

Melanie Matchett Wood

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Positions

Princeton University Minerva Distinguished Visitor Fall 2018
University of Wisconsin-Madison Vilas Distinguished Achievement Professor .. 2017-present
University of Wisconsin-Madison Professor 2017
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
- AMS-MAA-SIAM Morgan Prize** 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
- Leslie Walshaw Prize, Examination Prize, Research Scholarship, and Senior Scholarship**
(for top results of Part III Mathematics examinations), **Trinity College, University of Cambridge** 2004
- National Science Foundation Graduate Research Fellowship** 2003
- Gates Cambridge Scholarship** 2003
forty-four full-cost scholarships for U.S. students to University of Cambridge awarded that year in all disciplines
- Fulbright Award to the United Kingdom** (declined to accept Gates) 2003
all-discipline award
- Alice T. Schafer Prize** 2002
one or two given yearly to a U.S. undergraduate woman for excellence in mathematics
- Putnam Fellow (top five) and Elizabeth Lowell Putnam Prize (top female)** 2002
9th place and Elizabeth Lowell Putnam Prize 2001
in annual Putnam Mathematical Competition for college students in U.S. and Canada
- International Mathematical Olympiad**, 2 silver medals as member of 6 person US team 1998, 1999
- U.S.A. Mathematical Olympiad**, tied for first place 1998

Papers

37. “Cokernels of adjacency matrices of random r -regular graphs,” with Hoi H. Nguyen, (2018), arXiv:1806.10068.
36. “Random integral matrices: universality of surjectivity and the cokernel,” with Hoi H. Nguyen, (2018), arXiv:1806.00596.
35. “An effective Chebotarev density theorem for families of number fields, with an application to l -torsion in class groups,” with Lillian B. Pierce and Caroline L. Turnage-Butterbaugh, (2017), arXiv:1709.09637.
34. “Coincidences of homological densities, predicted by arithmetic,” with Benson Farb and Jesse Wolfson, (2016), arXiv:1611.04563.
33. “Nonabelian Cohen-Lenstra Moments” (including an appendix with Philip Matchett Wood), to appear *Duke Mathematical Journal*, arXiv:1702.04644.
32. “A heuristic for boundedness of ranks of elliptic curves,” with Jennifer Park, Bjorn Poonen, and John Voight, to appear *Journal of the European Mathematical Society*, arXiv:1602.01431.
31. “The free group on n generators modulo $n+u$ random relations as n goes to infinity”, with Yuan Liu, to appear *Journal für die reine und angewandte Mathematik (Crelle)*, arXiv:1708.08509.
30. “Random integral matrices and the Cohen Lenstra Heuristics,” to appear *American Journal of Mathematics*, arXiv:1504.04391.
29. “Cohen-Lenstra heuristics and local conditions,” *Research in Number Theory*, (2018) 4:41.
28. “On l -torsion in class groups of number fields,” with Jordan Ellenberg and Lillian B. Pierce, *Algebra & Number Theory* 11-8 (2017), 1739–1778.
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.
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 ℓ -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

University of Oregon Niven Lectures	2018
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

Conference on open questions in cryptography and number theory at UC Irvine, Invited Speaker	2018
Arithmetic Geometry, Number Theory, and Computation at MIT, Invited Speaker	2018
Canadian Number Theory Association Plenary Speaker	2018
Algorithmic Number Theory Symposium Invited Speaker	2018
Duke Math Journal Conference	2018
Carnegie Mellon Colloquium	2018
University of California, Berkeley Colloquium	2018
Columbia Algebraic Geometry Seminar	2017
Yale University Colloquium	2017
Yale University Algebraic Geometry Seminar	2017
University of Texas at Austin Number Theory Seminar	2017
University of Texas at Austin Group Theory Seminar	2017
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

AWM-Microsoft Research Prize Committee	2018-present
University of Wisconsin-Madison Women Faculty Mentoring Program Advisory Board	2018-present
AMS Representative on the Frank and Brennie Morgan Prize Committee	2016-present
Editorial Board, Journal de Théorie des Nombres de Bordeaux.....	2015-present
Regeneron Science Talent Search (formerly Westinghouse, Intel) 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
Panel member for National Science Foundation review panel	2010-11, 2013-14, 2015-16, 2017-18
Member, MAA Subcommittee on the United States Math Olympiad.....	2016-2017
University of Wisconsin Institutional Nominations and Internal Competitions Committee	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
Mathcounts Board of Directors	2007-2009
Noetherian Ring Co-chair, Princeton University	2006-2009
Institute for Advanced Study Women in Science Seminar Co-organizer	2007