

Alexandre Marthe

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Career Profile

Scientist with broad-ranging research expertise, able to work both independently and as a supportive team member. Quickly assimilates information, identifies key insights, and draws clear conclusions. Enjoys solving complex technical problems by developing original approaches and exploring them from new perspectives. Confident presenting to both technical and non-specialist audiences. Thrives on new intellectual challenges and collaborative environments.

Research Experience

PhD Research — Risk-Sensitive Planning in Markov Decision Processes | 2022–2026, ENS de Lyon, Lyon

- Established a unified mathematical characterization of the objectives that can be optimized using distributional dynamic programming in Markov Decision Processes.
- Analysed the structure of optimal policies for several classes of risk measures and developed a general algorithm for risk-sensitive planning.
- Derived new concentrations inequalities for a class of risk measures with application to reinforcement learning.
- Research accepted and presented at leading machine-learning and reinforcement-learning venues, including NeurIPS, ALT, and EWRL.

*Research Internship — Sparse Matrix Factorization and Dictionary Learning for Electron Tomography
Spring 2020 (3 months) — Swiss Data Science Center, Switzerland*

- Improved a dictionary-learning algorithm for the analysis of electron-tomography data by exploiting its sparse structure, significantly increasing reconstruction accuracy.

*Research Internship — Formal Modelling and Analysis of the Insulin Signalling Pathway
Summer 2019 (6 weeks) — BioComputing team at CRISTAL, Lille*

- Modelled the insulin signalling pathway using Petri nets to support the formal study of biological mechanisms associated with diabetes.

Education

2022–2026 | PhD in Mathematics, ENS de Lyon, France

2021–2022 | Master 2 — Mathematics, Vision and Learning (MVA), ENS Paris-Saclay, France

- Relevant coursework: Reinforcement Learning, Statistical Learning, Convex Optimization, Time-Series Learning, Deep Reinforcement Learning, and Speech and Natural Language Processing.

2020–2021 | Training for the Agrégation de Mathématiques, ENS de Lyon

- Passed France's highly selective national competitive examination for mathematics teaching.

2019–2020 | Master 1 — Fundamental Computer Science, ENS de Lyon

- Relevant coursework: Parallel Programming, Optimization, Performance Evaluation, Proofs and Programs, Semantics and Verification, Machine Learning, Cryptography, and Computer Security.

Personal Projects

Implementing LLMs from scratch

- Trained a small Language Model (~17M parameters) on the TinyStories dataset : Implemented a BPE tokenizer, all Transformer modules, AdamW, and the full training pipeline from scratch in PyTorch.
- Implemented a full RL pipeline from scratch to post-train OLMo-2-0425-1B on GSM8K: Implemented the pipeline and several RL algorithm variants: GRPO (both online and offline), Dr. GRPO, RFT, MaxRL, and GSPO.

Relevant Skills

Coding skills: Python, C & C++, OCaml

Other: Linux, Windows, Office, Latex, Git, AI agents

Leadership & Extracurricular Activities

Competitive Player and International Judge — Yu-Gi-Oh! Trading Card Game | 2022–2025

- Competed at the highest level in a complex and continuously evolving strategy game, developing original strategies and maintaining focus under competitive pressure.
- Supported the organization and delivery of international events attended by several thousand players.
- Resolved complex gameplay issues and interpersonal conflicts accurately and impartially in high-pressure environments.
- Led and mentored teams of volunteer judges, coordinating their work throughout large-scale tournaments.

Competitive Cheerleading Athlete | 2023–2026

- Won two bronze medals at the French National Championships and several medals, including gold, at international competitions.
- Performed technically demanding, high-intensity routines under significant competitive pressure.
- Developed strong team cohesion and mutual trust while executing routines requiring precise coordination and complete reliance on teammates.

Treasurer and Executive Committee Member — ENS de Lyon Student Council | 2019–2020

- Managed an annual budget of approximately €200,000 for a student association representing around 1,000 members.
- Led the planning and delivery of social events attended by several hundred participants.
- Coordinated budgets, logistics, and organizational responsibilities with other executive committee members.

Teaching Experience

2022–2024 | Tutorial Instructor for third-year undergraduate Computer Science student, ENS de Lyon

- Taught programming fundamentals in C, Python, and OCaml to third-year undergraduate computer science students.
- Led tutorials on computer architecture and operating systems.
- Taught discrete probability concepts up to concentration inequalities and Markov chains.

2020–2021 | Undergraduate Student mentoring, ENS de Lyon

- Mentored an undergraduate student throughout the academic year, providing support with coursework, study methods, and academic orientation.

Publications

- Marthe, A., Garivier, A., & Vernade, C. (2023). Beyond Average Return in Markov Decision Processes. *Advances in Neural Information Processing Systems*, 36, 56488-56507.
- Marthe, A., Bounan, S., Garivier, A., & Vernade, C. (2025). Efficient risk-sensitive planning via entropic risk measures. *arXiv preprint arXiv:2502.20423*. Presented at the 2025 European Workshop on Reinforcement Learning. (*submitted for publication*)
- Marthe, A. (2026). *Risk-Sensitive Planning in Markov Decision Processes: Distributional Perspective and Entropic Front* (Doctoral dissertation, École Normale Supérieure de Lyon).

In redaction or being reviewed:

- Marthe, A., Ahmadipour, M., Garivier, A., & Vernade, C. (2026). Statistical complexity of the entropic risk measure.
- Marthe, A., Garivier, A., & Vernade, C. (2026). On the Optimization of Functionals of the Return in Finite-Horizon Markov Decision Processes.