

Quentin BERGER
Full Professor
SORBONNE PARIS NORD
(last update in September 2024)

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Academic Position

- 2024-** Full professor, Sorbonne Paris Nord (Paris 13, Villetaneuse);
- 2023-28** Junior fellow of Institut Universitaire de France;
- 2014-24** **Associate Professor**, Sorbonne Université (Paris, France);
2022-24 Partial assignment to École Normale Supérieure;
2022-24 Director of Undergraduate Studies in Mathematics, Sorbonne Université;
2019 **Habilitation à Diriger des Recherches**, *Random polymers and related models*.
- 2012-14** **Assistant Professor (NTT)**, Université de Californie du Sud (USC, Los Angeles);
- 2009-12** **Doctorant**, École Normale Supérieure de Lyon, sous la direction de Fabio Toninelli;
Intitulé de la thèse : *Polymères en milieu aléatoire : influence d'un désordre corrélé sur le phénomène de localisation*.
Jacques Neveu prize of SMAI (Ph.D. thesis in Probability et Statistics).
- 2006-09** **Student of École Normale Supérieure de Paris**.

Studies

- 2007-09** Master of Mathematics : "Probability and applications", Université Paris Sud Orsay.
Thesis : *The Random Walk Pinning Model*, supervised by Fabio Toninelli;
- 2008** Agrégation de Mathématiques (french competitive exam for teachers);
- 2007-08** Licence and Master 1 (Bachelor's and Master's 1st year degrees) of Mathematics, École Normale Supérieure.

Grants

- 2023-28** Participation to ANR Local (PI : Bruno Schapira).
- 2019** PEPS grant (CNRS) : "Random walk trapped in a random interlacement".
- 2017-22** Participation to ANR SWiWS (PI : Amine Asselah).
- 2016** PEPS grant (CNRS) : "Polymers in heavy-tail environment".
- 2013-15** AMS Simons Travel Grant.

Area of research : Probability, Mathematical Physics.

Key words : Statistical mechanics, disordered systems, random polymers, phase transition, critical phenomena, influence of disorder, random walks, renewal processes, random graphs, first-passage percolation, last-passage percolation. . .

Complete list of publications

Preprints

1. Q. BERGER, N. BOUCHOT, *About the first eigenvector of the simple random walk killed upon exiting a large bounded domain*, [arXiv:2408.15858](#)
2. Q. BERGER, L. BÉTHENCOURT, C. TARDIF, *On joint returns to zero of Bessel processes*, [arXiv:2406.19344](#)
3. I. AYUSO VENTURA, Q. BERGER, *Non-linear conductances of Galton-Watson trees and application to the (near) critical random cluster model*, [arXiv:2404.11564](#)
4. I. AYUSO VENTURA, Q. BERGER, *Ising model on a Galton-Watson tree with a sparse random external field*, [arXiv:2310.09169](#)
5. Q. BERGER, L. BÉTHENCOURT, C. TARDIF, *Persistence problems for additive functionals of one-dimensional Markov processes*, [arXiv:2304.09034](#)

To appear

6. Q. BERGER, L. BÉTHENCOURT, *An application of Sparre Andersen's fluctuation theorem for exchangeable and sign-invariant random variables*, à paraître dans Séminaire de Probabilités, [arXiv:2304.09031](#)
7. Q. BERGER, M. BIRKNER, L. YUAN, *Collective vs. individual behaviour for sums of i.i.d. random variables : appearance of the one-big-jump phenomenon*, à paraître dans Ann. Fac. Sci. Toulouse, [arXiv:2303.12505](#)

Publications

8. Q. BERGER, A. LEGRAND, *Scaling limit of the disordered generalized Poland-Scheraga model for DNA denaturation*, Probab. Theory Relat. Fields (2024), online first.
9. Q. BERGER, B. MASSOULIÉ, *Wetting on a wall and wetting in a well : Overview of equilibrium properties*, Stoc. Processes Appl., Vol. 170, Special issue in tribute to Francis Comets (2024).
10. Q. BERGER, C. CHONG, H. LACON, *The Stochastic Heat Equation with multiplicative Lévy noise : Existence, moments, and intermittency*, Commun. Math. Phys., Vol. 402, pp. 2215–2299, (2023).
11. Q. BERGER, N. TORRI, R. WEI, *Non-directed polymers in heavy-tail random environment in dimension $d \geq 2$* , Electron. J. Probab., Vol. 27, pp. 1-67 (2022).
12. Q. BERGER, C.-H. HUANG, N. TORRI, R. WEI, *One-dimensional polymers in random environments : stretching vs. folding*, Electron. J. Probab., Vol. 27, pp. 1-45 (2022)
13. Q. BERGER, H. LACON, *The continuum directed polymer in Lévy Noise*, J. Éc. Polytech., Tome 9, pp. 213-280 (2022).
14. Q. BERGER, H. LACON, *The scaling limit of the directed polymer with power-law tail disorder is the continuum polymer with stable noise*, Commun. Math. Phys., Vol. 386, pp. 1051-1105 (2021).
15. Q. BERGER, N. TORRI, *Beyond Hammersley's Last-Passage Percolation : a discussion on possible local and global constraints*, Ann. Inst. Henri Poincaré D Combin. Phys. Interactions, Vol. 8, Num. 2, pp. 213-241 (2021).
16. Q. BERGER, M. SALVI, *Scaling limit of sub-ballistic 1D Random Walk among biased conductances : a story of wells and walls*, Electron. J. Probab., Vol. 25, no 30, 43 pp. (2020)
17. Q. BERGER, G. GIACOMIN, M. KHATIB, *Disorder and denaturation transition in the generalized Poland-Scheraga model*, Ann. Henri Lebesgue, Vol. 3, pp. 299-339 (2020).
18. Q. BERGER, N. TORRI, *Directed polymers in heavy-tail random environment*, Ann. Probab., Vol. 47, n° 6, pp. 4024-4076 (2019).

19. Q. BERGER, *Notes on Random Walks in the Cauchy domain of attraction*, Probab. Th. Relat. Fields, Vol. 175, Issue 1-2, pp. 1-44 (2019).
20. Q. BERGER, G. GIACOMIN, H. LACOIN, *Disorder and critical phenomena : the $\alpha = 0$ copolymer model*, Probab. Th. Relat. Fields, Vol. 174, Issue 3-4, pp. 787-819 (2019).
21. Q. BERGER, *Strong renewal theorems and local large deviations for multivariate random walks and renewals*, Electronic J. Probab., Vol. 24, n° 46, 47 pp (2019).
22. Q. BERGER, M. SALVI, *Scaling of sub-ballistic 1D Random Walks among biased Random Conductances*, Markov Processes Relat. Fields, Vol. 25, pp. 171-187 (2019).
23. Q. BERGER, N. TORRI, *Entropy-controlled Last-Passage Percolation*, Ann. Appl. Probab., Vol. 29, n° 3, pp. 1878-1903 (2019).
24. Q. BERGER, G. GIACOMIN, M. KHATIB, *DNA melting structures in the generalized Poland-Scheraga model*, ALEA Lat. Am. J. Probab. Math. Stat., Vol. 15, pp. 993-1025 (2018).
25. K. ALEXANDER, Q. BERGER, *Geodesics toward corners in First Passage Percolation*, J. Stat. Phys., Vol. 172, Issue 4, pp. 1029-1056 (2018).
26. Q. BERGER, F. DEN HOLLANDER, J. POISAT, *Annealed scaling for a charged polymer in dimensions two and higher*, J. Phys. A : Math. Theor, Vol. 51, n° 5 (2018). Special issue in honour of Stuart Whittington's 75th birthday.
27. K. ALEXANDER, Q. BERGER, *Pinning of a renewal on a quenched renewal*, Electron. J. Probab., Vol. 23, n° 6, 48 pp. (2018).
28. Q. BERGER, H. LACOIN, *Pinning on a defect line : characterization of marginal disorder relevance and sharp asymptotics for the critical point shift*, J. Inst. Math. Jussieu, Vol. 17, n° 2, pp. 305-346 (2018).
29. Q. BERGER, H. LACOIN, *The high-temperature behavior of the directed polymer in dimension 1 + 2*, Ann. Inst. Henri Poincaré Probab. Stat., Vol. 53, n° 1, pp. 430-450 (2017).
30. K. ALEXANDER, Q. BERGER, *Local asymptotics for the first intersection of two independent renewals*, Electron. J. Probab., Vol. 21, n° 68, pp. 1-20 (2016).
31. K. ALEXANDER, Q. BERGER, *Local limit theorem and renewal theory with no moments*, Electron. J. Probab., Vol. 21, n° 66, pp. 1-18 (2016).
32. Q. BERGER, J. POISAT, *On the critical curve of the pinning and copolymer models in correlated Gaussian environment*, Electron. J. Probab., Vol. 20, n° 71, 35 pp. (2015).
33. Q. BERGER, F. CARAVENNA, J. POISAT, R. SUN, N. ZYGOURAS, *The critical curves of the random pinning and copolymer models at weak coupling*, Commun. Math. Phys., Vol. 326, n° 2, pp. 507-530 (2014).
34. Q. BERGER, *Pinning model in random correlated environment : appearance of an infinite disorder regime*, J. Stat. Phys., Vol. 155, n° 3, pp. 544-570 (2014).
35. Q. BERGER, *Comments on the influence of disorder for pinning model in correlated Gaussian environment*, ALEA Lat. Am. J. Probab. Math. Stat., Vol. 10, n° 2, pp. 953-977 (2013).
36. Q. BERGER, F. TONINELLI, *Hierarchical pinning model in correlated random environment*, Ann. Inst. Henri Poincaré Probab. Stat., Vol. 48, n° 3, pp. 781-816 (2013).
37. Q. BERGER, H. LACOIN, *Sharp critical behavior for pinning model in random correlated environment*, Stochastic Process. Appl., Vol. 122, pp. 1397-1436 (2012).
38. Q. BERGER, H. LACOIN, *The effect of disorder on the free-energy for the random walk pinning model : smoothing of the phase transition and low temperature asymptotics*, J. Stat. Phys., Vol. 142, n° 2, pp. 322-341 (2011).
39. Q. BERGER, F. TONINELLI, *On the critical point of the Random Walk Pinning Model in dimension $d = 3$* , Electron. J. Probab., Vol. 15, n° 21, pp. 654-683 (2010).

Proceedings

40. Q. BERGER, C. BONNET, L. LAULIN, K. RASCHEL, *Topics in Random Walks*, à paraître dans ESAIM : Proceedings and Surveys, Modélisation aléatoire et stochastique – Journées MAS 2022.
41. Q. BERGER, *Influence of disorder for polymer pinning models*, ESAIM : Proceedings and Surveys, Vol. 51, p. 74 (2015), Modélisation aléatoire et stochastique – Journées MAS 2014.

Book

Introduction aux Probabilités : Modèles et applications,
Q. BERGER, F. CARAVENNA, P. DAI PRA (Dunod, Sept. 2021).

Ph.D. Students

- 2024-** Gaspard GOMEZ, *Polymers in random environment*. Shared supervision with Laure Dumaz (École Normale Supérieure).
- 2021-** Nicolas BOUCHOT, *Folding of polymers and of random walks*. Shared supervision with Julien Poisat (University Paris Dauphine).
- 2020-** Irene AYUSO VENTURA, *Random boundary conditions for the Ising model on random graphs*. Shared supervision with Arnaud Le Ny (Créteil University).
- 2017-21** Alexandre LEGRAND, *Perturbations of the adsorption transition in polymer models*. Shared supervision with Nicolas Pétrélis (Nantes University).

Supervision of Postdocs

- 2025-** Francesca Cottini (FSMP grant).
- 2023-** Rémy Poudevigne (ANR Local).
- 2023-24** Antoine Mouzard (co-supervised with Laure Dumaz, FSMP grant).
- 2019-20** Ran Wei (co-supervision with Amine Asselah, ANR SWiWS).
- 2018-19** Niccolò Torri (co-supervision with Amine Asselah, ANR SWiWS).

Invited presentations

International conferences

- Août 2024 : « Stochastic processes under constraints » (Bielefeld) ;
- Mars 2024 : French Japanese Conference on Probability Interactions (IHES) ;
- Juil. 2023 : 43^e conférence « Stochastic Processes and their Applications » (Lisbonne) ;
- Déc. 2022 : Conference « Lorentz gases at the intersection of smooth ergodic theory and probability theory » (Leiden, Pays-Bas) ;
- Mai 2022 : Conference « Random walks, polymers and localization » (CIRM, Marseille) ;
- Nov. 2021 : Conference « Stochastic Geometry Days » (Dunkerque, France) ;
- Sept. 2020 : Conference « Random Polymers and Networks » (Porquerolles, France) ;
- Juin 2019 : 2nd Italian meeting on probability and mathematical statistics (Vietri sul Mare) ;
- Sept. 2018 : Workshop « Scaling Limits in Models of Statistical Mechanics » (Oberwolfach) ;
- Juillet 2018 : CIMPA School « Geometry & scaling of random structures » (Buenos Aires) ;
- Juillet 2018 : Montreal summer workshop in Probability and Mathematical Physics ;
- Sept. 2017 : Workshop « Random walks, folding and related topics » (Florence, Italie) ;
- Juin 2016 : Workshop « Soft Local Times, Polymers and Related Topics », (IMéRA, Marseille) ;
- Juillet 2013 : 36^e conférence « Stochastic Processes and their Applications » (Boulder, USA) ;
- Janv. 2013 : « Young European Probabilists », Eurandom (Eindhoven, Pays-Bas) ;
- Mai 2012 : Conférence « Random Polymers and Related Topics », (Singapour).

National conferences

Août 2022 : Journées MAS 2022 (Rouen), Session « Marches Aléatoires » ;
 Août 2014 : Journées MAS 2014 (Toulouse), Exposé plénier (Prix Jacques Neveu) ;
 Juin 2014 : Journées scientifiques de Nantes ;
 Déc. 2012 : Southern California Probability Symposium (Los Angeles, USA) ;
 Avril 2012 : Conférence « Jeunes Probabilistes et Statisticiens » au CIRM, Luminy ;
 Juillet 2011 : École d'été de probabilités de Saint-Flour.

Probability and mathematical physics seminars (since 2018)

2024 : Paris Cité, IMPA, Student seminar at ENS Rennes, Milan, Rome ; 2023 : Polytechnique, Strasbourg (séminaire & colloquium), Sorbonne Paris Nord, Sorbonne Université, Los Angeles probability forum, UCLA ; 2022 : ENS, Seed Seminar, Paris Cité, Marseille, Lyon, Nice, Séminaire MEGA (IHP), Münster ; 2021 : Toulouse ; 2020 : Lille, Strasbourg, Paris Dauphine, Sorbonne Université, Nantes, Séminaire M2 Orsay ; 2019 : IMPA (Rio de Janeiro), Polytechnique, Paris Villetaneuse, Séminaire des mathématiques (ENS) ; 2018 : Orsay, Warwick, Cambridge, Créteil, Dijon.

Teaching activities

2024- Paris 13	<i>Intégration et Probabilités</i> (cours L3, Sup Galilée) ;
2022-24 ENS	<i>Processus Stochastiques</i> (cours, M1) ;
2014-24 Sorbonne Université	<i>Surfaces et polymères aléatoires</i> (cours, M2) 2019-2023 ; <i>Probabilités de base</i> (cours, M1) 2021-2022 ; <i>Introduction aux probabilités</i> (responsable de l'UE, L2) 2019-2022 ; <i>Préparation agrégation</i> (cours & TD, M2) 2018-2022 ; <i>Probabilités élémentaires – semestre d'été</i> (cours, L2) 2016-2018 ; <i>Probabilités approfondies</i> (TD, M1) 2015-2019 ; <i>Processus et simulation</i> (TD-TP, L3) 2014-2018 ; <i>Probabilités</i> (TD, L3) 2014-2017 ; <i>Théorie de la mesure et intégration</i> (TD, L3) 2014-2015.
2012-14 USC	<i>Probabilités appliquées</i> (cours, M1) ; <i>Théorie des probabilités</i> (cours, L3) ; <i>Principes fondamentaux de l'Analyse</i> (cours, L1).
2010-12 ENS lyon	<i>Introduction aux Probabilités</i> et <i>Probabilités</i> (TD, niveau L3) ; Colles de Mathématiques pour la « Classe Passerelle » (mise en place par l'ENS Lyon) ; Préparation aux oraux de l'Agrégation de Mathématiques (option Probab. Stat.).
2007-09	Colles de Mathématiques PCSI (Lycée Louis-le-Grand) et MP* (Lycée Saint-Louis).

2024- Paris 13	<i>Integration and Probability theory</i> (3 rd year) ;
2022-24 ENS	<i>Stochastic Processes</i> (Master 1) 2022-now ;
2014-24 Sorbonne Université	<i>Random polymers</i> (Master 2) 2019-2023 ; <i>Introduction to probability theory</i> (2-nd year Undergraduate) 2019-22 ; <i>Preparation to “Agrégation de mathématique”</i> (Master 2) 2018-22 ; <i>Elementary probability – summer class</i> (2-nd year Undergraduate) 2016-18 ; <i>Advanced probability</i> (Master 1) 2015-19 ; <i>Processes and simulation</i> (3-rd year Undergraduate) 2014-2018 ; <i>Probability</i> (3-rd year Undergraduate) 2014-17 ; <i>Measure theory and integration</i> (3-rd year Undergraduate) 2014-15.
2012-14 USC	<i>Applied probability</i> (Master 1) ; <i>Probability theory</i> (3-rd year Undergraduate) ; <i>fundamental principles of Calculus</i> (1-st year Undergraduate).
2010-12 ENS lyon	<i>Introduction to Probability</i> and <i>Probability</i> (TA) ; Oral examiner in mathematics (1-st year Undergraduate) ; Oral examiner for “Agrégation de Mathématiques”.
2007-09	Oral examiner in mathematics, Paris (1-st and 2-nd year undergraduate).

Supervision of research projects and master thesis

Undergraduate research projects : 14 students in total, 11 since 2018.

Master 1 thesis : 16 students in total, 10 since 2018.

Master 2 thesis : 8 students in total, 7 since 2018.

Mentoring and educational counselling

(2022-24) Mentoring for students of École Normale Supérieure.

(2020-23) Mentoring for students recipient of FSMP fellowships (Fondation des Sciences Mathématiques de Paris).

(2020-22) Mentoring students for their educational and professional project, Undergraduate level.

Responsibilities

Editorial duties

(2022-now) Associate editor of *Acta Applicandae Mathematicae*.

Organisation of scientific meetings

- « Les probabilités de demain », bi-annual meetings (2021-24) ;
- Workshop : « Random Walks : Interacting, Branching and more », au CIRM, April 2024 ;
- Workshop : « Localization phenomena », au CIRM, March 2023 ;
- Workshop : *Directed Polymers and Folding*, at CIRM (Marseille), Sept. 2021 ;
- Workshop : *Self-interacting Random Walks and folding*, at CIRM (Marseille), Sept. 2019 ;
- Workshop : *Random Walks and Polymers*, fondation des Treilles, March 2019 ;
- Workshop : *Polymers, Folding, and Phase Transition*, at CIRM Marseille, France ;
- Organization of a parallel session at “MAS days 2016” in Grenoble, France ;
- Weekly seminars :
Seminar “Friday’s probability” at Sorbonne Université (2017-24) ;
Probability Seminar at USC (2013-14).

Institutional responsibilities

(2022-) (co-)Director of Undergraduate Studies, Bachelor of Mathematics, Sorbonne University.

(2020) Evaluation committee for tenure faculty, Sorbonne University.

(2019) Vice-chair of an assistant professorship recruitment committee, Sorbonne University.

(2015-) Elected member of the Master of Mathematics council, Sorbonne University.

(2012-14) Member of the evaluation committee for non-tenure faculty, USC.

Commissions of trust

Ph.D. jury of Benjamin Bonnefont (Sorbonne Université), 2023.

Referee of the Ph.D. manuscript of Alexandre Boyer (Université Paris Saclay), 2022.

Ph.D. jury of Isao Sauzedde (Sorbonne Université), 2021.

Scientific expert for FONDECYT (Chilian National Research Agency), 2020.

Ph.D. jury of Benjamin Havret (University of Paris), 2019.

Reviewer for national research agencies and peer-reviewed journals —among which Probab. Theory Relat. Fields, Ann. Probab., Commun. Math. Phys., Trans. Amer. Math. Soc., Ann. Appl. Probab., Electron. Commun. Probab., Ann. Inst. Henri Poincaré Probab. Stat., Stoch. Process. Appl., J. Phys. Stat., J. Phys. A : Math. Theor., J. Math. Phys. Anal. Geom., etc. ; and for AMS Mathematical Reviews.

Other

Languages. French (mother tongue), English (fluent), Italian (fluent).

Informatic skills. $\text{\LaTeX}$, Python, Matlab, Mathematica, html.