

Jean-Philippe Labbé

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Area of specialization

The focus of my research is at the intersection of group theory, discrete geometry and combinatorics. My area of specialization consists of combinatorial, geometric, and computational approaches to study algebraic and topological structures. My research deals with problems related to Coxeter groups, polytopes (in particular the permutahedra, associahedra and their generalizations), triangulations, and simplicial complexes.

MSC2010 keywords:

Combinatorial aspects of groups and algebras, Reflection and Coxeter groups (05E15, 20F55)
Combinatorial aspects and Stanley-Reisner face rings of simplicial complexes (05E45, 13F55)
Combinatorial properties of polytopes, Special polytopes (52B05, 52B12)

Employment

Postdoctoral Research Fellow

Freie Universität Berlin October 2016 - June 2020
SFB Transregio “Discretization in Geometry and Dynamics”

Hebrew University of Jerusalem/Universidad de Cantabria October 2014 - September 2016

Freie Universität Berlin July 2013 - June 2014
SFB Transregio “Discretization in Geometry and Dynamics”

Teacher Assistant

Université du Québec à Montréal September 2009 - April 2010
(Algèbre II, Algèbre Matricielle, Combinatoire)

Education

Dr. rer. nat., Mathematics, Freie Universität Berlin October 2010 - July 2013
Polyhedral Combinatorics of Coxeter Groups
Advisor: **Günter M. Ziegler** Reviewers: **Vic Reiner, Volkmar Welker**

Maîtrise ès Sciences, Mathématiques, Université du Québec à Montréal May 2008 - August 2010
Mention Honorable – Top Score Thesis
Combinatorial approach to clusters using sortable elements of Coxeter groups [in French]
Advisor: **Christophe Hohlweg** Reviewers: **Robert Bédard, Christophe Reutenauer**

Bachelier ès Sciences, Mathématiques September 2005 - April 2008
Université Laval, Québec City

Semesters abroad

Math in Moscow, Independent University of Moscow Fall 2007
Budapest Semesters in Mathematics, St-Olaf College & Eötvös University Fall 2006

Articles in preparation

16. J.-P. Labbé, G. Rote, and G. M. Ziegler, *The discrepancy of odd-triangulations of the square*, 20 pp.
15. J.-P. Labbé and C. Lange, *On the common vertices of permutahedra and generalized associahedra*, 22 pp.

Preprints

14. J.-P. Labbé and E. Nevo, *Upper bounds on entries of the γ -vectors for flag spheres*, preprint, [arxiv:1612.01169](https://arxiv.org/abs/1612.01169), (December 2016) 13 pp.
13. J.-P. Labbé and S. Labbé, *A Perron theorem for matrices with negative entries and applications to Coxeter groups*, submitted, [arxiv:1511.04975](https://arxiv.org/abs/1511.04975) (November 2015), 14 pp.

Publications

12. J.-P. Labbé, T. Manneville, and F. Santos, *Hirsch polytopes with exponentially long combinatorial segments*, in press, Math. Program. DOI: 10.1007/s10107-016-1099-y
11. H. Chen and J.-P. Labbé, *Limit directions for Lorentzian Coxeter systems*, to appear in Groups, Geometry, and Dynamics.
10. S. B. Brodsky, C. Ceballos, and J.-P. Labbé, *Cluster Algebras of Type D_4 , Tropical Planes, and the Positive Tropical Grassmannian*, Beitr. Algebra Geom. **58** (2017), no. 1, 25–46.
9. C. Hohlweg and J.-P. Labbé, *On inversion sets and the weak order in Coxeter groups*, European J. Combin. **55** (2016), 1–19.
8. N. Bergeron, C. Ceballos, and J.-P. Labbé, *Fan realizations of type A subword complexes and multi-associahedra of rank 3*, Discrete Comput. Geom. **54** (2015), no. 1, 195–231.
7. H. Chen and J.-P. Labbé, *Lorentzian Coxeter systems and Boyd–Maxwell ball packings*, Geom. Dedic. **174** (2015), no. 1, 43–73.
6. C. Hohlweg, J.-P. Labbé, and V. Ripoll, *Asymptotical behaviour of roots of infinite Coxeter groups*, Canad. J. Math. **66** (2014), no. 2, 323–353.
5. C. Ceballos, J.-P. Labbé, and C. Stump, *Subword complexes, cluster complexes, and generalized multi-associahedra*, J. of Alg. Comb. **39** (2014), no. 1, 17–51.
4. J.-P. Labbé and G. Labelle, *Counting types of runs in classes of arborescent words*, Open Journal of Discrete Mathematics **3** (2013), no. 1, 7–15.
3. S. Brlek, J.-P. Labbé, and M. Mendès France, *Combinatorial variations on Cantor’s diagonal*, J. Comb. Theory, Ser. A **119** (2012), no. 3, 655–667.

Theses

2. J.-P. Labbé, *Polyhedral Combinatorics of Coxeter Groups*, Dissertation, Freie Universität Berlin, July 2013. www.diss.fu-berlin.de/diss/receive/FUDISS.thesis.000000094753
1. J.-P. Labbé, *Combinatorial approach to clusters using sortable elements of Coxeter groups* [in French], Mémoire de maîtrise en mathématiques, UQAM, 2010, 105 p. www.archipel.uqam.ca/3670/

Honors, Awards and Grants

Fonds de recherche Nature et Technologies (Québec) – by Provincial Competition

Postdoctoral Research Fellowship	2015-2016
Doctoral Research Fellowship	2010-2013
Master Research Fellowship	2008-2010

Berlin Mathematical School

Phase II – Certificate of Distinction	October 2013
Public Prize for Best Talk – Math Slam (Sandwich Theory)	BMS Days February 2013

Professional Services

<u>Referee</u> , (Experimental Mathematics, Israel Journal of Mathematics, Journal of Algebra, Discrete & Computational Geometry, Beiträge zur Algebra und Geometrie, Séminaire Lotharingien de Combinatoire, Discrete Mathematics, Australasian Journal of Combinatorics, and various conferences)	2011 -
<u>Organizer</u> , (Chair) <i>Sage Days 79</i> , Jerusalem	November 2016
<i>Berlin Mathematical School Student Conference</i>	February 2013
<i>Polyhedral Combinatorics Seminar</i> , Freie Universität Berlin	2011 - 2013
<i>Coxeter Groups meet Convex Geometry</i> , UQAM	August 2012
(Chair) Québec's Provincial Graduate Student Conference (ISM)	2009
<u>Political representation</u> , (nominated) Postdoctoral spokesperson, Einstein Institute of Math.	2015-2016
(elected) Student representative, Berlin Mathematical School	2012
Member: BMS Executive Board, Admission committee, and Mentoring, Gender and Diversity committee	
(elected) Vice-president, Department Student Association, Université Laval	2006-07
(elected) Student representative, Department Student Association, Université Laval	2005-06
<u>Ambassador</u> , Centre d'étude Collégial, Lac-Mégantic (Québec)	2011 -
<u>Programmer</u> , <i>Sagemath</i> , <i>Open Source Computer Algebra System</i>	2010 -

Selected Conferences

<u>Encuentro Colombiano de Combinatoria 2016</u> Medellín, Colombia	June 2016
• Talk on <i>Introduction to Subword Complexes of Coxeter Groups</i>	
<u>EACA International School on Computer Algebra and its Applications 2016</u> Sevilla, Spain	January 2016
• Talk on <i>Bounding the discrepancy of odd-equal triangulations of the square</i>	
<u>Discretization in Geometry and Dynamics</u> Conference, Herrsching am Ammersee, Germany	October 2015
• Talk on <i>Bounding the discrepancy of odd-equal triangulations of the square</i>	
Workshop, Lichtenfels, Germany	November 2013
• Talk on <i>The discrepancy of odd-equal-area triangulations of the square</i>	
<u>Postdoctoral Symposium</u> Faculty of Science, Hebrew University of Jerusalem, Selected by the Dean of Science	May 2015
• Talk on <i>Orange Packings Using Symmetry</i>	
<u>Algebraic and Geometric Combinatorics</u> Mathematisches Forschungsinstitut Oberwolfach, Germany	February 2015
<u>FPSAC International Conference</u> KAIST, Daejeon, Korea	July 2015
• Poster on <i>Fan realizations of multiassociahedron</i>	
DePaul University, Chicago, USA	July 2014
• Poster on <i>Lorentzian Coxeter systems & Boyd–Maxwell ball packings</i>	
University of Nagoya, Japan	August 2012
• Talk on <i>Multi-Cluster Complexes</i>	
• Talk on <i>Asymptotical behaviour of roots of infinite Coxeter groups</i>	
<u>Seminar on Combinatorics of words</u> Centre International de Rencontres Mathématiques, Luminy, France	May 2010
• Guest speaker , <i>Seminar on Cantorian tableaux</i>	

References

Günter M. Ziegler (PhD Advisor)

Institut für Mathematik
Freie Universität Berlin
Arnimallee 2,
D-14195 Berlin Germany

Christophe Hohlweg

Département de Mathématiques - LaCIM
Université du Québec à Montréal
CP 8888 Succ. Centre-Ville Montréal
Québec H3C 3P8 Canada

Victor Reiner

School of Mathematics
University of Minnesota
Minneapolis, MN 55455 (USA)

Volkmar Welker

Philipps-Universität Marburg
Fachbereich Mathematik und Informatik
Hans-Meerwein-Strasse D-35032 Marburg, Germany

Eran Nevo

Institute of Mathematics
Hebrew University
Givat Ram, Jerusalem 91904, Israel

Francisco Santos

Departamento de Matemáticas, Estadística y Computación
Universidad de Cantabria
Av. de los Castros 48, E-39005 Santander, Spain

Interests

Languages

French:	Native speaker	English:	Fluent	German:	Advanced
Russian:	Moscow Pushkin Institute (Beginner) McGill University (Advanced 2)	Spanish:	Intermediate	Hebrew:	Beginner
Hungarian:	Budapest Semesters (Beginner)				

Cycling

- Constructed three single-speed bikes
- Cyclo-camping: Québec City – Îles-de-la-Madeleine (June 2009 – 1200km in 7 days)
- Race: Vélothon Berlin 2012 (60km in 1h38min12sec)

Other

Rock climbing	Ultimate frisbee	French poetry
Theater of the Absurd	Progressive rock	Pencil drawing