

## Curriculum Vitae

### LAUREN WILLIAMS

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**Employment:**

- 2009 – University of California, Berkeley, Assistant Professor.
- 2006 – 2009 Harvard University, Benjamin Peirce Assistant Professor and NSF Postdoctoral Fellow.
- 2005 – 2006 University of California, Berkeley, NSF Postdoctoral Fellow.  
*Sponsoring scientist: Bernd Sturmfels*

**Short-term positions:**

- Fall 2009 Postdoctoral Scholar at MSRI.
- June 2009 Professeur invitée at Laboratoire d'informatique, Université Paris 6.
- Spring 2008 Viterbi Endowed Postdoctoral Scholar at MSRI.

**Education:**

- 2001 – 2005 Massachusetts Institute of Technology, Ph.D. in Mathematics received June 2005.  
*Advisor: Richard Stanley*  
*Fall 2003 at University of California, Berkeley, working with Bernd Sturmfels.*
- 2000 – 2001 Cambridge University, Part III of the Mathematical Tripos (with Distinction)
- 1996 – 2000 Harvard University, A.B. in Mathematics (*magna cum laude*)  
*Spring 1998 spent at the Budapest Semesters in Mathematics program.*
- 1992 – 1996 Palos Verdes Peninsula High School (valedictorian in a class of 646)

**Scientific/Academic Honors:**

- 2011 – 2016 National Science Foundation CAREER award DMS-1049513
- 2009 – 2011 Alfred P. Sloan Research Fellow
- 2009 – 2012 National Science Foundation research grant DMS-0854432
- 2008 Viterbi Endowed Postdoctoral Scholar at MSRI
- 2005 Runner up for the AIM Five-Year Fellowship
- 2005 National Science Foundation Postdoctoral Fellowship
- 2004 – 2005 National Science Foundation Graduate Fellowship
- 2002 – 2004 National Defense Science and Engineering Graduate Fellowship
- 2000 – 2002 National Science Foundation Graduate Fellowship
- 2004 Charles and Jennifer Johnson Prize, MIT departmental award  
(best paper submitted by a graduate student, tie)
- 2004 Formal Power Series and Algebraic Combinatorics Conference Prize  
(best paper submitted by a graduate student)
- 1999 Barry Goldwater Scholarship  
(nationwide scholarship awarded on the basis of science research)
- 1998 Director's Summer Program at the National Security Agency
- 1997 Research Experience for Undergraduates at the University of Minnesota, Duluth
- 1996 Presidential Scholar
- 1996 USA Today All-Academic Scholar
- 1995 Mathematical Olympiad Program
- 1994 Research Science Institute at the Massachusetts Institute of Technology

**Research Interests:**

Algebraic, enumerative, and topological combinatorics, and their connections with algebraic geometry, representation theory, and physics. In particular: total positivity, cluster algebras, statistical mechanics, tropical geometry.

**Publications:**available at <http://www.math.berkeley.edu/~williams>

1. (with Gregg Musiker and Ralf Schiffler) *Bases for cluster algebras from surfaces*, <http://front.math.ucdavis.edu/1110.4364>, to appear in *Compositio Mathematica*.
2. (with Gregg Musiker) *Matrix formulae and skein relations for cluster algebras from surfaces*, <http://front.math.ucdavis.edu/1108.3382>, to appear in *International Mathematics Research Notices*.
3. (with Yuji Kodama) *KP solitons, total positivity, and cluster algebras*, *Proceedings of the National Academy of Sciences*, published online ahead of print May 11, 2011, doi:10.1073/pnas.1102627108.
4. (with Sylvie Corteel, Richard Stanley, and Dennis Stanton) *Formulae for Askey-Wilson moments and enumeration of staircase tableaux*, arXiv:1007.5174, to appear in *Transactions of the American Mathematical Society*.
5. (with Sylvie Corteel) *Tableaux combinatorics for the asymmetric exclusion process and Askey-Wilson polynomials*, *Duke Mathematical Journal*, Volume 159, Number 3, September 2011, 385–415.
6. (with Gregg Musiker and Ralf Schiffler) *Positivity for cluster algebras from surfaces*, *Advances in Mathematics*, Volume 227, Issue 6, August 2011, 2241–2308.
7. (with Sylvie Corteel) *Staircase tableaux, the asymmetric exclusion process, and Askey-Wilson polynomials*, *Proceedings of the National Academy of Sciences*, published online ahead of print March 26, 2010, doi:10.1073/pnas.0909915107.
8. (with Thomas Lam) *A Markov chain on permutations which is Schubert positive?*, arXiv:1102.4406, to appear in *Experimental Mathematics*.
9. (with Sylvie Corteel and Matthieu Josuat-Verges) *The Matrix Ansatz, orthogonal polynomials, and permutations*, *Advances in Applied Mathematics*, Volume 46, special issue in honor of Dennis Stanton, January 2011, 209–225.
10. (with Konstanze Rietsch) *Discrete Morse theory for totally non-negative flag varieties*, *Advances in Mathematics*, Volume 223, Issue 6, April 2010, 1855–1884.
11. (with Jean-Christophe Novelli and Jean-Yves Thibon) *Combinatorial Hopf algebras, noncommutative Hall-Littlewood functions, and permutation tableaux*, *Advances in Mathematics*, Volume 224, Issue 4, July 2010, 1311–1348.
12. (with Konstanze Rietsch) *The totally nonnegative part of  $G/P$  is a CW complex*, *Transformation Groups*, special issue for Kostant’s birthday, Volume 13, 2008, 839–853.
13. (with Thomas Lam) *Total positivity for cominuscule Grassmannians*, *New York Journal of Mathematics*, Volume 14, 2008, 53–99.
14. (with Alex Postnikov and David Speyer) *Matching polytopes, toric geometry, and the non-negative part of the Grassmannian*, *Journal of Algebraic Combinatorics*, Volume 30, Issue 2 (2009), 173–191.
15. (with Alex Postnikov and Vic Reiner) *Faces of generalized permutohedra*, *Documenta Mathematica*, Volume 13, 2008, 207–273.
16. (with Robin Chapman) *A conjecture of Stanley on alternating permutations*, *Electronic Journal of Combinatorics*, Volume 14 (1), 2007.
17. (with Sylvie Corteel) *A Markov chain on permutations which projects to the PASEP*, *International Mathematics Research Notices*, article ID mm055, 2007.
18. (with Sylvie Corteel) *Tableaux combinatorics for the asymmetric exclusion process*, *Advances in Applied Mathematics*, Volume 39, Issue 3, September 2007, 293–310.

19. *Shelling totally nonnegative flag varieties*, Journal für die reine und angewandte Mathematik (Crelle's Journal), Issue 609, Aug. 2007, 1–22.
20. (with Einar Steingrímsson) *Permutation tableaux and permutation patterns*, Journal of Combinatorial Theory Series A, Volume 114, Issue 2, February 2007, pages 211–234.
21. (with Federico Ardila and Victor Reiner) *Bergman complexes, Coxeter arrangements, and graph associahedra*, Séminaire Lotharingien de Combinatoire (electronic), Volume 54A, 2006 (B54Aj).
22. (with Federico Ardila and Carly Klivans) *The positive Bergman complex of an oriented matroid*, European Journal of Combinatorics, Volume 27, Issue 4, May 2006, pages 577–591.
23. (with David Speyer) *The tropical totally positive Grassmannian*, Journal of Algebraic Combinatorics, Volume 2, Number 2, September 2005, pages 189–210.
24. *Enumeration of totally positive Grassmann cells*, Advances in Mathematics, Volume 190, Issue 2, January 2005, pages 319–342.
25. *On exact  $n$ -step domination*, Ars Combinatoria, Volume LVIII, January, 2001.
26. *Enumerating up-side self-avoiding walks*, Electronic Journal of Combinatorics, Volume 3 (1), 1996.

**Preprints:**available at <http://www.math.berkeley.edu/~williams>

1. (with Yuji Kodama) *Combinatorics of KP solitons from the real Grassmannian*, <http://front.math.ucdavis.edu/1205.1101>.
2. (with Yuji Kodama) *A Deodhar decomposition of the Grassmannian and the regularity of KP solitons*, <http://front.math.ucdavis.edu/1204.6446>.
3. (with Tomohiro Sasamoto) *Combinatorics of the asymmetric exclusion process on a semi-infinite lattice*, <http://front.math.ucdavis.edu/1204.1114>.
4. (with Yuji Kodama) *KP solitons and total positivity for the Grassmannian*, <http://front.math.ucdavis.edu/1106.0023>.

**Conference and Seminar Talks:**

- 2012 Mar. *American Math Society Meeting* (plenary speaker), University of Hawaii at Manoa, Honolulu.  
 Jan. *Introductory workshop: Lattice models and combinatorics*, MSRI, Berkeley.  
 Jan. *Geometry-combinatorics-PDE seminar*, University of Texas, Austin.  
 Jan. *Geometry-topology-combinatorics seminar*, University of Texas, Austin.  
 Jan. *Algebraic combinatorics session*, Joint AMS/MAA Meeting, Boston.  
 Jan. *Algebra and combinatorics seminar*, Université Lyon I, Villeurbanne, France.
- 2011 Nov. *Colloquium*, University of California, Berkeley.  
 Oct. *Mathematical physics and probability*, University of California, Davis.  
 Sep. *Group theory and its connections*, AWM celebration, Brown University, Providence.  
 Sep. *Combinatorics seminar*, Massachusetts Institute of Technology, Cambridge.  
 Sep. *Brandeis-Harvard-MIT-Northeastern Colloquium*, Northeastern University, Boston.  
 Sep. *Cluster algebras, representation theory, and Poisson geometry*, Banff, Canada.  
 Aug. *Minicourse on total positivity* (five lectures), MSRI, Berkeley.  
 July *Tropical geometry and integrable systems*, Glasgow, UK.  
 June *Combinatoire énumérative et analytique*, LIAFA, Université Paris Diderot, Paris.  
 June *The Abel Symposium: Algebras, quivers and representations*, Balestrand, Norway.  
 June *Formal Power Series and Algebraic Combinatorics* (plenary speaker), Reykjavik, Iceland.  
 May *Examples of geometries*, Columbus, Ohio.

- May *Algebraic Combinatorixx*, Banff, Canada.
- May *Colloquium*, University of Oregon, Eugene.
- Apr. *Representation theory, geometry, combinatorics seminar*, University of California, Berkeley.
- Apr. *Combinatorics seminar*, University of Michigan, Ann Arbor.
- Mar. *Combinatorics seminar*, Ohio State University, Columbus.
- Feb. *Student Probability and PDE seminar*, University of California, Berkeley.
- 2010 Dec. *Random matrix theory and its applications II*, MSRI, Berkeley.
- Nov. *Mentor lecture*, University of California, Berkeley.
- Nov. *Student discrete math seminar*, University of California, Berkeley.
- Aug. *Young Mathematicians Conference* (plenary speaker), Ohio State University, Columbus.
- July *Combinatorics and mathematical physics*, University of Queensland, Brisbane.
- June *Combinatorics seminar*, Universite de Marne-la-Vallee, Champs-sur-Marne, France.
- June *Working group on cluster algebras*, Université Paris Diderot, Paris.
- June *Combinatorics seminar*, LIAFA, Université Paris Diderot, Paris.
- May *Barrett Memorial Lectures, Discrete differential geometry*, University of Tennessee.
- Apr. *Combinatorial stochastic processes*, University of California, Berkeley.
- Mar. *Combinatorial representation theory*, Mathematisches Forschungsinstitut Oberwolfach.
- Feb. *AWM Colloquium*, University of California, San Diego.
- Feb. *Combinatorics and computer science day*, University of California, Berkeley.
- Jan. *Probability seminar*, University of California, Berkeley.
- Jan. *Mathematical physics and probability*, University of California, Davis.
- 2009 Nov. *Tropical structures in geometry and physics*, MSRI, Berkeley.
- Nov. *Combinatorics seminar*, University of Washington, Seattle.
- Nov. *Discrete math seminar*, University of California, Berkeley.
- Oct. *Combinatorics seminar*, University of Minnesota, Minneapolis.
- Oct. *Algebraic representation theory seminar*, University of Minnesota, Minneapolis.
- Oct. *Workshop on two dimensional lattice models*, Institut Henri Poincaré, Paris.
- Sep. *Algebra and discrete math seminar*, University of California, Davis.
- Sep. *Representation theory, geometry, combinatorics seminar*, University of California, Berkeley.
- Aug. *Connections for women workshop on tropical geometry*, MSRI, Berkeley.
- July *Saturday in Discrete Mathematics*, Friedrich-Alexander University, Erlangen.
- July *Seminaire de Laboratoire d'informatique*, Université Paris 6, Paris.
- May *Combinatorics Seminar*, Université du Québec à Montréal, Montreal.
- Apr. *Research Seminar*, Northeastern University, Boston.
- Apr. *Harvard-MIT-Brandeis-Northeastern Colloquium*, Brandeis University, Waltham.
- Jan. *Combinatorics seminar*, University of California, Berkeley.
- Jan. *Colloquim*, Tulane University, New Orleans.
- Jan. *Colloquium*, University of Southern California, Los Angeles.
- 2008 Dec. *International conference on cluster algebras and related topics*, Morelia, Mexico.  
(three lectures on total positivity)
- Nov. *Faculty Colloquium*, Harvard University, Cambridge.
- July *Combinatorics and Statistical Physics*, Erwin Schrodinger Institute, Vienna.
- June *Formal Power Series and Algebraic Combinatorics*, Valparaiso, Chile.
- May *Geometry and Combinatorics Seminar*, Stanford University, Palo Alto.
- May *Geometry-Algebra-Combinatorics Seminar*, San Francisco State University, San Francisco.
- Apr. *MSRI Evans Lecture*, University of California, Berkeley.
- Apr. *CombinaTexas*, Univesity of Texas, El Paso.
- Apr. *MIT Women in Mathematics: a celebration*, MIT, Cambridge.

- Apr. *Combinatorial representation theory*, AMS meeting, Indiana University, Bloomington.  
Jan. *Introductory workshop on combinatorial representation theory*, MSRI, Berkeley.
- 2007 Nov. *Algebra and combinatorics seminar*, Texas A& M University, College Station.  
Oct. *Dartmouth Discrete Math Day*, Hanover, New Hampshire.  
Oct. *Geometric combinatorics*, AMS meeting, DePaul University, Chicago.  
Sept. *Combinatorics seminar*, University of Michigan, Ann Arbor.  
July *Combinatorics seminar*, Universite de Marne-la-Vallee, Champs-sur-Marne, France.  
July *Formal Power Series and Algebraic Combinatorics*, Beijing, China.  
June *Interactions of Random Matrix Theory, Integrable Systems, Stochastic Processes*, Snowbird.  
May *Interactions of combinatorics and algebraic geometry*, Centre de Recherches Math., Montreal.  
May *Algebraic geometry and group actions*, Womens' program, IAS, Princeton.  
Apr. *Combinatorics/Lie Theory/Probability seminar*, University of Wisconsin, Madison.  
Apr. *Integrable systems and random matrices seminar*, Courant Institute, New York.  
Feb. *Valley geometry seminar*, Univ. of Massachusetts, Amherst.  
Jan. *Combinatorics seminar*, Ecole Polytechnique, Palaiseau, France.
- 2006 Dec. *Faculty Colloquium*, Harvard University, Cambridge.  
Nov. *Everytopic seminar*, Brandeis University, Waltham.  
Oct. *Combinatorial techniques in equivariant topology*, AMS meeting, Univ. of Connecticut, Storrs.  
Oct. *Algebraic and Analytic combinatorics*, AMS meeting, Univ. of Connecticut, Storrs.  
Oct. *Geometry-Algebra-Singularities-Combinatorics seminar*, Northeastern University, Boston.  
Oct. *Combinatorics seminar*, University of Washington, Seattle.  
Sept. *Colloquium*, University of Connecticut, Storrs.  
June *Combinatorics seminar*, LaBRI, Universite Bordeaux 1, Bordeaux, France.  
June *Permutation Patterns 2006*, Reykjavik University, Reykjavik, Iceland.  
May *Combinatorics seminar*, University of Kansas, Lawrence.  
Apr. *Combinatorics seminar*, University of California, San Diego.  
Apr. *Representation theory, geometry, combinatorics seminar*, University of California, Berkeley.  
Apr. *Combinatorics seminar*, Indiana University, Bloomington.  
Mar. *Combinatorics seminar*, Massachusetts Institute of Technology, Cambridge.  
Mar. *Applied Algebra Seminar*, York University, Toronto.  
Jan. *Colloquium*, University of Miami, Coral Gables.
- 2005 Dec. *Algebra seminar*, University of California, Santa Barbara.  
Nov. *Flavors of Groups, BIRS workshop*, Banff, Canada.  
Nov. *Algebraic combinatorics and geometry session*, AMS meeting, University of Oregon, Eugene.  
Nov. *Colloquium*, Rice University, Houston.  
Oct. *Bay Area Discrete Math Day*, University of California, Davis.  
Oct. *Representation theory seminar*, Stanford University, Palo Alto.  
Oct. *Algebraic combinatorics session*, AMS meeting, Bard College, Annandale-on-Hudson.  
Sep. *Combinatorics seminar*, University of California, Berkeley.  
Sep. *Algebra-Geometry-Combinatorics seminar*, San Francisco State University, San Francisco.  
Jun. *Formal Power Series and Algebraic Combinatorics*, University of Messina, Italy.  
Jun. *Algebraic combinatorics session*, AMS/ German Math. Society meeting in Mainz, Germany.  
May *Institute seminar*, Mittag-Leffler Institute, Djursholm, Sweden.  
Apr. *Combinatorics seminar*, University of Pennsylvania, Philadelphia.  
Apr. *Combinatorics seminar*, Massachusetts Institute of Technology, Cambridge.  
Mar. *Combinatorics seminar*, University of Minnesota, Minneapolis.  
Feb. *Colloquium*, University of Miami, Coral Gables.  
Jan. *Theory group seminar*, Microsoft Research, Seattle.

- Jan. *Tropical geometry session*, AMS/MAA National Meeting in Atlanta, Georgia.
- 2004 Oct. *Lie Theory seminar*, University of Wisconsin, Madison.
- Oct. *Theory group seminar*, Microsoft Research, Seattle.
- Oct. *Combinatorics seminar*, University of Washington, Seattle.
- Sep. *Combinatorics seminar*, University of Michigan, Ann Arbor.
- Jul. *Geometric Combinatorics at the Park City Mathematics Institute*, Park City, Utah.
- Jun. *Formal Power Series and Algebraic Combinatorics*, University of British Columbia.
- Apr. *Valley geometry seminar*, University of Massachusetts, Amherst.
- Apr. *Combinatorics seminar*, University of California, San Diego.
- Apr. *Combinatorics seminar*, University of California, Berkeley.
- Feb. *Combinatorics seminar*, Massachusetts Institute of Technology, Cambridge.
- Jan. *Lattice theory session*, AMS/MAA National Meeting in Phoenix, Arizona.
- 2003 Dec. *Working group on polytopes*, Mathematical Sciences Research Institute, Berkeley, California.
- Oct. *Amoebas and tropical geometry workshop*, American Institute of Mathematics, Palo Alto.
- Sep. *Commutative algebra and algebraic geometry seminar*, University of California, Berkeley.
- May *Zeilberger miniconference*, Massachusetts Institute of Technology, Cambridge.
- Apr. *Combinatorics, topology, convexity*, Spring School in Jerusalem.

### Professional Activities:

Editorial: Editor for *Advances in Applied Mathematics*, February 2012 - present.

Journals, books, and proposals refereed: *Advances in Mathematics*

*International Mathematics Research Notices*

*Journal of Algebraic Combinatorics*

*Journal of the American Mathematical Society*

*Journal of Combinatorial Theory Series A*

*Electronic Journal of Combinatorics*

*Springer Graduate Texts in Mathematics*

NSF and NSA proposals

Organization: MSRI program on cluster algebras, fall 2012

MSRI joint connections workshop on commutative algebra and cluster algebras, August 2012

Bay Area Discrete Math Day, March 2012

UC Berkeley Combinatorics seminar, spring 2006, and spring 2010 to present

ICERM Workshop on cluster algebras and statistical physics, August 2011

MSRI Graduate Workshop on cluster combinatorics and cluster algebras, August 2011

MIT Combinatorics seminar, spring 2007 to spring 2009

MSRI workshop on combinatorics and tropical geometry, fall 2009

AMS special session on matroids at San Francisco State University, April 2009

Member of the program committee for FPSAC, summer 2009

Service: Undergraduate major advisor, fall 2011 to present

Faculty sponsor for Berkeley chapter of Association of Women in Math, spring 2010 to present

Faculty sponsor for the Berkeley math tournament for high school students, fall 2011 to present

Assistant Director of Graduate Studies, Harvard math department, fall 2007 to spring 2009

Board of advisors for Girls' Angle, a math club for (middle-school) girls, fall 2008 to present

Board of advisors for Math prize for girls, fall 2010 to present

### Students and Postdocs:

2010-2012 Sponsoring scientist for NSF Postdoctoral Fellow Kelli Talaska at Berkeley.

2008-2009 Supervision of senior thesis of Kevin Carde at Harvard.

2006-2007 Supervision of senior thesis of Yan Zhang at Harvard.

**Teaching Activities:**

2012 Spring Abstract Algebra (Math 113) at Berkeley.  
2011 Fall Discrete Mathematics (Math 55) at Berkeley.  
2011 Spring Topics in algebra: cluster algebras (Math 274) at Berkeley.  
2010 Fall Discrete Mathematics (Math 55) at Berkeley.  
2010 Spring Graduate Algebraic Combinatorics (Math 249) at Berkeley.  
2009 Spring Probability (Math 154) at Harvard.  
2008 Fall Topics in Combinatorial Representation Theory (Math 277) at Harvard.  
2007 Fall Algebraic Combinatorics (Math 155r) at Harvard.  
2007 Fall Minor thesis advisor at Harvard (for Reid Barton).  
2007 May Four lectures/recitations for Lakshmibai's course on flag varieties at the Institute for Advanced Study.  
2007 Spring Multivariable Calculus (Math 21a) at Harvard.  
2006 Fall Algebraic Combinatorics (Math 192r) at Harvard.  
2004 Fall Teaching assistant for linear algebra at MIT.  
2004 Jul. Teaching assistant for Richard Stanley's course on hyperplane arrangements at the Park City Mathematics Institute.  
1998 Fall Teaching assistant for the course "Sets, Knots, Groups" at Harvard University.  
1997-1998 Math Tutor at the Harvard University Extension School.  
1995, 1996 Junior counselor at the Ross Young Scholars summer program.

**Other Activities**

1982 – Violin performance  
Participant in MIT's chamber music society (2001-2003)  
Member of the first violin section of the Cambridge University Chamber Orchestra (2000-2001), and of the Harvard-Radcliffe Orchestra (1996-2000).  
Soloist with the Beach City Symphony (1996).  
1998 – Running  
Completed the 1999 Grandma's Marathon in Duluth, Minnesota (3 hours, 55 minutes).