

# Lucas Benigni – Curriculum Vitae

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## Employment

**2022 – Assistant Professor** - Université de Montréal, Montréal

**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 the Conjugate Kernel of single-layered neural networks*, with S. Péché, preprint 2022.
- [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, Comm. Math. Phys. 391 (2022), 401-454.
- [5] *Optimal delocalization for generalized Wigner matrices*, with P. Lopatto, Adv. Math. 396 (2022), 108109.

- [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 two undergraduate students, 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

- 2023** Invited Speaker, High Dimensional Statistics and Random Matrices, Porquerolles  
Invited Speaker, Physics for Neural Networks, Princeton University, Princeton
- 2022** Probability Seminar, Temple University, Philadelphia  
CRM–ISM Probability Seminar, McGill University, Montreal  
Combinatorics and Probability seminar, UC Irvine, Irvine  
Invited Speaker, AMS sectional meeting “Random Growth Models”, Purdue University, West Lafayette  
Probability Seminar, University of Wisconsin-Madison, Madison  
Mathematics Department Colloquium, Baruch College CUNY, New York
- 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.*, *Ann. Inst. Henri Poincaré Probab. Stat.*, *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”