# Vincent Quirion

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## Education

**Mila - University of Montreal** — Montreal, Canada
*Master's Degree, Computer Science - GPA: 4.0* — *September 2024 – Anytime*

**University of Montreal** — Montreal, Canada
*Bachelor's Degree, Honors Computer Science – GPA: 4.0* — *Sept. 2021 – April 2024*

## Work Experience

**Machine Learning Researcher** | collaboration with **Google DeepMind** — June 2024 – Present
*Mila - Montreal Institute for Learning Algorithms - University of Montreal* — *Montreal, Canada*

- Fundamental research on machine unlearning in collaboration with Google DeepMind researchers Karolina Dziugaite, Eleni Triantafillou, and Ioannis Mitliagkas. Paper to submitted to ICLR.
- Studied the evolution of the discretized Langevin stochastic differential equation (noisy SGD) to prove statistical indistinguishability guarantees and generalization bounds for the Langevin Unlearning algorithm.
- Introduced a framework for incorporating auxiliary public domain data to improve the unlearning-utility tradeoff of Langevin Unlearning, and derived extended bounds for this regime.
- Ran large-scale experiments that highlighted the benefits of this novel framework for Langevin Unlearning.

**Machine Learning Researcher** | with **Prof. Yoshua Bengio** — September 2022 – May 2024
*Mila - Montreal Institute for Learning Algorithms - University of Montreal* — *Montreal, Canada*

- Led the development of an embarrassingly parallel method to better scale the training of generative models on multi-GPU hardware.
- Implemented it in efficient distributed PyTorch code and ran experiments on multi-node hardware configurations of the Mila cluster.
- Collaborated with Recursion Pharmaceuticals researchers to test the method on their industry-grade molecule generation environment.

**Quantum Information Science Researcher** | with **Prof. Gilles Brassard** — May 2023 – August 2023
*Laboratory for Theorical and Quantum Informatics - University of Montreal* — *Montreal, Canada*

- Utilized the NPA hierarchy to approximate the best strategies for non-local games by solving semi-definite programs. Work presented in my collaborator's thesis about entanglement-assisted communication complexity.
- Wrote high performance distributed Julia code to efficiently solve these SDPs at scale on a compute cluster.

**Software Engineer** — May 2021 – September 2022
*Secure AI Labs - Massachusetts Institute of Technology (MIT) spin-off* — *Cambridge, Massachusetts*

- Implemented numerous features of their proprietary federated learning and differential privacy library.
- Wore many other software engineer hats to build the MVP that allowed SAIL to raise a $5 million seed round.

## Relevant Coursework

**Adversarial Learning (IFT6164)** | *Mila - University of Montreal* | *Grade: A+* — Winter 2025

- Material: adversarial examples, adversarial learning, generative adversarial networks, Wasserstein generative adversarial networks, optimization & differentiable games, extragradient method, spectral analysis, stability and equilibrium, multi agent RL, evaluation and learning in multi-agent systems.

**Probabilistic Graphical Models (IFT6269)** | *Mila - University of Montreal* | *Grade: A+* — Fall 2024

- Material: probability concepts, maximum likelihood estimation, linear regression, logistic regression, Fisher discriminant, K-means, expectation–maximization algorithm, Gaussian mixtures, directed and undirected graphical models, exponential family, information theory, Gaussian networks, factor analysis, sum-product algorithm, hidden markov models, junction tree, approximate inference & sampling, variational methods, estimation of parameters in graphical models, Bayesian methods, model selection.