Quentin Berger
Associate Professor, Sorbonne Université
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Academic Position

2014- **Maître de conférences** (Associate Professor), Sorbonne Université (Paris, France) ;
2023-28 Junior fellow of Institut Universitaire de France ;
2022- Partial assignment to École Normale Supérieure ;
2022- Director of Undergraduate Studies in Mathematics, Sorbonne Université ;
2019 Habilitation à Diriger des Recherches, *Random polymers and related models.*

2012-14 **Assistant Professor (NTT)** of Mathematics, University of Southern California (Los Angeles, CA, USA).

2009-12 **Ph.D. Student**, École Normale Supérieure de Lyon, supervised by Fabio Toninelli ;
Polymers in random environment : influence of a correlated disorder on the localization phenomenon.
Jacques Neveu prize of SMAI (Ph.D. thesis in Probability et Statistics).

2006-09 **Student of École Normale Supérieure de Paris**.

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.

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. Thesis : *Kingman's Coalescent*, supervised by Jean Bertoin.

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. I. Ayuso Ventura, Q. Berger, *Ising model on a Galton-Watson tree with a sparse random external field*, `arXiv:2310.09169`
2. Q. Berger, L. Béthencourt, C. Tardif, *Persistence problems for additive functionals of one-dimensional Markov processes*, `arXiv:2304.09034`
3. Q. Berger, A. Legrand, *Scaling limit of the disordered generalized Poland-Scheraga model for DNA denaturation*, `arXiv:2209.13480`

To appear

4. Q. Berger, B. Massoulié, *Wetting on a wall and wetting in a well : Overview of equilibrium properties*, to appear in Stoc. Processes Appl. (special issue in tribute to Francis Comets), `arXiv:2309.02927`
5. Q. Berger, L. Béthencourt, *An application of Sparre Andersen's fluctuation theorem for exchangeable and sign-invariant random variables*, to appear in Séminaire de Probabilités, `arXiv:2304.09031`
6. 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*, to appear in Ann. Fac. Sci. Toulouse, `arXiv:2303.12505`

Publications

7. Q. Berger, C. Chong, H. Lacoin, *The Stochastic Heat Equation with multiplicative Lévy noise : Existence, moments, and intermittency*, Commun. Math. Phys., Vol. 402, pp. 2215–2299 (2023).
8. 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).
9. 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)
10. Q. Berger, H. Lacoin, *The continuum directed polymer in Lévy Noise*, J. Éc. Polytech., Tome 9, pp. 213-280 (2022).
11. Q. Berger, H. Lacoin, *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).
12. 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).
13. 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)
14. 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).
15. Q. Berger, N. Torri, *Directed polymers in heavy-tail random environment*, Ann. Probab., Vol. 47, n° 6, pp. 4024-4076 (2019).
16. 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).
17. 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).
18. 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).

19. 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).
20. Q. Berger, N. Torri, *Entropy-controlled Last-Passage Percolation*, Ann. Appl. Probab., Vol. 29, n° 3, pp. 1878-1903 (2019).
21. 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).
22. K. Alexander, Q. Berger, *Geodesics toward corners in First Passage Percolation*, J. Stat. Phys., Vol. 172, Issue 4, pp. 1029-1056 (2018).
23. 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.
24. K. Alexander, Q. Berger, *Pinning of a renewal on a quenched renewal*, Electron. J. Probab., Vol. 23, n° 6, 48 pp. (2018).
25. 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).
26. 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).
27. 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).
28. K. Alexander, Q. Berger, *Local limit theorem and renewal theory with no moments*, Electron. J. Probab., Vol. 21, n° 66, pp. 1-18 (2016).
29. 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).
30. 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).
31. 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).
32. 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).
33. 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).
34. Q. Berger, H. Lacoin, *Sharp critical behavior for pinning model in random correlated environment*, Stochastic Process. Appl., Vol. 122,pp. 1397–1436 (2012).
35. 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).
36. 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

37. Quentin Berger, Céline Bonnet, Lucile Laulin, Kilian Raschel, *Topics in Random Walks*, to appear in ESAIM : Proceedings and Surveys, Modélisation aléatoire et stochastique – Journées MAS 2022.
38. 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.

Large audience articles

- *Le paradoxe de Simpson illustré par des données de vaccination contre le Covid-19*, avec Francesco Caravenna, The conversation, 3 novembre 2021.
- *L'art et la manière de mélanger un paquet de cartes*, The conversation, 3 août 2020.
- *Modèles de polymère, transition d'accrochage et désordre*, Matapli n° 109, mars 2016.

Book

Introduction aux Probabilités : Modèles et des applications,
Q. Berger, F. Caravenna, P. Dai Pra (Dunod, Sept. 2021).

Ph.D. Students

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).

Invited presentations

International conferences

March 2024 : French Japanese Conference on Probability Interactions (IHES, France) ;
Juil. 2023 : 43rd conference « Stochastic Processes and their Applications » (Lisbon, Portugal) ;
Dec. 2022 : Conference "Lorentz gases at the intersection of smooth ergodic theory and probability theory" (Leiden, Pays-Bas) ;
May 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) ;
June 2019 : 2nd Italian meeting on probability and mathematical statistics (Vietri sul Mare) ;
Sept. 2018 : Workshop "Scaling Limits in Models of Statistical Mechanics" (Oberwolfach) ;
July 2018 : CIMPA School "Geometry & scaling of random structures" (Buenos Aires) ;
July 2018 : Montreal summer workshop in Probability and Mathematical Physics ;
Sept. 2017 : Workshop "Random walks, folding transitions and related topics" (Florence, Italie) ;
June 2016 : Workshop "Soft Local Times, Polymers and Related Topics", (IMéRA, Marseille) ;
July 2013 : 36e conférence "Stochastic Processes and their Applications" (Boulder, USA) ;
Jan.. 2013 : "Young European Probabilists", Eurandom (Eindhoven, Pays-Bas) ;
May 2012 : Conférence "Random Polymers and Related Topics", (Singapour).

National conferences

Août 2022 : Journées MAS 2022 (Rouen), « Random walk » session ;
Août 2014 : Plenary talk, Journées MAS 2014 (Toulouse, France) ;
Juin 2014 : Journées scientifiques de Nantes (France) ;
Déc. 2012 : Southern California Probability Symposium (Los Angeles, USA) ;
Avril 2012 : Conference "Jeunes Probabilistes et Statisticiens" at CIRM (Marseille) ;
Juillet 2011 : Saint-Flour probability Summer School.

Probability and mathematical physics seminars (since 2018)

2024 : IMPA, Student seminar at ENS Rennes, Rome ; 2023 : Polytechnique, Strasbourg (seminar & 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, Student

seminar at Orsay ; 2019 : Polytechnique, Sorbonne Paris Nord, Student seminar at ENS ; 2018 : Orsay, Warwick, Cambridge, Créteil, Dijon ;

Teaching activities

2022- ENS	*Stochastic Processes* (Master 1) 2022-now ;
2014-	*Random polymers* (Master 2) 2019-2023 ;
Sorbonne	*Introduction to probability theory* (2-nd year Undergraduate) 2019-22 ;
Université	*Preparation to "Agrégation de mathématique"* (Master 2) 2018-22 ;
	Elementary probability – summer class (2-nd year Undergraduate) 2016-18 ;
	Advanced probability (Master 1) 2015-19 ;
	Processes and simulation (3-rd year Undergraduate) 2014-2018 ;
	Probability (3-rd year Undergraduate) 2014-17 ;
	Measure theory and integration (3-rd year Undergraduate) 2014-15.
2012-14	*Applied probability* (Master 1) ; *Probability theory* (3-rd year Undergraduate) ; *fundamental principles of Calculus* (1-st year Undergraduate).
USC	
2010-12	*Introduction to Probability* and *Probability* (TA) ; Oral examiner in mathematics
ENS lyon	(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 : 12 students in total, 9 since 2018.

Master 1 thesis : 13 students in total, 8 since 2018.

Master 2 thesis : 6 students in total, 5 since 2018.

Mentoring and educational counselling

(2022-now) Mentoring for students of École Normale Supérieure.
(2020-21) Mentoring for students recipient of FSMP fellowships (Fondation des Sciences Mathématiques de Paris).
(2020-21) 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 (since 2021) ;
- Workshop : « Random Walks : Interacting, Branching and more », au CIRM, Avril 2024 ;
- Workshop : « Localization phenomena », au CIRM, Mars 2023 ;
- Workshop : *Directed Polymers and Folding*, at CIRM (Marseille), Sept. 2021 ;
- Workshop : *Self-interacting Random Walks and folding*, at CIRM (Marseille), September 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 (since 2017) ;
  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 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. LaTeX, Python, Matlab, Mathematica, html.