

Richard Ehrenborg
Vita (9/2007)

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Permanent resident of the United States

Research Interests

Combinatorics, coalgebras, geometry, invariant theory, probability, and stochastic processes.

Education

Massachusetts Institute of Technology (8/88–5/93)

- Ph.D. in Mathematics (5/93).
- Dissertation title, *Combinatorial Methods in Multilinear Algebra*.
- Supervised by Professor Gian-Carlo Rota.

University of Stockholm (7/82–8/88)

- B.S. in Mathematics (9/88).
- Minor in Mathematical Statistics.
- Attended in parallel with primary school and high school (7/82–6/87).
- Attended in parallel with army service (6/87–8/88).

Employment

University of Kentucky (8/00–present)

- Professor (7/06–present).
- Sabbatical leave (7/06–6/07).
- First Royster Research Professor (7/04–6/06).
- Associate Professor (8/00–6/04).

Royal Institute of Technology (10/98–6/00)

- Associate Professor.
- On leave the academic year 1998–1999.
- Senior researcher (1/00–6/00).

Institute for Advanced Study (9/98–7/99)

- Member.

Cornell University (7/95–8/98)

- H. C. Wang Assistant Professor.

Université du Québec à Montréal (8/93–6/95)

- Post-doctoral Fellow. Supported by LACIM, Université du Québec à Montréal and CRM, Université de Montréal.

Massachusetts Institute of Technology (8/88–5/93)

- Research Assistant 1/93–5/93 for Prof. Dan Kleitman.
- Research Assistant 6/90–8/90 for Prof. Gian-Carlo Rota.

Swedish Army (6/87–8/88)

- Compulsory military service, detailed to special service as a mathematician.

Visiting Positions

Satellite conference of International Congress of Mathematics 2006, Madrid, Spain (8–9/06)

- Visiting for one week. Workshop on Geometric and Topological Combinatorics.

Massachusetts Institute of Technology (7/06–6/07)

- Visiting Scholar for one year, while on sabbatical.

Banff International Research Station (3/06)

- Visiting for one week. Convex Sets and their Applications.

The Mittag-Leffler Institute, The Royal Swedish Academy of Sciences (3/05)

- Visiting Scholar for one month. Research Program in Algebraic Combinatorics.

Banff International Research Station (8/04)

- Visiting for one week. Combinatorial Hopf Algebra Workshop.

Institute for Advanced Study/Park City Mathematics Institute (7/04)

- Participating for three weeks in the Research Program in Geometric Combinatorics.

Mathematical Sciences Research Institute (11/03)

- Invited speaker and participating in the week-long workshop Combinatorial and Discrete Geometry.

Mathematisches Forschungsinstitut Oberwolfach (4/03)

- Visiting for one week. Workshop in Topological and Geometric Combinatorics.

University of Minnesota (7/02–8/02)

- Visiting Scholar for two weeks.

Institute for Advanced Study (6/02)

- Visiting Member for three weeks.

Massachusetts Institute of Technology (7/01–8/01)

- Visiting Scholar for one month.

Cornell University (6/00–8/00)

- Co-organizer of Research Experiences for Undergraduates Program in Mathematics. Advised four students in research in algebraic combinatorics (6–8/00).

Mathematisches Forschungsinstitut Oberwolfach (4/99)

- Visiting for one week. Workshop in Geometric and Topological Combinatorics.

Massachusetts Institute of Technology (9/98)

- Visiting Scholar for two weeks.

Chalmers University of Technology (5/97)

- Visiting Scholar for three weeks.

Mathematical Sciences Research Institute (10/96 and 1/97)

- General Member for special year in Combinatorics.

AT&T Bell Laboratories, Murray Hill (6/91–8/91)

- Consultant. Worked in the Mathematical Sciences Research Group with Dr. David S. Johnson and Dr. Peter W. Shor.

Ericsson's Computer Science Laboratory (summers of '85,'86,'89)

- Two months each summer. Programmed in modern logic and functional computer languages, such as Prolog and Erlang.

Grants

Polytopes: Inequalities for Flag Vectors, Poset Transformations and Complex Polytopes

- Principal investigator for National Security Agency grant H98230-06-1-0072. Amount awarded \$62,691.00 (6/06–5/08).
- During the summer 2006 supported two graduate students to do research.
 - Eric Clark, Inequalities among exceedance set statistic (6/06–7/06).
 - Michael Slone, Extending the \mathbf{cd} -index to partially ranked poset (6/04–7/04).

Inequalities for Polytopes and Permutations, and Homology for Newtonian Coalgebras

- Principal investigator for National Science Foundation grant DMS-0200624. Funded for three years, amount awarded \$102,104.00 (6/02–5/05).
- During each of the summers 2002 through 2004 supported one graduate student to do research.
 - Michael Slone, The Hochschild cohomology of interpolation coalgebras (6/04–7/04).
 - Scott Godefroy, New identities for the exceedance set statistic (6/03–7/03).
 - Molly Dunkum, Homology of coalgebras (6/02–7/02).

Inequalities for polytopes and complex zonotopes

- 2004 Summer Faculty Research Fellowship Program. Amount awarded \$4,000.00. (7/04–9/04).
- Supported during the summer 2004 one graduate student to do research.
 - Keith Kohrs, Properties of the beta-invariant of the subspace lattice (7/04–8/04).

Senior Researcher Position

- Senior researcher at the Royal Institute of Technology, Swedish Natural Science Research Council DNR 702-238/98 (1/00–6/00).

Research Experiences for Undergraduates Program

- Co-investigator for National Science Foundation grant DMS-9619681, amount awarded: \$248,788.00 (7/97–8/97).

Rotafest, MIT

- Co-investigator for National Science Foundation grant DMS-9600082, amount awarded: \$12,500.00 (4/96).
- Co-investigator for National Security Agency grant MDA904-96-1-0063, amount awarded: \$10,000.00 (4/96).

Editor

Electronic Journal of Combinatorics

- Editor-in-chief (5/03–4/04).
- Editor (5/04–present).

Order

- Editor (10/05–present).

Invariant Theory

- Joint editor with Joseph Kung on the third volume of Gian-Carlo Rota's collected works.

Organizing Committee

Rotafest, MIT, April 17–20, 1996

- Member of the organizing committee for a conference in honor of Gian-Carlo Rota's 64th birthday. Organized this conference together with Richard Stanley and Neil White.

Special session Algebraic and Analytic Combinatorics, October 28–29, 2006

- Organized the special session Algebraic and Analytic Combinatorics at the AMS sectional meeting in Storrs, CT, together with Margaret Readdy.

Awards

- Post-doctoral fellowship from LACIM, Université du Québec à Montréal and CRM, Université de Montréal (8/93–6/95).
- MIT Applied Mathematics Fellowship (9/88–5/89 and 9/89–12/89).
- Fellowship from Sweden America Foundation, 1988.
- Member of the Swedish team at three International Mathematical Olympiads: Finland 1985; Poland 1986, Third Prize; and Cuba 1987, Third Prize.
- Second place award for the paper "*The Archimedean Tree*" in the final round of European Philips Contest for Young Scientists and Inventors, 1982.

Students

Postdoctoral

- Guoce Xin (9/05–5/06).
- Sergey Kitaev (9/03–12/04).

Doctoral students

- Michael Slone (11/03–present).

Research Assistants

- Eric Clark (6/06–7/06).
- Keith Kohrs (7/04–8/04).
- Michael Slone (6/04–7/04 and 6/06–7/06).
- Scott Godefroy (6/03–7/03).
- Molly Dunkum (6/02–7/02).

Undergraduate Research Students

- Debbie Grier, Cornell University (6–8/00).
- Geir Helleloid, University of Wisconsin (6–8/00).
- Michael Levin, Harvard University (6–8/00).
- Adnan Rubai, Binghamton University (6–8/00).
- Harold Fox, Cornell University (6–8/97).
- Dan Johnston, Washington University in St. Louis (6–8/97).
- Rajmohan Rajagopalan, Oberlin College (6–8/97).

Seminar Organizing

Royal Institute of Technology (8/99–5/00)

- Organizer of the Combinatorics Seminar (8/99–5/00).

Institute for Advanced Study (9/98–7/99)

- Organizer of the Working Seminar in Algebraic Combinatorics (10/98–4/99).

Cornell University (7/95–8/98)

- Organizer of the Combinatorics and Algebraic Geometry Seminar (9/95–8/96, 9/97–5/98).
- Cofounder of the Working Seminar in Algebraic Combinatorics (9/96–5/97).

Refereeing

Conferences

- 14th International Conference on Formal Power Series and Algebraic Combinatorics, University of Melbourne.
- 16th International Conference on Formal Power Series and Algebraic Combinatorics, University of British Columbia.

Journals

- Graphs and Combinatorics
- Discrete and Computational Geometry
- Discrete Mathematics

- Electronic Journal of Combinatorics
- Journal of Algebraic Combinatorics
- Journal of Combinatorial Theory, Series A
- Journal of Computational and Applied Mathematics
- Linear Algebra and its Applications
- Proceedings of the American Mathematical Society

Referee for promotion cases

- Outside letter writer for Dr. William Schmitt promotion to Full Professor at the George Washington University. (11/06)

Invited Lectures

- “Eulerian binomial and Sheffer posets”
 - Northeastern University, 23 April 2007.
 - Cornell University, 28 March 2007.
- “Toric arrangements”
 - AMS meeting, Davidson, NC, 4 March 2007.
- “Counting pattern avoiding permutations via integral operators”
 - MIT, 23 February 2007.
 - Brandeis-Harvard-MIT-Northeastern joint mathematics colloquium, 14 September 2006.
 - University of Minnesota, 31 March 2006.
 - Colloquium, University of British Columbia, 24 March 2006.
 - University of Montana, 1 November 2005.
 - Cornell University, 6 October 2005.
 - University of Kentucky, 12 September 2005.
- “Counting pattern-avoiding permutations with Perron and Frobenius”
 - AMS meeting, Storrs, CT, 28 October 2006.
- “The **cd**-index of Gorenstein* lattices”
 - AMS meeting, Cincinnati, OH, 22 October 2006.
- “The **cd**-index, polytopes and Gorenstein* lattices”
 - Workshop on Geometric and Topological Combinatorics - A satellite conference of ICM 2006, Alcalá de Henares (Madrid, SPAIN), 2 September 2006.
 - Banff International Research Station, Canada, 6 March 2006.
- “The Möbius function of partitions with restricted block sizes”
 - University of British Columbia, 21 March 2006.
- “The **cd**-index, polytopes and Gorenstein* lattices”
 - Banff International Research Station, Canada, 6 March 2006.
- “Linear inequalities for flag f -vectors of polytopes”
 - Colloquium, University of Montana, 3 November 2005.
- “The mathematics of juggling”
 - University of Montana, 1 November 2005.
- “Combinatorics and topology”
 - University of Kentucky, 16 August 2005.
- “The Tchebyshev transform”
 - Indiana University, 26 April 2005.
 - University of Minnesota, 15 April 2005.
 - Mittag-Leffler, Sweden, 15 March 2005.
 - University of Kentucky, 1 November 2004.
- “Enumerative properties of Ferrers graphs”
 - Graduate Student Combinatorics Conference, University of Minnesota, Keynote speaker, April 17 2005
 - University of Kentucky, 22 September 2003.

- “Lifting inequalities for polytopes”
 - Colloquium, University of Linköping, Sweden, 23 March 2005.
 - Workshop in Combinatorial and Discrete Geometry at Mathematical Sciences Research Institute, 21 November 2003.
 - Oberwolfach, Germany, 9 April 2003.
 - Northeastern University, 20 February 2003.
 - MIT, 19 February 2003.
 - University of Kentucky, 13 February 2003.
 - Binghamton University, 9 October 2002.
 - University of Minnesota, 5 August 2002.
- “Juggling”
 - Freshmen writing seminar, University of Kentucky, 26 January 2005.
 - Henry Clay High School, Lexington, 29 April 2003.
 - The Undergraduate Math Club, University of Kentucky, 29 August 2001.
 - The Undergraduate Math Club, Cornell University, 4 September 1996.
 - The Undergraduate Math Club, Cornell University, 20 September 1995.
- “Two theorems and a lemma”
 - The Graduate Colloquium, University of Kentucky, 22 September 2004.
 - The Olivetti Club, Cornell University, 17 September 1996.
- “Geometric transforms of posets and associated coalgebras”
 - Banff International Research Station, Canada, 31 August 2004.
- “Combinatorial conjectures for the holidays”
 - University of Kentucky, 8 December 2003.
- “Inequalities for zonotopes”
 - AMS meeting, Binghamton, NY, 12 October 2003.
- “A brief introduction to polytopes”
 - University of Kentucky, 19 August 2003.
- “The topology of the independence complex”
 - 15th International Conference on Formal Power Series and Algebraic Combinatorics, University of Linköping, 26 June 2003.
- “Lifting the toric g -inequalities for polytopes”
 - 15th International Conference on Formal Power Series and Algebraic Combinatorics, University of Linköping, 25 June 2003.
- “The Greene-Nijenhuis-Wilf proof of the hook formula”
 - University of Kentucky, 20 November 2002.
- “Inequalities for polytopes and some rather recent results”
 - 14th International Conference on Formal Power Series and Algebraic Combinatorics, University of Melbourne, 8 July 2002.
- “Inequalities for polytopes”
 - Washington University in St. Louis, 25 March 2002.
 - AMS meeting, Montréal, Canada, 3 May 2002.

- AMS meeting, Ann Arbor, Michigan 3 March 2002.
- AMS meeting, San Diego, California, 8 January 2002.
- o “Recent progress on inequalities for polytopes”
 - University of Kentucky, 9 October 2001.
- o “Very recent progress on inequalities for polytopes”
 - MIT, 13 August 2001.
- o “Counting faces in the extended Shi arrangement”
 - AMS sectional meeting, University of Kansas, 30 March 2001.
- o “Non-shellable 3-spheres and 3-balls”
 - University of Kentucky, 24 October 2000.
- o “An introduction to shellings”
 - University of Kentucky, 10 October 2000.
- o “Maximizing the descent statistic”
 - Colloquium talk, University of Kentucky, 28 September 2000.
 - University of Stockholm, Sweden, 1 September 1999.
 - Temple University, 27 January 1999.
- o “Two permutation set statistics”
 - Invited speaker at LaCIM 2000 Conference, Université du Québec à Montréal, Canada, 8 September 2000.
- o “To shell or not to shell”
 - Research Experiences for Undergraduates, Cornell University, 31 July 2000.
- o “Non-shellable 3-spheres and the bridge index”
 - University of Stockholm, Sweden, 29 March 2000.
 - AMS meeting, Washington, D.C., 22 January 2000.
- o “Inequalities for the **cd**-index”
 - Colloquium talk, University of Georgia, 14 February 2000.
 - Colloquium talk, University of Illinois at Chicago, 11 February 2000.
 - Colloquium talk, College of William and Mary, 8 February 2000.
 - Colloquium talk, University of Iowa, 2 February 2000.
 - Colloquium talk, University of Kentucky, 28 January 2000.
 - Colloquium talk, University of Pittsburgh, 13 January 2000.
 - Colloquium talk, University of California Davis, 10 January 2000.
 - Oberwolfach, Germany, 12 April 1999.
 - AMS sectional meeting, University of Florida at Gainesville, 13 March 1999.
 - University of Pennsylvania, 20 October 1998.
 - MIT, 16 September 1998.
- o “Generic canonical forms for polynomials and tensors”
 - University of Stockholm, Sweden, 25 October 1999.
 - Chalmers University of Technology, Sweden, 2 June 1997.
- o “Three evaluations of the Hankel determinant of exponential polynomials”
 - University of Stockholm, Sweden, 29 September 1999.

- “The **cd**-index”
 - Working Seminar in Algebraic Combinatorics, Institute for Advanced Study, series of three lectures, 7 October through 21 October 1998.
- “Baxter’s theorem: an application of topology to combinatorics”
 - Research Experiences for Undergraduates, Cornell University, 8 July 1998.
- “Tilings”
 - The Undergraduate Math Club, Cornell University, 29 April 1998.
- “Valuations and mixed volumes”
 - Eötvös University, Budapest, Hungary, 17 March 1998.
- “Coproducts and geometric operations”
 - Eötvös University, Budapest, Hungary, 17 March 1998.
- “Polytopes and hyperplane arrangements”
 - Colloquium talk, Dartmouth College, 23 February 1998.
 - Colloquium talk, College of William and Mary, 16 February 1998.
 - Colloquium talk, Michigan State University, 9 February 1998.
 - Colloquium talk, University of Washington, 2 February 1998.
 - Colloquium talk, University of Kansas, 15 January 1998.
 - Colloquium talk, University of Florida at Gainesville, 12 January 1998.
 - Colloquium talk, Georgia Institute of Technology, 13 November 1997.
 - Mid-Atlantic Day for Combinatorics and Probability, Johns Hopkins University, one of four invited speakers, 7 November 1997.
- “The blind bartender’s problem”
 - The Undergraduate Math Club, Cornell University, 19 November 1997.
 - AT&T Bell Laboratories, Murray Hill, 8 August 1991.
- “The **cd**-index of zonotopes and hyperplane arrangements”
 - AMS sectional meeting, University of Montréal, Canada, 27 September 1997.
- “Valuations and the characteristic polynomial”
 - Combinatorics and Algebraic Geometry Seminar, Cornell University, 8 September 1997.
- “Tree counting and Lagrange inversion formula”
 - Research Experiences for Undergraduates, Cornell University, 9 July 1997.
- “The **cd**-index and zonotopes”
 - AMS sectional meeting, Wayne State University, 3 May 1997.
- “Exponential generating functions and the theory of species”
 - Working Seminar in Algebraic Combinatorics, Cornell University, series of four lectures, 3 February 1997 through 3 March 1997.
- “The **c-2d**-index of oriented matroids and hyperplane arrangements”
 - Mathematical Sciences Research Institute, 23 October 1996.
- “The **cd**-index, coproducts and zonotopes”
 - The Tutte colloquium, University of Waterloo, Canada, 12 July 1996.

- “Coproducts and the **cd**-index”
 - 8th International Conference on Formal Power Series and Algebraic Combinatorics, University of Minnesota, 25 June 1996 (with Margaret A. Readdy).
 - Rotafest, MIT, 20 April 1996.
 - Geometry and Topology Seminar, Cornell University, 11 April 1996.
- “The game of Nim”
 - The Undergraduate Math Club, Cornell University, 24 April 1996.
- “Apolarity and canonical forms”
 - The Oliver Club, Cornell University, 28 September 1995.
- “Juggling and the affine Weyl group \tilde{A}_n ”
 - Combinatorics and Algebraic Geometry Seminar, Cornell University, 11 September 1995.
- “Juggling and applications to q -analogues”
 - Research Experiences for Undergraduates, Cornell University, 17 July 1995.
 - 6th International Conference on Formal Power Series and Algebraic Combinatorics, DIMACS, Rutgers, 23 May 1994 (with Margaret A. Readdy).
- “Generalizations of Baxter’s Theorem”
 - Combinatorics and Algebraic Geometry Seminar, Cornell University, 3 April 1995.
 - Université de Montréal, Canada, 2 November 1994.
 - Università di Milano, Italy, 22 September 1994.
- “Sheffer posets and r -signed permutations”
 - MIT, 8 March 1995.
 - AMS sectional meeting, University of Richmond, 13 November 1994.
 - Royal Institute of Technology (KTH), Sweden, 15 September 1994.
 - Université du Québec à Montréal, Canada, 6 May 1994.
- “Simple and multiplex juggling sequences”
 - Colloquium talk, University of Missouri at Columbia, 14 February 1995.
 - Concordia University, Montréal, Canada, 18 July 1994.
 - University of Pennsylvania, 15 March 1994.
 - MIT, 9 March 1994.
 - Université de Montréal, Canada, 14 February 1994.
- “Juggling patterns”
 - University of Stockholm, Sweden, 12 September 1994.
- “Counting trees on partitions”
 - Université du Québec à Montréal, Canada, 22 October 1993.
 - MIT, 13 November 1992.
- “Colored species, plethysm and Lagrange inversion formula”
 - Université du Québec à Montréal, Canada, 17 September 1993.
- “Plethystic trees and Lagrange inversion formula”
 - MIT, 6 May 1993.
- “Apolarity and canonical forms for homogeneous polynomials”
 - Brandeis, 18 March 1992.

Publications

Refereed journal publications

- [1] “*Heron’s formula from a Pythagoras-type theorem*,” *The Mathematical Gazette* **68** (1984), 124–126.
- [2] “*Apolarity and canonical forms for homogeneous polynomials*,” *European Journal of Combinatorics* **14** (1993), 157–181 (with Gian-Carlo Rota).
- [3] “*Schröder parenthesizations and chordates*,” *Journal of Combinatorial Theory, Series A* **67** (1994), 127–139 (with Miguel Méndez).
- [4] “*A bijective proof of infinite variated Good’s inversion*,” *Advances in Mathematics* **103** (1994), 221–259 (with Miguel Méndez).
- [5] “*Generalizations of Baxter’s theorem and cubical homology*,” *Journal of Combinatorial Theory, Series A* **69** (1995), 233–287 (with Gábor Hetyei).
- [6] “*The blind bartender’s problem*,” *Journal of Combinatorial Theory, Series A* **70** (1995), 249–266 (with Chris M. Skinner).
- [7] “*Sheffer posets and r -signed permutations*,” *Annales des Sciences Mathématiques du Québec* **19** (1995), 173–196 (with Margaret A. Readdy).
- [8] “*The \mathbf{r} -cubical lattice and a generalization of the \mathbf{cd} -index*,” *European Journal of Combinatorics* **17** (1996), 709–725 (with Margaret A. Readdy).
- [9] “*Juggling and applications to q -analogues*,” *Discrete Mathematics* **157** (1996), 107–125, special issue on Algebraic Combinatorics (with Margaret A. Readdy).
- [10] “*On posets and Hopf algebras*,” *Advances in Mathematics* **119** (1996), 1–25.
- [11] “*Playing Nim on a simplicial complex*,” *Electronic Journal of Combinatorics* **3**, R9 (1996), 33pp (with Einar Steingrímsson).
- [12] “*The \mathbf{c} - $2\mathbf{d}$ -index of oriented matroids*,” *Journal of Combinatorial Theory, Series A* **80** (1997), 79–105 (with Louis J. Billera and Margaret A. Readdy).
- [13] “*Mixed volumes and slices of the cube*,” *Journal of Combinatorial Theory, Series A* **81** (1998), 121–126 (with Margaret A. Readdy and Einar Steingrímsson).
- [14] “*On valuations, the characteristic polynomial and complex subspace arrangements*,” *Advances in Mathematics* **134** (1998), 32–42 (with Margaret A. Readdy).
- [15] “*The \mathbf{cd} -index of zonotopes and arrangements*,” in *Mathematical essays in honor of Gian-Carlo Rota* (B. E. Sagan and R. P. Stanley, eds.), Birkhäuser, Boston, 1998, pages 23–40 (with Louis J. Billera and Margaret A. Readdy).
- [16] “*Coproducts and the \mathbf{cd} -index*,” *Journal of Algebraic Combinatorics* **8** (1998), 273–299 (with Margaret A. Readdy).

- [17] “*Maximizing the descent statistic*,” *Annals of Combinatorics* **2** (1998), 111–129 (with Swapneel Mahajan).
- [18] “*On apolarity and generic canonical forms*,” *Journal of Algebra* **213** (1999), 167–194.
- [19] “*Canonical forms of two by two by two matrices*,” *Journal of Algebra* **213** (1999), 195–224.
- [20] “*On flag vectors, the Dowling lattice and braid arrangements*,” *Discrete and Computational Geometry* **21** (1999), 389–403 (with Margaret A. Readdy).
- [21] “*Cutting polytopes and flag f -vectors*,” *Discrete and Computational Geometry* **23** (2000), 261–271 (with Dan Johnston, Rajmohan Rajagopalan and Margaret A. Readdy).
- [22] “*The Hankel determinant of exponential polynomials*,” *American Mathematical Monthly* **107** (2000), 557–560.
- [23] “*A bijective answer to a question of Zvonkin*,” *Annals of Combinatorics* **4** (2000), 195–197.
- [24] “*Flags and shellings of Eulerian cubical posets*,” *Annals of Combinatorics* **4** (2000), 199–226 (with Gábor Hetyi).
- [25] “*Monotonicity of the \mathbf{cd} -index for polytopes*,” *Mathematische Zeitschrift* **233** (2000), 421–441 (with Louis J. Billera).
- [26] “*The exceedance set of a permutation*,” *Advances in Applied Mathematics* **24** (2000), 284–299 (with Einar Steingrímsson).
- [27] “*A combinatorial proof of the log-concavity of the numbers of permutations with k runs*,” *Journal of Combinatorial Theory, Series A* **90** (2000), 293–303 (with Miklós Bóna).
- [28] “*Yet another triangle for the Genocchi numbers*,” *European Journal of Combinatorics* **21** (2000), 593–600 (with Einar Steingrímsson).
- [29] “*The toric h -vectors of partially ordered sets*,” *Transactions of the American Mathematical Society* **352** (2000), 4515–4531 (with Margaret Bayer).
- [30] “*The Dowling transform of subspace arrangements*,” *Journal of Combinatorial Theory, Series A* **91** (2000), 322–333 (with Margaret A. Readdy).
- [31] “*Non-constructible complexes and the bridge index*,” *European Journal of Combinatorics* **22** (2001), 475–491 (with Masahiro Hachimori).
- [32] “ *k -Eulerian posets*,” *Order* **18** (2001), 227–236.
- [33] “*A probabilistic approach to the descent statistic*,” *Journal of Combinatorial Theory, Series A* **98** (2002), 150–162 (with Michael Levin and Margaret A. Readdy).
- [34] “*The asymptotics of almost alternating permutations*,” *Advances in Applied Mathematics* **28** (2002), 421–437.

- [35] “*Homology of Newtonian coalgebras,*” *European Journal of Combinatorics* **23** (2002), 919–927 (with Margaret Readdy).
- [36] “*Determinants involving q -Stirling numbers,*” *Advances in Applied Mathematics* **31** (2003), 630–642.
- [37] “*Inequalities for \mathbf{cd} -indices of joins and products of polytopes,*” *Combinatorica* **23** (2003), 427–452 (with Harold Fox).
- [38] “*A conceptual proof of Cramer’s rule,*” *Mathematics Magazine* **77** (2004), 308.
- [39] “*Enumerative properties of Ferrers graphs,*” *Discrete and Computational Geometry*, special issue in honor of Louis J. Billera **32** (2004), 481–492 (with Stephanie van Willigenburg).
- [40] “*Lifting inequalities for polytopes,*” *Advances in Mathematics* **193** (2005), 205–222.
- [41] “*Inequalities for zonotopes,*” in *Mathematical Sciences Research Institute Publication on Combinatorial and Computational Geometry*, (J. E. Goodman, J. Pach and E. Welzl, eds.), Cambridge University Press, Cambridge, England, 2005, pages 277–286.
- [42] “*Decoding the Hamming code,*” *Math Horizons*, special issue on Codes, Cryptography and National Security, **13** (2006), 16–17.
- [43] “*The topology of the independence complex,*” *European Journal of Combinatorics* **27** (2006), 906–923 (with Gábor Hetyei).
- [44] “*Classification of the factorial functions of Eulerian binomial and Sheffer posets,*” *Journal of Combinatorial Theory, Series A* **114** (2007), 339–359 (with Margaret Readdy).
- [45] “*The Möbius function of partitions with restricted block sizes,*” *Advances in Applied Mathematics* **39** (2007), 283–292 (with Margaret Readdy).
- [46] “*Decomposition theorem for the \mathbf{cd} -index of Gorenstein* posets,*” *Journal of Algebraic Combinatorics* **26** (2007), 225–251 (with Kalle Karu).

Submitted papers

- [47] “*Counting faces in the extended Shi arrangement,*” submitted to *Transactions of the American Mathematical Society*.
- [48] “*The r -signed Birkhoff transform,*” submitted to *Transactions of the American Mathematical Society*.
- [49] “*The Tchebyshev transforms of the first and second kind,*” submitted to *Annals of Algebraic Combinatorics* (with Margaret Readdy).
- [50] “*Ehrhart-Macdonald reciprocity extended,*” submitted to *Contributions to Discrete Math* (with Matthias Beck).

- [51] “*Exponential Dowling structures,*” submitted to European Journal of Combinatorics (with Margaret Readdy).
- [52] “*Affine and toric hyperplane arrangements,*” submitted to Discrete and Computational Geometry (with Margaret Readdy and Michael Slone).
- [53] “*Asymptotics of the Euler number of bipartite graphs,*” submitted to Journal of Combinatorial Theory, Series B (with Yossi Farjoun).
- [54] “*Cyclotomic factors of the descent set polynomial,*” submitted to Journal of Combinatorial Theory, Series A (with Denis Chebikin, Pavlo Pylyavskyy and Margaret Readdy).

Papers in preparation

- [55] “*A spectral approach to pattern-avoiding permutations,*” in preparation (with Sergey Kitaev and Peter Perry).
- [56] “*Quotient inequalities for Gorenstein* lattices,*” in preparation.
- [57] “*Number of standard Young tableaux via calculus,*” in preparation (with Guoce Xin).
- [58] “*Edge labeled posets,*” in preparation (with Gábor Hetyei and Margaret Readdy).
- [59] “*Identities and inequalities for the excedance set statistic,*” in preparation (with Scott Godefroy).
- [60] “*Level Eulerian posets,*” in preparation (with Gábor Hetyei and Margaret Readdy).
- [61] “*On the Stanley symmetric function of a graph,*” in preparation (with Stephanie van Willigenburg).
- [62] “*Eulerian formal power series,*” in preparation (with Gábor Hetyei and Margaret Readdy).
- [63] “*Lectures on polynomials,*” manuscript, February 1995 (with Gábor Hetyei and Gian-Carlo Rota).

Refereed conference proceedings and technical reports

- [64] “*Sheffer posets and r -signed permutations,*” Research Report No. 222, May 6th 1994, at Département de Mathématiques et d’Informatique at UQAM (with Margaret A. Readdy).
- [65] “*The \mathbf{r} -cubical lattice and a generalization of the \mathbf{cd} -index,*” Research Report No. 245, March 31st 1995, at Département de Mathématiques et d’Informatique at UQAM (with Margaret A. Readdy).
- [66] “*The \mathbf{r} -cubical lattice and a generalization of the \mathbf{cd} -index,*” Conference Proceedings of 7th International Conference on Formal Power Series and Algebraic Combinatorics (May 1995, Université de Marne-la-Vallée) 173–184 (with Margaret A. Readdy).

- [67] “*Juggling and applications to q -analogues,*” Conference Proceedings of 6th International Conference on Formal Power Series and Algebraic Combinatorics (May 1994, DIMACS/Rutgers) 135–144 (with Margaret A. Readdy).
- [68] “*Mixed volumes and slices of the cube,*” Technical Report No. 1997:31, at Department of Mathematics, Chalmers University of Technology and Göteborg University (with Margaret A. Readdy and Einar Steingrímsson).
- [69] “*Coproducts and the \mathbf{cd} -index,*” Conference Proceedings of 8th International Conference on Formal Power Series and Algebraic Combinatorics (June 1996, University of Minnesota) 151–162 (with Margaret A. Readdy).
- [70] “*The \mathbf{cd} -index of Eulerian cubical posets,*” Conference Proceedings of 7th International Conference on Formal Power Series and Algebraic Combinatorics (May 1995, Université de Marne-la-Vallée) 161–172 (with Gábor Hetyei).
- [71] “*The exceedance set of a permutation,*” Technical Report No. 1998:51, at Department of Mathematics, Chalmers University of Technology and Göteborg University (with Einar Steingrímsson).
- [72] “*Yet another triangle for the Genocchi numbers,*” Technical Report No. 1999:7, at Department of Mathematics, Chalmers University of Technology and Göteborg University (with Einar Steingrímsson).
- [73] “*Counting faces in the extended Shi arrangement $\widehat{\mathcal{A}}_n^r$,*” Conference Proceedings of 13th International Conference on Formal Power Series and Algebraic Combinatorics (May 2001, Arizona State University) 149–158.
- [74] “*Inequalities for polytopes and zonotopes,*” Conference Proceedings of 14th International Conference on Formal Power Series and Algebraic Combinatorics (July 2002, University of Melbourne) 255–265.
- [75] “*The topology of the independence complex,*” Conference Proceedings of 15th International Conference on Formal Power Series and Algebraic Combinatorics (June 2003, University of Linköping) (with Gábor Hetyei), conference cd.
- [76] “*Lifting the toric g -vector inequalities,*” Conference Proceedings of 15th International Conference on Formal Power Series and Algebraic Combinatorics (June 2003, University of Linköping) 164–175.
- [77] “*Classification of the factorial functions of Eulerian binomial and Sheffer posets,*” Conference Proceedings of 18th International Conference on Formal Power Series and Algebraic Combinatorics (June 2006, University of California, San Diego) (with Margaret Readdy), conference cd.
- [78] “*A spectral approach to pattern-avoiding permutations,*” Conference Proceedings of 18th International Conference on Formal Power Series and Algebraic Combinatorics (June 2006, University of California, San Diego) (with Sergey Kitaev and Peter Perry), conference cd.

Miscellaneous

- [79] Solution to monthly problem 10654, *Pairs with equal squares*, in *American Mathematical Monthly* **107** (2000), page 368.
- [80] Solution to monthly problem 10753, *Leaves of ordered trees*, in *American Mathematical Monthly* **108** (2001), page 873 (composite solution with J. W. Moon).
- [81] Monthly problem 11099, in *American Mathematical Monthly* **111** (2004), page 625–626 (with Matthias Beck and Tom Zaslavsky). The solution appeared in *American Mathematical Monthly* **113** (2006), 464–465.
- [82] Monthly problem 11234, in *American Mathematical Monthly* **113** (2006), page 568 (with Jim Brennan).
- [83] “*Advertise!*” FOCUS, **26** (2006), August/September issue, number 6, 28–29.

Integer sequences

The following sequences in “The On-Line Encyclopedia of Integer Sequences” by N. J. A. Sloane

- [84] Sequence A6873, *Number of alternating 4-signed permutations*: 1, 1, 7, 47, 497, 6241, 95767, 1704527, 34741217, 796079041, 20273087527, ... (with Margaret A. Readdy).
- [85] Sequence A7286, *Number of alternating 3-signed permutations*: 1, 1, 5, 26, 205, 1936, 22265, 297296, 4544185, 78098176, 1491632525, ... (with Margaret A. Readdy).
- [86] Sequence A7788, *Number of augmented André 3-signed permutations*: 1, 1, 4, 19, 136, 1201, 13024, 165619, 2425216, 40132801, 740882944, ... (with Margaret A. Readdy).
- [87] Sequence A0698, *Number of shellings of an n -cube, divided by $2^n n!$* : 1, 2, 10, 74, 706, 8162, 110410, 1708394, 29752066, 576037442, 12277827850, ... (with Gábor Heteyi).
- [88] Sequence A034428, *Number of permutations on n elements having the descent pattern: up, up, down, up, down, ...*: 1, 1, 3, 9, 35, 155, 791, 4529, 28839, 201939, 1542739, 12767689, 113794603, ... (with Swapneel Mahajan).
- [89] Sequence A108917, *Number of knapsack partitions of n* : 1, 1, 2, 3, 4, 6, 7, 11, 12, 17, 19, 29, 25, 41, 41, 58, 56, 84, 75, 117, 99, 149, 140, 211, 172, 259, 237, 334, 292, 434, ... (with Margaret Readdy).

Teaching Experience

University of Kentucky (8/00–present)

- *Differential equations* Math 214 (8–12/07).
- The graduate course *Polytopes* Math 714 (8–12/07).
- *Applicable Algebra* Math 340/CS 340 (1–4/06).
- The graduate course *Lattice Point Enumeration* Math 714 (1–4/06).
- *Analytic Geometry and Trigonometry* Math 110 (9–12/05).
- The graduate course *Posets and permutations* Math 714 (9–12/05).
- *Applicable Algebra* Math 340/CS 340 (1–4/05).
- The graduate course *Enumerative Combinatorics* Math 614 (1–4/05).
- *Linear Algebra* Math 332 (9–12/04).
- *Combinatorics and Graph Theory* Math 415/CS 415 (9–12/04).
- Independent study with Michael Slone entitled “Homology of Newtonian coalgebras” (1–4/04).
- *Applicable Algebra* Math 340/CS 340 (1–4/04).
- The graduate course *Geometric Probability* Math 714 (1–4/04).
- Large lecture of *Calculus I* Math 113 (9–12/03).
- The graduate course *Polytopes* Math 715 (9–12/03).
- Taught and developed the new undergraduate course *Combinatorics and Graph Theory* Math 415/CS 415 (1–4/03).
- The graduate course *Topics in Linear Algebra* Math 765 (1–4/03).
- Large lecture of *Multivariable Calculus* Math 213 (9–12/02).
- The graduate course *Linear Algebra* Math 565 (9–12/02).
- *Applicable Algebra* Math 340/CS 340 (1–4/02).
- Two sections of *Linear Algebra* Math 332 (9–12/01).
- Large lecture of *Finite Mathematics and its Applications* Math 162 (1–4/01).
- Taught and developed the new undergraduate course *Applicable Algebra* Math 340/CS 340 (1–4/01).
- The graduate course *Enumerative Combinatorics* Math 715 (9–12/00).

Royal Institute of Technology (8/99–12/99)

- *Linear Algebra* (9–10/99).
- *Differential equations and transforms* (9–12/99).
- *Differential and integratal calculus* (9–12/99).

Cornell University (7/95–8/98)

- *Multivariable Calculus* Math 222 (2–5/98).
- Taught one section of *Calculus for Engineers* Math 191 and course czar of all four sections (9–12/97).
- *Algebra and Number Theory* Math 332 (9–12/97).
- *Calculus for Engineers* Math 193 (1–5/97).
- Taught and developed the new undergraduate course *Applicable Algebra* Math 336 (1–5/97).
- The graduate course *Topics in Algebra* Math 631 (9–12/96).
- *Honors Calculus* Math 121 (9–12/96).
- Two sections of *Multivariable Calculus* Math 222 (2–5/96).
- Two sections of *Calculus for Engineers* Math 193 (9–12/95).

Massachusetts Institute of Technology (8/88–7/93)

- Mentor for five high school students in Research Science Institute in the MIT Mathematics Department, a joint program between MIT and Center for Excellence in Education (7/93).
- Teaching Assistant for *Introduction to Discrete Applied Mathematics* for Prof. Dan Kleitman (9–12/92).
- Teaching Assistant for graduate *Stochastic Processes* for Prof. Gian-Carlo Rota (2–5/92).
- Teaching Assistant for graduate *Combinatorial Theory* for Prof. Richard Stanley (9–12/91).
- Tutor at Experimental Study Group, MIT, for *Differential Equations* (2–5/91).
- Teaching Assistant for graduate *Stochastic Processes* for Prof. Greta Ljung (2–5/90, 9–12/90).

Committees

University of Kentucky (8/00–present)

- During Arts & Sciences Week (Geek Week) organized and showed five times the Walt Disney movie “Donald in Mathmagic Land” starring Donald Duck, complete with popcorn (2/06).

- Executive committee (9/00–5/01).
- Web committee (9/00–5/01).
- Hiring committee (9/01–5/02).
- Math Club advisor (9/02–12/03).
- Trainer of the Putnam team (9/02–5/03).
- Executive committee (9/05–5/06).
- Hiring committee (while on sabbatical) (9/06–5/07).
- Royster research professorship committee (while on sabbatical) (9/06–5/07).
- Prelim committee for the discrete math exam (2/03–present).
- Chair of the prelim committee for the discrete math (4/04–present).
- Chair of the doctoral committee of Michael Slone (April 28, 2004–present).
- The doctoral committees of
 - Jakayla Robbins, April 17 2003.
 - Kyoungmi Kim, April 21 2003.
 - Laura Schmidt, April 22 2003.
 - Robert Riehemann, June 2003.
 - Gareth Bendall, November 26 2003.
 - Matt Menzel, April 19 2004.
 - Venkata Giruka, September 23 2004.
 - Philip Busse, April 27 2006.
- Chair of the master exams of
 - John Eveland, November 24 2003.
 - Jennifer Rowe, December 1 2003.
 - Adam Feldhaus, April 9 2004.
 - Scott Godefroy, April 21 2004.
 - Daniel Wells, April 19 2006.
- The master exams of
 - Cathy Mania, September 23 2002.
 - David Harness, April 10 2002.
 - Jennifer Rice, April 12 2002.
 - Bryson Perry, March 14 2003.
 - Ron Williams, May 1 2003.
 - Michael Slone, July 11 2003.
 - Matthew Brown, April 12 2004.
 - Patricia Muldoon, April 18 2005.
 - Keith Kohrs, April 22 2005.
 - Carlos Nicolas, April 17 2006.

- The language exams of
 - Gareth Bendall, March 2001.
 - Jakayla Robbins, April 2001.

Cornell University (7/95–8/98)

- Faculty advisor of eleven undergraduate students in the College of Arts and Sciences, including four math majors (9/96–5/98).
- Math Club advisor (9/96–5/98).
- Co-organizer of Research Experiences for Undergraduates Program in Mathematics. Advised three students in research in algebraic combinatorics (6–8/97).
- Advanced Placement Committee (8/96–5/97).

Memberships in Professional Organizations

- American Mathematical Society.
- Association for Women in Mathematics.
- Mathematical Association of America.