

# Pierre-Alexandre Kamienny

FINAL YEAR PHD STUDENT (META AI - SORBONNE UNIVERSITY)

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## Summary

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- Seeking opportunities to work as a **Research Scientist/Engineer**. Willing to relocate.
- Research Assistant at Meta AI with expertise in **Deep Reinforcement Learning** (RL) and **AI4Maths** (symbolic regression) using **Large Language Models** (LLMs). Papers accepted at top conferences (NeurIPS, ICLR and ICML).
- Studied Computer Science at the University of Oxford & CentraleSupélec

## Work Experience

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### Meta AI

Paris, France

RESEARCH ASSISTANT

2020 - Now

- Developed the symbolic regression (SR) algorithm [3] that achieves the **state-of-the-art** trade-off between inference speed and accuracy on tabular data benchmarks.
- Created a Streamlit **demo** to predict symbolic expressions from uploaded datasets with no-code and at least 100 faster than SOTA algorithms.
- My research involves challenging **large-scale engineering skills**: I built on **Transformer** models pre-trained on large synthetic datasets across multiple preemptable machines [3], fine-tuned using online data generated by a distributed **Monte-Carlo-Tree Search** [1].
- Developed model-based RL agents that explicitly model dynamics with **interpretable** symbolic expressions (equations) [8] allowing to improve sample efficiency and performance of their neural world-model counterpart.
- Developed a **unsupervised** hierarchical RL algorithm that learns re-usable skills that provide good state-space coverage and easily amenable to fine-tuning at test-time. Achieved state-of-the-art on a range of continuous control tasks [5].
- Published in top conferences (NeurIPS, ICLR and ICML).

### Facebook AI Research

Paris, France

RESEARCH INTERN

Sep. 2019 - Dec. 2019

- Developed an RL algorithm that learns task representations capable of facilitating zero-shot transfer to unseen test tasks [7]. Supervised by Ludovic Denoyer.

### Whiteson Reinforcement Learning Lab

Oxford, UK

RESEARCH ASSISTANT

Sep. 2018 - Sep. 2019

- Implemented algorithms for i) multi-agent continuous RL using input-convex neural networks [6], ii) training RL agents with significantly better sample efficiency by incorporating available extra information (e.g. full observations in POMDPs) without relying on it at test-time [10]. Supervised by Feryal Behbahani & Shimon Whiteson.

### Nokia Bell Labs

Paris, France

RESEARCH INTERN

Jun. 2018 - Sep. 2018

- Deep learning for telecommunications (Digital Pre-Distortion) under neural networks size constraints. Reduced the error of the expert model in production by an order of magnitude without additional latency cost. Supervised by Jakob Hoydis.

### Neoxia

Paris, France

SOFTWARE ENGINEER INTERN

Jun. 2017 - Aug. 2017

- Real-time Twitter Sentiment Analysis with NLP. Technologies: Tensorflow, Kafka, Cassandra, Akka, Spark, D3.JS.

## Education

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### Meta AI & Sorbonne University, ISIR

Paris, France

PHD STUDENT

2020 - Now

- Industrial Ph.D. at Meta AI advised by François Charton, Ludovic Denoyer and Sylvain Lamprier. **Graduation expected in summer 2023.**

## University of Oxford

MSc COMPUTER SCIENCE - DISTINCTION

Oxford, UK

2018 - 2019

- Master's thesis (under supervision of Shimon Whiteson): *Privileged information in Reinforcement Learning*
- Main courses: Computational learning theory, Machine learning, Computational game theory, Probability and computing

## CentraleSupélec

MASTER'S DEGREE IN ENGINEERING - TOP 10% (GPA:3.8/4.0)

Paris, France

2016 - 2019

- Main courses: Computer Science, Electrical Engineering, Applied Mathematics, Quantum physics, Economics, Business

## Miscellaneous

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- [Organization] **Organized** the Symbolic Regression competition to be held at there GECCO2023 conference with three senior researchers.
- [Invited talks] Gave talks about my research in SR at the University of Texas at Austin, Alibaba, Centrum Wiskunde & Informatica (CWI)...
- [Academic visit] Spent two weeks in Amsterdam at the CWI to collaborate with Marco Virgolin on [1].
- [Student Organization] Founded a **start-up** and led a team of **5** people during my studies to connect disabled people with companions that want to share their passion. Won several entrepreneurship prizes (GSVC, Crédit Mutuel, ...).
- [Interests] Practice street-lifting for 8 years (competition-level), Urbex amateur.

## Skills

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- [Programming] Python, PyTorch, LaTeX
- [Tools] Git, Unix, Slurm
- [Languages] French (native), English (C1-C2, IELTS 7.5), German (A2-B1)

## Papers

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- [1] **Pierre-Alexandre Kamienny**, Guillaume Lample, Sylvain Lamprier, Marco Virgolin. *Deep Generative Symbolic Regression with Monte-Carlo-Tree-Search*. In **ICML 2023**. <https://arxiv.org/abs/2302.11223>
- [2] Tommaso Bendinelli, Luca Biggio, **Pierre-Alexandre Kamienny**. *Controllable Deep Symbolic Regression*. In **ICML 2023**. <https://arxiv.org/abs/2304.10336v1>
- [3] **Pierre-Alexandre Kamienny**, Stéphane d'Ascoli, Guillaume Lample, Francois Charton. *End-to-end symbolic regression with transformers*. In **NeurIPS 2022**. <https://arxiv.org/abs/2204.10532>
- [4] **Pierre-Alexandre Kamienny**, Stéphane d'Ascoli, Guillaume Lample, Francois Charton. *Deep symbolic regression for recurrence prediction*. In **ICML 2022**. <https://arxiv.org/abs/2201.04600>
- [5] **Pierre-Alexandre Kamienny**, Jean Tarbouriech, Sylvain Lamprier, Alessandro Lazaric, Ludovic Denoyer. *Direct then Diffuse: Incremental Unsupervised Skill Discovery for State Covering and Goal Reaching*. In **ICLR 2022**. <https://arxiv.org/abs/2110.14457>
- [6] Bei Peng, Tabish Rashid, Christian Schroeder de Witt, **Pierre-Alexandre Kamienny**, Philip Torr, Wendelin Böhmer, Shimon Whiteson. *FACMAC: Factored multi-agent centralised policy gradients*. In **NeurIPS 2021**. <https://arxiv.org/abs/2003.06709>
- [7] **Pierre-Alexandre Kamienny**, Matteo Pirota, Alessandro Lazaric, Thibault Lavril, Nicolas Usunier, Ludovic Denoyer. *Learning adaptive exploration strategies in dynamic environments through informed policy regularization*. <https://arxiv.org/abs/2005.02934>
- [8] **Pierre-Alexandre Kamienny**, Sylvain Lamprier. *Symbolic Model-Based Reinforcement Learning*. In **NeurIPS 2022**, Workshop on AI4Science & Workshop on Gaussian Processes, Spatiotemporal Modeling, and Decision-making Systems. <https://openreview.net/pdf?id=yeF6cyYU7W>
- [9] **Pierre-Alexandre Kamienny**, Matteo Pirota, Alessandro Lazaric, Thibault Lavril, Nicolas Usunier, Ludovic Denoyer. *Meta-Reinforcement Learning With Informed Policy Regularization*, In **ICML 2020** Workshop on Inductive Biases, Invariances and Generalization in RL (BIG). <https://arxiv.org/abs/2005.09220>
- [10] **Pierre-Alexandre Kamienny**, Kai Arulkumaran, Feryal Behbahani, Wendelin Boehmer, Shimon Whiteson. *Privileged information dropout in reinforcement learning*. In **ICLR 2020** Workshop on Beyond tabula rasa in RL (BeTR-RL). <https://arxiv.org/abs/2005.09220>