Ludovic Goudenège

CentraleSupélec
Mathematics Federation - FR CNRS 3487
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Civil partnership, 40 years
Born November 10th, 1983
French nationality

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CNRS researcher
Habilitation to Direct Research

Training/Professional curriculum

2017-2024: **Researcher** normal class in CNRS section 41,
assigned to the CentraleSupélec Mathematics Federation

2018 : **Habilitation to Direct Research** (French diploma to supervise Ph.D. students)

Defended on December 11, 2018 at CentraleSupélec - Université Paris-Saclay.
Diploma from Paris-Sud University.
Title: Numerical algorithms for stochastic problems.

Anne DE BOUARD	DR CNRS - École Polytechnique	(external examiner)
Pauline LAFITTE	PU - CentraleSupélec	(internal examiner)
Gabriel James LORD	PU - Heriot Watt University	(external rapporteur)
Bertrand MAURY	PU - University of Paris Sud	(internal examiner)
Annie MILLET	PU - University Paris 1	(external rapporteur)
Francesco RUSSO	PU - ENSTA	(internal rapporteur)
Denis TALAY	DR Inria - Sophia-Antipolis Méditerranée	(president of the jury)

2014-2016: **Researcher** 1st class in CNRS section 41,
assigned to the Centrale Paris Mathematics Federation.

2010-2013: **Researcher** 2nd class in CNRS section 41,
assigned to the LAMA of the University of Paris-Est - Marne-la-Vallée.

2011-2012: **Scientific Consultant** at AXA - Group Risk Management.

2009-2010: **Research Master in Mathematics: Finance and Probability**

Master El Karoui-Pagès-Yor at Pierre and Marie Curie University, in Paris.

Research internship (6 months) within AXA - Group Risk Management under the direction of Aymeric Kalife: Simulations and studies of Lévy processes in insurance.

2006-2009: **Thesis in Applied Mathematics**

Defended on November 27, 2009 at the University of Rennes 1.
Title: Some results on the stochastic and deterministic Cahn-Hilliard equation.
Director: Arnaud DEBUSSCHE (ENS Cachan - Antenne de Bretagne).

M. Franck Boyer	PU - Université Paul Cézanne, Marseille	(president of the jury)
Mr. Tadahisa Funaki	PU - University of Tokyo	(external rapporteur)
Mr. Nicolas Fournier	PU - Université Paris Est	(external rapporteur)
M. Lorenzo Zambotti	PU - Université Pierre et Marie Curie	(external examiner)
M. Daniel Martin	MCF - University of Rennes 1	(internal examiner)
M. Ying Hu	PU - University of Rennes 1	(internal examiner)
M. Arnaud Debussche	PU - ENS Cachan - Antenne de Bretagne	(director)

Research fellow at ENS Cachan - Antenne de Bretagne, in the Stochastic Processes team and in the Numerical Analysis team of the Rennes Mathematics Institute (IRMAR) at the University of Rennes 1 - UMR 6625 of CNRS (2007-2010)

Monitor at ENS Cachan - Antenne de Bretagne (2007-2010)

Fourth year at ENS Cachan - Antenne de Bretagne (2006).

2003-2006: Student at ENS Cachan - Antenne de Bretagne

Research Master in Mathematics: Analysis and Applications at the University of Rennes 1, honors.

External Mathematics Aggregation Competition, Rank 116.

2001-2003: Preparatory classes for Grandes écoles at the Blaise Pascal high school, in Orsay.
2000-2001: Scientific baccalaureate, series S, specialty Mathematics, honors.

Skills

Computers

Systems	Unix, Windows, Mac OS X.
Languages	C, C++, FORTRAN, Julia, Pascal, Delphi, Python, PELICAN (web), VBA, Jinja, HTML, CSS, PHP, SQL, C-Shell, LaTeX, Beamer.
Libraries	NAG, Numerical Recipies, FFTW, dSFMT, PELICANS, TensorFlow, Keras.
Software	FreeFem++, FEniCS, Matlab, Scilab, Maple, SAS, R, Office automation.

Languages

French	native.
English	read, write, speak.

Search

Search themes

Analysis of PDEs:
Analysis of differential and stochastic partial differential equations. Existence and uniqueness of solutions of parabolic and hyperbolic equations. Allen-Cahn and Cahn-Hilliard equations. Gradient systems. α-Navier-Stokes models. Navier-Stokes/Cahn-Hiliiard coupling. Error order of high degree finite element methods. Asymptotic behavior and analysis of stable or meta-stable states. Inverse numerical analysis. Convergence orders of stochastic numerical algorithms via Kolmogorov equations in infinite dimensions. Kolmogorov equations for PDMPs.

Stochastic processes:
Analysis of differential and stochastic partial differential equations. Integration formulas by stochastic parts for Gaussian measurements on Hilbert spaces. Process invariant measures. Ergodicity. Large deviations. Sewing lemma. Analysis of piecewise deterministic Markov processes with boundaries. Unbiased estimators for rare events. Central limit theorem for estimators. Wright-Fisher models. Particle dynamics models for turbulence. Multiplicative Gaussian Chaos. Harnack inequalities. Fractional processes.

Financial mathematics:
Lévy process. Gap options. CPPI. Variable annuities insurance products. XVA products. Analysis of the Heston, Vasicek, Hull-White and Bates models. Numerical methods for simulation and pricing. Digital resolution of EDP. Monte Carlo methods. Tree methods. Hybrid methods. Fourier-Cosine methods.

Gaussian regression processes. Neural networks.

Numerical simulations:
Finite difference, finite element and finite volume methods. Monte Carlo and tree methods. Lévy process simulations. Numerical simulations for life insurance products. Development of numerical methods for PIDEs and EDPs of the Heston, CIR, Vasicek, Hull-White and Bates types. ADI methods for PDEs. Splitting operators. Development of finite element libraries. Finite volume method for PDMPs. Estimates of invariant measures of stochastic processes. Algorithms for simulating rare events. Multi-level Monte-Carlo. Splitting algorithms for stochastic PDEs. Simulations of particles in a turbulent fluid. Neural network architectures and machine learning.

Digital Science Projects

PREMIA: Pricing library developed at Inria. MathRisk Project Team led by Agnès Sulem. Member of the project since 2010. **https://www.rocq.inria.fr/mathfi/Premia/**
Development of numerical algorithms for PDEs: finite differences, finite volumes, ADI methods, Fourier-Cosine, mesh-free.
Development of stochastic numerical algorithms for EDPs and EDS: Monte Carlo and tree methods, hybrid methods, Gaussian regression processes, neural networks, machine learning.

XLIFE++: Creation of a library in C++ for calculations using finite element methods. Extension of the Mélina (IRMAR and POems) and Montjoie (INRIA) libraries.
https://uma.ensta-paris.fr/soft/XLiFE++/

PELICANS: Modification of a library in C++ for calculations by finite element methods for the coupling of 3 types of equations (Navier-Stokes, Cahn-Hilliard, species transport).
Interaction with teams of soft matter physicists for the development of calculation software for surfactant species (ANR HydroSurfDyn project with Isabelle Cantat - ERC Consolidator Grant 2017 - DISFILM).

Teaching

In chronological order:

École Nationale de la Statistique et de l'Administration Économique (ENSAE)	Introduction to stochastic processes Course of Éric Gautier **Teaching assistant**, License level 3, 12h	2009-...-2012
	Optimization and Applications Course of Michel Grun-Rehomme **Teaching assistant**, License level 3, 12h	2011
	Introduction to Scilab **Practical work manager**, License level 3, 12h	20011 and 2012
University of Cergy-Pontoise	Introduction to C++ **Lecturer**, Master 1 level, 6 p.m.	2011

Polytechnic Institute of Advanced Sciences (IPSA)	Stochastic Processes **Lecturer**, Master 1 level, 6 p.m.	2012
École Supérieure d'Informatique, Électronique, Automatique (ESIEA)	Stochastic Processes **Lecturer**, License level 3, 6 p.m.	2012
University of Paris-Est Marne-la-Vallée	Introduction to C++ **Lecturer**, Master 2 level, 3 p.m.	2012
	Digital methods and structured products in actuarial science **Lecturer**, Master 2 level, 3 p.m.	2015-...-2018
University of Evry	Structured Products in Finance and Insurance **Lecturer**, Master 2 level, 2 p.m.	2013 and 2014
Central University of Finance and Economics (Beijing)	Digital methods in finance **Lecturer**, Master 1 level, 4h	2014 and 2022
École Centrale Paris	Analysis (Lebesgue integration) Probabilities (discrete, density, Gaussian vectors) Partial differential equations **Teaching assistant**, License level 3, 27h	2011-...-2017
École Nationale des Ponts et Chaussées (ENPC)	Scientific Calculation (finite elements, optimization, conservation laws). Alexandre Ern's course **TD and TP manager**, License level 3, 27h	2013-...-2015
École Suérieure des Sciences Commerciales d'Angers (ESSCA)	Inferential Statistics **Lecturer**, License level 3, 42h	2018 and 2019
École Nationale Supérieure de Techniques Avancées (ENSTA)	Introduction to Matlab **Lecturer**, License level 3, 9 p.m.	2011-...-2022
CentraleSupélec	Convergence, Integration, Probabilities, PDE **Teaching Assistant**, License level 3, 12h	2018-...-2022
	Convergence, Integration, Probabilities **Lecturer**, License level 3, 12h Full promotion 800 students Advanced Group Manager of 160 students	2019-...-2022
	Partial differential equations **Lecturer**, License level 3, 12h Full promotion 800 students Advanced Group Manager of 160 students	2020-...-2022
	Stochastic partial differential equations **Lecturer**, Master 2 level, 24h	2016-...-2023

Polytechnique	MAP556 - Monte-Carlo method - Emmanuel Gobet's course **Small Classes Manager**, Master 1 level, 6 p.m.	2022-2023
	MAP412 - Introduction to Numerical Analysis - Marc Massot's Course **Examination Manager - Classifying Control**	2022-2023
	MAP435 - Optimization and Control - Grégoire Allaire's Course **Examination Manager - Classifying Control**	2023
	MAP595 - 3rd year internship **Head of option "Modeling and Scientific Calculation"**	2023

Supervision activities

Postdocs:

- C.-E. Bréhier and M. Gazeau. 1 proceeding and 1 publication (ESAIM Proc. 2014 - Anal. Appl. Prob. 2016). Supervision during CEMRACS 2013.

- A. Molent. Post-doctoral fellow 1 year (June 2018-June 2019). Co-financing CentraleSupélec Mathematics Federation and University of Udine in Italy. 2 publications in 2018 (TEL and CMS). Invited by the BNP Chair and the FiQuant team at CentraleSupélec at the beginning of 2019. 1 publication.

- H. Vroylandt. Post-doctoral fellow 18 months (September 2020 - 2022). ISCD MAESTRO project. Numerical methods and stochastic sampling for generalized Langevin equations. 1 publication in PNAS 2022.

- J. Pertinand. Post-doctoral fellow 1 year (January 2023-February 2024). ANR SIMALIN project. HMM (multi-scale) method for systems of stochastic equations with slow and fast variables. 1 preprint.

Doctoral students:

- J. Doghman. Direction of a thesis started in October 2019, defended in December 2022 on the convergence of numerical methods for stochastic partial differential equations of the α-Navier-Stokes type. EDMH grant, 2 pre-publications, 1 article published in JCAM.

- A. Beguinet. Direction of a thesis started in October 2020 on numerical methods for parabolic-elliptic equations for geothermal energy. ANR UPGEO project, 1 publication.

- E-M. Haress. Direction of a thesis started in October 2021 on the convergence of numerical schemes for EDS and stochastic PDEs with singular drifts. EDMH scholarship, 2 articles submitted.

- Mr. Castellano. Direction of a thesis started in September 2023 in co-direction with Flore Nabet, lecturer at CMAP, on the convergence of finite volume methods for a Cahn-Hilliard-Navier-Stokes-Surfactant model previously developed in the HydroSurfDyn project. EDMH scholarship.

Collaboration with doctoral students:

- A. Molent. 4 joint publications during his thesis from 2014 to 2017 (IME 2016 - JGPG 2016 - TEL 2018 - CMS 2018). Director: A. Zanette. PhD student at the University of Udine, Italy.
- D. Mercier. 1 publication: ESAIM Proc. in 2019. Supervision during CEMRACS 2018. Directors: M. Massot and A. Vié. Doctoral student in the EM2C laboratory at CentraleSupélec.
- J. Llobell. 1 publication: ESAIM Proc. in 2019. Supervision during CEMRACS 2018. Directors: T. Goudon and S. Minjeaud. PhD student at the Dieudonné laboratory in Nice. Inria COFFEE team.
- R. Letournel. 1 publication in 2021, 1 article in preparation. Directors: M. Massot and F. Laurent-Nègre. Doctoral student in the EM2C laboratory at CentraleSupélec.

Master 2: Master 2 end-of-study internship supervision.

- K. Rinaldy. 2012. Bifurcations in binary systems with Onsager mobility.
- D. Iampietro. 2013. Analysis and simulation of high-dimensional random systems.
- L. Tudela. 2014. Central Limit Theorem for Adaptive Multilevel Splitting Estimators in an Idealized Setting. 1 proceeding (MCQMC - 2016).
- Mr. Zhang. 2014. Closed-form solutions for Guaranteed Minimum Accumulation Benefits.
- A. Sitbon. 2015. Introduction to Stochastic Partial Differential Equations. Existence and Uniqueness of solutions for linear or well-posed equations.
- Mr. Du. 2016. Fourier-Cosine Expansion Method for GLWB.
- Y. Zhou. 2016. Quantitative analysis of model risk and method risk for equity-linked policies.
- A. Lanza. 2018. Alternating implicit directions method for Heston models.
- D. Fourcade. 2019. Particle system in a turbulent fluid.
- A. Y. Kamri, N. Delisle, S. Kazdaghli. 2020. Long project 1 year. Deep learning methods for pricing in very high dimensions. Natixis Challenge.
- A. Beguinet. 2020. Numerical resolution of partial differential equations applied to geothermal energy by finite volumes and mixed finite elements.
- Mr. Gabsi. 2020. Solving partial differential equations applied to geothermal energy, in a geometry generated by Poisson-Voronoi diagrams.
- Y. Jiang. 2020. Connections between EDP and EDSR: Machine learning techniques.
- C. Meynard. 2021. LSTM Neural Networks for Free Boundary PDEs.
- A. Ezzaheri. 2022. Neural Network Algorithms for American Options.

- A. Bensoubaya. 2023. Pricing of financial assets via Monte Carlo, Black Scholes and quantum algorithm methods.
- H. De Souza. 2023. Valuation of financial products in an illiquid market: Frey model.
- C. Ovo. 2023. Monte Carlo and analytical method for the Frey model.
- A. Espa. 2023. Quantum algorithms for pricing.
- C. Jestin-Scanvion. 2023. Multiplicative Gaussian Chaos Models by "smooth Gaussian" approximation. 1 preprint.
- N. Charles. 2024. EDS driven by fractional Brownian motions.

CentraleSupélec: Supervision of several students from the first year via the CentraleSupélec

"Research Pathway" on the complete 3-year course. Search path completed:

- Q. Peyras (2013): Piecewise deterministic Markov processes.
- C. Gontier (2014): Piecewise deterministic Markov processes.
- A. Jarret (2015): Markov chains in biology. Wright-Fisher model.
- E. Miri (2016): Śtochastic partial differential equations.
- I. Ayadi (2017): Lévy process, numerical simulations and estimations.
- T. Sainrat (2018): Resolution of PDE in large dimensions using deep learning method.
- K. Khaldi (2019): Neural network resolution of retrograde EDS.
- C. Jestin-Scanvion (2019): Modeling of PDE in large dimensions using neural networks.
- T. Duez (2020): Numerical simulations of stochastic PDEs.

Administrative Activities and Collective Responsibilities

2021-2023: **Member of the Local Council of the Pascal Institute**. Representative of the Graduate School of Mathematics **https://www .institut-pascal.universite-paris-saclay.fr/**.
2017-2023: **Head of the axis** "Analysis of EDPs" of the Mathematics Federation of CentraleSupélec (**FDM**).
2017-2023 : **Communications officer**, and responsible for the website of the Mathematics Federation from CentraleSupélec. **https://fd-math.pages.centralesupelec.fr/**
2017-2023 : **Member of the Board of Directors** of the Society of Industrial Mathematics and Applied (**SMAI**). Member of the IT Commission.
2016-2019: **Member of the Study Council** of CentraleSupélec.
2014-2018 : **Member of the Scientific Council** of the National Institute of Mathematical Sciences and of their Interactions (**INSMI**) from the CNRS. Member of the office as secretary.
2010-2018 : **Member of Operation Posts**: Help with MCF/PU recruitment competitions.

Member of selection committees for the recruitment of lecturers.

- 2014 - MCF position in 26^{eme} section - University of Lille - Applied mathematics, with priority in scientific computing, numerical analysis, EDP.

- 2015 - MCF position in 26^{eme} section - École Centrale Paris - In the field of mathematics, with strong competence in probability and statistics.
- 2017 - MCF position in 26^{eme} section - École Centrale Lyon - In the field of partial differential equations with research activities relating to modeling, analysis, numerical analysis and/or scientific computing.
- 2017 - two Assistant Professor positions 26^{eme} section - École Polytechnique - In the field of probability and partial differential equations, and in the field of statistics and data sciences.
- 2024 - position Assistant Professor 26^{eme} section - École Polytechnique - In the field of probability.

Organization of Congresses, Days, Symposiums

January 2016: **Ile-de-France days for doctoral students in mathematical sciences** organized by the FMJH, the FSMP and Labex Bézout (DIM RDM IDF) on January 5 and 6, 2016. 80 participants and 20 speakers. **http://www.rdm-idf. fr/fr/JFDM**

June 2016: **Organizer of a mini-symposium** in "The final conference of the Thematic Cycle on Monte-Carlo Techniques" organized by the **LabEx Louis Bachelier**. On the subject of stress tests and rare events, July 5, 6, 7 and 8, 2016. **https://www.louisbachelier.org/**
195 participants. 12 plenary conferences, 16 mini-symposia.

November 2016: **Ile-de-France days for doctoral students in mathematical sciences** organized by the FMJH and the FSMP with the support of the Ile-de-France Region on November 14 and 15, 2016.
100 participants and 20 speakers. **http://www.rdm-idf. fr/fr/JFDM**

March 2019: **Math.en.Jeans Congress at CentraleSupélec** on March 22, 23 and 24, 2019. **https://www.mathenjeans.fr/congres2019/saclay**
650 participants, 120 presentation stands, 50 workshops, 4 plenary conferences.

April 2019: **Welcome day for new entrants in mathematics** at the IHP sponsored by learned societies (SMAI, SMF, SFDS) and the CNRS/INRIA/INRA institutes. **http://postes.smai.emath.fr/apres/accueil/index2019. php**
∼80 participants, round tables, testimonials, presentations from organizations, communities, etc.

June 2020: **Math.en.Jeans Congress at CentraleSupélec** on June 5 and 6, 2020. **https://www.mathenjeans.fr/congres2020/saclay**
450 participants, 4 plenary conferences.

November 2020: **Workshop SIMALIN** at CIRM on November 4, 5 and 6, 2020. **https://conferences.cirm-math.fr/2603.html** (by video conference).
12 participants, 4 plenary conferences.

March 2021: **Math.en.Jeans Congress at CentraleSupélec** on March 26 and 27, 2021. **https://www.mathenjeans.fr/congres2021/saclay**
200 participants, 2 plenary conferences.

April 2021: **Welcome day for new entrants in mathematics** at the IHP sponsored by learned societies (SMAI, SMF, SFDS) and the CNRS/INRIA/INRA institutes. **http://postes.smai.emath.fr/apres/accueil/index2021. php** (via video conference).
∼100 participants, round tables, testimonials, presentations from organizations, communities, etc.

November 2021: **NASPDE International Conference** at CIRM on November 4 and 4, 2021. **https://conferences.cirm-math.fr/2408.html**
50 participants, 9 plenary conferences.

April 2022: **Math.en.Jeans Congress at CentraleSupélec** on April 1 and 2, 2022. **https://www.mathenjeans.fr/congres2022/saclay**

600 participants, 3 plenary conferences.

June 2022: **Mini-Symposium at the CANUM Congress** from June 13 to 17, 2022.
Co-organization with G. Vilmart, 8 guest speakers.
Theme: Numerical integrators for multi-scale and long-time dynamics.

June 2023: **MathRisk Conference - 25th anniversary** in Udine, Italy, from June 14 to 16, 2023.
Co-organization with A. Zanette, conferences + parallel sessions
https://mathrisk2023.sciencesconf.org/
60 participants, 4 plenary conferences.

Expertise and jury

Reviewer for journals: Annals of Applied Probability, Applied Mathematics Research eXpress, Applied Mathematics and Optimization, Applied Mathematics Research Express, ASTIN Bulletin - The Journal of the International Actuarial Association, BIT Numerical Mathematics, Communication in Pure and Applied Analysis, Computational Management Science, Discrete and Continuous Dynamical Systems - Series-A, Discrete and Continuous Dynamical Systems - Series-B, EPJ Nuclear Sciences & Technologies, ESAIM: Mathematical Modeling and Numerical Analysis, IMA Journal of Numerical Analysis, Journal of Applied Mathematics and Computing, Journal of Mathematical Analysis and Applications, Mathematics and Computers in Simulation, Mathematical Methods in the Applied Sciences, Numerische Mathematik, Quantitative Finance, Risk, SIAM Journal on Financial Mathematics, SIAM Journal on Mathematical Analysis, SIAM Journal on Numerical Analysis, SIAM Journal of Scientific Computing, Stochastic Processes and their Applications, Stochastics and Partial Differential Equations: Analysis and Computations, Stochastics: An International Journal Of Probability And Stochastic Processes.

Thesis jury: *Rapporteur*:

2019 - Guillaume Fenger - Analysis of dispersive equations with stochastic modulation, under the direction of Olivier Goubet and Youcef Mammeri, University of Picardie Jules Verne.

2021 - Sébastien Mollaret - Applications of artificial intelligence algorithms in quantitative finance under the direction of Romuald Elie, University of Paris-Est.

2021 - Shmuel Rakotonirina-Ricquebourg - Theoretical and numerical study of multi-scale stochastic kinetic equations, under the direction of Charles-Édouard Bréhier and Julien Vovelle, Claude Bernard Lyon 1 University.

2023 - André Berg - Numerical Analysis and Simulations of SPDEs with white noise dispersion, under the direction of Guillaume Dujardin and David Cohen, Umea University, Sweden.

Examiner:

2017 - Romain Poncet - Numerical methods for the simulation of non-linear stochastic PDEs in Bose-Einstein condensation under the direction of Anne De Bouard, Polytechnique.

2020 - Marc-Arthur N'Guessan - Space adaptive methods with error control based on adaptive multi resolution for the simulation of low-Mach reactive flows, under the direction of Marc Massot and Christian Tenaud, Polytechnique and EM2C.

2022 - Bouazza Saadeddine - Learning on simulated data in finance: XVAs, risk measures and calibration under the direction of Stéphane Crepey and Lokman Abbas-Turki, Paris Cité Univ.

2023 - François Ernoult - Contributions to splitting algorithms for rare events, under the direction of Mathias Rousset and Frédéric Cérou, University of Rennes 1.

Project rapporteur: for the National Research Agency.

École Polytechnique & École Normale Supérieure: Jury for the writings of the X-ENS bank - MP, PC and Info sector - Maths Test C. Examiner for oral exams at ENS Cachan and Rennes.

2015, 2016, 2017 and (written) 2020.

ENSAE - CAPESA: Editor of the competition subject for CAPESA (Support Center for African Śchools of Statistics). Proofreader of writings. Since 2013.

Aggregation: Corrector of the written analysis test. Examiner for oral exams for the mathematics aggregation for the Scientific Calculation, Probability and Computer Science options. 2018-2022. Option A Pilot - Probabilities and Statistics.

CentraleSupélec: 2018-2021 CentraleSupélec recruitment jury for parallel admissions.

TFJM: Member of the jury in 2015 for the French tournament for young mathematicians. **https://tfjm.org/** The TFJM^2 is a team competition of 4 to 6 high school students. Each team is accompanied by one or two supervisors, mathematics teachers, doctoral students or still former participants. Students work on a series of math problems published in January. These are difficult problems that touch on several areas of mathematics. During the two months preceding the meeting, the teams work with their supervisors and look for solutions to these problems. The teams will meet over a weekend at the end of March. During this This weekend, on two occasions they will face a jury in groups of 3 or 4 teams. Tournament national and the regional tournament take place at the Ecole Polytechnique, at ENSTA-Paristech, or at CentraleSupélec.

University of Val de Marne: Jury for the University of Val de Marne prize which rewards quality theses. These theses may have been supported in different fields, much more widely than mathematics. Participation in 2016-2017-2018-2019.

Scientific projects - Grants

Member of the ANR-PRCI project - SDAIM (led by Francesco Russo and Christian Olivera) - 370k€+75k€.
Bilateral collaboration ANR/FAPESP - Franco-Brazilian projects.
Stochastic and deterministic analysis for irregular models.
GRANT_NUMBER: PRCI-22 From January 1, 2023 until December 31, 2027.

Recipient of the Thomas Jefferson Scholarship - 20 k€
FACE Foundation (French-American Cultural Exchange)
Computational Fluid Dynamics: Numerical Approximation and Long-time Behavior
with H. Bssaish of the University of Florida.
URL: https://face-foundation.org/ From October 1, 2021 until March 31, 2024.

Manager Project partner team MALAYSIA - MITI - 80Prime 2021
MAchine LeArning bY StochastIc Approaches: application to water clusters
URL: **http://goudenege.perso.math.cnrs.fr/output/malaysia.html**
Mission for transversal and interdisciplinary initiatives **https://miti.cnrs.fr/**
From October 1, 2021 until September 30, 2023.

Member of the MAESTRO 2.0 project (led by Marco Saitta) ISCD team
MAterials for Energy through STochastic sampling and high performance computing.
URL: **https://iscd.sorbonne-universite.fr/research/sponsored -junior-teams/maestro-2/**
Institute of Computing and Data Sciences (ISCD) - Sorbonne University
https://iscd.sorbonne-universite.fr/ From January 1, 2023 until December 31, 2028.

ANR project leader SIMALIN - 107 k€
Random SIMulations in Infinite dimension
URL: **http://goudenege.perso.math.cnrs.fr/output/simalin.html**
GRANT_NUMBER: ANR-19-CE40-0016 From October 1, 2019 until March 31, 2024.

Member of the MAESTRO project (led by Marco Saitta) ISCD Junior Project Team - 166 k€
MAterials for Energy through STochastic sampling and high performance computing.
URL: **https://iscd.sorbonne-universite.fr/research/sponsored -junior-teams/maestro-2/**
Institute of Computing and Data Sciences (ISCD) - Sorbonne University
https://iscd.sorbonne-universite.fr/ From January 1, 2020 until December 31, 2021.

Associate member of the ANR project (led by Benjamin Brigaud) UpGeo - 690 k€.
Scaling and simulating heat flows to improve the efficiency of deep geothermal systems.
URL: **https://anr.fr/Projet-ANR-19-CE05-0032**
GRANT_NUMBER: ANR-19-CE05-0032-01 From January 1, 2020 until May 31, 2024.

Funding of LabEx LMH
International project for collaboration with the University of Udine - 3 k€
Recruitment of a post-doc 30 k€ From June 1, 2018 until May 31, 2019.

Member of ReaDiNet, "International Research Network" (IRN CNRS)
Reaction-Diffusion Network in Mathematics and Biomedicine
URL: **http://readinet.iecl.univ-lorraine.fr/index.html**
Formerly ReaDiLab (2007-2015) then GDR International ReaDiNet (2015-2023).

Creative member of the XLIFE++ project
From 2011 to 2014, funding by the "SIMPOSIUM European Project".
From 2015 to 2018, funding by "DGA/MRIS" (Directorate General of Armaments).
URL: **https://uma.ensta-paris.fr/soft/XLiFE++/**

Member of the ANR project (led by Jacopo Seiwert) HydroSurfDyn - 370 k€.
Coupling between HYDRODYNamics and SURFactant transport at interfaces: experimental and numerical challenges.
URL: **https://app.dimensions.ai/details/grant/grant.4527771**
GRANT_NUMBER: ANR-13-PDOC-0014 From January 1, 2014 until June 30, 2017.

Publications

Refereed journals

[A1] Ludovic Goudenège. Stochastic Cahn-Hilliard equation with singular nonlinearity and reflection. *Sto. Proc. Appl.*, 119(10):3516–3548, 2009.

[A2] Arnaud Debussche and Ludovic Goudenège. Stochastic Cahn-Hilliard equation with double singular nonlinearities and two reflections. *SIAM J. Math. Anal.*, 43(3):1473–1494, 2011.

[A3] Ludovic Goudenège, Daniel Martin, and Grégory Vial. High order finite element calculations for the Cahn-Hilliard equation. *J. Sci. Comput.*, 52(2):294–321, 2012.

[A4] Ludovic Goudenège, Aymeric Kalife, and Saad Mouti. Managing gap risks in iCPPI for life insurance companies: a risk/return/cost analysis. *Insurance Markets and Companies: Analyses and Actuarial Computations*, 5(2), 2014.

[A5] Ludovic Goudenège. Numerical methods for piecewise deterministic Markov processes with boundary. *ESAIM*, 45:338–348, September 2014.

[A6] Ludovic Goudenège and Luigi Manca. Asymptotic properties of stochastic Cahn-Hilliard equation with singular nonlinearity and degenerate noise. *Sto. Proc. Appl.*, 125(10):3785–3800, October 2015.

[A7] Ludovic Goudenège and Pierre-André Zitt. A Wright-Fisher model with indirect selection. *Journal of Mathematical Biology*, 71(6):1411–1450, December 2015.

[A8] Ludovic Goudenège, Andrea Molent, and Antonino Zanette. Pricing and Hedging GLWB in the Heston and in the Black-Scholes with Stochastic Interest Rate Models. *Insurance: Mathematics and Economics*, 70:38–57, September 2016.

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