Sebastian Baudelet

Postdoctoral researcher in applied mathematics

Inria Saclay, France

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Research interests

Stochastic particle systems and population models; quantitative convergence to deterministic limits; coagulation and growth–fragmentation; mathematical biology.

Current appointment

Postdoctoral researcher, Inria Saclay December 2025–present

Working with Jakob Ruess on rare lineages and the onset of asymptotic population growth in a growth–fragmentation model with inherited Ornstein–Uhlenbeck growth rates. The project connects deterministic long-time behaviour with almost-sure asymptotics of normalised population observables. The current objective is to quantify the timescale for reaching the asymptotic regime and its dependence on the OU parameters.

Education

PhD in Applied Mathematics, Université Côte d'Azur 2021–2025

Defended on 7 November 2025. Laboratoire J. A. Dieudonné.

Supervisors: Thierry Goudon and Rémi Catellier.

Multi-scale modeling of branching in mycelial networks. HAL: tel-05517187.

Mechanistic modelling of apical branching through Brownian coalescence of protein clusters; successive stochastic and analytical approximations; quantitative convergence of regular observables for stochastic coalescence with singular kernels.

Master's in Mathematical Modelling, Sorbonne University 2020–2021

Specialisation: Mathematics for Biology.

Master's in Mathematical Engineering for Data Science 2019–2020

University of Lorraine; Big Data option.

École des Mines de Nancy 2017–2019

Civil engineering track, followed by the mathematics option in the Department of Mathematics and Industrial Engineering.

Publications and manuscripts

Published work

S. Baudelet, B. Frénais, M. Laurière, A. Machtalay and Y. Zhu. *Deep learning for mean field optimal transport.* ESAIM: Proceedings and Surveys, **77**, 145–175, 2024. DOI: 10.1051/proc/202477145.

Manuscripts in preparation

- S. Baudelet and R. Catellier. *Convergence rates of observables in a stochastic coalescence model toward the Smoluchowski equation using a Wasserstein-type distance.*
- S. Baudelet and R. Catellier. *A mechanistic model for apical branching in mycelial networks and the derivation of a branching probability.*

Teaching experience

Undergraduate tutorials at Université Côte d'Azur.

- **2024–2025 — 96 hours.** First-year bridging course; introduction to probability and statistics (second-year mathematics); statistics (second-year biology).
- **2023–2024 — 64 hours.** Introduction to probability and statistics (second-year mathematics); optimisation (third-year mathematics).
- **2022–2023 — 64 hours.** Statistics (ISEM); fundamentals of analysis (second-year mathematics); optimisation (third-year mathematics).
- **2021–2022 — 64 hours.** Statistics (ISEM); numerical methods (second-year IUT).

Conferences and scientific meetings

- **Complex Days**, Nice, February 2025. Poster: *Mathematical Analysis of an Apical Branching Model in Filamentous Fungi*, with Rémi Catellier.
- **Colloque des Jeunes Probabilistes et Statisticiens**, Oléron, October 2023.
- **CEMRACS 2022**, CIRM, Marseille, July 2022. Collaborative project on deep learning for mean field optimal transport, leading to the publication listed above.
- **Journées Nice–Toulon–Marseille**, Porquerolles, June 2022.
- **ANR NEMATIC project meetings**, Paris, 2022–2024. Research presentations.

Earlier research and engineering experience

Research internship, Children's Hospital, Boston, USA 2020

Statistical sparse coding methods for ultrasound image enhancement, in collaboration with medical professionals.

Mitral valve modelling project, Loria, Nancy 2019

Numerical optimisation for heart-valve modelling.

Engineering internship, THALES LAS FRANCE SAS 2019

Limours. Study of a digital compensation method for radar interference.

Technical internship, ECA Robotics, Saclay 2018

Technical work in a drone design company.

Computing and languages

Computing: Python (advanced); MATLAB (advanced); R; Git and Docker.

Languages: French and Spanish (native); English (C1, IELTS certified).

Other interests

Salsa dancing, Muay Thai, skiing, cycling and hiking.