Rémi Bardenet

✉ remi.bardenet@gmail.com
rbardenet.github.io

Research interests

Keywords Probabilistic modelling and inference; Monte Carlo methods; applications to machine learning, signal processing, particle physics, and cell biology.

Academic positions

Feb. 2015- **Chargé de recherche**, *CNRS & CRIStAL, Université de Lille*, Lille (France).
CRIStAL [link] is the department of computer science, signal processing and automatic control.
Permanent full-research position, employed by the French national centre for scientific research.

2013-2015 **Postdoctoral fellow**, *Department of Statistics, University of Oxford*, Oxford (UK).
2020 Science fellowship of the EPSRC, working with Chris Holmes on large-scale Markov chain Monte Carlo methods, motivated by biological data analysis.
2020 science [link] is a network of computational scientists creating effective approaches to answer fundamental life science questions.

Education

2009-2012 **Doctorat (Ph.D.)**, *Université Paris-Sud XI*, Orsay (France), *très honorable*.
Computer science, *Towards adaptive learning and inference - Applications to hyperparameter tuning and astroparticle physics*, under the supervision of *Balázs Kégl* [link].
Très honorable is the highest honours you can get in Université Paris-Sud. My thesis reviewers were Éric Moulines and Christian Robert. Feel free to ask me for their reports.

2008-2009 **Master (M.Sc.)**, *Ecole Normale Supérieure*, Cachan (France), *highest honours*.
Mathematics, computer vision and machine learning.
Master programme 'MVA'; this programme is considered the best machine learning master nationwide.

2008 **Agrégation**, *Université Louis Pasteur*, Strasbourg (France), *national rank 82*.
Mathematics major, probability & statistics minor.
The *agrégation* is a national competitive exam, originally meant to hire teachers for undergraduate levels. A large proportion (2800+ candidates that year for 252 positions) of French students in mathematics take it, as it is also considered a sesame to the Ph.D. programme.

2005-2009 **Magistère**, *Université Louis Pasteur*, Strasbourg (France), *highest honours*.
Applied and pure mathematics.
Magistères are selective university programmes made of traditional B.Sc./M.Sc. programmes with privileges such as small-group exercise sessions and advanced complementary courses.

Management of funding resources

2016-2020 **ANR JCJC**, *rôle:* PI, **172k€**, 4 people.
Project BoB "Bayesian inference on a budget".
Annual call for starting grants by ANR, the French funding agency (13% acceptance rate).

2016 **CNRS PEPS JCJC**, *rôle:* PI, **10k€**, 2 people.
Project DPPMC "Monte Carlo with determinantal point processes".
PEPS JCJC is a call issued by CNRS for short-term exploratory research projects by young researchers.

2015 **CNRS PEPS JCJC**, *rôle:* co-PI, **7k€**, 2 people.
Project ProMo "Projected Monte Carlo".
PEPS JCJC is a call issued by CNRS for short-term exploratory research projects by young researchers.

Awards

2013 **2nd prize of the *Gilles Kahn* award**, *Société Informatique de France*.
Awarded by the French society of Computer Science for the best French Ph.D. of the academic year.

Recent (2016-) international seminars and visits

- Dept. of mathematics, **Univ. Bristol, UK** (3 days, 2017)
- Dept. of mathematics, **Univ. Aalborg, Denmark** (7 days, 2017)
- Probabilistic numerics group, **Max Planck Institut Tübingen, Germany** (2 days, 2016);
- Dept. of statistics, **Univ. Kent, UK** (2 days, 2016);
- Machine learning group, **Microsoft Sunnyvale, USA** (2 days, 2016);
- Dept. of medical physiology, **Univ. Utrecht, Netherlands** (3 days, 2016);
- Dept. of statistics, **Harvard Univ., USA** (3 days + 1 week 2016);
- Dept. of statistics and Dept. of computer science, **Univ. Oxford, UK** (several visits totalling 1 month since 2016);

Recent (2016-) national seminars and visits

- Dept. of mathematics, **Univ. Paris-Saclay**, Paris (2018, one day).
- *Journée algorithmes stochastiques* [link], **Univ. Paris-Dauphine**, Paris (2017, one day).
- Dept. of mathematics *Jean Leray*, **Univ. Nantes**, Nantes (2017, two days).
- Dept. of signal processing and automatic control *GIPSA-lab*, **Univ. Grenoble-Alpes** (2016, three days).
- Dept. of applied mathematics *Jean Kuntzmann*, **Univ. Grenoble-Alpes** (2016, one day).
- Project-team *Mistis*, **Inria Grenoble**, Grenoble (2016, one day).

Recent (2016-) invited talks in special sessions of international workshops/conferences

- MLSS *African machine learning summer school*, Algiers, Algeria, June 2018.
- SSP conference on *Statistical signal processing*, Freiburg, Germany, June 2018.
- BNPSI workshop on *Bayesian nonparametrics for signal and image processing*, Bordeaux, France, June 2018.
- Workshop on *Cardiac modelling* of the Royal Statiscal Society, Chicheley, UK, February 2017.
- MCQMC conference *Monte Carlo and quasi-Monte Carlo methods*, Stanford Univ., Palo Alto, USA, August 2016.
- Workshop on *High-Dimensional Statistical Models & Big Data*, Alan Turing Institute, London, UK, February 2016.
- MCMSki conference on *Monte Carlo methods*, Lenzerheide, Switzerland, January 2016.

Recent (2016-) invited talks in national workshops/conferences

- Invited speaker at the French *Académie des Sciences* for a mini-workshop on determinantal point processes, June 2018.
- Invited speaker at the Physics colloquium of ENS Lyon, France, March 2018.
- Plenary speaker at the *StatLearn* [link] workshop, Univ. Lyon, April 2017.
- Plenary speaker at the *GRETSI* [link] conference, September 2017.
  GRETSI is the main French-speaking event on signal processing, held every other year since 1967, with 400+ regular participants. Plenaries are prestigious and usually given by more senior academics.
- Bayes in Paris *[link] national seminar series*, Paris, April 2016.

Teaching Experience

CNRS positions come with no teaching duty. Out of personal inclination, I still maintain a small teaching activity at the master level.

2016-2018 **Lecturer**, *ENSAE*, Paris (France).
9 hours per year, on Bayesian nonparametrics (master-level students in statistics and econometry).

2015-2018 **Lecturer**, *École centrale de Lille*, Lille (France).
15 hours per year, on practical machine learning with applications to bankruptcy prediction (master-level engineering students).

2013-2014 **Lecturer**, *Univ. Oxford*, Oxford (UK).
8 hours, teaching half of the course *Advanced simulation* on Monte Carlo methods (4th year statistics students).

2013 **Class tutor**, *Univ. Oxford*, Oxford (UK).
14 hours, tutoring for the course *Advanced simulation* on Monte Carlo methods (4th year statistics students).

2009–2012 **Teaching assistant**, *Univ. Paris-Sud XI*, Orsay (France).
64 hours per year. Covered topics include Linear and Nonlinear Programming (L3), Stochastic processes (M1), C programming (L2) and orientation of students (L1).
L1, L2, and L3 correspond to the first, second, and third year that lead to a bachelor's degree, M1 and M2 to the two years of master.

Scientific responsibilities and research management

2017– I am running a small workgroup on *reproducible research* in Lille, where software engineers transfer selected skills to researchers to achieve high standards of reproducibility. See our *tutorial* [link] for instance, or a *concrete example* [link] of our standards: our software package on DPP sampling for machine learning. More software activity on my *GitHub account* [link]

2013– I have co-organised several national workshops and invited sessions in France and in the UK, the most recent being a one-day workshop with academic and industrial guests on *Big data: modeling, estimation and selection* [link] in 2016, and a special session on *statistical applications of determinantal point processes* [link] at the MAS days of the French society for applied and industrial mathematics (SMAI). I have co-organized one international *workshop* [link] at ICML'14, one of the major international machine learning conferences. I am co-organizing another international *workshop* [link] across physics, mathematics, and signal processing in February 2019 in Lille.

2009– Reviewer for journals such as *Annals of Statistics, Journal of the Royal Statistical Society B, Bernoulli, Journal of Machine Learning Research (JMLR)*, *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, *IEEE Transactions on Signal Processing (TSP)*, *IEEE Transactions on computers (TC)*, *Journal of Computational and Graphical Statistics (JCGS)*, and conferences such as *International Conference on Machine Learning (ICML)*, *Advances in Neural Information Processing Systems (NIPS)*, *International conference on learning theory (COLT)*.

Supervision

Percentages display my own share of the supervision.

2017– **Ph. D. student**, *Ecole Centrale de Lille*, Lille (France), 50%.
I am co-supervising Ayoub Belhadji's Ph.D. with Pierre Chainais (Prof. Centrale Lille & CRIStAL), on *Determinantal point processes for dimension reduction in signal processing.*

2017 **Master student**, *Ecole Centrale de Lille*, Lille (France), 50%.
I have co-supervised Ayoub Belhadji's internship with Pierre Chainais (Prof. Centrale Lille & CRIStAL), on *Determinantal point processes for dimension reduction in signal processing.* Ayoub went on to start a PhD with us.

2016– **Ph. D. student**, *Ecole Centrale de Lille*, Lille (France), 70%.
I am co-supervising Guillaume Gautier's Ph.D. with Michal Valko (HDR, Inria Lille & CRIStAL), on *Fast sampling of determinantal point processes.*

2016 **Master student**, *Ecole Centrale de Lille*, Lille (France), 100%.
I have supervised Guillaume Gautier's internship (master MVA, ENS Cachan), on *Determinantal point processes in statistics and machine learning.* Guillaume went on to start a PhD with me.

2016 **Master student**, *Ecole Centrale de Lille*, Lille (France), 100%.
I have co-supervised Souhail Toumdi's internship (master-level engineering student, majoring in "data analysis and decision-making" at Ecole Centrale de Lille, and following in parallel a master in probability and statistics, Université de Lille), on *Sampling uniform spanning trees.* Souhail then went on to start another prestigious master (MVA; ENS Cachan).

2014–2018 **Ph. D. student**, *Univ. Oxford*, Oxford (UK), 25%.
I have co-supervised Ross Johnstone's Ph.D. with Gary Mirams and David Gavaghan (Oxford Computer Science), with industrial collaborators at *Roche labs* (Basel, Switzerland) on *Uncertainty characterisation in action potential modelling for cardiac drug safety.*

2014 **Master student**, *Univ. Oxford*, Oxford (UK), 33%.
I have co-supervised Joseph Page's internship with Mike Bonsall (Oxford Zoology) and Maria Bruna (Oxford Maths), on *The effect of migration on the resilience and behaviour of coral reefs.*

2012 **Master student**, *Univ. Paris-Sud XI*, Orsay (France), 50%.
I have co-supervised Ahmed Lasmar's master internship with Balázs Kégl, on *Modelling the electro-magnetic component of the Auger tank signal.*

Computer skills

Tools I have a working knowledge of C, Python, Matlab and Mathematica, and I am a regular user of CPU grids. I aim both at collarborative and reproducible research pipelines, using social coding platforms such as *Github* [link] and continuous integration tools.

Languages

French	Fluent	*Mother language.*
English	Fluent	*Main working language.*
German	Fluent	*"Abitur" with highest honours (German equivalent to the French "baccalauréat" or British A-levels).*

Interests

Music I play the piano, keyboards and synthesizers, and I am teaching myself guitar and drums. I am currently especially interested in free improvised music.