

# Paul Immanuel

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## Introduction

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Master's graduate in Mathematics with a strong foundation in problem-solving, statistical analysis, and advanced modelling. Skilled in Python, with experience applying machine learning and data analysis to complex datasets. Adept at translating abstract concepts into practical solutions and enthusiastic about leveraging analytical skills to contribute to data science projects in finance and technology.

## Education

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### University of Bonn

Bonn, Germany

Master of Science in Mathematics

Oct 2021 – June 2025

- Received a grade of 1.8/5 (3.6 GPA). Specialised in the field of Arithmetic Geometry, studying how geometric data from higher dimensional shapes helps us to understand problems in the arithmetic of numbers.

### Lancaster University

Lancaster, UK

Bachelor of Science (Honours) in Mathematics

Oct 2018 – June 2021

- First class honours degree in Mathematics, with a focus in pure mathematics. Equivalent GPA of 3.9

## Experience

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### Teaching Assistant - Topological Data Analysis

Bonn, Germany

University of Bonn

June 2024 – Sept 2024

- Guided students through foundational algebraic topology concepts (homology and cohomology) and led hands-on labs connecting theory to machine learning applications.
- Particular focus on kernel methods that help extract topological information from data sets that is robust to small perturbations using persistence diagrams.

## Projects and Publications

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### Multi-Timeframe EMA trading strategy ([GitHub](#))

Dec 2025

Developed a multi-timeframe cryptocurrency trading strategy based on Exponential Moving Averages (EMAs), with consistent signal logic across live Binance execution and historical backtesting.

- Integrated high-frequency (1-second) and low-frequency (1-minute) EMA-based signals to align short-term momentum with higher-timeframe trends.
- Implemented both live trading logic (Binance API) and historical backtesting using backtesting.py to validate execution consistency.

### Tennis Stroke classification and labelling ([GitHub](#))

July 2025

Created a program that identified instances of backhand shots in videos of matches and training.

- Used MediaPipe pose estimation to extract joint and limb data from videos and used VGG image annotation software for temporal labelling of shots.
- This method drastically reduced the amount of raw data required and greatly simplified the complexity of the model.

### Thesis: Incarnations of the Fourier transform in Algebraic Geometry

June 2024 – June 2025

Thesis prepared and written over a year long process, supervised by Prof. Jessica Fintzen. Published on the [ArXiv](#).

- Treats the topic of Banach-Colmez spaces, for which we give a detailed introduction to the theory of perfectoid spaces as laid out by Fields medal winning Prof. Peter Scholze in recent work.

## Skills

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**Programming:** Proficient in Python for data analysis (pandas, NumPy, matplotlib), machine learning and deep learning (scikit-learn, PyTorch, tensorflow), SQL

**Communication:** Strong interpersonal and communication skills, with the ability to bridge the gap between technical detail and big-picture understanding