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Research Interests Enumerative and algebraic combinatorics; in particular, pattern-avoiding permutations, bijections, generating functions, lattice paths, generalized triangulations, algorithms, and applications to computational biology and dynamical systems.

Education MASSACHUSETTS INSTITUTE OF TECHNOLOGY (MIT), Cambridge, MA, 2000-2004.
Ph.D. in Mathematics, June 2004.
Thesis title: *Statistics on Pattern-avoiding Permutations*.
Advisor: Richard Stanley.
GPA: 4.0/4.0.

UNIVERSITAT POLITÈCNICA DE CATALUNYA (UPC), Barcelona, Spain, 1996-2000.
B.S. in Mathematics, June 2000.
Undergraduate advisor: Marc Noy.
Ranked *First in Class*, with final grade of *A with Honors*.

Work Experience DARTMOUTH COLLEGE, Hanover, NH, 2007-present.
Assistant Professor (tenure-track).

DARTMOUTH COLLEGE, Hanover, NH, 2005-2007.
John Wesley Young Research Instructor.

CENTRE DE RECERCA MATEMÀTICA (CRM), Spain, winter 2007.
Postdoctoral Fellow in the program *Enumerative Combinatorics and Random Structures*.

INSTITUT MITTAG-LEFFLER, Sweden, spring 2005.
Postdoctoral Fellow. Member of the program *Algebraic Combinatorics*.

MATHEMATICAL SCIENCES RESEARCH INSTITUTE (MSRI), Berkeley, CA, 2004-2005.
Postdoctoral Fellow. Member of the programs *Hyperplane Arrangements and Applications*, Fall 2004, and *Probability, Algorithms, and Statistical Physics*, Spring 2005.

Publications *Descent sets of cyclic permutations*, preprint, [arXiv:0906.2795](https://arxiv.org/abs/0906.2795).
On basic forbidden patterns of functions (with Y. Liu), preprint, [arXiv:0909.2277](https://arxiv.org/abs/0909.2277).
Improved bounds on the number of numerical semigroups of a given genus, preprint, [arXiv:0905.0489](https://arxiv.org/abs/0905.0489).
The largest and the smallest fixed points of permutations (with E. Deutsch), preprint, [arXiv:0904.2792](https://arxiv.org/abs/0904.2792).
The number of permutations realized by a shift, *SIAM J. Discrete Math.* 23 (2009), 765–786.
Sorting by Placement and Shift (with P. Winkler), *Proceedings of the Twentieth Annual ACM-SIAM Symposium on Discrete Algorithms, SODA 2009*.
The X-class and almost-increasing permutations, *Annals of Combinatorics*, to appear.
Pattern avoidance in dynamical systems (with J.M. Amigó, M.B. Kennel), *Discrete Math. Theor. Comput. Sci. proc. AJ* (2008), 71–82.

Forbidden patterns and shift systems (with J.M. Amigó, M.B. Kennel), *Journal of Combinatorial Theory Series A* 115 (2008), 485–504.

Generating trees for permutations avoiding generalized patterns, *Annals of Combinatorics* 11 (2007), 435–458.

A bijection between 2-triangulations and pairs of non-crossing Dyck paths, *Journal of Combinatorial Theory Series A* 114/8 (2007), 1481–1503.

Bounds on the number of inference functions of a graphical model (with K. Woods), *Statistica Sinica* 17 (2007), 1395–1415.

The probability of choosing primitive sets (with K. Woods), *Journal of Number Theory* 125 (2007), 39–49.

Restricted Dumont permutations, Dyck paths, and noncrossing partitions (with A. Burnstein and T. Mansour), *Discrete Mathematics* 306 (2006), 2851–2869.

Combinatòria i biologia: funcions d'inferència i alineació de seqüències, *Butlletí de la Societat Catalana de Matemàtiques* 21 (2006), n. 1, 39–52.

Asymptotic enumeration of permutations avoiding generalized patterns, *Advances in Applied Mathematics* 36 (2006), 138–155.

Inference functions. Chapter of the book *Algebraic Statistics for Computational Biology*, edited by L. Pachter and B. Sturmfels, Cambridge University Press, 2005.

Bounds for optimal sequence alignment (with F. Lam). Chapter of the book *Algebraic Statistics for Computational Biology*, edited by L. Pachter and B. Sturmfels, Cambridge University Press, 2005.

Old and young leaves on plane trees (with W.Y.C. Chen and E. Deutsch), *European Journal of Combinatorics* 27 (2006), Issue 3, 414–427.

Multiple pattern-avoidance with respect to fixed points and excedances, *Electronic Journal of Combinatorics* 11 (2004), #R51.

Restricted Motzkin permutations, Motzkin paths, continued fractions, and Chebyshev polynomials (with T. Mansour), *Discrete Mathematics* 305 (2005), 170–189.

A simple and unusual bijection for Dyck paths and its consequences (with E. Deutsch), *Annals of Combinatorics* 7 (2003), 281–297.

Bijections for refined restricted permutations (with I. Pak), *Journal of Combinatorial Theory Series A* 105 (2004), 207–219.

Fixed points and excedances in restricted permutations, *Proceedings of FPSAC 2003*.

Consecutive Subwords in Permutations (with M. Noy), *Advances in Applied Mathematics* 30 (2003), 110–125.

Games and Invariants. Chapter of the book *Training Sessions for the International Mathematical Olympiad* (in Catalan), Catalan Mathematical Society, Barcelona, 2000.

Selected Presentations

SIAM Conference on Discrete Mathematics, mini-symposium on Enumerative Combinatorics, Jun. 2010 (invited).

AMS Fall Southeastern Meeting, Oct. 2009 (invited).

AMS Fall Eastern Section Meeting, Oct. 2009 (invited).

University of Hawaii Mathematics Colloquium, Oct. 2009.

23rd Midwest Conference on Combinatorics, Cryptography, and Computing, Oct. 2009 (invited).

International conference on Formal Power Series and Algebraic Combinatorics:

FPSAC 2008, FPSAC 2007, FPSAC 2006, FPSAC 2003 (talks);

FPSAC 2009, FPSAC 2005, FPSAC 2004, FPSAC 2001 (posters).
International conference on Permutation Patterns: PP 2009, PP 2008, PP 2006, PP 2005, PP 2004.
Dartmouth College Combinatorics Seminar, Jan. 2009.
SIAM Symposium on Discrete Algorithms, SODA, Jan. 2009.
Universitat Politècnica de Catalunya, Seminar in non-linear dynamics, Dec. 2008.
University of Washington Combinatorics Seminar, Oct. 2008.
Jornadas de Matemática Discreta y Algorítmica, Spain, July 2008.
George Washington University Combinatorics Seminar, May 2008.
AMS Fall Central Section Meeting, De Paul University, Oct. 2007 (invited).
Discrete Mathematics Day of the Northeast, Middlebury College, Sep. 2007.
Coloquio Latinoamericano de Álgebra, Colombia, Jul. 2007 (invited).
Conference on Enumeration and Probabilistic Methods in Combinatorics, CRM, Spain, Jun. 2007.
Howard University Mathematics Colloquium, Feb. 2007.
University of Denver Mathematics Colloquium, Feb. 2007.
University of Colorado at Boulder Mathematics Colloquium, Feb. 2007.
UQAM Mathematics Colloquium, Feb. 2007.
University of Vermont Mathematics Colloquium, Feb. 2007.
Dartmouth College Mathematics Colloquium, Jan. 2007.
University of South Carolina Mathematics Colloquium, Jan. 2007.
University of Kentucky Mathematics Colloquium, Jan. 2007.
Centre de Recerca Matemàtica Seminar, Dec. 2006.
Wesleyan University, Algebra and Topology Seminar, Dec. 2006.
University of Vermont, Combinatorics Seminar, Nov. 2006.
AMS Fall Southeastern Meeting, Nov. 2006 (invited).
MIT Combinatorics Seminar, Sep. 2006, Feb. 2005, Nov. 2003.
AMS Fall Eastern Meeting, Oct. 2006 (invited).
International Congress of Mathematicians (ICM), Madrid, Aug. 2006.
York University, Applied Algebra Seminar, Mar. 2006, Jan. 2004.
San Francisco State University Algebra-Geometry-Combinatorics Seminar, Jan. 2006.
U.C. Berkeley Combinatorics Seminar, Jan. 2006, Feb. 2004.
Dartmouth College Mathematics Colloquium, Jan. 2006.
Joint meeting AMS - German Math. Soc. - Austrian Math. Soc., Germany, Jun. 2005 (invited).
Institut Mittag-Leffler Seminar, Sweden, May 2005.
MSRI Post-doc Seminar, Apr. 2005, Nov 2004.
Bay Area Discrete Mathematics Day, San Jose State University, Apr. 2005.
Algebraic Statistics in Computational Biology Seminar, U.C. Berkeley, Feb. 2005, Nov. 2004.
University of Central Florida, Mathematics Department Colloquium, Jan. 2005.
Stanford University Representation Theory and Algebra Seminar, Dec. 2004.

U.C. San Diego Combinatorics Seminar, Oct. 2004.
University of Michigan Combinatorics Seminar, Oct. 2004.
U.C. Davis Discrete Mathematics and Representation Theory Seminar, Oct. 2004.
Joint International Meeting RSME-AMS, Spain, Jun. 2003 (invited).
UPC Seminar of Graph Theory, Combinatorics and Applications, Jun. 2000.

Awards and Fellowships

Burke Research Initiation Award for Junior Faculty, Dartmouth College, 2007.
Beatriu de Pinós Fellowship, for a postdoctoral stay at the *Centre de Recerca Matemàtica (CRM)*, Barcelona, Spain, winter 2007.
J. William Fulbright Association of Spanish Fulbright Alumni Fellowship, 2006.
Ph.D. Thesis Extraordinary Award, Universitat Politècnica de Catalunya (UPC), Barcelona, 2006.
Clay Mathematics Institute affiliate scholar, 2004-2006.
Invitation for a Postdoctoral stay at the Institut Mittag-Leffler, Sweden, spring 2005.
Mathematical Sciences Research Institute Postdoctoral Fellowship, fall 2004 and spring 2005.
MAE Fellowship to study abroad, Spanish Ministry of Foreign Affairs, 2002-2003 and 2003-2004.
Second National Graduation Award in Mathematics, Ministry for Education, Spain, 2001.
“La Caixa” Foundation Fellowship. This is one of the most prestigious fellowships conceded in Spain, and is awarded in person by His Majesty Juan Carlos I, King of Spain; Barcelona, 2000.
Initiation in Research Fellowship, Higher Council of Scientific Research (CSIC, Spain), Section of Physics and Mathematics, 2000.
Collaboration Fellowship from the Ministry of Education and Culture, Department of Applied Mathematics, UPC, Spain, 1999.
Silver Medal, Iberoamerican Mathematical Olympiad, Guadalajara, Mexico, 1997.
Record high score, Spanish Mathematical Olympiad, 1997.
Received also two *Special Mentions* for exceptionally good solutions.
Bronze Medal, Iberoamerican Mathematical Olympiad, San José, Costa Rica, 1996.
Honorable Mention, International Mathematical Olympiad, Bombay, India, 1996.
Gold Medal, Spanish contest for the International Physics Olympiad, 1996.
Winner and Gold Medal, Spanish Mathematical Olympiad, 1996.

Professional Activities

Main organizer of the International Conference on Permutation Patterns, Dartmouth College, Aug. 9-13, 2010, expecting 70 participants from around the world.
Member of the **Program Committee** of FPSAC 2010, San Francisco, Aug. 2009.
Main organizer of the weekly *Dartmouth Combinatorics Seminar*, 2007-present.
Co-organizer of the conference *Discrete Mathematics Day of the Northeast*, Dartmouth College, Oct. 2007, with over 50 participants.
Co-organizer of the conference *Mechanical Puzzles Day*, Dartmouth College, Feb. 2008, with over 100 participants.
Member of the Graduate Admissions Committee at the Dartmouth Math Department, 2008-2010.
Referee for *Advances in Applied Mathematics*, *American Mathematical Monthly*, *Annals of Combinatorics*, *Australasian Journal of Combinatorics*, *Discrete Applied Mathematics*, *Discrete Mathematics*, *Discrete Mathematics and Theoretical Computer Science*, *Electronic Journal of Combinatorics*,

European Journal of Combinatorics, *Experimental Mathematics*, *Formal Power Series and Algebraic Combinatorics*, *Integers: Electronic Journal of Combinatorial Number Theory*, *Journal of Algebraic Combinatorics*, *Journal of Combinatorial Theory Series A*, *Journal of Mathematical Psychology*, *LMS Lecture Notes Series*, *Order*, *Séminaire Lotharingien de Combinatoire*, *SIAM Journal on Discrete Mathematics*, *SIAM Symposium on Discrete Algorithms (SODA)*, and *Theoretical Computer Science*. Reviewer for *Mathematical Reviews*.

Problem Coordinator (in charge of developing the grading schemes) for the International Mathematical Olympiad, Madrid, 2008.

President of *Xarxa FME*, the Association of Alumni and Friends of the Facultat de Matemàtiques i Estadística of the Universitat Politècnica de Catalunya, 2005-present.

President of *Iberia*, the Association of Spanish people in the Boston area, with over 400 members, 2003-2004.

Teaching and advising

Instructor of the following courses at Dartmouth College:

- Winter 2009: *Abstract Algebra*.
- Fall 2008: *Introduction to Calculus; Topics in Algebra* (graduate course).
- Winter 2008: *The Probabilistic Method* (graduate course).
- Fall 2007: *Algebraic Combinatorics*.
- Spring 2007: *Graph Theory*.
- Fall 2006: *Topics in Combinatorics* (graduate course); *Multivariable Calculus*.
- Summer 2006: *Discrete Probability*.
- Spring 2006: *Graph Theory; Linear Programming*.
- Fall 2005: *Introduction to Calculus; Algebraic Combinatorics*.

Supervisor of the following undergraduate students at Dartmouth College:

- Yangyang Liu, *On basic forbidden patterns of functions*, Senior Thesis, 2008-09.
- Alexander Borland, *Allowed patterns of β -shifts*, Presidential Scholarship, 2008-09.
- Emily Chang, *Forbidden patterns of the Collatz sequence*, Women in Science Project, 2008-09.
- Vlad Dobru, *Combinatorics of the logistic map*, Presidential Scholarship, 2008-09.
- Will Chen, *The Fibonacci conjecture on numerical semigroups*, 2009.

Coach of the Dartmouth Putnam team, 2008-present.

Deputy leader of the Spanish Team in the Iberoamerican Mathematical Olympiad, Cartagena, Colombia, September 2005.

Recitation Instructor in *Theory of Computation*, MIT, fall 2002 and fall 2003.

Academy Fellow for the *Clay Mathematics Research Academy*, Clay Mathematics Institute, Cambridge, MA, March 2003, March 2004 and April 2005.

Teaching Assistant in *The art of counting*, MIT, spring 2003.

Microteaching Workshop, MIT, August 2002.

Instructor in the training sessions of the Spanish team for the International Mathematical Olympiad, 1999, 2000, 2001 and 2003.

Additional Studies

Languages spoken: Spanish, Catalan, English; French, German, Italian.

Music Studies:

PROFESSIONAL CONSERVATORY OF MUSIC OF TERRASSA, Spain, 1990-2000.

Title of *Professor in Piano*, *Professional Degree*, June 2000.