Clément ERIGNOUX

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Academic curriculum and degrees

2023-Today – *ISFP* (INRIA Starting Faculty Position), INRIA Lyon.

2020-2023 – *ISFP* (INRIA Starting Faculty Position), INRIA Lille Nord-Europe.

2018-2020 – *Post-doctoral fellow* (Assigni di ricerca) , Università Roma Tre, on the ERC grant of Alessandro Giuliani.

2016-2018 – *Post-doctoral fellow* at IMPA, Rio, with a Brazilian CNPq grant.

2012-2016 – *PhD thesis* under the direction of Thierry Bodineau, at ENS Ulm's DMA (2012-2013) then at École Polytechnique's CMAP (2013-2016), Paris, with the title *Hydrodynamic limit for an active stochastic lattice gas*. The subject is strongly related to the question of universality of the features of the emergence of collective motion in active matter.

PhD defended on May 4th 2016 (Pres. Ellen Saada, Ref. Claudio Landim & Stefano Olla, Jury Sylvie Méléard, Giambattista Giacomin, Julien Tailleur & Thierry Bodineau).

2010-2012 – *Master's degree* (Probabilities and random models, with high honours) at École Normale Supérieure, then Paris 6 University (UPMC), Paris. Dissertation about a Poisson process on the loops set. Work group and dissertation on random graphs. Six month internship in Schlumberger working on Error Control Coding.

2009-2010 – Got into *École Normale Supérieure Ulm*, Paris on the Math-Physics-Informatics series. Obtained a Bachelor's degree. Dissertation about asymptotic shape of the first passage percolation time.

2007-2009 – Two years of *classes préparatoires* at Lycée Clemenceau, Nantes.

2007 – *Bachelor* (With highest honors).

Publications and submissions

NB : My articles (either published or submitted), together with further scientific content, are available on my web page, <http://chercheurs.lille.inria.fr/cerignou/homepage.html>

Publications

15. $\big[$BEL2024$\big]$ - Steady state large deviations for one-dimensional, symmetric exclusion processes in weak contact with reservoirs, with A. Bouley and C. Landim, (41p.)
    To appear in Annales de l'IHP B - Probabilités et Statistiques (July 2024).

14. $\big[$E2024$\big]$ - On the hydrodynamics of active matter models on a lattice, (18p.)
    Markov Processes and Related Fields - IRS Proceedings , Volume 30, Issue 1, pages 57-80 (2024).

13. $\big[$ESZ2024$\big]$ - Mapping hydrodynamics for the facilitated exclusion and zero-range processes, with M. Simon and L. Zhao, (45p.)
    Annals of Applied Probability, Volume 34, Issue 1B (2024).

12. $\big[$MEJB2023$\big]$ - Exact hydrodynamics and onset of phase separation for an active exclusion process, with J. Mason, M. Bruna and R. Jack, (28p.)
    Submitted to Royal Society Proceedings A, Volume 479, Number 2279 (2023).

11. $\big[$ESZ2023$\big]$ - Asymmetric attractive zero-range processes with particle destruction at the origin, with M. Simon and L. Zhao, (24p.)
    Stochastic Processes and their Applications, volume 159, pp 1–33 (2023).

10. $\big[$BES2021$\big]$ - Stefan problem for a non-ergodic facilitated exclusion process, collaboration with O. Blondel and M. Simon (49p.)
    Probability and Mathematical Physics, volume 2, issue 1, pp 127-178 (2021).

9. $\big[$E2021$\big]$ - Hydrodynamic limit for an active exclusion process, (214p., Published version of PhD thesis, under the supervision of Thierry Bodineau)
   Mémoires de la SMF, volume 169 (2021).

8. $\big[$EGN2020-1$\big]$ - Hydrodynamics for SSEP with non-reversible slow boundary dynamics: Part I, the critical regime and beyond, collaboration with P. Gonçalves and G. Nahum (26p.)
   Journal of Statistical Physics, volume 181, pp 1433–1469 (2020).

7. $\big[$EGN2020-2$\big]$ - Hydrodynamics for SSEP with non-reversible slow boundary dynamics: Part II, below the critical regime, collaboration with P. Gonçalves and G. Nahum (26p.)
   ALEA v.17, pp 791-823 (2020).

6. $\big[$EG2020$\big]$ - Nematic first order phase transition for liquid crystals in the Van Der Waals triple limit, collaboration with A.Giuliani (14p.)
   Journal of Mathematical Physics Vol.61, Issue 10 (2020).

5. $\big[$BESS2020$\big]$ - Hydrodynamic limit for a facilitated exclusion process, collaboration with O. Blondel, M. Sasada and M. Simon (55p.)
   Annales de l'IHP- Probabilités et Statistiques, Volume 56, Issue 1, pp 667–714 (2020).

4. [ES2019] - Equilibrium fluctuations for the disordered harmonic chain perturbed by an energy conserving noise, collaboration with M. Simon (54p.)
   Electronic Journal of Probability, Vol. 24, n° 144 (December 2019).

3. [E2018] - Hydrodynamic limit of boundary driven exclusion process with nonreversible boundary dynamics, (30p.)
   Journal of Statistical Physics, Volume 172, Issue 5, pp 1327–1357 (September 2018).

2. [KEBT2018] - Exact hydrodynamic description of active lattice gases, collaboration with M. Kourbane-Houssene, T. Bodineau and J. Tailleur (6p.)
   Physics Review Letter, Vol. 120, 268003 (June 2018).

1. [ELX2018] - Stationary states of boundary driven exclusion processes with nonreversible boundary dynamics, collaboration with C. Landim and T. Xu (32p.)
   Journal of Statistical Physics, Vol. 171, Issue 4, pp 599-631 (May 2018).

Submissions and preprints

– [ERSS2023] - Hydrodynamic behavior near dynamical criticality of a facilitated conservative lattice gas , with A. Roget, A. Shapira and M. Simon, (6p.)
Submitted to Physical Review E, (May 2024).

– [EM2024] - Cutoff for the transience and mixing time of a SSEP with traps and consequences on the FEP, with B. Massoulié (39p.)
Submitted to Communications in Mathematical Physics, (May 2024).

– [DES2024] - Hydrodynamic limit for a boundary-driven facilitated exclusion process, with H. Da Cunha and M. Simon (45p.)
Submitted to Annales de l'IHP B - Probabilités et Statistiques, (Jan 2024).

– [EZ2023] - Stationary Fluctuations For The Facilitated Exclusion Proc., with L. Zhao, (38p.)
Submitted to Annales de l'IHP, (May 2023).

Referee work and other scientific duties

Member of the ANR MICMOV "ANR-19-CE40-0012", up until august 31 2024.
http://chercheurs.lille.inria.fr/masimon/anr.html

Referee work for

– Annales de l'IHP
– Annals of Probability,
– Bernoulli
– Electronic Communications in Probability,
– Electronic Journal of Probability,
– Journal of Statistical Physics

– Non-linearity,
– PI
– PSPDE Conference Proceedings,
– Probability Theory and Related Fields,
– Probability and Mathematical Physics
– Stochastic Processes and Applications.

Author of the Oberwolfach Reports for the *Large Scale Stochastic Dynamics* workshops, (ID: 1646 and 1938).
Author of the PARADYSE annual team activity report (RADAR) 2020-2023.

Teaching and supervision

Teaching activities

Fall 2022, 2023 – (2h/week, 20h/year total) *Teaching for M2 Maths fondamentales*, Lille 1 University. Advanced probabilities course.

Spring 2021, 2022, 2023 – (2h/week, 18h/year total) *Teaching for L3 Maths*, Lille 1 University. Integration and probability course.

Oct. 2020 – (2h/week, 10h total) *Teaching for L3 MASS*, Lille 1 University. Course and exercise sessions on the topic of Markov chains for the *Advanced Probability* course.

Sept. 2013 - Aug. 2016 – (2h/week) *Teaching for PSL* CPES formation* under the supervision of Farouk Boucekkine. Those were 2nd year university level discrete probabilities course, and 2nd year university level exercises sessions.

Feb. 2014 - Apr. 2016 – ($\simeq$ 140h/year) *Exercises sessions* with first year medical school students, organized by Medisup Paris. 4-8hours/week during teaching periods (4month/year)

Oct. 2011 - Nov. 2012 – (2h/week) *Math "Kholles"* (Oral examination training) at Institut Bossuet, Paris, 2hours/week for ECE-ECS (Economics "classes préparatoires") first and second year students.

2009-2015 – *Maths and physics individual lessons* to several students (first and second year of "classes préparatoires" level & high school level).

Post-doc supervision

Sept. 2020-Agust-2022 – *Linjie Zhao*, Post-doc INRIA **Nov. 2023-Today** – *Gabriel Nahum*, Post-doc INRIA

PhD supervision

Sept. 2023-Today – *Brune Massoulié*, co-advised with Cristina Toninelli, on the macroscopic behavior and timescales of kinetically constrained models

From Sept. 2024 on – *Hugo Da Cunha*, co-advised with M. Simon, Boundary effects in equilibrium and out of equilibrium on the Facilitated Exclusion Process

Students supervision

Avril-July 2023 – *Hugo Da Cunha*, M2 - Maths internship, Stationary states and macroscopic behavior of the boundary-driven FEP.

Avril-July 2023 – *Brune Massoulié*, M2 - Maths internship, sharp estimation of the FEP's transience time.

May-July 2022 – *Adel Assakaf*, M2 - Maths internship, effet de dynamiques de bord sur le FEP.

May-July 2022 – *Hugo Dorfsman*, M1 - Calcul scientifique internship, Comportement microscopique et macroscopique du SSEP en interaction faible avec des réservoirs.

May-June 2022 – *Fael Rebei*, L3 - ENS internship, Limite hydrodynamique et grandes déviations pour le SSEP.

April-July 2021 – *Hugues Moyart*, M1 - Maths internship, dualité et influence de thermostats sur la limite macroscopique du processus d'exclusion simple symétrique.

Conferences, Workshops and Seminars

Mini courses

- *Varadhan's method for non-gradient hydrodynamics - 6h*, Instituto Superior Tecnico, Lisba, May 2-6 2022.

Workshop and conferences organization

- *Asymmetry in interacting particle systems: microscopic and macroscopic effects*, Lille university, October 3–7 2022. Organized with G. Barraquand, O. Blondel, P.Illien, M. Simon.

- *Journée de rentrée de l'équipe Probabilités - Statistiques*, Lille university, September 20 2022. Organized with Charlotte Baey, Sophie Dabo, David Dereudre, Céline Duval and Baba Thiam.

- *Journée de rentrée du laboratoire Paul Painlevé*, 15 November 2021. Organized with Thierry Gobron and Andrea Natale.

Contributed talks in conferences and workshops

- *Workshop "Building a bridge between non-equilibrium statistical physics and biology"*, Isaac Newton Institute, Cambridge, July 3-7 2023.

- *Final workshop for Alessandro Giuliani's UNICOSM grant*, Roma Tre University, February 6-8 2023.

- *Journées MAS*, Rouen University, August 29-31 2022.

- *Workshop* Markov Chains with Kinetic Constraints and Applications, Banff International research center, July 3-8 2022.

- *Workshop* Interacting Particle Systems and Hydrodynamic Limits, CRM Montréal, March 21-25 2022.

- *Workshop* Inhomogenous Random Systems (IRS), held online, January 26-27 2021.

- *Workshop* Random Polymers and Networks, Porquerolles, September 7-11 2020.

- *Short talk at the Workshop* Large Scale Stochastic Dynamics, MFO, Oberwolfach, September 15-20 2019.

- *First joint meeting Brazil-France in mathematics, stochastic analysis session*, IMPA, Rio de Janeiro, July 15-20 2019.

- *Particle Systems and PDE VII, Palermo*, University of Palermo, November 18-23 2018.

- *Journées de probabilité de Rouen*, University of Rouen, September 27-28 2018.

- *CIMPA School, Geometry and scaling limits of random structures*, University of Buenos Aires, July 15-27 2018.

- *IHP Thematic semester Stochastic Dynamics Out Of Equilibrium - Young researcher's seminar*, Institut Henri Poincaré, April 13 2017.

- *Particle Systems and PDE V, Braga*, Braga University, November 28-30 2016.

- *School and Workshop on Random Interacting Systems*, Bath University, June 19-24 2016.

- *YEP : Large Deviations for Interacting Particle Systems and Partial Differential Equations*, Einhoven, March 7-11 2016.

- *Rencontres de Probabilités de Rouen 2015*, Université de Rouen, September 17-18 2015.

Contributed talks in seminars and workgroups

- *Seminario de mecanica statistica*, Held online, June 7 2023.

- *DRACULA team seminar*, University Lyon 1, June 8 2023.

- *Probability Seminar*, Weierstrass Institute, May 17 2023.

- *Joint probability and condensed matter seminar*, Newton institute, Cambridge, May 17 2022.

- *Journée de rentrée de l'équipe PARADYSE*, INRIA Lille, September 24 2021.

- *Journée de rentrée du laboratoire Paul Painlevé*, Université de Lille, July 1 2021.

- *Séminaire Modal'X*, Université Paris Nanterre, May 27 2021.

- *Séminaire du Ceremade*, Université Paris Dauphine, May 11 2021.

- *Journée de rentrée de l'équipe PARADYSE*, INRIA Lille, October 5 2020.

- *Seminar of Probability and Statistical Mechanics*, Universita di l'Aquila, April 16 2019.

- *Informal seminar*, Instituto Superior Técnico , Lisbon, April 4 2019.

- *Seminar of the probability department*, Instituto Superior Técnico , Lisbon, April 2 2019.

- *Seminar of the department of physics and mathematics*, Universita degli studi Roma Tre, October 23 2018.

- *Seminario de probabilidade e combinatorica*, IMPA, June 6 2018.

- *Seminar of Probability*, Università Roma Tre, January 9 2018.

- *Seminaire de probabilités et Statistiques*, Université de Lille, October 18 2017.

- *Seminario de probabilidade e combinatorica*, IMPA, December 6 2016.

- *C.A.K.E. Seminar*, CMS-Cambridge, May 25 2016.

- *Séminaire de Probabilités et Modélisation*, Paris 7, March 24 2016.

- *BOUM project : Fluctuation in particle systems*, Institut Henri Poincaré, March 21-22 2016.

- *Séminaire des Doctorants du CMAP*, CMAP-École Polytechnique, March 27 2015.

- *Séminaire des Doctorants du DMA*, DMA-ENS Ulm, February 5 2014.

- *Groupe de travail des thésards*, LPMA-UPMC, February 17 2014.

Conferences and workshops participations without contributed talks

- *Workshop* Inhomogenous Random Systems (IRS), held online, January 25-26 2022.
- *Rencontres de Probabilités de Rouen*, Université de Rouen, October 21-22 2021.
- *IHP Thematic semester Stochastic Dynamics Out Of Equilibrium, Closing Workshop*, Institut Henri Poincaré, June 12-18 2017.
- *IHP Thematic semester Stochastic Dynamics Out Of Equilibrium, Introductory cConference*, CIRM, April 2-8 2017.
- *Large Scale Stochastic Dynamics, Workshop 1646*, Oberwolfach, November 14-18 2016.
- *Workshop COSMOS (Contributed Poster)*, Les Cordelier-UPMC, February 2-5 2016.
- *Nonequilibrium: Physics, Stochastic and Dynamical Systems*, CIRM, January 18-22 2016.
- *Inhomogeneous Random Systems*, Institut Henri Poincaré, January 26-27 2016.
- *YSP - Young Statisticians and Probabilists III*, Institut Henri Poincaré, January 30th 2015.
- *Inhomogeneous Random Systems*, Institut Henri Poincaré, January 27-28 2015.
- *Rencontres Mathématiques de Rouen 2014*, Université de Rouen, June 18-20 2014.
- *Inhomogeneous Random Systems*, Institut Henri Poincaré, January 28-29 2014.
- *YSP - Young Statisticians and Probabilists I*, Institut Henri Poincaré, January 17th 2014.
- *École d'été de probabilités de Saint-Flour*, Saint-Flour, July 9-19 2013.
- *Inhomogeneous Random Systems*, Institut Henri Poincaré, January 22-23 2013.
- *Probability and Statistical Physics*, CIRM, February 11-15 2013.

Languages & Informatics skills

	Oral Expr.	Oral compr.	Written Expr.	Written compr.
French (*Mothertongue*)	Fl	Fl	Fl	Fl
English	Fl	Fl	Fl	Fl
Portuguese (*Brazil*)	Fl	Fl	G	G
Italian	Fl	Fl	G	G
Spanish	Fu	Fu	R	G
Chinese	R	R	R	R

Table 1: Fl : Fluent, G : Good, Fu : Functional, R : To Reactivate, B : Beginner

- **Programming languages :** Studied *Pascal* and *Maple* during my "classes préparatoires", Proficient in *LaTeX*, strong bases in *C*, in *HTML/CSS* and *Matlab*.

- Very familiar with Windows and Linux.