

ANTOINE MOULIN

PhD student in Machine Learning

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RESEARCH INTERESTS

Reinforcement learning (efficient exploration with function approximation, adversarial environments, distribution shift), online learning (adaptive algorithms, post-training of language models).

EDUCATION

Ph.D in Machine Learning

Universitat Pompeu Fabra

Dec 2021 – Present

Barcelona, Spain

- The overarching topic is to identify and exploit structural properties of Markov decision processes that make large-scale reinforcement learning (RL) statistically and computationally feasible.
- Part of the ELLIS program, advised by [Gergely Neu](#) and [Arthur Gretton](#).

Master of Science in Machine Learning

ENS Paris-Saclay

Sep 2019 – Sep 2020

Paris, France

- Grade: 17.34/20.00. Courses: RL, Computer Vision, Graphical Models, Convex Optimization, Deep Learning, Neurosciences, Kernel Methods, Sequential Learning, Multi-scale models, Biostatistics.

Engineering Degree

Telecom Paris

Sep 2017 – Sep 2020

Paris, France

- GPA: 4.00/4.00. Equivalent to a Masters, top 5% cohort. Some courses: Measure & Probability Theory, Functional Analysis, Signal Processing, Statistics, Machine Learning, Optimization, Algorithm Design.

Preparatory Classes

Lycée Janson-de-Sailly

Sep 2015 – Jul 2017

Paris, France

- GPA: 3.96/4.00. Post-secondary two-year program in Advanced Mathematics and Physics.

EXPERIENCE

Student Researcher

Google DeepMind

Jun 2024 – Dec 2024

London, UK

- Worked on epistemic uncertainty quantification and how to compute finite-time predictive intervals for general function classes using ensembles and approximations thereof. Advisor: [Ilja Kuzborskij](#).
- Worked on task-specific data mixture selection for large language models.

Research Engineer

Research Intern

INRIA

Feb 2021 – Apr 2021

May 2020 – Oct 2020

Lille, France

- Focus on deep RL. Implemented extensions of actor-critic methods (PPO, TRPO) to improve exploration, worked on reproducibility issues in RL. Advisor: [Philippe Preux](#).

Research Intern

Aalto University

Summer 2019

Helsinki, Finland

- Reviewed the literature on canonical correlation analysis (CCA) methods and implemented an efficient extension of a sparse kernel CCA method. Advisor: [Juho Rousu](#).

PUBLICATIONS & PREPRINTS

Inverse Q -Learning Done Right: Offline Imitation Learning in Q^π -Realizable MDPs [arXiv]

Antoine Moulin, Gergely Neu, and Luca Viano (α - β order).

(NeurIPS 2025) 39th Annual Conference on Neural Information Processing Systems.

Demystifying Spectral Feature Learning for Instrumental Variable Regression [arXiv]

Dimitri Meunier, **Antoine Moulin**, Jakub Wornbard, Vladimir R Kostic, and Arthur Gretton.

(NeurIPS 2025) 39th Annual Conference on Neural Information Processing Systems.

When Lower-Order Terms Dominate: Improved Loss-Range Adaptivity for Expert Algorithms [arXiv]

Antoine Moulin*, Emmanuel Esposito*, and Dirk van der Hoeven.

(NeurIPS 2025) 39th Annual Conference on Neural Information Processing Systems.

Optimistically Optimistic Exploration for Provably Efficient Infinite-Horizon Reinforcement and Imitation Learning [arXiv]

Antoine Moulin, Gergely Neu, and Luca Viano (α - β order).

(COLT 2025) 38th Annual Conference on Learning Theory.

Contributed talk at the 18th European Workshop on Reinforcement Learning (EWRL 2025).

Spectral Representation for Causal Estimation with Hidden Confounders [arXiv]

Haotian Sun, **Antoine Moulin**, Tongzheng Ren, Arthur Gretton, and Bo Dai.

(AISTATS 2025) 28th International Conference on Artificial Intelligence and Statistics.

Optimistic Planning by Regularized Dynamic Programming [arXiv]

Antoine Moulin, and Gergely Neu (α - β order).

(ICML 2023) 40th International Conference on Machine Learning.

TALKS

Learning in Adversarial Linear MDPs

University of Tokyo

Mar 2024

Tokyo, Japan

Optimistic Planning by Regularized Dynamic Programming

Princeton University

Aug 2023

Princeton, NJ

Optimistic Planning by Regularized Dynamic Programming

Stanford University

Jul 2023

Stanford, CA

Infinite-Horizon RL with Linear Function Approximation

Universitat Pompeu Fabra

Mar 2023

Barcelona, Spain

Primal-dual Methods for RL

Gatsby Unit, University College London

Sep 2022

London, UK

Introduction to JAX

ELLIS Doctoral Symposium

Sep 2021

Tubingen, Germany

TEACHING

Machine Learning	Universitat Pompeu Fabra	2022 – 2023
Algorithm Design	Universitat Pompeu Fabra	2022 – 2024
Computer Science	IPESUP, bootcamp for high-school students	2023
Probabilities	Universitat Pompeu Fabra	2022
Mathematics Examiner	Lycée Janson-de-Sailly, preparatory classes	2018 – 2019

ACADEMIC ACTIVITIES

- Organizer of the NeurIPS 2025 workshop *Aligning Reinforcement Learning Experimentalists and Theorists*.
- Organizer of the **RL theory virtual seminars**.
- Organizer of the ICML 2024 workshop *Aligning Reinforcement Learning Experimentalists and Theorists*.
- Organizer of the **Reinforcement Learning Summer School 2023** (RLSS 2023).
- Reviewer at EWRL 2023, ARLET 2024, NeurIPS 2025, EWRL 2025, ARLET 2025, JMLR.
- Chair of the ELLIS RL reading group (2021 – 2022).
- Volunteer at AISTATS 2021.

SKILLS

Programming	Python (JAX, PyTorch), MATLAB, C++ , Java, SQL, HTML.
Languages	French (native), English (fluent), Spanish, Italian (intermediate).

SCHOLARSHIPS & GRANTS

ELSA mobility grant	2025
ELISE mobility grant	2022, 2024
Doctoral scholarship, Universitat Pompeu Fabra	2021
Doctoral scholarship, University of Cambridge (declined)	2021
Doctoral scholarship, University of Geneva (declined)	2021
Research studentship (Gatsby Unit), University College London (declined)	2021
3rd place for “Virtual Sculpture” at Innovation Day, Telecom Paris	2018

OTHER ACTIVITIES

- Organizer of the beach volley tournament at DTIC, Universitat Pompeu Fabra (2022 – 2023).
- Communication manager in a student-led company at Telecom Paris (2018 – 2019). Organized workshops, study cases, visits and a gala for students & partner companies (€27K budget). Managed missions in Machine Learning for several companies.
- Hobbies include climbing, (beach) volleyball, ski, table tennis.