

# Arsene Brice Zotsa-Ngoufack, Postdoc researcher, UQAM.

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## Research Interests

- **Probability theory, Statistics, Complex Analysis and Actuarial science: Asymptotic behavior of PDE, Stochastic modeling, Stochastic particles systems, Stochastic process, Epidemic model, Branching Process, SPDE, Hawkes Process, Diffusion Process, Generative AI, Functional Analysis, Ruin Probability.**

## Education

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|-----------------------------|---|
| April 2021 – September 2024 | ■ <b>Ph.D in mathematics, INRAE/Aix-Marseille Université:</b> Institut de Mathématique de Marseille, France.<br><b>Thesis title:</b> <i>Stochastic epidemic model with varying infectivity and waning immunity. Weighted norm inequalities in the variable exponent Lebesgue spaces for Bergman projector on the unit ball of <math>\mathbb{C}^n</math>.</i><br><b>Advisor:</b> Professor Raphael Forien and Professor Etienne Pardoux. |
| 2019 – 2020                 | ■ <b>Master's degree in Probabilities-Statistics apply in Biology,</b> Université Félix Houphouët Boigny d'Abidjan, Côte d'Ivoire .<br><b>Master thesis title:</b> <i>Generalizations of stochastic epidemic models.</i><br><b>Advisor:</b> Professor Raphael Forien and Professor Etienne Pardoux.   |
| 2013 – 2019                 | ■ <b>Master's degree in Mathematics, University of Yaounde I, Cameroon.</b><br><b>Master thesis title:</b> <i>Generalization of the properties of classical Bergman spaces to variable exponents Bergman spaces.</i><br><b>Advisor:</b> Professor Edgar Tchoundja.  |

## Grants

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|----------------------------|--|
| August 2025                | ■ Frontiers in stochastic Analysis: \$800 USD.   |
| July 2025                  | ■ RSN funding support to attend the INFORMS APS conference in Georgia: \$2860 CAD.   |
| September 2024             | ■ Conference on new developments in Probability : \$1650 CAD.  |
| July 2024                  | ■ CRM-PIMS Probability summer school : \$800 CAD.  |
| April-May 2023             | ■ FRQ support for the CRM-CNRS international research lab: \$5000 CAD.   |
| November 2021-October 2024 | ■ Contrat doctoral Aix-Marseille Université: €60000.   |
| October 2021               | ■ EMS-SIMONS for Africa, \$3200 USD (declined).  |
| 2020                       | ■ Master 2 scholarships: institut Archimède Mathématiques-informatique, Aix-Marseille Université: €5000.                             |
| 2019-2020                  | ■ Bourse Master M2PSAV : €2000.  |
| 2019-2022                  | ■ Cameroonian government scholarship to the <a href="#">CAPESA</a> statistics schools, ISE, ENSEA Abidjan : 4000000 FCFA (declined). |
| 2017-2019                  | ■ Paul Biya Excellence Scholarship, 150000 FCFA.   |

## Research Publications

### Journal Articles

- 1 D. Békollè, E.-L. Tchoundja, and A.-B. **Zotsa-Ngoufack**, “Weighted norm inequalities in the variable lebesgue spaces for the bergman projector on the unit ball of  $\mathbb{C}^n$ ,” *Transactions of A. Razmadze Mathematical Institute*: [179.1](#), 2025.
- 2 R. Forien, G. Pang, E. Pardoux, and A.-B. **Zotsa-Ngoufack**, “Stochastic epidemic models with varying infectivity and waning immunity,” *The Annals of Applied Probability*, vol. 35, no. 3, [2175–2216](#), 2025.
- 3 A.-B. **Zotsa-Ngoufack**, “Functional central limit theorem for stochastic epidemic models with varying infectivity and waning immunity,” *ESAIM: Probability and Statistics* [29:45–112](#), 2025.

## Preprint

- 1 H. Guérin and A. B. **Zotsa-Ngoufack**, “Stochastic epidemics models with memory on the last infection and waning immunity,” *arXiv preprint arXiv*: [2505.00601](#), 2025.
- 2 A.-B. **Zotsa-Ngoufack**, “Functional central limit theorem and spde for epidemic model with memory on the last infection and waning immunity,” *arXiv preprint*: [2505.15617](#), 2025.

## Work In Progress

- 1 H. Guérin, M. Mandjes, J.-F. Renaud, and A. B. **Zotsa-Ngoufack**, “An insurance risk model with an epidemic compoment,” *Work in progress*, 2025.

## Visiting

April-May 2023: Université du Québec à Montréal (UQAM), funded by a FRQNT grant supporting research mobility for the IRL CRM-CNRS.

## Student Supervision and Mentorship

May-August 2025: Co-supervision of an intern with Hélène Guérin as part of the [Mitacs Globalink program](#)






## Conferences

- **Frontiers in Stochastic Analysis, Purdue University, West Lafayette, Indiana, US**, August 2025  
*Status*: Speaker  
*Subject*: Central Limit theorem and SPDE for epidemic model with waning immunity.
- **Society for Mathematical Biology Annual Meeting, Edmonton, Canada**, July 2025  
*Status*: Speaker and chairman  
*Subject*: Stochastic epidemic model with memory on the previous infection and with varying infectivity and waning immunity.
- **INFORMS Applied Probability Society Conference, ATLANTA, US**, June 2025  
*Status*: Speaker  
*Subject*: Impact of immune memory on the dynamic of an epidemic: Non-Markovian model.
- **Women and Mathematics in interaction**, June 2025.
- **Emerging connections between Reaction-Diffusion, Branching Processes and Biology, workshop in Banff**, May 2025  
*Status*: Invited Poster  
*Subject*: Central Limit Theorem for epidemic model with varying infectivity and waning immunity.
- **Journée de la recherche STATQAM, Université du Québec à Montréal**, May 2025  
*Status*: Invited speaker  
*Subject*: Epidemic model with memory: Functional Law of Large Numbers and endemic equilibrium

- **Statistics Seminar, University of Mississippi, US, April 2025**  
*Status:* Invited speaker  
*Subject:* Stochastic epidemic model with varying infectivity and waning immunity.
- **Montréal-Guanajuato Workshop on Probability and Machine Learning, CIMAT, Mexico, February 2025**  
*Status:* Poster  
*Subject:* Stochastic modeling: Generalized SIS non-Markovian model with waning immunity.
- **Conference on new developments in Probability, Montreal, September 2024**  
*Status:* Speaker  
*Subject:* Stochastic epidemic model with varying infectivity and waning immunity.
- **CRM-PIMS Probability summer school 2024 , Montréal, Canada**  
*Status:* Speaker  
*Subject:* Stochastic epidemic model with varying infectivity and waning immunity.
- **European Summer Program in Infectious Disease Analysis and Modelling (ESPIDAM) , Stockholm, June 2024**
- **Conference on spatial Epidemic models, Rice University, May 2024**  
*Status:* Invited speaker  
*Subject:* Stochastic epidemic model with varying infectivity and waning immunity.
- **Conference in honor of the 70th Birthday of David Békollè, Yaounde University, 2023**  
*Status:* Invited speaker  
*Subject:* Weighted inequality in the variable Lebesgue space for Bergman Projector.
- **JPS-2023: Colloque Jeunes Probabilistes et statisticiens, France, Ile d'Oleron**  
*Status:* Speaker  
*Subject:* Stochastic epidemic model with varying infectivity and waning immunity.
- **SPA conference 2023, Lisboa,**  
*Status:* Invited speaker  
*Subject:* Stochastic epidemic model with varying infectivity and waning immunity.
- **Saint-Flour (France) Summer school, July 2023,**  
*Status:* Speaker  
*Subject:* Stochastic epidemic model with varying infectivity and waning immunity.
- **Workshop: Probability meets Biology II, University of Bath, June 2023,**  
*Status:* Invited speaker  
*Subject:* Stochastic epidemic model with varying infectivity and waning immunity.
- **Séminaire des doctorants de l'UQAM, Montréal, May 2023**  
*Status:* Speaker  
*Course:* Introduction to epidemic models.
- **Seminaire Institut Denis Poisson, Orleans, France, February 2023.**  
*Status:* Invited speaker  
*Subject:* Weighted norms inequalities in the variable exponent Lebesgue space for Bergman Projector on the unit ball of  $\mathbb{C}^n$ .
- **Rencontres des Jeunes chercheurs Africains en France, Institut Henry Poincaré (Paris), December 2022,**  
*Status:* Speaker  
*Subject:* Stochastic epidemic model with varying infectivity and waning immunity.
- **Sport and IA: Ecole d'automne sport et intelligence artificielle, Antibes, October 2022.**

- **MLISTRAL:** Machine Learning in Insurance Sector Targeted to Risk Analysis and Losses, CIRM, September 2022.
- School on Climate Sensitivity and Workshop on Mathematics and Theoretical Physics for Climate Dynamics, Lyon, France, September 2022.
- Séminaire d'Analyse et Géométrie-Institut de mathématiques de Marseille, France, March 2022.  
*Status:* Invited speaker  
*Subject:* Weighted norms inequalities in the variable exponent Lebesgue space for Bergman Projector on the unit ball of  $\mathbb{C}^N$ .
- Séminaire internationale d'analyse classique à Yaoundé, December 2021,  
*Status:* Speaker  
*Subject:* Weighted variable inequality for Bergman Projector on the unit ball.
- Conférence internationale de mathématiques du GIRAGA au Cameroun, December 2021  
*Status:* Speaker  
*Subject:* Stochastic epidemic model with waning immunity.
- Conférence de la Chaire Modélisation Mathématique et Biodiversité: Aussois, France, June 2021  
*Status:* Speaker  
*Subject:* Stochastic epidemic model with varying infectivity and waning immunity.
- Conférence internationale de mathématiques au Cameroun parrainé par les universités Saint Cyr de France, 2019-2020  
*Status:* Speaker  
*Subject:* Variable exponent Bergman spaces.

## Teaching experience

- 2023–2024     **Teaching assistant.** Aix-Marseille Université,
- Financial Mathematic (Master): Pricing, Arbitrary theory, Stochastic calculus,
  - Mathematics for Microeconomics (Bachelor),
  - Linear Algebra and real Analysis (Bachelor).
- 2022–2023     **Tutor.** Aix-Marseille Université,  
 Mathematical tools for physic L2PASS.
- 2021–2022     **Teaching assistant.** Aix-Marseille Université,  
 Mathematical language course L1enzans portail René Descartes, classe inversée (flipped classroom).
- 2018–2019     **Teaching.** Institut international d'Afrique centrale(IIAC)
- Introduction to Matlab,
  - Numerical methods for ODE and application to Matlab.
-  **Tutor.** ESSFAR Cameroun,
- Real Analysis (Bachelor),
  - Linear Algebra (Bachelor).


## Teaching experience (continued)

2016 – 2019     **Tutor.** University of Yaounde 1

- Real Analysis (Bachelor),
- Topology of metric space (Bachelor),
- Differential calculus (Bachelor),
- Integral calculus (Bachelor),
- Complex Analysis (Bachelor).

## Miscellaneous Experience

### Association and responsibility

2022–2024     **Representative of p.h.d students of the doctoral school 184 (i.e doctoral school of Mathematics and computer science), Aix-Marseille Université.**

 **Co-organizer of Aix-Marseille Université p.h.d student's day.**

December 2022     **Scientific mediation in high schools, Marseille.**

### Research and Development

August 2023     **Treizième atelier de résolution de problèmes industriels de Montréal**

*Organizer:* CRM-IVADO


The objective was to compute the customer life value (CLV) in insurance. To do this we first use regression tree on the data to identify the different group (i.e. the states of the Markov chain) with the profit as a target variable, secondly we estimate the transition probabilities between each group/state and finally we compute the CLV by Monte Carlo method.

May 2022     **Semaine de mathématiques-entreprises, France.**

*Organizer:* AMIES

The objective was to use mathematical tools to propose solutions to business problems. Based on mathematical achievements, we proposed three methods that are less costly in complexity, which we implemented on Python that can allow the Cailabs structure to perform a non-homogeneous smoothing of the light.

### Professional experiences

2024–2026     **Postdoc Fellow, Université du Québec à Montréal.**

- Epidemiological models in relation to actuarial issues.
- Diffusion processes and AI generative.

March-June 2021     **Assistant Statistical Engineer, INRAE-France.**

- Development of an application for monitoring an epidemic in real time;
- Collection and processing of data in the application.

### Certification

2023     **Exam P. SOA.**

## Skills

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Languages	📖	Strong reading, writing and speaking competencies for English, French (Mother tongue), Yemba (Mother tongue), German.
Coding	📖	Matlab, PHP, Python, R, SQL, XML/XSL, L <sup>A</sup> T <sub>E</sub> X, C.
Databases	📖	MySQL, SQLite.
Web Dev	📖	HTML, CSS, JavaScript, PHP, Apache Web Server.
Hobbies.	📖	Karate, Football, Hiking, Music, Cinema, Game.