

Jay Pantone

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Research Area

My research is focused on the development and application of **analytic and symbolic methods** to **enumerative combinatorics**. These methods incorporate techniques from a variety of areas, including **analytic combinatorics**, **computer algebra**, **experimental and computational mathematics**, and **statistical mechanics**.

Appointments and Visiting Positions

Dartmouth College

John Wesley Young Research Instructor

○ Postdoctoral research and teaching position

Hanover, NH

July 2015 – present

University of Melbourne

NSF EAPSI Fellow

Melbourne, Australia

June 2015 – August 2015

University of Otago

Visiting Scholar

Dunedin, New Zealand

March 2014 – May 2014

Education

University of Florida

PhD, Mathematics (2015), Advisor: Vincent Vatter

MS, Mathematics (2013)

Gainesville, FL

2011 – 2015

University of Florida

BS, Mathematics, Computer Science

Gainesville, FL

2007 – 2011

Grants

National Science Foundation

East Asia and Pacific Summer Institutes, Award #1514825

June 2015 – August 2015

○ Joint program with the National Science Foundation and the Australian Academy of Science to fund a two-month visiting position at the University of Melbourne to collaborate with Tony Guttmann

Combinatorial Exploration: A New Approach to Enumeration — (Application Pending)

○ In this pending application, I propose work to unite many ad hoc techniques from enumerative combinatorics into the single framework of *combinatorial exploration*. The proposal requests funding for travel, salary for an undergraduate researcher, and resources to host a ten-day collaborative workshop.

Publications (in reverse chronological order)

All articles can be found at jaypantone.com/publications/.

- [17] Bevan, D., Brignall, R., Elvey Price, A., and Pantone, J. New bounds on the growth rate of 1324-avoiders. arXiv:1711.10325.
- [16] Albert, M. H., Engen, M., Pantone, J., and Vatter, V. Universal layered permutations. arXiv:1710.04240.
- [15] Fidler, J., Glasscock, D., Miceli, B., Pantone, J., and Xu, M. Shift equivalence in the generalized factor order. arXiv:1612.09003.
- [14] Albert, M. H., Pantone, J., and Vatter, V. On the growth of merges and staircases of permutation classes. arXiv:1608.06969.
- [13] Guttmann, A. J., Jensen, I., Maillard, J.-M., and Pantone, J. Is the full susceptibility of the square-lattice Ising model a differentially algebraic function? *J. Phys. A* 49.50 (2016), p. 504002.
- [12] Pantone, J. The asymptotic number of simple singular vector tuples of a cubical tensor. *Online J. Anal. Comb.* (2017).

- [11] Pantone, J. and Vatter, V. Growth rates of permutation classes: categorization up to the uncountability threshold. arXiv:1605.04289.
- [10] Bevan, D., Levin, D., Nugent, P., Pantone, J., Pudwell, L., Riehl, M., and Tlachac, M. Pattern avoidance in forests of binary shrubs. *Discrete Math. Theor. Comput. Sci.* (2016).
- [9] Albert, M. H., Homberger, C., Pantone, J., Shar, N., and Vatter, V. Generating permutations with restricted containers. *J. Combin. Theory Ser. A (to appear)* (2017). arXiv:1510.00269.
- [8] Bóna, M., Homberger, C., Pantone, J., and Vatter, V. Pattern-avoiding involutions: exact and asymptotic enumeration. *Australas. J. Combin.* 64.1 (2016), pp. 88–119.
- [7] Albert, M. H., Atkinson, M. D., Homberger, C., and Pantone, J. Deflatability of permutation classes. *Australas. J. Combin.* 64.1 (2016), pp. 252–276.
- [6] Azarija, J., Klavžar, S., Lee, J., Pantone, J., and Rho, Y. On isomorphism classes of generalized Fibonacci cubes. *European J. Combin.* 51 (2016), pp. 372–379.
- [5] Burstein, A. and Pantone, J. Two examples of unbalanced Wilf-equivalence. *J. Comb.* 6.1-2 (2015), pp. 55–67.
- [4] Albert, M. H., Homberger, C., and Pantone, J. Equipopularity classes in the separable permutations. *Electron. J. Combin.* 22.2 (2015), Paper 2.2, 18.
- [3] Pantone, J. The enumeration of permutations avoiding 3124 and 4312. *Ann. Comb.* 21.2 (2017), pp. 293–315.
- [2] Pantone, J. and Vatter, V. On the Rearrangement Conjecture for generalized factor order over \mathbb{P} . In: *26th International Conference on Formal Power Series and Algebraic Combinatorics (FPSAC 2014)*. Discrete Math. Theor. Comput. Sci. Proc., AT. 2014, pp. 217–228.

Conference Articles

- [1] Bevan, D., Brignall, R., Elvey Price, A., and Pantone, J. Staircases, dominoes, and the growth rate of 1324-avoiders. *Electronic Notes in Discrete Mathematics* 61 (2017). The European Conference on Combinatorics, Graph Theory and Applications (EUROCOMB'17), pp. 123–129.

Scholarly Activities

Software Development

- Co-authored open-source Python library for handling large sets of permutations: jaypantone.com/software/permpy/

Conference Organization

- Permutation Patterns 2018 (Dartmouth College), Chair, Organizing Committee and Scientific Committee
- Formal Power Series and Algebraic Combinatorics 2018 (Dartmouth College), Organizing Committee
- Special Session on Applied and Computational Combinatorics (2018, AMS-MAA Joint Meetings), Co-organizer
- Discrete Math Day 2017 (Dartmouth College), Organizing Committee
- Permutation Patterns 2016 (Washington, D.C.), Scientific Committee
- Special Session on Enumerative Combinatorics (2015, AMS-MAA Joint Meetings), Co-organizer
- Bijective and Algebraic Combinatorics (2014), Organizing Committee

Journal Editing

- Online Encyclopedia of Integer Sequences, Associate Editor
- Discrete Mathematics and Theoretical Computer Science, Guest Editor for *Permutation Patterns 2016* special issue

Journal Refereeing

Advances in Applied Mathematics, Australasian Journal of Combinatorics, Discrete Applied Mathematics, Discrete Mathematics, Discrete Mathematics and Theoretical Computer Science, Electronic Journal of Combinatorics, European Journal of Combinatorics, Journal of Combinatorial Theory A, Journal of Combinatorics, Journal of Mathematical Analysis and Applications, Theory of Computing Systems

AMS Mathematical Reviews – 8 reviews written

Department Service

Combinatorics Seminar Organizer

Dartmouth College

2015 – present

Association for Women in Mathematics, Essay Contest Judge

Dartmouth College

2017

Thesis Committee Member

- Everett Sullivan, Ph.D., 2017

Invited Talks

Patterns and Colorability in Chord Diagrams (*upcoming*)

Special Session on Applied and Computational Combinatorics, 2018 Joint Math Meetings

January 2018

Sorting with \mathcal{C} -Machines

San Diego State University, Department Colloquium

November 2017

Sorting with \mathcal{C} -Machines

Brandeis University Combinatorics Seminar

November 2017

Sorting with \mathcal{C} -Machines

Erwin Schrödinger International Institute – Vienna, Austria

October 2017

Exact and Asymptotic Analysis of Combinatorial Sequences

University of Florida Combinatorics Seminar

October 2017

Combinatorial Exploration

University of Florida, Department Colloquium

October 2017

The Method of Differential Approximation in Enumerative Combinatorics

SIAM Conference on Applied Algebraic Combinatorics

July 2017

Experimental Analysis of Combinatorial Sequences

Georgia Tech Combinatorics Seminar

February 2017

On the Growth of Merges and Staircases of Permutation Classes

AMS Section Meeting – Minneapolis, Minnesota

October 2016

Sorting with \mathcal{C} -machines: Enumerative and Analytic Aspects

Banff International Research Station – Banff, Canada

October 2016

Approximate Asymptotic Analysis of Combinatorial Sequences

Rutgers Experimental Mathematics Seminar

October 2016

Exact and Asymptotic Analysis of Combinatorial Sequences

Dartmouth College, Department Colloquium

May 2016

The Method of Differential Approximants

Leibniz Center for Informatics – Warden, Germany

February 2016

The Method of Differential Approximants

AMS Section Meeting – Chicago, Illinois

October 2015

Sorting with \mathcal{C} -Machines

University of Melbourne Statistical Mechanics Seminar

July 2015

Equivalence of Words in the Generalized Factor Order

AMS Section Meeting – Washington, D.C.

March 2015

Equipopularity in the Separable Permutations

AMS Section Meeting – Eau Claire, Wisconsin

September 2014

Contributed Talks

Growth Rates of Permutation Classes

Permutation Patterns 2016 – Washington, D.C.

June 2016

Sorting with \mathcal{C} -Machines

University of Florida Combinatorics Seminar

December 2015

Sorting with \mathcal{C} -Machines

Dartmouth College Combinatorics Seminar

October 2015

Pattern-Avoiding Involutions: Exact and Asymptotic Enumeration

Permutation Patterns 2014 – Johnson City, Tennessee

July 2014

The Rearrangement Conjecture, poster

Formal Power Series and Algebraic Combinatorics 2014 – Chicago, Illinois

July 2014

Introduction to LaTeX, parts 1 and 2

University of Florida LaTeX Seminar

March 2014

Checker Jumping, Coin Counting, and Cap Throwing: Why Generating Functions are Magic!

University of Florida Graduate Student Colloquium

August 2013

The Enumeration of Permutations Avoiding the Patterns 3124 and 4312

Permutation Patterns 2013 – Paris, France

July 2013

Enumeration of the Area Under Lattice Paths

University of Florida Combinatorics Seminar

November 2012

The History of π

University of Florida Pi Mu Epsilon Seminar

March 2012

Teaching Experience

More detailed information about my teaching experience can be found at jaypantone.com/teaching/.

Instructor, Dartmouth College

Math 31 – Abstract Algebra

Summer 2017

Math 20 – Probability

Summer 2017

Math 118 – Graduate Combinatorics

Spring 2017

○ Special topics course on language theory and enumeration, designed from scratch

Math 28 – Combinatorics

Winter 2017

Math 13 – Multivariable Calculus

Fall 2016

Math 22 – Linear Algebra with Applications

Spring 2016

Math 118 – Graduate Combinatorics

Winter 2016

○ Special topics course on the symbolic method and analytic combinatorics, designed from scratch

Math 11 – Multivariable Calculus for Freshmen

Fall 2015

Instructor, University of Florida

MAP 2302 – Differential Equations

Summer 2015

MAC 2233 – Survey of Calculus 1

Summer 2014

MAC 1147 – Precalculus with Trigonometry

Summer 2012

Teaching Assistant, University of Florida

Precalculus, Calculus 1, Calculus 2, Calculus 3

2011 – 2015

Technical Skills

- Extensive programming and computing experience with Python, PHP, Java, C++, Maple, Sage, GAP, and Singular
- Extensive web development experience with PHP, MySQL, and Javascript