Killian Le Milbeau

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EDUCATION

ENS Rennes & Paris-Saclay University – Paris, France *Apr 2026*

2nd Year of Master's Degree in Applied Mathematics: Quantitative Finance & Data Sciences (Expected)

Relevant coursework: Stochastic Processes, Stochastic Control, Machine Learning, Deep Learning, Computer Science, Numerical Finance, Risk Management, Derivatives, IT Quant, Machine Learning in Finance, Particle Systems, McKean–Vlasov SDEs and applications to Machine Learning, Advanced Process Approximation.

ENS Rennes – Rennes, France *Jul 2025*

Bachelor's degree and 1st year of Master's degree in Mathematics

Focused in Probability, Statistics and Machine Learning (Supervised & Unsupervised Learning, Model Validation / Cross-Validation).

Lycée Chateaubriand – Rennes, France *Jul 2022*

Preparatory classes (MPSI-MP)

Intensive 2-year academic program in Mathematics, Physics leading to high-level national competitive examinations.

WORK EXPERIENCE

Research Trainee – RIKEN, High Dimensional Structure Theory Team *May 2025 – Sep 2025 | Tokyo, Japan*

- Studied and performed problem decomposition of the Manole and Ramdas unified technique for sequential estimation of convex divergences between distributions (including φ-divergences and Optimal Transport costs), achieving tighter theoretical bounds by leveraging reverse-submartingale properties, paying in O(log(log(n)).
- Developed and constructed a sequential anytime-valid confidence sequence for Distributional Treatment Effects, quantified by the kernel MMD.

Research Internship – The University of Tokyo *May 2024 – Aug 2026 | Tokyo, Japan*

- Conducted an in-depth study of Category Theory and Cech cohomology applied to Topological Algebra structures, ressulting in the proof of the De Rham theorem.

Research internship – Mathematical Institute of Bordeaux *May 2023 – Jul 2023 | Bordeaux, France*

- Investigated Hardy's spaces and their role in invariant subspaces of the shift operator, contributing to improve the rigor and clarity of mathematical proofs. (Beurling Theorem, Inner/Outter functions, Fatou Theorem, Riesz-Smirnov Theorem, Payley-Wiener spaces).

Mathematic and Physic tutor – Complétude *Present | Paris, France*

- Tutoring for high-school and university students.

PROJECTS

Machine / Deep Learning, Mathematics *Jan 2024 – Present*

- Built an adaptive AI-driven trend-following trading system using HMM for latent market regime inference and Reinforcement Learning (PPO) as a meta-controller for strategy parameters, validated with Deflated Sharpe Ratio, purged cross-validation, and TimeGAN-generated synthetic data.
- Extended a research-oriented deep learning project on Infinitely Deep Bayesian Neural Networks, providing rigorous mathematical derivations (SDE formulation, path-space KL via Girsanov, infinite-dimensional ELBO), analyzing variance-reduced gradient estimators (STL) for continuous-depth Bayesian inference, and studying limitations and extensions to Lévy-driven (jump) processes.
- Developed probabilistic graphical models (Bayesian Networks and Gaussian Graphical Models) for high-dimensional financial data, applying structure learning (Hill Climb, PC algorithm, Graphical Lasso), parameter estimation, and conditional inference to analyze hierarchical and residual dependency structures.
- High-dimensional Supervised learning on Cancer classification (RNA-seq).

SKILLS

Programming & Tools: Python (SciPy, NumPy, Matplotlib, Pandas, Scikit-learn, TensorFlow, PyTorch) , C++, SQL, VBA
Data Science & AI: Supervised / Unsupervised Learning , Neural Networks (NN), CNN, RNN, BNN, NLP, Dimensionality Reduction (PCA, t-SNE) , Time Series Forecasting , Reinforcement Learning
Finance Concepts: Options Pricing Models , Greeks , Monte Carlo simulation, Volatility Modelling, Risk Modeling / Risk Analytics
Sports / Soft skills: Ex-competitive swimmer, Brazilian Jui-Jitsu, Gym (3 years)

LANGUAGES

French : Native, English : Fluent (C1), Korean / Japanese : Beginner (Actively Learning)