Julian Brandon

Phone: +33 6 95 93 04 07 | Email: julianbrandon06@gmail.com | Paris
Linkedin: www.linkedin.com/in/julian-brandon-6a4b73226

PROFILE

Research assistant with a first-class background in Theoretical Physics. Strong expertise in dynamical systems, differential geometry, and machine learning, with research experience analysing neural collapse and manifold geometry in neural networks. Skilled in bridging physics-based theory with modern ML methods (JAX, PyTorch) for studying learning in networks using representational geometry.

EDUCATION

University of Edinburgh **2024-2025**
Artificial Intelligence (MSc)

- Master's thesis: *A Riemannian Geometry Analysis of Discrete Computations in Neural Networks.*
- Completed projects in computer vision, time series forecasting and reinforcement learning.
- Related courses: Machine Learning and Pattern Recognition (82), Reinforcement Learning (79), Computational Neuroscience (72), Simulation, Analysis, and Validation of Comp. Models (86).

University of Birmingham – First Class (Moreton Prize) **2021-2024**
Theoretical Physics (BSc)

- Ranked second in cohort; awarded Moreton Prize.
- Completed a project analysing statistics of wildfires using python.
- Related courses: Mathematics for Physicists (94), Complex Variable Theory (88), Applied Mathematical Analysis (87), Quantum Mechanics (93), Statistical Physics (79).

RESEARCH EXPERIENCE

- **Research Assistant at ENS Paris (current)** – investigating mode collapse in CNFs and flow matching, applying dynamical systems and operator theory to gain an analytical description.
- **MSc Dissertation –** *Emergent Riemannian geometry over learning discrete computations on continuous manifolds (2025)*
    - Developed analytic and numerical tools to study collapse and manifold geometry in neural networks.
    - Identified metric degeneracy and curvature divergence as signatures of collapse, contrasting rich vs lazy regimes.
    - Implemented large-scale experiments in JAX, combining geometric analysis with Bayesian perspectives on noise.
- **Undergraduate Project** – *Statistical Analysis of Wildfire Models (Python)*: applied probabilistic/statistical methods to study self-organising criticality and percolation in forest fire models.

SKILLS

- **Computational Neuroscience:** Neural dynamics, representational geometry, manifold-based analysis.
- **Simulation and Mathematical Modelling:** Dynamical systems, ODEs/PDEs, Riemannian geometry, linear algebra.
- **Programming & ML:** Python, PyTorch, JAX, NumPy/SciPy; Git; LaTeX; experience in CV, RL.

AWARDS AND ACHIEVEMENTS

- **Moreton Prize** – awarded for graduating with the second-highest mark in Theoretical Physics, University of Birmingham (2024).
- Consistently high performance in advanced mathematics and ML coursework.

PUBLICATIONS

- Brandon, J. (2025). *Emergent Riemannian geometry over learning discrete computations on continuous manifolds*. NeurReps 2025.

ADDITIONAL INFORMATION

- Nationality: British/French dual.
- Languages: English, French.
- Attended Geometry and Dynamics of Neural Computation workshop, Edinburgh 2025.