

# Guillaume Barraquand

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## Scientific interests

**Probability theory and mathematical physics:** Integrable probability, KPZ universality class and equation, interacting particle systems, growth processes, directed polymers, random walks in random environment, quantum integrable systems, random matrix theory.

## Education

- 2012 – 2015 **Université Paris Diderot – Paris 7**, Ph.D. in applied mathematics. Advisor: Sandrine Péché.
- 2011 – 2012 **Université Pierre et Marie Curie – Paris 6**, M.S. in probability and statistics.
- 2008 – 2012 **École Polytechnique**, B.S. in applied mathematics.
- 2006 – 2008 **Lycée Henri IV**, Paris, “Classes préparatoires aux grandes écoles”, mathematics and physics.

## Academic positions

- 2016 – 2018 **Ritt assistant professor**, Columbia University.
- 2015 – 2016 Postdoctoral researcher, Columbia University (funded by Ivan Corwin’s Packard fellowship).
- 2012 – 2015 PhD student and Teaching assistant, Université Paris Diderot – Paris 7.

## Publications

### Preprints

- 8. Half-space Macdonald processes, with Alexei Borodin et Ivan Corwin, *submitted*. [ArXiv:1802.08210](https://arxiv.org/abs/1802.08210)

### Journal articles

- 7. Stochastic six-vertex model in a half-quadrant and half-line open ASEP, with Alexei Borodin, Ivan Corwin and Michael Wheeler, *to appear in Duke Mathematical Journal*. [ArXiv:1704.04309](https://arxiv.org/abs/1704.04309)
- 6. Facilitated exclusion process, with Jinho Baik, Ivan Corwin and Toufic Suidan, *to appear in Computation and Combinatorics in Dynamics, Stochastics and Control, proceedings of Abel symposium 2016*. [ArXiv:1707.01923](https://arxiv.org/abs/1707.01923)
- 5. Pfaffian Schur processes and last passage percolation in a half-quadrant, with Jinho Baik, Ivan Corwin and Toufic Suidan, *to appear in Annals of Probability*. [ArXiv:1605.00525](https://arxiv.org/abs/1605.00525)
- 4. Random walks in Beta-distributed random environment, with Ivan Corwin, *Probability Theory and Related Fields*, (2017) 167: 1057. [Arxiv:1503.04117](https://arxiv.org/abs/1503.04117).

3. The  $q$ -Hahn asymmetric exclusion process, with Ivan Corwin, *Annals of Applied Probability*, 2016, Vol. 26, No. 4, 2304-2356. [ArXiv:1501.03445](#).
2. A phase transition for  $q$ -TASEP with a few slower particles. *Stochastic Processes and their Applications*, 125 (2015), pp. 2674–2699. [ArXiv:1404.7409](#)
1. A short proof of a symmetry identity for the  $q$ -Hahn distribution. *Electronic Communications in Probability*, 2014, 19:1-3.

## PhD Thesis

[Some integrable models in the KPZ universality class](#), Université Paris Diderot – Paris 7, June 2015. Committee: Philippe Biane, Francis Comets, Ivan Corwin, Pierre Le Doussal, Sandrine Péché and Ellen Saada.

## Teaching

### Summer schools

June 2018 Co-teaching with Ivan Corwin of the course on *Integrable probability*, during the summer school “2018 Summer School on Random Matrices” at University of Michigan (3 lectures).

### Columbia University

Spring 2018 Linear algebra (two sections).  
 Fall 2017 Introduction to ordinary differential equations.  
 Spring 2017 Linear algebra.  
 Fall 2016 Calculus III (two sections).

### Université Paris-Diderot– Paris 7

Spring 2015 Preparation to oral exams.  
 Fall 2014 Probability theory, Chargé de TD (recitations).  
 Fall 2013 Elementary algebra and analysis, Chargé de TD.  
 Fall 2012 Elementary algebra and analysis, Chargé de TD.

## Invited talks

### Conferences

May 2018 Integrable Probability Boston 2018, MIT. Title: *Macdonald processes and KPZ equation in a half space*.  
 Jul. 2017 27th Annual PCMI Summer Session, Random Matrices, Park city, USA. Title: *ASEP and KPZ equation in a half- space with open boundary*.  
 Jun. 2017 Stochastic dynamics out of equilibrium, Institut Henri Poincaré, France. Title: *ASEP and the KPZ equation in a half space*.  
 Apr. 2017 Qualitative Methods in KPZ Universality, CIRM, Marseille, France. Title: *ASEP on the positive integers with an open boundary and the KPZ equation in a half space*.  
 Jan. 2017 Joint mathematics meeting American Mathematical Society-Mathematical Association of America, Atlanta, USA. Title: *Facilitated TASEP and half-space KPZ growth*.

- Apr. 2016 Columbia-Princeton Probability Day, New York, USA. Title: *Random walks in Beta random environment*.
- Jan. 2016 New approaches to non-equilibrium and random systems, Kavli institute, Santa Barbara, USA. Title: *Fluctuations of the first particle in exclusion processes*.
- Dec. 2015 *Master Lectures in Mathematics* around the work of Horng-Tzer Yau, Tsinghua Sanya International Mathematics Forum, China. Title: *Fluctuations of the first particle in exclusion processes*.
- May 2015 Clay Mathematics Institute workshop "Random Polymers and Algebraic Combinatorics", Oxford, UK. Title: *Random walks in Beta random environment*.

## Seminars

- May 2018 Sorbonne Université (LPTHE). Title: *Kardar-Parisi-Zhang equation and Macdonald processes in a half-space*.
- May 2018 ENS (LPTENS). Title: *Kardar-Parisi-Zhang equation and Macdonald processes in a half-space*.
- Jan. 2018 Université Paris 5. Title: *Classe d'universalité KPZ dans un demi-espace*.
- Nov. 2017 University of Kansas. Title: *ASEP and KPZ equation in a half-space*.
- Mar. 2017 CUNY. Title: *ASEP on the positive integers with an open boundary*.
- Feb. 2017 New York University. Title: *KPZ random growth in a half space*.
- Sept. 2016 NYC Integrable Probability Working Group. Title: *Stochastic spin models and symmetric functions (after Borodin-Petrov)*.
- Mar. 2016 University of Virginia. Title: *Fluctuations of the first particle in exclusion processes*.
- Feb. 2016 UCLA. Title : *Random walks in Beta random environment*.
- Dec. 2015 Harvard. Title : *Random walks in Beta random environment*.
- Nov. 2015 MIT. Title : *Random walks in Beta random environment*.
- Nov. 2015 MIT. Title : *Facilitated TASEP and Pfaffian Schur processes*.
- Nov. 2015 New York University. Title : *Random walks in Beta random environment*.
- Oct. 2015 University of Michigan. Title : *Random walks in Beta random environment*.
- Oct. 2015 UC Berkeley. Title : *Random walks in Beta random environment*.
- Oct. 2015 UC Davis. Title : *Random walks in Beta random environment*.
- Oct. 2015 Stanford University. Title : *Random walks in Beta random environment*.
- May 2015 Institut Henri Poincaré, Groupe de travail "Matrices Et Graphes Aléatoires". Title: *Marches aléatoires en environnement Bêta*.
- Apr. 2015 Université Paris 6. Title: *Marches aléatoires en environnement Bêta*.
- Feb. 2015 Université d'Angers. Title: *Théorèmes limites pour les processus d'exclusion intégrables dans la classe d'universalité KPZ*.
- Nov. 2014 Budapest University of Technology. Title: *KPZ scaling theory for integrable exclusion processes*.
- Oct. 2014 Columbia University. Title : *KPZ scaling theory for integrable exclusion processes*.

## Organization of seminars/conferences

- Oct. 2017 Co-organizer of a workshop at Columbia University for the NSF Focused Research Group Integrable Probability.
- Apr. 2017 Organizer of the Spring Columbia-Courant probability seminar.
- 2015 – ... Co-organizer of the Columbia Probability Seminar.
- 2013 – 2014 Co-organizer of the PhD students probability seminar joint between Paris 6 and Paris 7.

## Other activities

- 2012 & 2014 Team Leader (mentoring high-school students) for the *French Tournament of Young Mathematicians* organized by Animath.
- Summer 2011 Research internship in mathematical analysis of communication networks, Télécom Paristech.
- 2008 – 2009 Military service in the French Navy (part of the École Polytechnique curriculum).

Last updated: May 8, 2018