Jorys Mahamba

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Personal Profile

Aspiring mathematical physicist with dual BSc degrees in Mathematics and Physics (valedictorian), currently pursuing rigorous training in mathematical and theoretical physics. My research interests focus on the mathematical foundations of quantum gravity, particularly through higher category theory, derived geometry, and string/M-theory. Combining deep theoretical knowledge with computational skills from data science training, I aim to contribute to unifying frameworks in fundamental physics through a PhD program at the intersection of mathematics and theoretical physics.

Education

University of Oxford — Oxford, UK
MSc in Mathematical and Theoretical Physics — *Oct. 2025 – June 2026*

- Core modules: Quantum Field Theory, String Theory, Differential Geometry, Algebraic Topology
- Proposed thesis: *Derived Moduli Stacks in the Geometric Langlands Program*

CentraleSupélec & ESSEC Business School — Paris, France
Joint MSc in Data Sciences & Business Analytics (Honours) — *Sept. 2024 – May. 2025*

- Relevant coursework: Machine Learning Theory, Statistical Learning, Mathematical Optimization
- Leveraging computational skills for physics research applications in string theory landscapes

Université Paris-Est Créteil (UPEC) — Créteil, France
Dual BSc in Mathematics & Physics (Highest Honours, Valedictorian) — *Sept. 2023 – June 2024*

- Ranked 1st overall in mathematics program; 1st in dual degree cohort (GPA: 18.5/20)
- Key courses: Metric Spaces (19/20), Quantum Mechanics (17/20), Measure Theory (17/20), Differential Calculus and Curves (16.5/20)

Lycée Marcelin Berthelot — Saint-Maur-des-Fossés, France
Classes Préparatoires PC (Mathematics, Physics, Chemistry – Highest Honours)* — *Sept. 2020 – July 2023*

- Intensive 2-3 years undergraduate program preparing for the highly competitive *Grandes Ecoles* entrance exams (elite class are starred).

Research Experience

Statistical Mechanics of Phase Transitions — UPEC, Créteil, France
Undergraduate Research Project (Supervisor: Prof. [Name]) — *Feb. 2024 – June 2024*

- Investigated critical phenomena in 2D Ising model using Peierls arguments and renormalization group methods
- Developed pedagogical framework connecting rigorous mathematical proofs to physical intuition
- Produced comprehensive report bridging statistical mechanics and probability theory

Machine Learning for Quantum Systems — Independent Research
Self-Directed Project — *Sept. 2024 – Present*

- Exploring ML applications to Calabi-Yau manifold classification and swampland conjectures
- Developing computational tools for analyzing geometric structures in string compactifications
- Investigating connections between quantum information theory and holographic principles

BRED Banque Populaire — Paris, France
Quantitative Research Intern — *May 2024 – Aug. 2024*

- Applied mathematical methods to neural network architectures for financial modeling
- Co-authoring paper on theoretical foundations of deep learning in quantitative finance

Publications and Preprints

Memory Capacity and Phase Transitions in Hopfield Networks
Under review at La Gazette de la SMF — *2024*

- Survey article connecting statistical mechanics, neural networks, and biological memory systems

Advanced Coursework and Self-Study

Category Theory & Topos Theory: Lurie's *Higher Topos Theory*, Riehl's *Category Theory in Context*
Algebraic Geometry: Hartshorne, Vakil's *Rising Sea*, introduction to derived algebraic geometry
Differential Geometry: Lee's manifold series, Kobayashi-Nomizu, introduction to Kähler geometry
Quantum Field Theory: Weinberg Vol. 1, Srednicki, path integral formulation and BRST quantization
String Theory: Polchinski (Vols. I-II), Green-Schwarz-Witten, AdS/CFT correspondence basics

Selected Seminars and Conferences

Mathematics for and by Large Language Models — IHES, Bures-sur-Yvette
Participant — *May 2025*

Random Hyperbolic Surfaces Seminar — Collège de France (Prof. N. Anantharaman)
Regular Attendee — *Nov. 2024 – Jan. 2025*

Working Mathematician's Guide to Topos Theory — CentraleSupélec (Prof. O. Caramello)
Workshop Participant — *March 2024*

Technical Skills

Programming: Python (NumPy, SciPy, TensorFlow), Mathematica, C++, LaTeX

Mathematical Software: SageMath, GAP, Macaulay2

Languages: French (Native), English (C1 - IELTS 7.5), Spanish (B1)

Honors and Awards

Valedictorian, UPEC Mathematics & Physics Programs — 2024
Excellence Scholarship, ESSEC Business School — 2024
Outstanding Academic Achievement, Lycée Marcelin Berthelot — 2023

Leadership and Extracurricular Activities

Physics Study Group Organizer, UPEC — 2023-2024
Shotokan Karate, Black Belt 1st Dan, Former Regional Competitor — 2012-2022
High School Mathematics Tutor, Volunteer Program — 2023-Present