Harry S. Kieval Lecture, Humboldt State University .....	2007
University of Minnesota Duluth Colloquium and Public Talk.....	2006
Bay Area Mathematical Olympiad Awards Ceremony Keynote Speaker .....	2005
New York Metropolitan MAA Section Meeting Invited Major Session Speaker .....	2005
American University Public Talk .....	2004

### Service

AMS Representative on the Frank and Brennie Morgan Prize Committee .....	2016-present
University of Wisconsin Institutional Nominations and Internal Competitions Committee .....	2016-present
Editorial Board, Journal de Théorie des Nombres de Bordeaux.....	2015-present
Intel Science Talent Search Judging Panel (national research competition for high schoolers) ..	2015-present

Undergraduate research coordinator for UW-Madison's NSF Research and Training Grant in Number Theory, Algebraic Geometry, and Applied Algebra .....2015-present  
 Assistant Director, Wisconsin Mathematics, Engineering, and Science Talent Search .....2012-present  
 Member, MAA Subcommittee on the United States Math Olympiad.....2016-2017  
 Reviewer for NSA Mathematical Sciences Grant Program .....2012-2016  
 Reviewer for Banff International Research Station.....2015-2016  
 Developed research problem for and co-organized research group for Women in Numbers 2 .....2011  
 Panel member for National Science Foundation review panel .....2010-11, 2013-14, 2015-16  
 Mathcounts Board of Directors .....2007-2009  
 Institute for Advanced Study Women in Science Seminar Co-organizer .....2007  
 Noetherian Ring Co-chair, Princeton University .....2006-2009