

BÁLINT VIRÁG
CURRICULUM VITAE

PERSONAL

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Date of Birth: November 2, 1973.

Citizenship: Hungarian, Canadian Landed Immigrant

EDUCATION

University of California, Berkeley, 1996-2000

Ph.D. in Statistics June 2000.

Thesis: Random walks and geometry on graphs of exponential growth.

Advisor: Yuval Peres. Eric Lehmann citation for Ph.D. thesis.

Harvard University, 1992-1996

B.A. Magna Cum Laude in Mathematics, June 1996.

Thesis: Random walk on finite convex sets of lattice points. Advisor: Persi Diaconis.

Thomas Temple Hoopes Prize awarded for outstanding honours thesis.

Fazekas Gimnázium, Budapest, 1988-1992

High-school mathematics program.

EMPLOYMENT HISTORY

University of Toronto, 2003-present

Canada Research Chair, Departments of Mathematics and Statistics

Professor, July 2011-

Associate Professor (tenured), 2008-2011

Assistant professor, 2003-2008

Mathematical Sciences Research Institute, spring 2005

Semester-long workshop on probability, algorithms and statistical physics.

Institut Henri Poincaré Paris, spring 2003

Visiting Researcher

Massachusetts Institute of Technology, 2000-2003

C.L.E. Moore Instructor, Department of Mathematics

Clay Mathematics Institute, summer 2000

Liftoff Program, research support.

Research Interests: Random matrices, random polynomials, random walks, randomness in groups

HONOURS, GRANTS AND AWARDS

Institute of Mathematical Statistics, Medallion Lecturer, 2013

ML “is an honor and an acknowledgment of a significant research contribution.”

Canadian Mathematical Society Coxeter-James Prize, 2010

For “young mathematicians who have made outstanding contributions to mathematical research.”

Rollo Davidson Prize, 2008

Awarded annually to early-career probabilists by the R.D. trustees at Cambridge University.

Sloan Research Fellow, Fall 2004-2008

Connaught Research Grant, Fall 2004-2008

NSERC Research Grant, Fall 2004-present

NSERC Discovery Accelerator grant 2009-present

Canada Research Chair, 2003-present

NSF Research Grant, 2001-2004

Loève Fellowship in Probability, 1998-2000

Hewlett Scholarship, 1996-97

Given to Berkeley graduate students in recognition of distinguished academic record.

Putnam Mathematical Competition, 1996

Placed among the 25 highest-ranking individuals.

Hoopers Prize, 1996

Given to thirty students in the Harvard graduating class for the best honors theses.

PUBLICATIONS

Book

- [1] *Zeros of Gaussian analytic functions and determinantal point processes*, volume 51 of *University Lecture Series*. American Mathematical Society, Providence, RI, 2009 (with J. B. Hough, M. Krishnapur, and Y. Peres).

Refereed publications

- [2] Patterns in Sinai’s walk. *arXiv/1102.1716*, to appear in *Annals of Probability*, 2011 (with D. Cheliotis).
- [3] The right tail exponent of the Tracy-Widom-beta distribution. *arXiv/1102.4818*, to appear in *Annales de l’Institut Henri Poincaré*, 2011 (with L. Dumaz).
- [4] The scaling limit of the critical one-dimensional random Schrodinger operator. *arXiv/1107.3058*, To Appear in *Comm. Math. Physics*, 2011 (with E. Kritchovski and B. Valko).
- [5] Beta ensembles, stochastic Airy spectrum, and a diffusion. *J. Amer. Math. Soc.*, 24(4):919–944, 2011 (with J. A. Ramírez and B. Rider).

- [6] Absolute continuity of the limiting eigenvalue distribution of the random Toeplitz matrix. *Electron. Comm. Probab.*, 16:706–711, 2011 (with A. Sen).
- [7] The spectrum of the random environment and localization of noise. *Probab. Theory Related Fields*, 148(1-2):141–158, 2010 (with D. Cheliotis).
- [8] Large gaps between random eigenvalues. *Ann. Probab.*, 38(3):1263–1279, 2010 (with B. Valkó).
- [9] Amenability of linear-activity automaton groups. *arXiv/0905.2007*, to appear in *Journal of EMS*, 2009 (with G. Amir and O. Angel).
- [10] On the girth of random Cayley graphs. *Random Structures Algorithms*, 35(1):100–117, 2009 (with A. Gamburd, S. Hoory, M. Shahshahani, and A. Shalev).
- [11] Continuum limits of random matrices and the Brownian carousel. *Invent. Math.*, 177(3):463–508, 2009 (with B. Valkó).
- [12] Random sorting networks. *Adv. Math.*, 215(2):839–868, 2007 (with O. Angel, A. E. Holroyd, and D. Romik).
- [13] Complex determinantal processes and H^1 noise. *Electron. J. Probab.*, 12:no. 45, 1238–1257, 2007 (with B. Rider).
- [14] The noise in the circular law and the Gaussian free field. *Int. Math. Res. Not. IMRN*, (2):Art. ID rnm006, 33, 2007 (with B. Rider).
- [15] Determinantal processes and independence. *Probab. Surv.*, 3:206–229, 2006 (with J. B. Hough, M. Krishnapur, and Y. Peres).
- [16] Dimension and randomness in groups acting on rooted trees. *J. Amer. Math. Soc.*, 18(1):157–192, 2005 (with M. Abért).
- [17] Amenability via random walks. *Duke Math. J.*, 130(1):39–56, 2005 (with L. Bartholdi).
- [18] Zeros of the i.i.d. Gaussian power series: a conformally invariant determinantal process. *Acta Math.*, 194(1):1–35, 2005 (with Y. Peres).
- [19] Random walks that avoid their past convex hull. *Electron. Comm. Probab.*, 8:6–16, 2003 (with O. Angel and I. Benjamini).
- [20] Brownian beads. *Probab. Theory Related Fields*, 127(3):367–387, 2003.
- [21] Fast graphs for the random walker. *Probab. Theory Related Fields*, 124(1):50–72, 2002.
- [22] Anchored expansion and random walk. *Geom. Funct. Anal.*, 10(6):1588–1605, 2000.
- [23] On the speed of random walks on graphs. *Ann. Probab.*, 28(1):379–394, 2000.
- [24] Random walks on finite convex sets of lattice points. *J. Theoret. Probab.*, 11(4):935–951, 1998.

Preprints

- [25] Kesten's theorem for Invariant Random Subgroups. *arXiv/1201.3399*, *submitted*, 2012 (with M. Abert and Y. Glasner).
- [26] Speed exponents of random walks on groups. *arXiv/1203.6226*, 2012 (with G. Amir).
- [27] Limits of spiked random matrices I. *arXiv/1011.1877*, *to appear in Probab. Theory Related Fields*, 2012 (with A. Bloemendal).
- [28] The measurable Kesten theorem. *arXiv/1111.2080*, *submitted*, 2011 (with M. Abert and Y. Glasner).
- [29] Positive speed for high-degree automaton groups. *arXiv/1102.4979*, 2011 (with G. Amir).
- [30] The Ginibre ensemble and Gaussian analytic functions. *arXiv/1112.2457*, *submitted*, 2011 (with M. Krishnapur).
- [31] Limits of spiked random matrices II. *arXiv/1109.3704*, *submitted*, 2010 (with A. Bloemendal).
- [32] Random Schrödinger operators on long boxes, noise explosion and the GOE. *arXiv/0912.0097*, *submitted*, 2009 (with B. Valkó).

SELECTED INVITED LECTURES

The top eigenvalue of the random Toeplitz matrix

CMS Winter meeting, Toronto, December 2011

Speed of random walks and automaton groups

Renyi Institute Colloquium, Budapest, May 2011

MSRI Workshop on Quantitative Geometry, September, 2011

The measurable Kesten theorem

Workshop on Invariant Random Subgroups, SDE-Boker, Israel, February 2012

Oberwolfach workshop, September 2010

Probability Seminar, Technical University of Budapest, November, 2010

Limits of spiked random matrices

Sparse Random Structures: Analysis and Computation, BIRS, Banff, January, 2010.

MSRI conference on random matrices, December 2011.

Random Schrödinger operators and random matrices

Oberwolfach workshop on random Schroedinger operators, October, 2011

Current Developments in Mathematics Conference, Harvard University, November, 2009

Western Mathematical Physics Meeting (Caltech), February 2010

Statistical Mechanics on Random Structures, BIRS, Banff, November 2009

Chebyshev Institute Colloquium, St Petersburg Russia, April 2011

Amenability of automaton groups

University of Wisconsin, Madison Mathematics Colloquium September, 2009.

CRM Conference in new directions in random spatial processes, Montreal, May 2009

Erwin Schrödinger Institute, Vienna, November, 2008

Steklov Institute Probability Seminar, St Petersburg Russia, April 2011

The Ginibre ensemble and Gaussian analytic functions

Technical University, Budapest, March 2009

MIT Probability Seminar, November 2008

Large Gaps Between Random Eigenvalues

Harvard Probability Seminar, November, 2008

Probabilistic approach to Geometry, Kyoto, July, 2008

Oberwolfach workshop in Stochastic Analysis, July, 2008

Foundations of Computational Mathematics, Hong Kong, June, 2008

EURANDOM Probability Seminar, April, 2008

Determinantal processes

Statistical Society of Canada, Vancouver, June, 2009.

Scaling Limits of Random Matrices

Brownian motion and Random matrices workshop, American Institute of Mathematics, December 2009

Bonn, Hausdorff Institute, January, 2008

Princeton Mathematics Colloquium, November, 2007

Institute for Advanced Study / PCMI Colloquium, July, 2007

NYU Probability Seminar, March 2007

Midwest Probability Colloquium, November, 2006

Stochastic Processes and Applications, Plenary Lecture, Paris, July, 2006

Girth of Random Cayley Graphs

SMF Conference on the geometry of Groups, Luminy, February 2007

MSRI Probability Seminar, April, 2005

Noise Limits for Complex Eigenvalues

CMS Meeting, Victoria, December, 2005.

Conference on Hydrodynamic Limits, Budapest, August, 2005.

Zeros of the i.i.d. Gaussian power series

25th European Meeting of Statisticians, Opening lecture, August 2006

University of Paris, Orsay, Probability seminar, March 2005

AMS Annual Meeting, Phoenix, January 2004.

Latin American Congress in Probability, Uruguay, March 2004.

Mathematics Colloquium, University of Toronto, November 2003.

Self-similar walks and amenability

Sixth world congress, Bernoulli Society / 67 annual meeting, IMS. July, 2005.

Geometric Group Theory, Random Walks, and H. Analysis, Cortona, Italy, June 2004.

Geometric and Analytic Aspects of Stochastic Processes, Banff, April 2004.

Groups and Probability, Budapest, June 2003.

Random tree-automorphisms

Waterloo Mathematics Colloquium, October 2005.

MINICOURSES

Spectra of graphs and graph limits

Leipzig spring school, April, 2011

Agora workshop, Chateau de Goutelas, France, February, 2011.

Zeros of Gaussian Analytic Functions

AMS-MSA Joint Meetings, Boston, January 2012

Operator Limits of Random matrices

IMA Summer School in Random Matrices, Minneapolis, June 2012

UK Easter probability meeting, Warwick, March 2012

ICTS, Bangalore, India, January 2012

Technical University, Budapest, October, 2011

TEACHING AND GRADUATE STUDENT SUPERVISION

UNDERGRADUATE COURSES

Mathematics C01, Groups and Symmetry (fall 2003)

Mathematics C34, Complex Variables (fall 2004)

Mathematics B61, Linear Programming (fall 2004)

On leave, winter 2005

Teaching relief on SLOAN research fellowship (2005-06 academic year)

Mathematics A27, Introduction to Optimization (winter 2007)

Mathematics C15, Number Theory (winter 2008)

Statistics C15, Stochastic Processes (fall 2008)

Mathematics A27, Introduction to Optimization (winter 2008)

Statistics C15, Stochastic Processes (fall 2009)

Mathematics C90, Beginnings of Mathematics (fall 2011)

GRADUATE COURSES

Statistics. Random matrices and Random Polynomials (winter 2004)

Statistics 2111, Graduate Probability (fall 2006)

Statistics 2111, Graduate Probability (fall 2007)

Statistics 2112, Graduate Probability (winter 2008)

Statistics 2112, Graduate Probability (winter 2009)

Statistics 2112, Graduate Probability (winter 2010)

Mathematics 1124, Random Matrices (winter 2010)

Statistics 4247 Random Matrices (winter 2012)

POSTDOCTORAL FELLOWS

Dimitris Cheliotis (2004-2007) (currently at EURANDOM)

Benedek Valko (2005-2008) Currently at a tenure-track position at University of Wisconsin, Madison

Manjunath Krishnapur (2006-2009)

Gideon Amir (2007-2010)

Gabor Pete (Coxeter Lecturer, 2008-2011)

Viktor Harangi (Coxeter Lecturer, 2012-)

Janosch Ortmann (2012-)

PHD STUDENTS

Guangyu Fu PhD 2006, Thesis title: Random walks and random polynomials

Alex Bloemendal, PhD. 2011, Limits of spiked random matrices. Currently Simmons postdoc at Harvard University

Eric Hart (2009-present) Random Schrödinger operators with singular noise distribution.

Ben Rifkind (2009-present) Dynamics of stochastic operators and KPZ dimension formulas.

Andrew Stewart (2010-present) Central limit theorem for free group bridges.

Mustazee Rahman (2011-present) Graph limits and belief propagation.

Raoul Normand (Visiting for one year from Paris 6) Multifractal spectrum of tridiagonal operators.

Laure Dumaz, (fall, 2008) visiting from Ecole Normale Supérieure in Paris, Paris. Project title: Large deviations for the Tracy-Widom β distribution

MASTERS STUDENTS

Efstratios Ioannidis (MA 2004) (informal supervision) Thesis title: Towards and understanding of last encounter routing in ad hoc networks

Michael Andrushchenko Project title: Central limit theorems for the GUE ensemble

Eckhard Schlemm (2007-2008) Provisional thesis title: First passage formulas in one dimension

Kyle Thompson (summer 2010) Determinantal processes spheres

Anjie Zhou (summer 2008) Project title: Stochastic analysis and its connection to PDEs

Charles Zhi Hao Li (spring, summer, 2009) Project title: The volume of the Birkhoff polytope

UNDERGRADUATE RESEARCH PROJECTS

Alexander Chestopalov Project title: Random walks in random environments and flows

Mu Cai Project title: Stochastic analysis of the Brownian Carousel.

Janet Li Project title: Continuum percolation models

Kai Yang (summer 2010) Project title: Mixing of Markov Chains

Kai Yang (fall 2011) Erdos-Renyi random graphs

Kai Yang (winter 2012) Compressed sensing