



# Nina Vesseron

## Curriculum Vitae

### About me

I am a PhD student at CREST in Paris-Saclay (France). My research interests lie at the intersection of optimal transport, generative modeling and sampling.

### Education

- 2022 - **PhD in Applied Mathematics**, *CREST-ENSAE*, Paris-Saclay, present  
Expected Graduation: 03/26.  
Dissertation Topic: Optimal Transport, Generative modeling, Optimization, Sampling  
Advisor: Marco Cuturi
- 2021 - 2022 **Master's Degree in Machine Learning**, *Ecole Normale Supérieure*, Paris-Saclay, Paris.  
Major in Mathematics, Vision and Learning. Highest honors.  
Main courses: Optimization, Computational Statistics, Optimal Transport, Machine learning with kernel methods, Generative models.
- 2019 - 2021 **Master's Degree in Computer Science**, *Ecole Normale Supérieure*, Lyon.  
Main courses: Machine Learning, Statistical Learning, Information Theory, Algorithmics, Complex Systems, Parallel and Distributed Algorithms
- 2018 - 2019 **Bachelor's Degree in Computer Science**, *Ecole Normale Supérieure*, Lyon.  
Main courses: Graph Theory, Algorithmics, Logic, Automata Theory
- 2018 - 2019 **Bachelor's Degree in Mathematics**, *Claude Bernard University*, Lyon.  
Main courses: Probability Theory, Statistics, Linear Algebra, Numerical Analysis

### Publications

- 2025 Nina Vesseron, Elsa Cazelles, Alice Le Brigant, and Thierry Klein. On the Wasserstein Geodesic Principal Component Analysis of probability measures, 2025.
- 2025 Nina Vesseron, Louis Béthune, and Marco Cuturi. Sample and Map from a Single Convex Potential: Generation using Conjugate Moment Measures, 2025.
- 2024 Nina Vesseron and Marco Cuturi. On a Neural Implementation of Brenier's Polar Factorization. **Spotlight Paper**. In *International Conference on Machine Learning*, 2024.
- 2021 Nina Vesseron, Ievgen Redko, and Charlotte Laclau. Deep neural networks are congestion games: From loss landscape to Wardrop equilibrium and beyond. In *International Conference on Artificial Intelligence and Statistics*, 2021.

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## Presentations

- June 2025 **Conference Presentation**, Sample and Map from a Single Convex Potential: Generation using Conjugate Moment Measures, SMAI2025, Carcans Maubuisson.
- May 2024 **Congress Presentation**, On a Neural Implementation of Brenier's Polar Factorization, National Congress on Numerical Analysis, Le-Bois-Plage-en-Ré, Ile de Ré.
- May 2024 **Invited Talk**, On a Neural Implementation of Brenier's Polar Factorization, Ecole Normale Supérieure Seminar, Ecole Normale Supérieure, Paris.
- April 2024 **Workshop Presentation**, On a Neural Implementation of Brenier's Polar Factorization, Optimal Transport Workshop, Institut d'Etudes Scientifiques, Cargèse, Corsica.
- October 2022 **Presentation**, Quantile functions in high dimension and neural Optimal Transport, **Best student presentation award**, Junior Conference on Data Science and Engineering, INRIA, Paris-Saclay.
- June 2022 **Invited Talk**, Deep neural networks are congestion games: From loss landscape to wardrop equilibrium and beyond, CentraleSupélec Seminar, CentraleSupélec, Paris-Saclay.

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## Research Internships

May 2025 - October 2025 **Research Internship in Computer Graphics – 3D Gaussian Splatting (Ongoing)**, Adobe, Paris.

Advisor: **Élie Michel**

February 2021 - July 2021 **Posterior sampling applied to inverse problems**, ONERA, Palaiseau.

- Project: Analyzed gas flow dynamics during rocket take-off using tomography images.
- Methodology: Reconstructed gas flow by parameterizing prior distribution with a normalizing flow and sampled posterior distribution using the Metropolis-adjusted Langevin algorithm.

Advisor: **Frédéric Champagnat**

April 2020 - August 2020 **Posterior sampling applied to inverse problems**, Hubert Curien Laboratory, St-Etienne.

- Project: Explored the relationship between deep neural networks (DNNs) and congestion games to apply theoretical insights from game theory to DNNs.
- Achievements: Developed a model demonstrating that local minima are global minima of the DNN's loss function for specific architectures.

Advisors: **Ievgen Redko** and **Charlotte Laclau**

June 2019 - July 2019 **The knapsack problem with conflict graph (KPCG)**, INRIA, Bordeaux.

- Project: Developed and implemented a C++ algorithm for the REALOPT team to optimally solve the KPCG problem by finding the largest interval subgraph of a conflict graph.

Advisors: **François Clautiaux** and **Pierre Pesneau**

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## Workshop Organization

2021 - 2022 **Workshop Organizer**, *International Conference on Learning Representations (2022)*, Gamification and Multiagent Solutions Workshop.

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## Teaching Assistant

- 2024 - 2025 **Optimal Transport: theory, computations, statistics and ML**, ENSAE, Paris.
- 2024 - 2025 **Algorithmics and Programming**, ENSAE, Paris.
- 2023 - 2024 **Optimization**, ENSAE, Paris.

- 2023 - 2024 **Algorithmics and Programming**, ENSAE, Paris.
- 2022 - 2023 **Optimal Transport: theory, computations, statistics and ML**, ENSAE, Paris.
- 2022 - 2023 **Optimization**, ENSAE, Paris.
- 2022 - 2023 **Python for Data Science**, ENSAE, Paris.
- 2022 - 2023 **Algorithmics and Programming**, ENSAE, Paris.

## Languages and Skills

- Languages French (mother tongue), English (fluent)
- Programming Languages **Proficient in:** Python, JAX, FLAX, PyTorch
- Languages **Familiar with:** Keras, C, C++, OCaml
- Database **Familiar with:** SQL, Neo4j
- Open source contribution Python Library OTT-JAX for Optimal Transport Tools in JAX, <https://github.com/ott-jax/ott>
- Python Library for Neural Brenier's Polar Factorization Solver in JAX, <https://github.com/nvesseron/Neural-Polar-Factorization/>