Bastien Mallein

Born March 30th 1988

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Professional situation

2017 – **Assistant professor (Maître de Conférence)**, *LAGA, Université Paris 13*, Villetaneuse, France.

2016 – 2017 **Post-doc**, *Institüt fur Mathematik, Universität Zürich*, Zürich, Suisse.
Advisor : Jean Bertoin

2013 – 2016 **Teaching assistant (Agrégé-Préparateur CDD)**, *DMA, École Normale Supérieure*, Paris, France.

2012 – 2013 **PhD student**, *Université Pierre et Marie Curie*, Paris, France.
Director : Zhan Shi

Formation universitaire

2012– 2015 **PhD in Mathematics**, *Université Pierre et Marie Curie*, Paris.
Title: Branching random walk, time-inhomogeneous environment, selection
Director: Zhan Shi

2009 – 2011 **Master of Mathematics**, *Université Paris 11*, Orsay, France.
Option Probability and Statistics

2010 **Research internship**, *University of British Columbia*, Vancouver, Canada.
Title: Convergence of superprocesses through Girsanov transform
Advisor: Edwin Perkins

2008 – 2011 **Licence in Mathematics**, *École Normale Supérieure*, Paris, France.

2006 – 2008 **CPGE**, *Lycée Pierre de Fermat*, Toulouse, France.
Classe préparatoire MPSI/MP

Publications and preprint (links to the manuscripts)

Research themes

○ **Branching Markov processes:** Branching random walk, branching Brownian motion, branching Lévy process

○ **Interacting branching processes :** Branching random walk with selection, in inhomogeneous environment, or multi-types

○ **Application of branching processes :** Directed Erdős-Rényi graphs, infinite bins model

○ **Tree-valued processes :** Derrida–Retaux model, frozen percolation on trees, fixed point of the smoothing transform

○ **Humanoid robotics :** trajectory of linear inverted pendulum, stochastic control of a system

Prépublications

Jul 2020 **Branching Brownian motion conditioned on small maximum**, *Joint work with Xinxin Chen and Hui He*, arXiv:2007.00405, (link).

May 2020 **Group testing as a strategy for the epidemiologic monitoring of COVID-19**, *Joint work with Vincent Brault and Jean-François Rupprecht*, arXiv:2005.06776, (link).

Apr 2020 **Derivative martingale of the branching Brownian motion in dimension** $d \geq 1$, *Joint work with Roman Stasiński and Julien Berestycki*, arXiv:2004.00162, (link).

Feb 2020 **On the derivative martingale in a branching random walk**, *Joint work with Dariusz Buraczewski and Alexander Iksanov*, arXiv:2002.05215, (link).

Oct 2019 **Tight estimates of exit and containment probabilities for nonlinear stochastic systems**, *Joint work with Quang-Cuong Pham and Jean-Jacques Slotine*, arXiv:1910.03724, (link).

Jul 2019 **A simple method to find all solutions to the functional equation of the smoothing transform**, *Joint work with Gerold Alsmeyer*, arXiv:1907.04111, (link).

Oct 2018 **Extremes of branching Ornstein-Uhlenbeck processes**, *Joint work with Julien Berestycki, Éric Brunet and Aser Cortines* , arXiv:1810.05809, (link).

Oct 2016 **Barak-Erdős graphs and the infinite-bin model**, *Joint work with Sanjay Ramassamy*, arXiv:1610.04043, (link).

Publications

2020 **Capturability-based Pattern Generation for Walking with Variable Height**, *Joint work with Stéphane Caron Adrien Escande and Leonardo Lanari*, IEEE Transactions on Robotics, 36, no 2, 517–536.

2020 **An exactly solvable continuous time Derrida–Retaux model**, *Joint work with Yueyun Hu and Michel Pain*, Communications in Mathematical Physics, 375, no 1, 605–651.

2019 **Coalescences in Continuous-State Branching Processes**, *Joint work with Clément Foucart and Chunhua Ma*, Electronic Journal of Probability, 24, no 103, 1–52.

2019 **Analyticity of the growth rate of the longest path in Barak-Erdős graphs**, *Joint work with Sanjay Ramassamy*, Bernoulli, 25, no 4B, 3479–3495.

2019 **Maximal displacement of a supercritical branching random walk in a time-inhomogeneous random environment**, *Joint work with Piotr Miłoś*, Stochastic Processes and their applications, 129, no 9, 3239–3260.

2019 **On the trajectory of an individual chosen according to supercritical Gibbs measure in the branching random walk**, *Joint work with Xinxin Chen and Thomas Madaule*, 125, no 10, 3821–3858.

2019 **Infinitely ramified point measures and branching Lévy processes**, *Joint work with Jean Bertoin*, Annals of Probability, 47, no 3, 1619–1652.

2019 **Necessary and sufficient conditions for the convergence of the consistent maximal displacement of the branching random walk**, Brazilian Journal of Probability and Mathematical Statistics, 33, no 2, 356–373.

2018 **A result on power moments of Lévy-type perpetuities and its application to the** Lp**-convergence of Biggins' martingales in branching Lévy processes**, *Joint work with Alexander Iksanov*, Alea Latin-American Journal on Probability and Statistics, 15, no 2, 315–331.

2018 **Branching-stable point measures and processes**, *Joint work with Jean Bertoin and Aser Cortines*, Advances in Applied Probability, 50, no 4, 1294–1314.

2018 **The genealogy of an exacly solvable Ornstein-Uhlenbeck type branching process with selection**, *Joint work with Aser Cortines*, Electronic Communications in Probability, 23, no 98, 1–13.

2018 **Biggins' Martingale Convergence for Branching Lévy Processes**, *Joint work with Jean Bertoin*, Electronic Communications in Probability, 23, no 83, 1–12.

2018 **Brownian motion and Random Walk above Quenched Random Wall**, *Joint work with Piotr Miłoś*, Annales de l'Institut Henri Poincaré B : Probabilités et Statistiques, 54, no 4, 1877–1916.

2018 **Genealogy of the extremal process of the branching random walk**, *ALEA*, 15, no 39, 1065–1087.

2018 **Balance control using both ZMP and COM height variations: A convex boundedness approach**, *Joint work with Stéphane Caron*, ICRA 2018, Brisbane, Australie, May 2018.

2018 **Branching random walk with trapping zone**, *Joint work with Romain Biard and Landy Rabehasaina*, Stochastic processes and their applications, 128, 2341–2366.

2017 **Second order behavior of the block counting process of beta coalescents**, *Joint work with Yier Lin*, Electronic Journal of Probability, 22, no 61, 1–8.

2017 **A N-branching random walk with random selection**, *Joint work with Aser Cortines*, Alea Latin-American Journal on Probability and Mathematical Statistics, 14, no 1, 117–137.

2017 **N-branching random walk with α-stable spine**, Theory of Probability and its Applications, 62, no 2, 295–318.

2017 **Branching random walk with selection at critical rate**, Bernoulli, 23, no 3, 1784–1821.

2015 **Maximal displacement of a d-dimensional branching Brownian motion**, Electronic Communications in Probability, 20, no. 76, 1–12.

2015 **Maximal displacement of a branching random walk in time-inhomogeneous environment**, Stochastic processes and their applications, 125, no. 10, 3958–4019.

2015 **Maximal displacement of a branching random walk through interfaces**, Electronic Journal of Probability, 20, no. 68 , 1–40.

Publications of mathematical popularization

2016 **Asymptotic of the maximal displacement in a branching random walk**, *Graduate Journal of Mathematics*, 1, no 2, 92–104.

2011 **Généalogie de populations : le coalescent de Kingman**, *(in French) CultureMath, Editeur : Eric Vandendriessche*, lien vers l'article.

2010 **Urnes aléatoires, populations en équilibre et séries génératrices**, *(in French) CultureMath, Editeur : Eric Vandendriessche*, lien vers l'article.

Participations to books

Jun 2016 **Exercices sur les temps locaux de semi-martingales continues et les excursions browniennes**, *Joint work with Marc Yor (in French)*, arXiv:1606.07118, hal-01336238v1.
Livre d'exercices basé sur le cours de M2 éponyme de Marc Yor.

Reports (last 5 years)

Writing reports for Acta Applicandae Mathematicae, Annals of Applied Probability, ALEA–Latin American Journal of Probability and Mathematical Statistics, Annales de l'Institut Henri Poincaré (B) Probabilités et Statistiques (x4), Bernoulli, Electronic Communications in Probability (x2), Electronic Journal of Probability (x5), Markov Processes and Related Fields, Statistics and Probability Letters (x2), Stochastic Processes and their Applications (x3)
Writing reviews for MathSciNet (x11), zbMath (x1), Modcov19 (x8).

Conferences, seminars and colloquiums

Invitation to international events

Aug 2019 **Applied Probability Workshop**, *Novosibirsk State University, Novosibirsk, Russia*, Invited talk.

Jul 2019	**9th international conference on Lévy processes**, *University of the Aegean, Samos, Greece*, Invited talk.
Jun 2019	**5th Workshop on Branching Processes and Related Topics**, *Beijing Normal University, Beiing, China*, Invited talk.
Sept 2017	**Modern perspectives of branching in probability**, *Universität Münster, Münster, Germany*, Invited talk.
Jul 2017	**SPA2017**, *Moscow, Russia*, Exposé à une session invité.
Jul 2017	**Phase transition on random trees**, *Dortmund Universität, Dortmund, Germany*, Invited talk.
May 2017	**P&A 2017**, *Probability and Analysis 2017, Będlewo, Poland*, Invited talk.
Oct 2016	**Conference on Random processes, random media**, *Université de Brest et IUF*, Invited talk.

2020	Probability seminar (University of Bath), Séminaire de Probabilités (Université Lyon 1 et ENS Lyon), Séminaire de M2 (Université Paris-Saclay), Séminaire de Probabilités (LMO, Université Paris-Sud), Groupe de travail Math4Covid-19 (LJLL, Sorbonne Université), Informal seminar (Probability at University College London), Bernoulli-IMS One World Symposium (Exposé participant).
2019	Probability seminar (Department of Statistics, University of Oxford), Séminaire de probabilités (Modal'X, Université Paris-Nanterre), Séminaire de probabilités (Universität Münster), Workshop on Lévy processes (Universität Mannheim), Séminaire de probabilités (CMAP, École Polytechnique), Séminaire de probabilités (LMBP, Université Clermont-Auvergne), Séminaire de probabilités (IMT, Université Toulouse 3 – Paul Sabatier).
2018	Groupe de travail de probabilités (MAP5, Université Paris-Descartes), Séminaire Probabilités et Statistique (LAREMA, Université d'Angers), Séminaire SPACE (Institut Denis Poisson, Université de Tours).
2017	Seminar IHP Combinatorics and Interactions (IHP, Paris), Séminaire de Probabilités (Institut Fourier, Université Grenoble-Alpes), Séminaire de Probabilités (LMO, Université Paris-Sud), Seminar on Stochastic Processes (Institüt fur Mathematik, Universität Zürich), Séminaire de Probabilités (LAGA, Université Paris 13), Séminaire Analyse-Probabilités Dauphine (CEREMADE, Université Paris-Dauphine), Seminar Postdoc and graduate Students (Institüt fur Mathematik, Universität Zürich).
2016	Seminar on Stochastic Processes (Institüt fur Mathematik, Universität Zürich), 4e rencontre Paris-Bath sur les structures branchantes (IHP, Paris), Ecole d'été de Saint-Flour.
2015	Séminaire de Probabilités (Université Lille 1), Séminaire Probabilités et Statistiques (Université Lyon 1), Séminaire de Probabilités (Institut Denis Poisson, Université d'Orléans).
2014	Responsable de session Journées YSP (IHP, Paris), Exposé Jeunes Probabilistes et Statisticiens, Séminaire de Probabilités (LAGA, Université Paris 13), Séminaire de Probabilités (Institut Elie Cartan, Université de Nancy), Ecole d'été de Saint-Flour, Rencontres ANR MEMEMO2, Séminaire des thésards (École Polytechnique).
2013	Séminaire Analyse-Probabilités Dauphine (CEREMADE, Université Paris-Dauphine), Séminaire de Probabilités et Statistiques (Laboratoire de Mathématiques de Versailles, Université Versailles-St-Quentin), Exposé Journées de Probabilités 2013.

Teaching and formation

Teaching

2019 **Invited lecture**, *Sobolev Institute of Mathematics, Novosibirsk State University.*
- Lecture for doctoral level of 6 hours on Galton-Watson processes, branching random walks and the spinal decomposition.

2017– **Assistant professor**, *Institut Galilée, Université Paris 13.*
- M1 : Responsible for TA and TP *Probability*, Responsible for Lectures, TA and TP *Statistics.*
- L3 : Responsible for Lecture and TA *Differential equations and systems* (for Math applied to the Economy), TA and TP *Probability* (for Math applied to the Informatics).
- L2 : TA in *Probability*, TA in *Statistics.*

2016–2017 **Post-doc with Lecture sessions**, *Institüt fur Mathematik, Universität Zürich.*
- M2 : Lecture *Branching random walk.*
- M2 : Responsible for a reading group *Large deviations in infinite dimensions.*
- Doctoral : Responsible for a reading group *Levy processes.*

2013–2016 **Teaching assistant**, *FIMFA, École Normale Supérieure.*
- M1 : TA sessions in *Probability.*

2012–2013 **Doctorant contractuel**, *LPMA, UPMC.*
- L1 : TA sessions in *Analysis.*

Doctoral evaluation

2019 **Rapporteur and Jury member for the thesis of Benjamin Dadoun**, *Some aspects of growth-fragmentation*, at Universität Zürich, directed by Jean Bertoin.

Supervision (PhD, Postdoc)

Oct 2018 – **Mohamed Ali Belloum**, *Extremal values of log-correlated Gaussian fields*, Co-supervised by Yueyun Hu.

Sep 2020 – **Elie Cerf**, *Branching-selection particle systems based on a large number of genes*, Co-supervised by Bénédicte Haas and Laurent Tournier.

Supervision (internship, projects)

2020 **M1 intership of Laila Nizdar**, *Université Paris 13*, Parking processes on critical Galton-Watson trees.

2020 **Undergrad internship of Jérémy Maignant**, *ENS Lyon*, Number of increasing paths on N-ary trees.

2019 **M1 internship of Thi Dai Trang Nguyen**, *Université Paris 13*, Page Parking process (stopped).

2018 **Master thesis of Mohamed Ali Belloum**, *Université Paris 13*, Construction of a genealogical version of Markovian growth-fragmentation processes.

2018 **Master thesis of Vera Ibrahimi**, *Universität Zürich*, Coalescent processes with instantaneous fragmentation.

2017 **Master thesis of François Chalus**, *Universität Zürich*, Branching Brownian motion with decay of mass.

2016 **Internship project of Yier Lin**, *École Normale Supérieure*, Short time asymptotics of the number of blocs in a coalescent process.

2015 **First year short project of Vincent Aubry, Junkang Li**, *École Normale Supérieure*, Branching random walk with selection.

2014 **First year project of Jean-Jil Duchamps et Paul Thévenin**, *École Normale Supérieure*, Voter model.

2012–2015 **Supervision 5 students/year**, *École Normale Supérieure.*
Supervision of ENS students following mathematical studies

Academic and scientific responsibilities

Academic responsibilities

2020–	**Elected member of the laboratory advisory board**, *LAGA, Université Paris 13.*
2019–	**Assistant director of the M2 Mathematics for Data**, *LAGA, Université Paris 13.*
2018	**Member of a working group creating a new master to profesionalize students**, *LAGA, Université Paris 13.*
2013 – 2015	**Elected represutant of AGPR to the advisory lab**, *DMA, ENS.*
2012 – 2013	**Elected represutant of PhD students to the advisory lab**, *LPMA, UPMC.*

Organization of conferences, seminars and colloquiums

June 2020	**Co-organization of Random Networks and Interacting Particle Systems [Abandonned due to Covid19]**, *École Normale Supérieure de Paris.* Four days long thematical conference
Apr 2020	**Co-organization of Paris-Bath-Beijng 6 [Abandonned due to Covid19]**, *University of Bath.* Week-long seminar with thematics englobing branching processes and their applications
Oct 2019	**Co-organization of Journées MathSTIC**, *Université Paris 13.* Three days long seminar with thematics related to combinatorics and statistical physics models
2018 – 2020	**Organization of the Colloquium du LAGA**, *Université Paris 13.* Colloque for all LAGA members, happening 4 times a year
Sept 2018	**Co-organization of the workshop Branching-type structures**, *Universität Zürich.* Three days seminar around branching processes
2015 – 2019	**Co-organization of Probabilités de demain**, *Paris.* Yearly PhD students meeting days in probability of the Paris area
2013 – 2015	**Co-organization of Lab(émol)**, *ENS.* Weekly seminar of former students of the ENS
2012 – 2013	**Co-organization of GTT**, *LPMA, UPMC.* Weekly seminar of PhD students of LPMA
2011 – 2012	**Co-organization of the seminar of Probability students of the ENS**. Weekly seminar of second year probability students of the ENS

Participation to research grants

2017–2020	**ANR MALIN**, *Coordinator: Pierre Tares.*
2011–2015	**ANR MEMEMO2**, *Coordinator: Fabienne Castell.*

Received grants and research projects

2019–2021	**PICS CNRS (PRC Franco-Russe)**, *Infinite-bin models*, French PI.
2019	**PEPS CNRS Jeune chercheur**, *Branching Lévy process.*
2018	**PEPS CNRS Jeune chercheur**, *Growth-fragmentation process.*

Acts of scientific popularization

Sept. 2017	**Savantes Banlieue**, *(Science Fair)*, Villetaneuse.
2013 – 2016	**Fête des Sciences**, *(Science Fair)*, Paris.
2012 – 2015	**Salon Culture et Jeux Mathématiques**, *(Science Fair)*, Paris.