Nathanaël Berestycki

Academic Positions

Professor of Probability, University of Cambridge	since 2015
Reader in Probability, University of Cambridge	2012-2015
Lecturer, University of Cambridge	2007-2012
Fellow of King's college, Cambridge	since 2009
Postdoctoral fellow, University of British Columbia & PIMS	2005-2007

Research Interests

Probability theory, geometry and analysis. More precisely: Brownian motion, random geometry, Liouville quantum gravity, Gaussian free field, SLE, branching and coalescing systems and relation to partial differential equations, random walks on groups, mixing times.

Education

Joint PhD (Cornell 2005 and ENS Paris 2006). Advisors: R. Durrett and J.F. Le Gall.
[Jury: J. Bertoin, R. Durrett, M. Ledoux, J.F. Le Gall, Y. Le Jan, and W. Werner.]

DEA, Paris VI	2002
Ecole Normale Supérieure (Cachan)	2000-2004

Invited Lecture Courses

Chicago summer school in probability. Title of lectures: *Introduction to the GFF and Liouville quantum gravity*	July 2016
Darmstadt spring school in probability. Title of lectures: *Introduction to the GFF and Liouville quantum gravity*	April 2016
Marseille. Title of lectures: *Random walks on random graphs*	October 2015
Clay institute / LMS "modern developments in probability", Title of lectures: *Introduction to the GFF and Liouville quantum gravity*	July 2015
Probability and Representation Theory, Edinburgh Title of lectures: *Mixing times and representation theory*	February 2014
Ecole Polytechnique (Paris) Title of lectures: *Mixing times.*	October 2011
Young European Probabilists, Eindhoven, Title of lectures: *Recent progress in coalescent theory.*	March 2009
IMPA, Rio de Janeiro, Title of lectures: *Recent progress in coalescent theory.*	January 2009

Selected Invited Lectures

British Mathematical Colloquium, morning speaker	April 2016
Clay Institute: Advances in Probability	Sept. 2014
Front Propagation and Particle Systems, Banff	August 2014
Spin Glasses and Related Topics, Banff	July 2014
School and Workshop on Random Interacting Systems, Bath,	June 2014
Mathematical biology, particle systems and reaction-diffusion, Toulouse	March 2014

Random Walks on Groups, IHP, Paris,	January 2014
German Probability and Statistics Days, Mainz	March 2012
Plenary speaker, Stochastic Processes and Applications, Oaxaca (Mexico)	June 2011
Branching processes and coalescent processes, Beijing,	April 2011
Random Structure and Dynamics, Oxford	April 2011
Northeast Probability Seminar, New York,	November 2010
Discrete probability and geometry: the mathematics of Oded Schramm, Jerusalem,	Dec. 2009

Selected Invited Seminars

Helsinki colloquium (10/15), Rainwater seminar Seattle (09/15), UBC (09/15), KTH Stockholm (09/15), Duke (11/14), Warwick colloquium (11/14), Oxford (10/13), Bristol (10/13), Warwick (05/13) London Analysis seminar (03/13), Geneva (11/12), Warwick (05/12), U. Washington (04/12), Paris VI (12/11), ENS (12/11), Paris V (11/11), Marseille (11/11), Orsay (10/11), Polytechnique (10/11), ENS Paris (09/11), Frankfurt (05/11), ENS Lyon (04/11), ETH Zürich (10/10), Warwick (06/10), Paris VI (03/10), Bath (03/10), UBC (09/09), Warwick (02/09), UCL (colloquium) (01/09), ETH Zürich (11/08), Bristol (10/08), Microsoft Research (08/08), Weizmann Institute (06/08), Oxford (Stochastic Analysis Seminar) (05/08), Toronto, (04/08), Weizmann Institute of Science (06/07), Technion (05/07), Ecole Polytechnique (02/07), Oxford (Math. Genetics) (02/07), Indiana U. (colloquium) (01/09), U.C. Davis (colloquium) (01/07), Wisconsin (12/06), UCSD (colloquium and seminar) (12/06), UBC (11/06), Chicago (10/06), Cornell (Summer School) (07/06), Wisconsin (10/06), Berkeley (03/06), Oregon State (colloquium and seminar) (02/06), ENS Lyon (01/06), Marseille (01/06), UBC (10/05), Pittsburgh (colloquium) (03/05), Wisconsin (02/05), Microsoft Research (02/05), UCSD (01/05), Paris X (01/05), Marseille Provence (01/05), Delaware (12/04), NYU Courant Institute (02/04).

PhD students

Richard Pymar (graduated 2011), Lee Zhuo Zhao (graduated 2013), Bati Sengul (graduated 2014), Ed Mottram (graduated 2014), Henry Jackson (current), Ellen Powell (current), Mo-Dick Wong (current).

Postdoctoral Associates

Ariel Yadin (Herschel Smith Fellow, 2009–2010), Arnab Sen (2010–2012), Laure Dumaz (2013-2015), Gourab Ray (current), Benoit Laslier (current).

Honours, Grants

Early-career fellowship from EPSRC, value £1.2M.	2014
1st recipient of Bernoulli Society Outstanding Expository Paper Prize	2012
Plenary speaker at Stochastic Processes and Application	2011
ESF grant for "Geometry and Analysis of Random Processes", value €13,950	2013
EPSRC Programme grant, "New frontiers in Random Geometry". Co-PI with Geoffrey Grimmett and James Norris, value £1.65M.	2011
EPSRC First grant EP/G055068/1 (ranked top), value £290,000	2009
IMS Laha travel award	2004

Organisation of Conferences

I was the principal organiser of a semester at the Newton Institute in Spring 2015 on *Random Geometry.* Co-organisers: Itai Benjamini, Jean-François Le Gall, Scott Sheffield.

Geometry and Analysis of Random Processes (Easter UK Probability meeting), Cambridge. April 2013

Extremes in branching Brownian motion and random walks,
with Louigi Addario-Berry and Nina Gantert — Oberwolfach, September 2013

The geometry of discrete random structures,
with Christina Goldschmidt (funded by EPSRC) — Warwick, June 2012

Other Services

Member of the Editorial board of:
Annals of applied probability, to begin 2016.
Electronic Journal of Probability, since 2015.
Springer Briefs in Mathematical Physics, since 2014.
Mathematical Proceedings of the Cambridge Philosophical Society, since 2014.
Theoretical Population Biology. (Resigned 2012).

I have served as a PhD examiner in Cambridge, Oxford, Bath, ENS Lyon, Paris Dauphine.

Refereeing for: Transactions of AMS, Annals of Probability, J. Theoretical Probability, EJP, PTRF, J. Stat. Physics, Annals of Applied Probability, Bernoulli, Electronic J. Combinatorics, Discrete Mathematics, Random Structures and Algorithms, Bulletin of Math Biology, Annales de l'IHP, Duke Math. Journal, SODA.

Grant proposal reviews for: NSA (United states), ISF (Israel), ANR (France), NWO (Netherlands), NSERC (Canada), Royal Society (UK), EPSRC (UK).

Publications

1. N. Berestycki and R. Durrett, (2006). A phase transition in the random transposition random walk. *Probab. Theory Rel. Fields*, 136, 203–233.

2. N. Berestycki (2006). The hyperbolic geometry of random transpositions. *Ann. Probab.*, Vol. 34(2), 429-467.

3. N. Berestycki and J. Pitman. Gibbs distributions for random partitions generated by a fragementation process. *J. Stat. Phys.* **127**(2), 381–418 (2007).

4. J. Berestycki, N. Berestycki and J. Schweinsberg. Beta-coalescents and continuous stable random trees. *Ann. Probab.*, 35, 1835–1887 (2007).

5. J. Berestycki, N. Berestycki and J. Schweinsberg. Small-time behavior of beta-coalescents. *Ann. Inst. H. Poincaré (B): Probab. Stat.* 44(2), 214–238 (2008).

6. N. Berestycki and R. Durrett, (2008). Limiting behavior for the distance of a random walk. *Electr. J. Probab.* 13, 374–395.

7. N. Berestycki. *Recent progress in coalescent theory.* Ensaios Matematicos, Vol. 16 (2009).

8. J. Berestycki and N. Berestycki. Kingman's coalescent and Brownian motion. *Alea*, **6**, 239–259 (2009).

9. J. Berestycki, N. Berestycki and V. Limic. The Λ-coalescent speed of coming down from infinity. *Ann. Probab.*, 38, 207-233 (2010).

10. N. Berestycki, A. Etheridge, and M. Hutzenthaler. Survival, extinction and ergodicity in a spatially continuous population model. *Markov Proc. Rel. Fields,* 15, 265-288 (2009). Special issue "Inhomogeneous random systems".

11. I. Benjamini and N. Berestycki. Random paths with bounded local time, *J. Eur. Math. Soc.* 12(4), 819–854 (2010).

12. I. Benjamini and N. Berestycki. An integral test for the transience of Brownian paths with limited local time. *Ann. Inst. H. Poincaré (B): Probab. Stat.*, 47, 539-558 (2011).

13. N. Berestycki, O. Schramm and O. Zeitouni. Mixing times of random k-cycles and coagulation-fragmentation chains. arXiv:1001.1894. *Ann. Probab.* 39(5), 1815–1843 (2011). Special volume in memory of Oded Schramm.

14. O. Angel, N. Berestycki, and V. Limic. Global divergence of spatial coalescents. arXiv:0909.4859. *Probab. Theory Rel. Fields*, 152, 625–679 (2012).

15. J. Berestycki, N. Berestycki and J. Schweinsberg. Survival of near-critical branching Brownian motion. *J. Stat. Phys.* 143(5), 833–854, (2011).

16. N. Berestycki. Emergence of giant cycles and slowdown transition in random transpositions and k-cycles. *Electr. J. Probab.* 16, 152–173 (2011).

17. N. Berestycki, R. Pymar. Effect of scale on long-range random graphs and chromosomal inversions. *Ann. Appl. Probab.*, 22, 1328–1361(2012).

18. J. Berestycki, N. Berestycki and J. Schweinsberg. The genealogy of branching Brownian motion with absorption.
Ann. Probab., 41(2), 527–618 (2013).

19. N. Berestycki, A. Etheridge and A. Veber. Large-scale behaviour of the spatial Λ-Fleming-Viot process. arXiv:1107.4254 *Ann. Inst. H. Poincaré,* 49(2), 374–401 (2013).

20. J. Berestycki, N. Berestycki, and V. Limic. A small-time coupling between Λ-coalescents and branching processes. *Ann. Appl. Probab.*, 24, 2, 449-475 (2014).

21. N. Berestycki, N. Gantert, P. Mörters and N. Sidorova. Galton–Watson trees with vanishing martingale limit. *J. Stat. Phys.*, 155, 4, 737–762 (2014).

22. N. Berestycki and G. Kozma. Cycle structure of the interchange process and representation theory. *Bull. Soc. Math. France*, to appear.

23. J. Berestycki, N. Berestycki, and V. Limic. Asymptotic sampling formulae for Λ-coalescents. *Ann. Inst. H. Poincaré*, to appear.

24. J. Berestycki, N. Berestycki and J. Schweinsberg. Critical branching Brownian motion with absorption: survival probability. *Probab. Theor. Rel. Fields*, to appear.

25. N. Berestycki, Diffusion in planar Liouville quantum gravity. To appear in *Ann. Inst. H. Poincaré (B).*

26. J. Berestycki, N. Berestycki and J. Schweinsberg. Critical branching Brownian motion with absorption: particle configurations. To appear in *Ann. Inst. H. Poincaré (B).*

27. N. Berestycki and L. Zhuo Zhao. The shape of multidimensional Brunet-Derrida particle systems. To appear in *Ann. Appl. Probab.*

28. N. Berestycki, C. Garban and A. Sen. Coalescing Brownian flows: a new approach. To appear in *Ann. Probab.*

29. N. Berestycki and A. Yadin. Condensation of random walks and the Wulff crystal. arXiv.

30. N. Berestycki, C. Garban, R. Rhodes and V. Vargas. KPZ formula derived from Liouville heat kernel. arXiv.

31. N. Berestycki and B. Sengul. Cutoff for conjugacy-invariant random walks on the permutation group. arXiv.

32. N. Berestycki, S. Sheffield and X. Sun. Equivalence of Liouville measure and Gaussian free field. arXiv.

33. N. Berestycki, B. Laslier and G. Ray. Critical exponents on Fortuin–Kasteleyn weighted planar maps.

34. N. Berestycki, Eyal Lubetzky, Yuval Peres and Allan Sly. Random walks on the random graph.

35. N. Berestycki. An elementary approach to Gaussian multiplicative chaos.

Last modified: October 25, 2015.