Paulin Aubert

 Apolain | Paulin Aubert | https://apolain.github.io/ | paulinaubert@orange.fr

SUMMARY

Research Scientist with a **PhD in Applied Mathematics**, specialized in reinforcement learning, stochastic control, numerical optimization, and deep learning. Experienced in designing theoretically grounded learning algorithms and deploying them in real-world, large-scale systems.

WORK EXPERIENCE

Quantitative Researcher & Analyst — Exiom Partners (Jun. 2021 - Present)

- **Quantitative Analyst (Full-Time, Tier-1 global bank — CCR/XVA)** Sept. 2025 – Present
    - Contribute to the development and maintenance of a quantitative library for derivative pricing, XVA computation, and regulatory risk metrics (C++, Python).
    - Contribute to the design and implementation of a Python-based tool automating performance and stability monitoring across the CCR/XVA library.

- **Doctoral Researcher (Industrial PhD, CIFRE)** Jun. 2022 – Dec. 2025
    - Industry-sponsored doctoral research conducted under joint supervision with Université Paris-Saclay and Laboratoire de Mathématiques et Modélisation d'Évry (LaMME).
    - Conduct research on reinforcement learning and learning-based numerical methods for high-dimensional stochastic control problems.
    - Design theoretically grounded algorithms combining dynamic programming, deep neural networks, and Monte Carlo methods.
    - Study convergence, stability, and generalization properties of learning-based control algorithms.
    - Apply developed methods to optimal stopping, sequential decision-making, and market making problems.
    - Publish research papers and present results at international conferences.

- **Quantitative Analyst (Part-Time, Concurrent with PhD)** Jun. 2022 – Sept. 2025
    - **Large French retail bank (ALM team):** Led the redesign of the existing C++/C# library into a flexible, object-oriented Python architecture for pricing and risk applications.
      Designed the object-oriented Python architecture of the new framework and supervised the technical work of the development team throughout the project. Conducted model reviews and developments covering swap, bond, and swaption pricing, yield-curve stripping, and short-rate model calibration.
    - **Multiple financial institutions (credit risk projects):** Delivered various credit risk projects, including the design of credit-scoring models, the analysis of non-performing loan portfolios, and the review of provisioning methodologies.
      Performed statistical analysis and developed data-driven models in Python, applying techniques from statistics, data analysis, and machine learning to assess credit quality and model default risk.

- **Quantitative Analyst (Full-Time)** Nov. 2021 – Jun. 2022
    - Contribute to the development and maintenance of an internal Python quantitative finance library.
    - Participate in various quantitative projects for financial institutions.
    - Conduct exploratory research on learning-based methods for stochastic control, leading to the definition and writing of the doctoral research proposal.

- **Internal Tools & IT Infrastructure** Nov. 2021 – Present
    - Led the design, development, and maintenance of internal IT tools, including a Django-based planning and recruitment platform (Python, HTML, CSS, JavaScript, Azure).
    - Administered and maintained a self-hosted GitLab environment to support version control, CI/CD workflows, and team collaboration.

- **Quantitative Research Intern** May 2021 – Nov 2021
  - Conducted research on Default Risk Charge (DRC) requirements under the Fundamental Review of the Trading Book (FRTB) framework.
  - Developed a multi-period Merton model for credit risk analysis and performed theoretical and numerical studies of dependence structures using copula models.

Education

2022 – 2025	**PhD in Applied Mathematics** — Université Paris-Saclay, Laboratoire de Mathématiques et de Modélisation d'Évry (LaMME), Exiom Partners **Thesis:** *Learning-based numerical methods for stochastic control in finance.*
2019 – 2021	**Master's Degree in Quantitative Finance** — Université Paris-Saclay Graduated with honors.
2016 – 2019	**Double bachelor's degree in Economics and Mathematics** — Le Mans Université Graduated with honors.

Publications

[1] Paulin Aubert. *Bermudan option pricing with reinforcement learning*. To be submitted. 2025.

[2] Paulin Aubert, Etienne Chevalier, and Vathana Ly Vath. *Optimal dividends and capital injection with self-exciting arrival of claims*. Nov. 2025. URL: https://arxiv.org/abs/2511.19701.

[3] Paulin Aubert, Etienne Chevalier, and Vathana Ly Vath. *Option market making with hedging-induced market impact*. Nov. 2026. URL: https://arxiv.org/abs/2511.02518.

Research Interests

- Reinforcement Learning and Sequential Decision-Making
- Learning-based Numerical Methods
- Stochastic Optimization and Control
- Deep Learning for High-Dimensional Problems
- Theory-guided Machine Learning

Skills

Machine Learning	Reinforcement learning, supervised and unsupervised learning, deep neural networks.
Data Science	Data preprocessing, exploratory data analysis, statistical modeling, and empirical evaluation of machine learning models.
Optimization & Control	Stochastic control, dynamic programming, optimal stopping, policy optimization.
Numerical Methods	Monte Carlo methods, high-dimensional approximation, PDE-based and learning-based solvers.
Programming	Python (PyTorch, NumPy, SciPy, Pandas), C++. Experience with large-scale experiments and research codebases.
Research	Algorithm design, theoretical analysis, experimental validation, academic writing and peer-reviewed publications.
Languages	French (native), English (fluent).