Samy MEKKAOUI

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I am currently a PhD student at Ecole Polytechnique, conducting my research at the CMAP laboratory on the topic "Modeling and Control of Complex Systems with Heterogeneous Interactions." My work lies at the intersection of several fields in applied mathematics.
Prior to this, I graduated from ENSAE Paris and the M2MO Master's program. Since November 2024, I have also been a member of the French Institute of Actuaries.

Education

PhD Student in Applied Mathematics — **CMAP- Ecole Polytechnique**
Palaiseau, France — *2025 – 2028*

- PhD thesis subject : Modeling and control of complex systems with heterogeneous interactions
- Area of research : Probability, control theory, mean-field games and mean-field control, optimal transport, deep learning theory, reinforcement learning

MSc in Quantitative Finance — **M2MO(Ex DEA Laure Elie)-Université Paris Cité**
Paris, France — *2023 – 2024*

- Derivatives Modeling, Data Modeling & Statistical Inference, Stochastic Calculus & Diffusion Models, Stochastic Control,Monte-Carlo Methods
- Foundations of Risk Management, Machine Learning for Finance,Advanced Interest Rate Curve Models, Deep XVA Analysis

Engineering Degree — **ENSAE Paris-Institut Polytechnique de Paris**
Palaiseau, France — *2020 – 2024*

- Probability, Statistics, Stochastic Processes, Financial Mathematics, Econometrics, Time Series, Machine Learning
- Financial Instruments, Microeconomics, Macroeconomics, Banking and Financial Economics, Portfolio Management, Extreme Value Theory

CPGE MPSI-MP* — **Marcelin Berthelot**
Saint-Maur-Des-Fossés, France — *2018 – 2020*

Professional Experience

- **Quantitative Researcher** — **Mazars**
  Paris, France — *May – November 2024*
  - Writing an actuarial dissertation about Deep Learning Methods in order to calculate different XVAs available (by clicking here)
  - Study of Differential Learning Method and Deep XVA Solver and comparaison with classical nested Monte-Carlo
- **Quantitative ALM Analysis** — **Caisse des Dépôts**
  Paris, France — *January – July 2023*
  - Review of the interest rate shock calculation method for the Fonds d'Epargne Capital Requirement
  - Study and calibration of various interest rate models: Vasicek, CIR, Hull White, G2++, Jarrow-Yildirim
  - Study of yield curve reconstruction models: Functional Nelson-Siegel
- **ESG Risk Modeling** — **Cabinet Command Strategy**
  Paris, France — *June – December 2022*
  - Study on the Markowitz Efficient Frontier with ESG constraints for the portfolio
  - Study on the impact of aggregated E, S, and G pillar ratings (Clustering algorithms)
  - Publication of an article on the dispersion of ESG ratings within an equity portfolio (Published here)
  - Study of various financial instruments and their valuation methods for a pricing library implementation

Teaching Experience

- **Machine Learning for Finance** — **ENSAE Paris - M2MO**
  Palaiseau, France — *February – March 2025*
  - Gave 2 lectures for Master 2 students on Gaussian Process Regression (GPR) and Deep Learning for PDE and how they can be efficiently used in finance and insurance.
- **M2 Master Thesis Supervision** — **ISUP**
  Paris, France — *January 2025 – Now*
  - Tutor of several Master 2 students of ISUP during their writing of their actuarial thesis.
- **Financial Mathematics** — **ENSAE Paris**
  Palaiseau, France — *January 2025 – Now*
  - Teaching assistant for M1 students of ENSAE Paris for the course of Financial Mathematics.
- **Probability Theory** — **ENSAE Paris**
  Palaiseau, France — *January 2025 – Now*
  - Teaching assistant for L3 students of ENSAE Paris for the course of Probability Theory.

Projects

- **Deep Solver for PDE**
  M2MO, France *May 2024*
  - Studying various methods to solve PDE including Deep Galerkin and Deep BSDE Solver for XVA computations
- **Deep Calibration of Interest Rate Model**
  ENSAE Paris, France *March 2024*
  - Project carried out in PyTorch to calibrate the G2++ Model Using Neural Networks
- **Milstein Scheme for CEV SDEs**
  M2MO, France *February 2024*
  - Project carried out in Python to study empirically the rate of convergence of some CEV SDEs
- **Applied Statistics Project** **Qube Research** & **Technologies**
  Paris, France *November 2021 – May 2022*
  - Project carried out in Python to predict real-time stock price fluctuations using multiregression methods and penalization methods

Skills

- **Mathematical Finance**: Stochastic Calculus and Diffusion Models, Derivative Product Modeling
- **Tools**: Python, Microsoft Office, HTML/CSS, LaTeX
- **Python Modules**: Numpy, Pandas, Matplotlib, Scikit-Learn,PyTorch
- **Advanced Techniques**: Object-Oriented Programming, Git/GitHub
- **Languages**: French (Native), English (C1), Spanish (B2)
- **Interests**: Football, Table Tennis, Road Trips