

CURRICULUM VITAE

Mark David Haiman

Department of Mathematics
970 Evans Hall
University of California
Berkeley, California 94720-3840

Office phone: (510) 642-4318
Home phone: (510) 849-3894
Fax: (510) 642-8204
mhaiman@math.berkeley.edu
www.math.berkeley.edu/~mhaiman

EDUCATION

B.S., Computer Science, Massachusetts Institute of Technology, 1979
B.S., Electrical Engineering, Massachusetts Institute of Technology, 1979
Ph.D., Mathematics, Massachusetts Institute of Technology, 1984

EMPLOYMENT

Massachusetts Institute of Technology
1984–86 Applied Mathematics Instructor
1986–91 Assistant Professor of Applied Mathematics
University of California, San Diego
1991–93 Assistant Professor of Mathematics
1993–97 Associate Professor of Mathematics
1997–2001 Professor of Mathematics
University of California, Berkeley
2001– Professor of Mathematics

RESEARCH INTERESTS

Algebraic combinatorics, algebraic geometry, representation theory, lattice theory.

AWARDS

First recipient of the *E. H. Moore Prize*, January 2004, for best research article in an AMS journal during the preceding six years.

VISITING POSITIONS AND RESEARCH INSTITUTES

Mittag-Leffler Institute, Stockholm, Sweden, Spring 1992
Mathematical Sciences Research Institute, Berkeley, California, Spring 1997
Mathematical Sciences Research Institute, Berkeley, California, Spring 2000
Visiting Miller Professor, University of California, Berkeley, Fall 2000
Isaac Newton Institute, Cambridge, England, Spring 2001
LACIM, University of Québec at Montréal, Spring 2005
Mittag-Leffler Institute, Stockholm, Sweden, Spring 2005
Mathematics Dept., University of Québec at Montréal, Spring 2005 and Spring 2007
CRM, University of Montréal, Spring 2007
Miller Professor, University of California, Berkeley, 2007-08 academic year

INVITED LECTURES (SELECTED)

- Claudio 70: conference in honor of C. Procesi, Rome, Italy, June 2011.
- London Mathematical Society Symposium on Combinatorial and Geometric Structures in Representation Theory, Durham, England, July 2009 (3 lectures)
- Special Session on Applications of Algebraic and Geometric Combinatorics, AMS Southeastern Section Meeting, Raleigh, N.C., May 2009
- Special Session on Algebraic Combinatorics, AMS Western Section Meeting, Claremont, Calif., May 2008
- Workshop on Topics in Combinatorial Representation Theory, MSRI, Berkeley, Calif., March 2008
- ARCC Workshop on Arithmetic Harmonic Analysis on Character and Quiver Varieties, Palo Alto, Calif., June 2007.
- Workshop on Interactions between Algebraic Combinatorics and Algebraic Geometry, CRM, Montréal, Québec, May 2007.
- CRM/ISM Joint Colloquium, Montréal, Québec, April 2007.
- International Congress of Mathematicians, Combinatorics Section, Madrid, Spain, Aug. 2006
- Plenary Address, AMS Western Section Meeting, Eugene, Ore., Nov. 2005.
- Summer Institute in Algebraic Geometry (3 lectures), Seattle, Wash., Aug. 2005.
- ARCC Workshop on Generalized Kostka Polynomials, Palo Alto, Calif., July 2005.
- Formal Power Series and Algebraic Combinatorics, Taormina, Sicily, June, 2005.
- KTH Conference in honor of Dan Laksov, Stockholm, Sweden, May 2005.
- Graduate summer school on Geometric Combinatorics (5 lectures), PCMI, Park City, Utah, July 2004.
- Summer school on Combinatorics of Groups and Algebras (5 lectures), Luminy, France, July 2004.
- Current Developments in Mathematics, Harvard University (2 lectures), Boston, Mass., November 2002.
- MSRI Workshop on Commutative Algebra (3 lectures), Berkeley, Calif., September 2002.
- Symmetric Functions 2001: Nato advanced study institute (3 lectures), Cambridge, England, July 2001.
- Per Claudio: conference in honor of C. Procesi, Rome, Italy, June 2001.
- Whittaker Lecture, Edinburgh University, Edinburgh, Scotland, May 2001.
- International Workshop on Physics and Combinatorics (3 lectures), Nagoya, Japan, August 2000.
- Plenary address, 49th Colloquium of the Québec Mathematical Society, Montréal, Québec, April 1998.
- Commutative Algebra, Representation Theory, and Combinatorics: conference in honor of David Buchsbaum, Boston, Mass., October 1997.
- Rotafest: conference in honor of G.-C. Rota, M.I.T., Boston, Mass., April 1996.

Algebraic Combinatorics Conference in Honour of Adriano Garsia, Taormina, Sicily, July 1994.

OTHER PROFESSIONAL ACTIVITIES

Organizer, Berkeley Workshop on Representation Theory, Geometry and Combinatorics, June 2008

Co-organizer, Workshop on Combinatorial Hopf Algebras and Macdonald Polynomials, CRM Semester in Combinatorics, Montréal, Spring 2007

Organizer, Special Session on Algebraic Combinatorics and Geometry, AMS Western Section Meeting, Eugene, Oregon, Nov. 2005

Organizer, Algebraic Combinatorics Conference in honour of Adriano M. Garsia, Taormina, Sicily, July 1994

Scientific advisory board, *Centre de Recherches Mathématiques*, Montréal, 2002–2005

Editorial board, *Algebra Universalis*, 1997–2005

Reviewer for *Mathematical Reviews*

Grant support:

NSF Graduate Fellow, 1979–82

NSF Research Grants DMS-8717795 (1988–91), DMS-9119355 (1992–94), DMS-9400934 (1994–97), DMS-9701218 (1997–2000), DMS-0070772/DMS-0296203 (2000–03), DMS-0301072 (2003–08), DMS-0801262 (2008–13)

NSF EMSW21 Research Training Group Grants in Interactions of Representation Theory, Geometry and Combinatorics, DMS-0354321 (2004–10), DMS-0943745 (2010–15)

NSF Special Meeting Grant: Recent Advances in Combinatorics, CRM Thematic Semester 2007, DMS-0603479 (2007)

DOCTORAL STUDENTS

David Herscovici (MIT, 1992)

Joseph Alfano (UCSD, 1994)

Sara Billey (UCSD, 1994)

William Brockman (UCSD, 1997)

Carol Chang (UCSD, 1998)

Jason Ribando (UCSD, 2000)

Jeremy Martin (UCSD, 2002)

Alex Woo (UC Berkeley, 2005)

Sami Assaf (UC Berkeley, 2007)

Jonah Blasiak (UC Berkeley, 2009)

Brian Rothbach (UC Berkeley, 2009)

Arun Sharma (UC Berkeley, 2009)

Li-Chung Chen (UC Berkeley, 2010)

Sarah Iveson (current)

Damien Mondragon (current)

Adam Chavin (current)

POSTDOCTORAL ADVISEES

Glenn Tesler (NSF, U.C.S.D., 1995–98)
Rosa Orellana (U.C. President’s Postdoctoral Fellow, U.C.S.D., 1999–2000)
Monica Vazirani (NSF, U.C. Berkeley and U.C.S.D., 1999–2002)
Sarah Mason (NSF, U.C. Berkeley, 2005–07)
Dagan Karp (NSERC and NSF EMSW21, U.C. Berkeley, 2005–08)
Beth Samuels (NSF EMSW21, U.C. Berkeley, 2005–07)
David Hill (NSF EMSW21, U.C. Berkeley, 2007–10)
Joshua Sussan (NSF EMSW21, U.C. Berkeley, 2007–10)
Michael Rose (NSF EMSW21, U.C. Berkeley, 2008–10)
Brendon Rhoades (NSF, U.C. Berkeley, 2008–09)
Luke Oeding (NSF EMSW21, U.C. Berkeley, 2011–)

GRADUATE ADVISOR: Gian-Carlo Rota

CITIZENSHIP: U.S.

PUBLICATIONS

1984

1. *The Theory of Linear Lattices*. Ph.D. thesis, M.I.T. (1984).

1985

2. *Linear lattice proof theory, an overview*. Universal Algebra and Lattice Theory: Proceedings, Charleston, 1984, Springer Lecture Notes in Math. **1149** (1985) 129–141.
3. *Two notes on the Arguesian identity*. Algebra Universalis **21** (1985) 167–171.
4. *Proof theory for linear lattices*. Advances in Math. **58**, no. 3 (1985) 209–242.

1987

5. *Arguesian lattices which are not linear*. Bull. Amer. Math. Soc. (NS) **16**, no. 1 (1987) 121–123.

1989

6. (with W. Schmitt) *Incidence algebra antipodes and Lagrange inversion in one and several variables*. J. Combinatorial Theory (A) **50**, no. 2 (1989) 172–185.
7. *On mixed insertion, symmetry, and shifted Young tableaux*. J. Combinatorial Theory (A) **50**, no. 2 (1989) 196–225.

1991

8. *A simple and relatively efficient triangulation of the n -cube*. Discrete and Computational Geometry **6** (1991) 287–289.
9. *Arguesian lattices which are not type-1*. Algebra Universalis **28** (1991) 128–137.

1992

10. *Dual equivalence with applications, including a conjecture of Proctor*. Discrete Mathematics **99** (1992) 79–113.
11. (with D. Kim) *A characterization of generalized staircases*. Discrete Mathematics **99** (1992) 115–122.

1993

12. *Noncommutative rational power series and algebraic generating functions*. Europ. J. Combinatorics **14** (1993) 335–339.

13. *Hecke algebra characters and immanant conjectures.* J. Amer. Math. Soc. **6** (1993) 569–595.

14. (with A. M. Garsia) *A graded representation model for Macdonald's polynomials.* Proc. Nat. Acad. Sci. U.S.A. **90** (1993) 3607–3610.

1994

15. *Conjectures on the quotient ring by diagonal invariants.* J. Alg. Combinatorics **3** (1994) 17–76.

16. *On realization of Björner's 'continuous partition lattice' by measurable partitions.* Trans. Amer. Math. Soc. **343**, No. 2 (1994) 695–711.

1995

17. (with A. M. Garsia) *Factorizations of Pieri rules for Macdonald polynomials.* Discrete Mathematics **139** (1995) 219–256.

18. (with S. Billey) *Schubert polynomials for the classical groups.* J. Amer. Math. Soc. **8** No. 2 (1995) 443–482.

1996

19. (with A. M. Garsia) *A remarkable q, t -Catalan sequence and q -Lagrange inversion.* J. Alg. Combinatorics **5** (1996) 191–244.

20. (with A. M. Garsia) *Some natural bigraded S_n modules and q, t -Kostka coefficients.* Electronic J. Combinatorics **3**, No. 2: Foata Festschrift (1996) R24, 60 pp.

1998

21. *t, q -Catalan numbers and the Hilbert scheme,* Discrete Mathematics **193** (1998) 201–224.

22. (with W. Brockman) *Nilpotent orbit varieties and the atomic decomposition of the q -Kostka polynomials.* Canadian Journal of Mathematics **50** (1998) 525–537.

23. (with A. M. Garsia) *A random q, t -hook walk and a sum of Pieri coefficients.* J. Combinatorial Theory (A) **82**, no. 1 (1998) 74–111.

1999

24. *Macdonald polynomials and geometry.* New perspectives in algebraic combinatorics, MSRI Publications **37** (1999) 207–254.

25. (with F. Bergeron, N. Bergeron, A. M. Garsia and G. Tesler) *Lattice diagram polynomials and extended Pieri rules*. Advances in Math. **142** (1999) 244–334, arXiv:math.CO/9809126
26. (with A. M. Garsia and G. Tesler) *Explicit plethysic formulas for Macdonald q, t -Kostka coefficients*. The Andrews Festschrift (Maratea, 1998), Seminaire Lotharingien **42** (1999) Art. B42m, 45pp. (electronic).
27. (with F. Bergeron, A. M. Garsia, and G. Tesler) *Identities and Positivity Conjectures for some remarkable Operators in the Theory of Symmetric Functions*. Methods and Applications of Analysis **6**, No. 3 (1999) 363–420.

2001

28. *Hilbert schemes, polygraphs, and the Macdonald positivity conjecture*. J. Amer. Math. Soc. **14** (2001) 941–1006, arXiv:math.AG/0010246.
29. *Vanishing theorems and character formulas for the Hilbert scheme of points in the plane (abbreviated version)*. Physics and Combinatorics 2000: Proceedings of the Nagoya 2000 International Workshop, A. N. Kirillov and N. Liskova, eds.. World Scientific (2001) 1–21.

2002

30. *Notes on Macdonald polynomials and the geometry of Hilbert schemes*. In *Symmetric Functions 2001: Surveys of Developments and Perspectives*. Proceedings of the NATO Advanced Study Institute held in Cambridge, June 25–July 6, 2001. Edited by Sergey Fomin. NATO Science Series II: Mathematics, Physics and Chemistry, **74**. Kluwer Academic Publishers, Dordrecht (2002) 1–64.
31. *Vanishing theorems and character formulas for the Hilbert scheme of points in the plane*. Invent. Math. **149**, no. 2 (2002) 371–407, arXiv:math.AG/0201148

2003

32. *Combinatorics, symmetric functions and Hilbert schemes*. Current Developments in Mathematics, 2002, edited by D. Jerison, G. Lusztig, B. Mazur, T. Mrowka, W. Schmid, R. Stanley and S.-T. Yau. International Press Books (2003) 39–112.

2004

33. (with B. Sturmfels) *Multigraded Hilbert schemes*. J. Alg. Geom. **13** (2004) 725–769, arXiv:math.AG/0201271
34. *Commutative algebra of n points in the plane* (with an appendix by Ezra Miller). In Trends in Commutative Algebra, MSRI Publications **51** (2004) 153–180.

2005

35. (with J. Haglund, N. Loehr, J. B. Remmel and A. Ulyanov) *A combinatorial formula for the character of the diagonal coinvariants*. Duke Math. J. **126** (2005), no. 2, 195–232.
36. (with J. Haglund and N. Loehr) *A Combinatorial Formula for Macdonald Polynomials*. J. Amer. Math. Soc. **18** (2005) 735–761.
37. (with J. Haglund and N. Loehr) *Combinatorial theory of Macdonald polynomials I: Proof of Haglund’s formula*. Proc. Natl. Acad. Sci. **102** (2005), no. 8, 2690–2696.

2006

38. *Cherednik algebras, Macdonald polynomials and combinatorics*. Proceedings of the International Congress of Mathematicians, Madrid, 2006, Vol III, 843–872.

2007

39. (with A. Woo) *Geometry of q and q, t -analogs in combinatorial enumeration*. In Geometric Combinatorics, Miller, Reiner, and Sturmfels, eds., IAS/Park City Math. Series **13** (2007), 207–248.

2008

40. (with J. Haglund and N. Loehr) *A combinatorial formula for nonsymmetric Macdonald polynomials*. Amer. J. Math. **130**, no. 2 (2008), 359–383.

2009

41. (with I. Grojnowski) *Affine Hecke algebras and positivity of LLT and Macdonald polynomials*. Preprint, UC Berkeley.