Guillaume **Chennetier**

PhD Student · Probability and stastistics

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Summary

I am a third-year French PhD student in probability and statistics. My PhD is an industrial collaboration between CMAP (Applied Mathematics Laboratory of École polytechnique) and the energy company EDF (at the Probabilistic Safety Studies team of the R&D Lab Paris-Saclay). My research focuses on the simulation of rare events for piecewise deterministic Markov processes (PDMP).

From an application perspective, PDMPs are used to model complex dynamic industrial systems where estimating the probability of failure is essential. Given the rarity of these failures and the high cost of simulating industrial systems, my research is dedicated to exploring methods that offer reduced variance compared to the standard Monte Carlo approach.

I am looking for a post-doctoral contract, preferably in the Île de France region, starting in May 2024 (flexible).

Education

PhD candidate in Applied Probability and Statistics
Palaiseau, France

CMAP, Ecole polytechnique, Institut polytechnique de Paris
Mar. 2021 — Present

- **Industrial collaboration** (CIFRE) between EDF R&D Lab Paris-Saclay and CMAP laboratory
- **Topic:** Adaptive importance sampling of piecewise deterministic Markov processes for rare event simulation
- **Application** in reliability assessment of complex dynamic industrial systems
- **Academic advisor:** Josselin Garnier, **industrial advisors:** Hassane Chraibi and Anne Dutfoy
- **Keywords:** Monte Carlo, Uncertainty quantification, Stochastic processes

MSc. in Mathematics and applications — specializing in Statistics
Paris, France

Sorbonne Université — Paris VI
2017 — 2020

- **Courses:** Machine learning, Non parametric statistics, Monte Carlo methods, Topological data analysis, Compressed sensing, etc.
- **Internship** at EDF on the future PhD topic: rare event simulation with piecewise deterministic Markov processes

B.S. in Applied Mathematics
Toulouse, France

Université Paul Sabatier
2015 — 2016

- **Courses:** Measure theory, Topology, Ordinary differential equations, Probability and statistics, Signal processing, etc.
- **Internship** at Inbenta on clustering for natural language processing

Work Experience

Research engineer (CIFRE) — Probability and statistics for reliability assessment
Palaiseau, France

EDF Lab Paris-Saclay, PERICLES Department, Probabilistic Safety Assessment team
Mar. 2021 — Present

- **Mission:** Developing new methods for estimating the probability of failure of complex dynamic industrial systems.
- **IT:** Contributing to enhancing the `PyCATSHOO` modeling and simulation tool.
- **Supervision:** Two interns supervised on a 6-month IT topic and a 3-month mathematics topic.
- **Teaching:** 64 hours as an instructor at École polytechnique.
- **Participation in academic laboratory activities:** co-organization of the PhD student days in 2022 (scientific and social event).

Internship — Data Analyst in Quantitative Marketing and Educational Support
Paris, France

Prepaya — Institute for preparing students for competitive exams for business schools and public service
Jun. 2017 — Aug. 2017

- Web scraping with R and classification for targeted advertising on social media.
- Teaching quantitative exercises. Educational content writing and website contributor.

Internship — Statistician and Python Developer in Natural Language Processing
Toulouse, France

Inbenta — Start-up specializing in natural language processing for customer relations (chatbots)
Jun. 2016 — Aug. 2016

- Documentation of a K-medoids clustering algorithm.
- Parameter optimization: development of an efficiency criterion and testing on real data.

Mission — Qualitative survey of transport users in anticipation of a line closure
Paris, France

BVA in mission for RATP — Public transportation for Paris and its suburbs
Jul. 2015

- Interviews with passengers on platforms, analysis, and report writing.

Publications

Accepted paper

2023   Adaptive importance sampling based on fault tree analysis for piecewise deterministic Markov process
Guillaume Chennetier, Hassane Chraibi, Anne Dutfoy & Josselin Garnier.
Accepted in SIAM Journal of Uncertainty Quantification.

In proceedings

2023   A fault-tree-based importance sampling strategy for piecewise deterministic Markov processes
Guillaume Chennetier, Hassane Chraibi, Anne Dutfoy & Josselin Garnier.
UNCECOMP 5th International Conference on Uncertainty Quantification in Computational Sciences and Engineering.

In preparation

2023   Approximating committor functions with graph-based mean hitting times
Guillaume Chennetier, Hassane Chraibi, Anne Dutfoy & Josselin Garnier.
Preprint soon online.

Talks

Contributed Talks at conferences

CJC-MA   Congrès des Jeunes Chercheurs en Mathématiques Appliquées
2023 Gif-sur-Yvette, France.
2021 Palaiseau, France.

JDS   Journées de Statistique de la SFDS
2023 Long abstract. Bruxelles, Belgium.
2022 Long abstract. Lyon, France.

MCM   Monte Carlo Methods and applications
2023 Paris, France.

UNCECOMP   Uncertainty Quantification in Computational Science and Engineering
2023 Paper. Athens, Greece.

MASCOT-NUM   Annual meeting of the MASCOT-NUM research network
2023 Poster. Le Croisic, France.
2022 Award won: best PhD Student Poster. Clermont-Ferrand, France.

MAS   Journées du groupe Modélisation Aléatoire et Statistique de la SMAI
2022 Rouen, France.

ESREL   European Safety and Reliability Conference
2021 Angers, France.

Talks at seminars

ETICS	Research School on Uncertainty in Scientific Computing
	2023 Cap-Ferret, France.
	2022 L'Île Rousse, France.
	2021 Erdeven, France.
CJPS	Colloque Jeunes Probabilistes et Statisticiens
	2023 Île d'Oléron, France.
SIMPAS	Seminar of the Statistics Team of the CMAP laboratory
	2023 Hyères, France.
	2022 Palaiseau, France.
PSPP	Probabilités et Statistiques pour les Phénomènes Physiques
	2022 EDF Chatou, France.
ASCII	Seminar of the INRIA team Analysis of Stochastic Cooperative Intelligent Interactions
	2022 Rueil-Malmaison, France.
	2021 Saint-Rémy-lès-Chevreuse, France.
Gaussbusters	Seminar of the PhD students in probability and statistics at IRMAR
	2022 Rennes, France.

Teaching and mentoring

Teaching

3rd year Ecole polytechnique	Random numerical simulation of rare events MAP473D, **Practical work 1x4h,** Arvind Singh (2023).
2nd year Ecole polytechnique	Statistics MAP433, **Correction of 160 homeworks,** Eric Moulines (2022).
	Modelling random phenomena MAP432, **Correction of 40 homeworks,** Thierry Bodineau (2022).
1st year Ecole polytechnique	Randomness MAP361, **Practical work 4x2h,** Arvind Singh (2022).
Master X-HEC Data Science for Business	Probability refreshers MAP530, **Tutorial 4x3h,** Tabea Rebafka (2022).
	Linear algebra refreshers MAP532, **Tutorial 1x3h,** Flore Nabet (2022).

Mentoring

EDF internships	**Interns co-supervised with Hassane Chraibi in the Probabilistic Safety Assessment team.**
	Implementing importance sampling based on fault tree analysis in `PyCATSHOO` tool, Yann Barbier (Apr. 2023 — Oct. 2023).
	Computing mean hitting times of a random walk in a large sparse graph, Thomas Quarck (June 2023 — Aug. 2023).
Bachelor thesis	**Supervision of short theses by 3rd year Bachelor students at Ecole polytechnique.**
	Multiple hypothesis testing: the p-value problem, (Jan. 2023 — Mar. 2023).
	Simulated annealing: using randomness to solve the traveling salesman problem, (Jan. 2023 — Mar. 2023).

Extracurricular Activity

In mathematical community

Secretary — The Young Statisticians, SFDS (French Statistical Society) France

Groupe Jeunes de la Société Française de Statistique — 2023 — present

- Co-organizing the 12th Young Statisticians and Probabilists day.
- Co-organization of scientific sessions and social events at JDS 2023.

Speaker and Instructor for Math'Gic Festival — Mathematics popularization workshops Gennevilliers, France

Gennevilliers Town Hall — Festival held one week a year 2017 — 2022

- Conducting workshops for primary, middle school and high school students.
- Training new speakers since 2020.

In music

Civil service — Facilitator for the DEMOS project & Mentoring music students Paris, France

Regional Conservatory of Paris Feb. 2019 - Oct. 2019

- **DEMOS Project:** Musical and orchestral training for underprivileged children.
- **Administrative work:** computerization of services, establishment of partnerships, and archiving.

Organ practice Cagnes-sur-Mer & Toulouse, France.

Conservatory in Cagnes-sur-Mer & Music school in Toulouse 2002 — 2014

- Piano practice since 2018.
- Strong interest in musicology.

Skills

Programming	Python, R
Languages	French (Native), English (C1), German (A2)