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# Ruben Van Belle

Webpage  
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## EDUCATION

**PhD in Geometry and Topology**  
*University of Edinburgh*

September 2019 - August 2023 (expected)

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

**MASt in Pure Mathematics (Part III)**  
*University of Cambridge*

September 2018 - August 2019

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

**Bachelor of Science in Mathematics**  
*University of Antwerp*

September 2015 - August 2018

- 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, *in preparation*

## 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

## 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.

## CONTRIBUTED TALKS

- 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, *Categorical Late Lunch (Edinburgh)* March 2022
- Categorical probability, *Categorical Late Lunch (Edinburgh)* November 2021
- Probability monads as codensity monads, *CT20->21(online)* August 2021
- Probability monads as codensity monads, *Categorical Late Lunch (Edinburgh)* August 2021
- Lax algebras and topology, *Categorical Late Lunch (Edinburgh)* October 2020

## TEACHING

### Graduate teaching assistant

January 2020 - present

*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)*

## CONFERENCES ATTENDED

- |   |                |
|---|----------------|
| • Applications of Categorical Probability to Finance (ACPF10), <i>Tokyo</i> | February 2023  |
| • Third ItaCa Workshop, <i>Pisa</i>   | December 2022  |
| • Symposium on Compositional Structures (SYCO 10), <i>Edinburgh</i>         | December 2022  |
| • Categories and Companions Symposium (CaCS 2022), <i>Online</i>            | September 2022 |
| • Applied Category Theory Conference (ACT), <i>Glasgow</i>                  | July 2022      |
| • Peripatetic Seminar on Sheaves and Logic (PSSL 106), <i>Brno</i>          | May 2022       |
| • Categories and Companions Symposium (CaCS 2021), <i>Online</i>            | August 2021    |
| • Category Theory Conference 2021 (CT20->21), <i>online</i>                 | August 2021    |
| • Categorical Probability and Statistics, <i>online</i>                     | June 2020      |
| • Topics in Category Theory: A Spring School, <i>Edinburgh</i>              | March 2020     |
| • Symposium on Compositional Structures (SYCO 6), <i>Leicester</i>          | December 2019  |

## ADDITIONAL COURSEWORK

### 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*

## SEMINAR/CONFERENCE ORGANIZATION

**Category Theory Seminar**, co-organizer  
*University of Edinburgh*

September 2019 - present

## FUNDING

- PhD Scholarship, School of Mathematics (University of Edinburgh) September 2019- August 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
- Calouste Gulbenkian Foundation summer school funding, €500 2019
- Calouste Gulbenkian Foundation summer school funding, €500 2018