

# Raphaël Barboni

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## Education

- Since 2018 **Research apprentice (Élève fonctionnaire stagiaire)**, *ÉNS Ulm*, Paris, France.  
Department of Mathematics and their Applications
- 2020–2021 **MSc. Mathematics for Machine Learning and Data Science (MVA)**, *ÉNS Paris-Saclay*, with honors.
- 1st Semester : Computational optimal transport, Stochastic Differential Equations, Numerical imaging, Dynamical systems and stochastic models in neuroscience, Medical image analysis,
  - 2nd Semester : Random matrix theory, Sparse representation theory, Geometry in the space of shapes, Inverse problems in imaging, PDEs for image analysis,
  - Master thesis** : “*Convergence properties of Gradient Descent in the training of Deep Residual Networks*” (supervised by G. Peyré and F-X. Vialard).
- 2019–2020 **First year of Master degree in mathematics**, *ÉNS Ulm*.
- 1st Semester : Stochastic processes and Markov chains, Elliptic PDEs, Dynamical systems and ergodic theory,
  - 2nd Semester : Stochastic calculus, Optimal transport and applications in kinetic theory,
  - Industrial workshop** : optimization with cardinality constraints for the daily adjustment of electricity production,
  - Workshop** : “*Spectral theory in quantum mechanics*” (E.Séré).
- 2018–2019 **Sorbonne Université’s Bachelor degree in mathematics**, *ÉNS Ulm*, with honors.
- Bachelor thesis**, “*Mean curvature flow, an introduction to geometrical flows*” (supervised by T. Ozuch),
  - Workshop** : “*Riemannian geometry in the space of shapes*” (J. Feydy).
- 2016–2018 **Scientific preparation for competitive exams**, *Lycée Henri IV*, Paris.  
MPSI then MP\*, optional courses in computer science

## Skills

### Computer

Programming Python, Pytorch  
Operating System Linux

### Languages

French Mother tongue  
English, German Professional skills (B2)

## Professional experiences

### Research experiences

- 2021 **Research internship**, *CNRS - DMA*, Paris.  
“Convergence properties of Gradient Descent in the training of Deep Residual Networks”,  
under supervision of G. Peyré and F-X. Vialard.
- 2020 **Research internship**, *Center for Mathematical Modeling (CMM) - CNRS*, Santiago, Chile.  
“Hydrodynamical models for red tides phenomena in Quellón’s bay”, under supervision of C. Conca.  
Interrupted due to the Covid pandemic.

### Teaching

- 2021–2022 **Teaching assistant**, *Lycée Henri IV*, Paris.  
“Cycle Pluridisciplinaire d’Études Supérieures” (CPES), Bachelor level.
- 2018–2022 **Preparation for competitive exams**, *Lycée Henri IV*, Paris.  
Questioning students on mathematical exercises (“colles”).

## Community life

- 2019–2021 **Confer’ENS Ulm**.  
Students’ forum, canvassing speakers, preparing interviews
- 2019 **Member of the ENS Students’ Office**.  
Scheduling artistic events, organizing associative events

## Hobbies

Track & Field I do Pole Vault, my record is 4.15m  
Mountain sports Hiking, climbing, skiing and traveling  
Guitar Spanish and South-american music