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Ruben Van Belle

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ACADEMIC EMPLOYMENT

Research Associate in Foundations of Probabilistic Programming **September 2023 - Present**
University of Oxford
Group leader: Prof. Sam Staton

ARIA creator **September 2024 - Present**
Employing categorical probability towards safe AI

Lead Selector for Admissions in Computer Science **November 2025 - September 2026**
Brasenose college, University of Oxford

EDUCATION

PhD in Geometry and Topology **September 2019 - August 2023**
University of Edinburgh

- Thesis: Kan extensions in probability theory (Supervisor: Prof. Tom Leinster)

MASt in Pure Mathematics (Part III) **September 2018 - August 2019**
University of Cambridge

- Part III essay: Sheaves on locales and internal locales (supervisor: Prof. Peter Johnstone)
- Grade: *Merit*

Bachelor of Science in Mathematics **September 2015 - August 2018**
University of Antwerp

- Thesis 1: Stone duality (supervisor: Prof. Bob Lowen)
- Thesis 2: The binomial asset pricing model and the Black-Scholes model (supervisor: Prof. Jan Van Casteren)
- Grade: *Greatest Distinction*

PUBLICATIONS

- Probability monads as codensity monads, [Theory and Applications of Categories](#) 38(2022), no. 21, 811-842
- A categorical proof of the Carathéodory extension theorem, [ArXiv:2210.01720](#), *submitted*
- A categorical proof of the Radon-Nikodym theorem, [ArXiv:2305.03421](#), *submitted*
- Convergence of martingales via enriched dagger categories, [arXiv:2404.15191](#), *submitted*

INVITED RESEARCH VISITS

- Tokyo Metropolitan University, Collaborator: *Prof. Takanori Adachi* February 2023
I was invited for a fully funded two week visit to the School of Management to give two talks, one of which was at the department's quantitative finance seminar.

INVITED TALKS

- Kan extensions in probability theory, *Marunouchi Quantitative Finance seminar (Tokyo)* March 2023
- Lax algebras in topology and probability theory, *ACPF10 (Tokyo)* February 2023

CONTRIBUTED TALKS

- Giry algebras, *PSSL110 (Tallinn)* May 2025
- Convergence of martingales via enriched dagger categories, *ACT2024 (Oxford)* June 2024
- Radon-Nikodym derivatives and martingales, *CT2023 (Louvain-la-Neuve)* July 2023
- Radon-Nikodym derivatives and martingales, *ItaCa Workshop (Pisa)* December 2022
- Radon-Nikodym derivatives and martingales, *Hodge club (Edinburgh)* October 2022
- An overview of categorical probability, *Category theory seminar (Edinburgh)*, September 2022
- A categorical proof of the Carathéodory extension theorem, *CaCS (online)* September 2022
- Adjoint School presentation, *ACT (Glasgow)* July 2022
- Lax natural transformations and measures, *PSSL (Brno)* May 2022
- Lax natural transformations and measures, *Category theory seminar (Edinburgh)* March 2022
- Categorical probability, *Category theory seminar (Edinburgh)* November 2021
- Probability monads as codensity monads, *CT20->21 (online)* August 2021
- Probability monads as codensity monads, *Category theory seminar (Edinburgh)* August 2021
- Lax algebras and topology, *Category theory seminar (Edinburgh)* October 2020

TEACHING

Tutor

September 2023 - Present

University of Oxford

- 2024-2025: Continuous mathematics (Corpus Christi)
- 2023-2024: Discrete mathematics, Linear Algebra and Continuous mathematics (Merton, Corpus Christi and Oriel)

Nominee for ‘Tutor of the Year’

2023

University of Edinburgh

Graduate teaching assistant

January 2020 - August 2023

University of Edinburgh

- 2022-2023: Probability, Introduction to Linear algebra, Foundations of Probability Theory (graduate course, [SMSTC](#)), Metric spaces, Calculus and Applications
- 2021-2022: Introduction to Linear Algebra, Measure and Integration (graduate course, [SMSTC](#)), Engineering mathematics, Proofs and problem solving (including marking the exams), Metric spaces.
- 2020-2021: Geometry, Introduction to Number Theory, Engineering mathematics, Honors Algebra Skills.
- 2019-2020 (Semester 2): Proofs and problem solving, Calculus and Applications

Writing a calculus exercises booklet

July 2018

University of Antwerp

Composed and wrote a booklet with exercises and solutions as part of the course material of a calculus undergraduate course, taught at the university of Antwerp.

Volunteer at the ‘Tutoraatproject’

2017-2018

University of Antwerp

I was a volunteer in a project organized by the University of Antwerp. This project focused on helping students that were at risk of dropping out of school by providing afterschool tutoring and help with their homework.

Private tutor

2016-2018

Stud’ant (a commercial tutoring company in Antwerp)

STUDENT SUPERVISION

- Janis Bailitis, *MSc in Mathematics and Foundations of Computer Science* 2024-2025
- Willem Jump, *MSc in Mathematics and Foundations of Computer Science* 2025-2026

CONFERENCES ATTENDED

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- Category Theory Conference (CT2025), *Brno* June 2024
- Peripatetic Seminar on Sheaves and Logic (PSSL110), *Tallinn* May 2025
- Category Theory Conference (CT2024), *Santiago de Compostela* June 2024
- Applied Category Theory Conference (ACT2024), *Oxford* June 2024
- Applications of Categorical Probability to Finance (ACPF10), *Tokyo* February 2023
- Third ItaCa Workshop, *Pisa* December 2022
- Symposium on Compositional Structures (SYCO 10), *Edinburgh* December 2022
- Categories and Companions Symposium (CaCS 2022), *Online* September 2022
- Applied Category Theory Conference (ACT2023), *Glasgow* July 2022
- Peripatetic Seminar on Sheaves and Logic (PSSL 106), *Brno* May 2022
- Categories and Companions Symposium (CaCS 2021), *Online* August 2021
- Category Theory Conference 2021 (CT20->21), *online* August 2021
- Categorical Probability and Statistics, *online* June 2020
- Topics in Category Theory: A Spring School, *Edinburgh* March 2020
- Symposium on Compositional Structures (SYCO 6), *Leicester* December 2019

SEMINAR/CONFERENCE ORGANIZATION

Category Theory Seminar, co-organizer September 2019 - present
University of Edinburgh

FUNDING

- PhD Scholarship, School of Mathematics (University of Edinburgh) September 2019- August 2023
- Laura Wisewell Travel Scholarship, *£1000* 2023
- Fully funded visit to Tokyo + honorarium of ¥207 481, Tokyo Metropolitan University February 2023
- Adjoint School funding, *£400* 2022
- Laura Wisewell Travel Scholarship, *£500* 2021
- SYCO 6 funding (Leicester), *£150* 2019
- Calouste Gulbenkian Foundation summer school funding, *€500* 2019
- Calouste Gulbenkian Foundation summer school funding, *€500* 2018

SUMMER SCHOOLS

Adjoint School of the Applied Category Theory Conference July 2022
Strathclyde University

Probability Summer School August 2019
Institute Superior Técnico, University of Lisbon

Differential Geometry Summer School July 2018
Institute Superior Técnico, University of Lisbon

Geometry Summer School August 2017
University of Utrecht