Olivier Bernardi

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Position since 2012: Assistant Professor of Mathematics at Brandeis University.

Previous positions

2009 - 12 Instructor in Applied Mathematics at MIT, Cambridge, USA.

2007 - 09 CNRS researcher, Mathematics Department at Université Paris-Sud, Orsay, France.

2006 - 07 Postdoctoral researcher at the Center of Mathematical Research, Barcelona, Spain.

Education

2003 - 06 Ph.D. in Computer Science at Université Bordeaux I, France.
Advisor: Mireille Bousquet-Mélou.

2002 - 03 Master in Computer Science, joint program École Normale Supérieure, École Polytechnique, and Université Paris VI.

2000 - 02 Bachelor in Computer Science at École Normale Supérieure (ENS), Paris.

Grants and Awards:

- NSF grant DMS-1400859, 2014-2017.
- NSF grant DMS-1308441, 2012-2014.
- NSF grant DMS-1068626, 2011-2012.
- Collective grants: *Explore-maps* 2008-13 (European grant)
  Project Geocomp 2004-07, *Project A3* 2009-13 (French grants).
- Admitted to ENS and École Polytechnique (national examination grant full tuition and salary 2000-04).

Invited research stays

2016 MIT Mathematics Department: Visiting Professor (sabbatical semester).
2008 Newton Institute (Cambridge UK): Visiting Fellow.
2007 Schrödinger Institute (ESI, Vienna): Postdoctoral Fellow.
2006 UQAM (Montreal): Predoctoral Fellow.

Publications

Articles in journals:

1. *Some probabilistic trees with algebraic roots*, with Alejandro H. Morales.
   Electronic Journal of Combinatorics, Vol 23(2), P2.36, 24pp, 2016.
2. *Counting trees using symmetries*, with Alejandro H. Morales.
   Journal of Combinatorial Theory, Series A, Vol. 123(1), pp 104-122, 2014.
3. *Separation probabilities for products of permutations*, with Rosena R.X. Du, Alejandro Morales and Richard P. Stanley.
   Combinatorics, Probability and Computing, Vol 23(2), pp 201-222, 2014.
4. *Short proof of Rayleigh's Theorem with extensions.*
   American Mathematics Monthly, Vol 120(4), pp. 362-364, 2013.
5. *Bijections and symmetries for the factorizations of the long cycle*, with Alejandro Morales.
   Advances in Applied Mathematics, Vol 50, pp. 702-722, 2013.
6. *On the spanning trees of the hypercube and other products of graphs.*
   Electronic Journal of Combinatorics, Vol 19(4), P51, 16pp, 2012.
7. *Unified bijections for maps with prescribed degrees and girth*, with Éric Fusy.
   Journal of Combinatorial Theory, Series A, Vol. 119 pp.1351-1387, 2012.
8. *An analogue of the Harer-Zagier formula for unicellular maps on general surfaces.*
   Advances in Applied Mathematics, Vol 48(1) pp.164-180, 2012.
9. *A bijection for triangulations, quadrangulations, pentagulations, etc.*, with Éric Fusy.
   Journal of Combinatorial Theory, Series A, Vol. 119(1) pp.218-244, 2012.
10. *Schnyder decompositions for regular plane graphs and application to drawing*, with Éric Fusy.
    Algorithmica, Vol.62(3), pp.1159-1197, 2012.
11. *A bijection for covered maps, or a shortcut between Harer-Zagier's and Jackson's formulas*, with Guillaume Chapuy.
    Journal of Combinatorial Theory, Series A, Vol. 108(6), pp.1718-1748, 2011.
12. *Counting colored planar maps: algebraicity results*, with Mireille Bousquet-Mélou.
    Journal of Combinatorial Theory, Series B, Vol. 101(1), pp.315-377, 2011.
13. *Counting unicellular maps on non-orientable surfaces*, with Guillaume Chapuy.
    Advances in Applied Mathematics, Vol. 47, pp.259-275, 2011.
14. *On the growth rate of minor-closed classes of graphs*, with Marc Noy and Dominic Welsh.
    Journal of Combinatorial Theory, Series B, Vol. 100(5), pp.468-484, 2010.
15. *Counting simplicial decompositions of surfaces with boundaries*, with Juanjo Rué.
    European Journal of Combinatorics, Vol. 33, pp.302-325, 2012.
16. *A linear algorithm for the random sampling from regular languages*, with Omer Giménez.
    Algorithmica, Vol. 62(1), pp.130-145, 2012.
17. *A bijection between well-labelled positive paths and matchings*, with Bertrand Duplantier and Philippe Nadeau. *Séminaire Lotharingien de Combinatoire*, Vol. 63, B63e, 13pp, 2010.
18. *Intervals in Catalan lattices and realizers of triangulations*, with Nicolas Bonichon.
    Journal of Combinatorial Theory, Series A, Vol. 116(1), pp.55-75, 2009.
19. *Solution to a combinatorial puzzle arising from Mayer's theory of cluster integrals.*
    Séminaire Lotharingien de Combinatoire, Vol. 59, B59e, 10pp, 2008.
20. *Tutte polynomial, subgraphs, orientations and sandpile model: new connections via combinatorial embeddings. Electronic Journal of Combinatorics*, Vol. 15(1), R109, 52pp, 2008.
21. *A characterization of the Tutte polynomial via combinatorial embedding.*
    Annals of Combinatorics, Vol 12(2), pp.139-153, 2008.
22. *On triangulations with high vertex degree.*
    Annals of Combinatorics, Vol 12(1), pp.17-44, 2008.
23. *Bijective counting of Kreweras walks and loopless triangulations.*
    Journal of Combinatorial Theory, Series A, Vol 114(5), pp.931-956, 2007.

24. *Bijective counting of tree-rooted maps and shuffles of parenthesis systems.* *Electronic Journal of Combinatorics*, Vol. 14(1), R9, 36pp, 2007.

Articles in refereed conference proceedings:

1. *Counting quadrant walks via Tutte's invariant method*, with Mireille Bousquet-Mélou and Kilian Raschel. Extended abstract in *Formal Power Series and Algebraic Combinatorics* (FPSAC) 2016.
2. *On the distance-profile of random rooted plane graphs*, with Gwendal Collet and Eric Fusy. Extended abstract in AofA 2014.
3. *A bijection for plane graphs and its applications*, with Gwendal Collet and Eric Fusy. Extended abstract in ANALCO 2014.
4. *Counting unicellular maps on non-orientable surfaces*, with Guillaume Chapuy. Extended abstract in *Formal Power Series and Algebraic Combinatorics* (FPSAC) 2010.
5. *A unified bijective method for maps: application to two classes with boundaries*, with Éric Fusy. Extended abstract in *FPSAC 2010*.
6. *A bijection for covered maps on orientable surfaces*, with Guillaume Chapuy. Short abstract in *Topological and Geometric Graph Theory* 2008.
7. *Catalan's intervals and realizers of triangulations*, with Nicolas Bonichon. Extended abstract in *FPSAC 2007*.
8. *Bijective counting of Kreweras walks and loopless triangulations.* Extended abstract in *FPSAC 2006*.
9. *On triangulations with high vertex degree.* Extended abstract in *FPSAC 2005*.

Submitted preprints:

1. *Deformations of the braid arrangement and Trees.*
2. *Directed rooted forests in higher dimension*, with Caroline Klivans.
3. *Counting coloured planar maps: differential equations*, with Mireille Bousquet-Mélou.
4. *Bijections for maps with boundaries: Krikun's formula for triangulations, and a quadrangulation analogue*, with Eric Fusy.
5. *Unified bijections for planar hypermaps with general cycle-length constraints*, with Eric Fusy.

In Preparation:

1. *Tutte polynomials for directed graphs*, with Jordan Awan.
2. *Tutte polynomials for oriented matroids*, with Jordan Awan.
3. *Percolation on random triangulations*, with Nicolas Curien and Gregory Miermont.
4. *Site percolation on triangulations I: Kreweras walks, exploration trees and peanosphere*, with Nina Holden and Sun Xin.
5. *Bijections for maps as a change of matrix model*, with Abdelmalek Abdesselam, Gregory Anderson and Alexander Miller.
6. *Branched polymers and the Tutte polynomial.*
7. *Unified bijections for irreducible maps*, with Eric Fusy.

Talks

Talks in conferences and workshops:

1. Sep. 2016, Brunswick, AMS sectional meeting: invited talk.

2. Jul. 2016, Vancouver, FPSAC conference.
3. Jul. 2016, Vancouver, Journee Combinatoires Franco-Vancouvéroises: invited talk.
4. Apr. 2015, Cambridge, Newton institute workshop - random geometry: invited talk.
5. Jun. 2013, Paris, FPSAC conference: invited keynote talk.
6. Jun. 2013, Paris, Journee cartes: invited talk.
7. Jun. 2012, Halifax, SIAM Conference on Discrete Mathematics: 2 invited talks.
8. Jan. 2012, Hanover, Dartmouth colloquium.
9. Jan. 2012, Berkeley, MSRI Workshop on lattice models and Combinatorics: invited talk.
10. Jan. 2012, Boston, AMS national meeting: invited talk.
11. Jun. 2011, Oaxaca, Conference on Stochastic Processes and their Applications: invited talk.
12. Nov. 2009, Paris, Workshop on planar maps and embedded graphs: invited talk.
13. Jul. 2009, Berlin, Summer school at Technische: invited lectures (18 hours).
14. Nov. 2008, Temuco, Workshop on Randomness and Enumeration: invited lecture (3 hours).
15. Jul. 2008, Vienna, Summer school on combinatorics and statistical mechanics.
16. Apr. 2008, Cambridge, Newton institute - combinatorics and statistical mechanics: 2 invited talks.
17. Mar. 2008, Marseille, Aléa workshop: invited talk.
18. Jul. 2007, Nankai, FPSAC conference.
19. Jun. 2007, Barcelona, Conference on Enumeration and Probabilistic Methods.
20. Feb. 2007, Montreal, CRM workshop - combinatorics and statistical mechanics: invited talk.
21. Oct. 2006, Ottrott, 57$^{\text{th}}$ Séminaire Lotharingien de Combinatoire.
22. Jun. 2006, San Diego, FPSAC conference.
23. May 2006, Palaiseau, Journée GéoComp.
24. Nov. 2005, Bordeaux, Journées graphes et applications.
25. Jul. 2005, Vienna, Summer School on Geometric Combinatorics.
26. Apr. 2005, Palaiseau, Journée GéoComp.
27. Apr. 2005, Montpellier, École jeune chercheur en algorithmique.
28. Mar. 2005, Marseille, Aléa workshop.

Talks in seminars (58 talks):
Brandeis University (10 talks), MIT (8 talks), Université Bordeaux 1 (5 talks), CRM Barcelona (4 talks), New York University (3 talks), Université Paris-Sud (3 talks), Dartmouth College (2 talks), U.Q.A.M. (2 talks), Université Paris 7 (2 talks), Georgia Tech. (2 talks), Harvard University, Brown University, U.C. Berkeley, U.C. Los Angeles, Columbia University, Microsoft research Redmond, University of Pennsylvania, McGill University, Oxford University, Humboldt Universität, Technische Universität Berlin, Waterloo University, UPC Barcelona, Université de Geneve, École Polytechnique, Université Paris 6, Université Lyon 1.

Teaching

2012 - Assistant Professor at Brandeis University.
- Lecturer: *Graduate Algebra 1* - Graduate class.
- Lecturer: *Graduate Algebra 2* - Graduate class.
- Lecturer: *Topics in Combinatorics* - Graduate class.
- Lecturer: *Introduction to Combinatorics* - Undergraduate class.
- Lecturer: *Advanced calculus* - Undergraduate class.
- Lecturer: *Introduction to Statistics and Probability* - Undergraduate class.

2009 - 12 Mathematics Instructor at MIT.
- Lecturer: *Principles of Applied Mathematics* - Undergraduate class.
- Lecturer: *Undergraduate Seminar in Applied Mathematics* - Undergraduate class.
- Recitation instructor: *Multivariate Calculus* - Undergraduate class.

2007 - 08 Instructor at École Polytechnique.
- *Advanced Algorithmic Methods* - Master in computer science.

2004 - 06 Teaching assistant at Université Bordeaux I.
- *Probability and Statistics* - Bachelor in computer science.
- *Algorithms and Data Structures* - Bachelor in computer science.
- *Introduction to Computer Science* - Bachelor in computer science.

Organizing Activities

Seminar/Conference organizer:
2013 - 17: Co-organizer of the *Combinatorics Seminar* at Brandeis University.
2015: Co-organizer of the *miniconference in honor of Ira Gessel's retirement* at Brandeis University.
2013 - 15: Organizer of the *Everytopic Seminar* at Brandeis University.
2014: Organizer of the minisymposium *Combinatorics of maps* at the *SIAM conference on Discrete Mathematics 2014*.
2011 - 12: Co-organizer of the *Combinatorics seminar* at MIT.
2010 - 12: Co-organizer of the *Probability seminar* at MIT.
2007 - 09: Organizer of the *Seminars on maps* at Université Paris-Sud.
2006 - 07: Co-organizer of the *Seminars for young researchers* at the CRM Barcelona.
2005: Co-organizer of the conference *Innovation : Doctorants et Entreprises (IDeE)*.

Advisor: Ducan Levear (graduate advisor, Brandeis University, current), Jordan Awan (graduate advisor, Brandeis University, current), Keith Frankston (undergraduate research project, Brandeis University, 2013), Daniel Koenigsberg (undergraduate research project, Brandeis University, 2013), Alex Rossie (UROP project, MIT, 2010), Jérémie Rousselin (Master thesis, Université Paris-Sud, 2009)

Journal Editor: *Discrete Mathematics and Theoretical Computer Science* (since 2012).

Referee: Advances in mathematics, Advances in Applied Mathematics, Annales de l'IHP D, Annales de Toulouse, Annals of combinatorics, Combinatorics Probability and Computing, Discrete Applied Mathematics, Discrete Mathematics, Discrete & Computational Geometry, Electronic Journal of Combinatorics, European Journal of Combinatorics, FPSAC conference, International Mathematics Research Notices, Journal of Algebraic Combinatorics, Journal of Combinatorial Theory Series A, Journal of Combinatorial Theory Series B, Journal of Graph Theory, Journal of Physics A, SIAM Journal on Discrete Mathematics.