

Lucas Benigni – Curriculum Vitae

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Employment

2019 – 2022 L. E. Dickson Instructor - University of Chicago, Chicago

Fall 2021 Research Member - MSRI, Berkeley

Program: *Universality and Integrability in Random Matrix Theory and Interacting Particle Systems*

Education

2016–2019 PhD in Mathematics - LPSM, Université Paris-Diderot, Paris

Advisors : Sandrine Péché, *Laboratoire de Probabilités, Statistique et Modélisation*

Paul Bourgade, *Courant Institute of Mathematical Sciences*

Title : *Dynamics of eigenvectors of random matrices and eigenvalues of nonlinear matrix models*

2015–2016 Research Internship - CIMS, New York University, New York

Advisor : Paul Bourgade, *Courant Institute of Mathematical Sciences*

Subject : *Eigenvector moment flow in the non-perturbative regime*

2014–2015 Master of Science, Probability and Statistics, *magna cum laude* - Université Paris-Sud, Orsay

Thesis Advisor : Edouard Maurel-Ségala, *Laboratoire de Mathématiques d'Orsay*

Subject : *Last Passage Percolation and Random Matrices*

2013–2014 Master 1, Mathematics, *summa cum laude* - Ecole Normale Supérieure de Cachan, Cachan

Thesis Advisor : Gérard Ben Arous, *Courant Institute of Mathematical Sciences*

Subject : *Randomly Trapped Random Walks*

2012–2013 Bachelor of Science, Mathematics *summa cum laude* - Ecole Normale Supérieure de Cachan, Cachan

Thesis Advisors : Florian De Vuyst, Mauricio Delbracio, Gabriele Facciolo, *CMLA*

Subject : *Methods of Seamless Image Cloning*

2009–2012 Classes Préparatoires aux Grandes Ecoles, MPSI-MP* - Lycée Joffre, Montpellier

Research Items

- [8] *Largest eigenvalues of Feed-Forward Neural Networks data covariance matrices*, with S. Péché, preprint 2021.
- [7] *Determinantal structures for Bessel fields*, with P.-K. Hung and X. Wu, preprint 2021.
- [6] *Fluctuations in local quantum unique ergodicity for generalized Wigner matrices*, with P. Lopatto, preprint 2021, to appear in Comm. Math. Phys.
- [5] *Optimal delocalization for generalized Wigner matrices*, with P. Lopatto, to appear in Adv. Math.
- [4] *Eigenvalue distribution of nonlinear models of random matrices*, with S. Péché, Electron. J. Probab. 26 (2021), 1-37

- [3] *Fermionic eigenvector moment flow*, Probab. Theory Related Fields 179 (2021), 733-775.
- [2] *Eigenvectors distribution and quantum unique ergodicity for deformed Wigner matrices*, Ann. Inst. Henri Poincaré Probab. Stat. 56 (4) (2020), 2822-2867
- [1] *Hausdorff dimension of the record set of a fractional Brownian motion*, with C. Cosco, A. Shapira, and K.J. Wiese, Electron. Commun. Probab. 23 (2018), paper no. 22, 8 pp.

Teaching Experience

- 2021–2022** Mentor of an undergraduate student, University of Chicago, *Directed Reading Program*
Instructor, University of Chicago, MATH 18400-500 Sections 41 & 51, *Mathematical Methods in the Physical Sciences II & III*
- 2020–2021** Instructor, University of Chicago, MATH 18300-400 Sections 41 & 51, *Mathematical Methods in the Physical Sciences I & II*
Mentor of two students, University of Chicago, *Research Experience for Undergraduates 2021*
- 2019–2020** Instructor, University of Chicago, MATH 16110-210-310 Section 50 *Honors Calculus (IBL)*
Instructor, University of Chicago, MATH 20400 *Analysis in \mathbb{R}^n II*
- 2018–2019** Teaching Assistant, Université Paris Diderot, *Algebra and Mathematical Analysis 4*
Supervisor of Mathematical Projects, Université Paris Diderot
Oral Interrogator, Université Paris Diderot, *Basic Algebra and Mathematical Analysis 2*
- 2017** Teaching Assistant, Université Paris Diderot, *Basic Algebra and Mathematical Analysis 2*
Supervisor of Mathematical Projects, Université Paris Diderot
- 2014–2015** Oral Interrogator in Mathematics for CPGE students, Lycée Blaise Pascal

Research Talks and Posters

- 2022** Invited Speaker, AMS sectional meeting “Random Growth Models”, Purdue University, West Lafayette
- 2021** Mathematics Department Colloquium, Université de Montréal, Montréal
Mathematics Department Colloquium, Syracuse University, Syracuse
Contributed talk, Frontier Probability Days, UNLV, Las Vegas
Probability Seminar, University of Bonn, Bonn
Program Seminar, MSRI, Berkeley
Mathematics Department Colloquium, North Carolina State University, Raleigh
Invited speaker, Youth in high dimensions 2021, online
Mathematical Physics Seminar, Université de Genève, Geneva
- 2020** “Modélisation Stochastique” Workshop, Université de Paris, Paris
Random Matrix and Probability Theory Seminar, Harvard University, Cambridge
Probability Seminar, Stanford University, Stanford
- 2019** Mathematical Physics Seminar, Université de Genève, Geneva
Invited speaker, Workshop on Random Matrices, MFO, Oberwolfach
Probability and Statistical Physics Seminar, University of Chicago, Chicago
Probability Seminar, Northwestern University, Evanston
Invited speaker, Random Matrix Theory: Applications in the Information Era, Krakow
MathPhys Analysis Seminar, IST Austria, Klosterneuburg
- 2018** Probability and Mathematical Physics Seminar, UCLA, Los Angeles
Contributed talk, EMS-IAMP Summer School in Mathematical Physics, Ischia
Poster, Random Matrices and their Applications, Kyoto
CEREMADE Young Researchers Seminar, Université Paris-Dauphine, Paris
Poster, PCMI Summer School on Random Matrices, Park City

Other Talks

- 2021** *Universality in random matrix theory and beyond*, University of Chicago REU 2021, Chicago
- 2019** *Lectures on random band matrices*, University of Chicago Proseminar in Probability, Chicago
Diffusion of eigenvectors of random matrices, LPSM PhD Probability Seminar, Paris
- 2017** *On eigenvectors of large symmetric random matrices*, CIMS PhD Probability Seminar, New York
Universality of eigenvalues and eigenvectors of random matrices, LPSM PhD Seminar, Paris
- 2016** *Last passage percolation and random matrices*, CIMS PhD Probability Seminar, New York

Service

- Referee for *Ann. Appl. Probab.*, *Electron. J. Probab.*, *Forum Math. Sigma*, *Probab. Theory Related Fields*, *Random Matrices Theory Appl.*, *Random Structures Algorithms*.
- 2019–2021** Co-organizer of the University of Chicago Probability and Statistical Physics Seminar
- 2020** Member of the scientific committee for the 42nd Midwest Probability Colloquium
- 2017–2018** Co-organizer of a reading group on “Random Walks, Random Fields and Disordered Systems”

Attended Conferences, Workshops, and Summer Schools

- 2020** Midwest Probability Colloquium, Online
Online Random Matrices and Their Applications, Online
- 2019** Workshop on Random Matrices, MFO, Oberwolfach
Midwest Probability Colloquium, Northwestern University, Evanston
From Many-Body Problems to Random Matrices, BIRS, Banff
Celebration in honor of J.-F. Le Gall, *Walking through the Brownian Zoo*, Paris
Random Matrix Theory: Applications in the Information Era, Jagellonian University, Krakow
Random Matrices and Random Graphs, CIRM, Luminy
- 2018** États de la Recherche SMF: Mécanique Statistique, IHP, Paris
Random Matrices, Maps, and Gauge Theories, ENS Lyon, Lyon
LPSM Kick-Off Conference, Paris
EMS-IAMP Summer School, *Universality in Probability and Statistical Mechanics*, Ischia
Summer School at IST Austria, *Probability and Mathematical Physics*, Klosterneuburg
Random Matrices and their Applications, Kyoto University, Kyoto
- 2017** Summer School at IHES, *Spectral Properties of Large Random Objects*, Paris
Summer School at PCMI, *Random Matrices*, Park City
Celebration in honor of G. Ben Arous, *Dynamics, Aging and Universality in Complex Systems*, New York
Probably ON Random Matrices, ENS Lyon, Lyon
- 2015–2018** Yearly Northeast Probability Seminar, NYU-CUNY-Columbia, New York