

# Cheikh MBAYE

Cortil du Bailly, 24/002  
1348 Louvain-la-Neuve, Belgium  
Tel. : +32 (0) 465 49 72 76  
[cheikh.mmbaye@gmail.com](mailto:cheikh.mmbaye@gmail.com)



## EXPERIENCE

---

**PhD researcher**, Research grant from National Bank of Belgium 2015 - 2019

- Topic: Credit Risk Modelling: Beyond standard intensity models
- Modelling of default/ counterparty risk, credit derivatives pricing
- Pricing wrong-way risk CVA & CDS options

**Internship on Multilevel Monte Carlo**, 6 months, LPSM, Sorbonne Université, Paris 2014 - 2015

- Reduction of the computational complexity to estimate expected values of functional of SDE solutions
- Application to vanilla and path-dependant options pricing by Monte Carlo simulation

**Teaching Assistant in Mathematics**, 10 months, Darius Milhaud High School, Paris 2014 - 2015

- Mathematical subjects; Guidance and supervision of students

## EDUCATION

---

**PhD in Quantitative Finance**, Université catholique de Louvain, Belgium 2015 - 2019

- Structural & reduced-form intensity based credit risk modelling
- Application to Counterparty Credit Risk modelling (CVA), CDS options
- Projects supervision for master's students in finance
- Ph.D. training: conference presentations, Ph.D. courses

**Master 2 Probabilités & Finance, El KAROUI**, Sorbonne Université - Polytechnique X, Paris 2013 - 2014

- Graduated with Honours
- Stochastic calculus, Monte Carlo methods, Optimization & stochastic control, Interest rate modelling
- Statistical methods in finance, Big Data, Risk measures, Counterparty risk, Collateral management
- Scientific computing in C++, Numerical methods for SDEs and PDEs
- C++ Project on Sensitivity Analysis applied to Lookback options, 3 months,

**Master's in Mathematical Sciences and Applications**, AIMS-Senegal 2012 - 2013

- African Institute for Mathematical Sciences, Senegal, Distinction
- Master Thesis - Pricing and Hedging of European Options
- Concepts of Linear Algebra and Analysis, Mathematical Problem Solving
- Measure Theory, Probability and Statistics, Physics Problem Solving
- Introduction to Python, Numerical Problem Solving and Modelling
- Topology and Functional Analysis, PDEs and Modelling, Differential Calculus and Geometry

**BSc in Applied Mathematics and Computer Science**, Gaston Berger University 2010 - 2012

- (Department of Applied Sciences and Technology), Senegal, First Class Honours

## TECHNICAL SKILLS

---

Programming languages: C, C++, Python, Rcpp, R  
Softwares: Windows, Office, Linux, Latex, ...  
Languages: French (Native), English (fluent)

## ACHIEVEMENTS

---

**Grants**, Full scholarship from African Institute for Mathematical Sciences, PhD funds from FSR & the National Bank of Belgium selected among about 80 candidates

**Modelling**, Reduced-form approach based on enlargement of filtrations, e.g. default information vs market information, Intensity modelling in credit risk using reduced-form approach, Exact calibration with deterministic shift, Handling Stochastic Differential Equations driven by Brownian motions

**Credit risk**, New CVA pricing model based on a two-sided time-changed Lévy process, Reduction of the computational cost of the standard Monte Carlo in presence of wrong-way risk using an adaptive control variate, New model allowing exact calibration for CDS quotes

**Numerical methods**, Comparison of Multilevel Monte Carlo and the Weighted Multilevel Monte Carlo, applied to the pricing of European options and path-dependent options, PDEs approach

**Projects**, Pricing CVA for interest rates products, Pricing and hedging exchange options under Black-Sholes

## HOBBIES

---

Sport, Geopolitics, Politics, Movie Theatres, Reading, ...

## ANNEXES

---

### Conferences Presentations:

- Numerical Analysis and Applications, 15-22 June 2016 in Lozenets, Bulgaria
- UCL/KUL Ph.D. student's day in quantitative finance: 3<sup>rd</sup> May 2017, UCL
- 2<sup>nd</sup> International Conference on Computational finance, 04-08 Sep 2017 in Lisbon
- Belgian Mathematical Society PhD-Day, 25 May 2018, UGent
- 16<sup>th</sup> Belgian Financial Research Forum, 1<sup>st</sup> June 2018, National Bank of Belgium
- 10<sup>th</sup> World Congress of the Bachelier Finance Society, 16-20 July 2018, Dublin
- 11<sup>th</sup> European Summer School in Quantitative Finance, 27-31 Aug 2018, Paris
- AIMS Journal Talk: African Institute for Mathematical Sciences, 12<sup>th</sup> Oct. 2018
- Actuarial science seminar, 21<sup>st</sup> Nov. 2018, UCL, Belgium

### Summer School & Training:

- "Nonlinear valuation and XVA under credit risk" by Prof. Damiano Brigo, UCL
- "Informational and Imperfect Financial Markets", University of Alberta, Canada
- "School and Workshop on Dynamical Models in Finance" at EPFL, Lausanne
- "Credit Risk Modelling" by Prof. David Lando at UCL, Belgium
- "Advanced Monte Carlo Methods" by Prof. Gilles Pagès at UCL, Belgium

### Publications:

- "An antithetic approach of Multilevel Richardson Romberg Extrapolation for Multidimensional SDEs" (Gilles Pagès & Frédéric Vrins). In: Springer LNCS, Vol. 10187, pp 482-491 (2017).
- "A subordinated CIR intensity model with application to wrong-way risk CVA" (Frédéric Vrins). In: IJTAF, Vol. 21, No. 7 (2018) 1850045. (A first version was published in ICCF 2017).
- "Affine term structure models : a time-changed approach with perfect fit to market curves" (Frédéric Vrins). Submitted.
- "Computation of conditional survival probabilities under partial information via fast quantization" (Abass Sagna & Frédéric Vrins). Work in progress.
- "An arbitrage free conic martingales model and applications to credit risk" (Frédéric Vrins). Work in progress.