

THÉO DUMONT

PhD student at LIGM, Univ. Gustave Eiffel (Marne-la-Vallée, France)
Optimal transport / Riemannian geometry / Machine learning



OVERVIEW

1.1. Summary. I am a PhD student in mathematics at LIGM (Université Gustave Eiffel), under the supervision of François-Xavier VIALARD, Théo LACOMBE and Virginie EHRLACHER. I am studying the geometry of several optimizations problems related to optimal transport (OT), such as regularized OT or Gromov–Wasserstein.

1.2. Interests and recent work. My interests span the theory of OT and infinite-dimensional Riemannian geometry, and I am passionate about the interplay between those fields. In particular, I am fond of gradient flows and functional inequalities when they both arise from various choices of metrics on the space of probability measures. I recently worked with F.X. VIALARD and T. LACOMBE on gradient flows constrained to the space of OT maps [1] and on the Gromov–Wasserstein problem [2], with P. HARMS on the infinite-dimensional geometry of neural networks, and with K. MODIN on gradient flows in the diffeomorphism group. I also have a strong background in computer science and machine learning, both theoretical and applied, thanks to my academic background and my early research experiences [3, 4].

I also love teaching—whether it is mathematics, computer science, or societal topics. I love creating visuals, summarizing dense content in a clear way, and thinking about the best way to make something easily understandable.

CURRICULUM

2.1. Education.

- 2023– : **PhD in mathematics, LIGM (Université Gustave Eiffel)**
Thesis: *Geometry of some optimization problems on spaces of measures* [1]
Supervisors: François-Xavier VIALARD, Théo LACOMBE and Virginie EHRLACHER
- 2021–2022: **M.Sc., ENS Paris-Saclay**, Master 2 MVA (*Mathematics, Computer Vision and Machine Learning*)
Thesis: *Existence of Monge maps for the Gromov–Wasserstein problem* ([link](#) of the thesis) [2]
Supervisors: François-Xavier VIALARD and Théo LACOMBE
- 2018–2022: **M.Sc., Mines Paris – PSL University** (*Applied Mathematics and Computer Science*) [3, 5, 4]
- 2016–2018: **B.Sc., Lycée Sainte-Geneviève** (*Mathematics, Physics, Fundamental and applied Computer Science*)

2.2. Teaching experiences.

- **Mathematics**

(3 years) 2023–2026	Computer Science for Mathematics, Year 2, Université Gustave Eiffel, France.
2020–2025	Private tutor in Mathematics, Years 1,2,3.

- **Machine Learning and Computer Science**

(2 years) 2023–2025	Algorithm and programming, Year 1, Université Gustave Eiffel, France.
(2 years) 2024–2026	Machine learning, Year 4, Université Gustave Eiffel, France.
(2 years) 2023–2025	Data science, Year 3, Mines Paris, France (link).

- **Ecological crisis**

(2 years) 2024–2026	Climate change, Year 1, Université Gustave Eiffel, France.
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2.3. Research experiences.

- Here is a list of my research stays, prior to my PhD.
- 2023: **Chalmers University (Göteborg, Sweden)**, internship (infinite-dimensional Riemannian geometry)
(2 months) *Gradient flows in the diffeomorphism group*
Supervisor: [Klas MODIN](#)
- 2022–2023: **NTU Singapore**, internship (infinite-dimensional Riemannian geometry)
(6 months) *Intrinsic geometry of neural networks*
Supervisor: [Philipp HARMS](#)

- 2022: **Université Gustave Eiffel – LIGM**, internship (optimal transport)
 (6 months) *Existence of Monge maps for Gromov–Wasserstein* [2]
 Supervisors: François-Xavier VIALARD and Théo LACOMBE
- 2021: **Tekal.ai, working with MIT CSAIL**, internship (deep learning)
 (6 months) *Video memorability prediction* [3]
 Supervisor: Camilo FOSCO
- 2020–2021: **InterDigital, Inc.**, internship (deep learning)
 (6 months) *Temporal segmentation of facial features*
 Supervisors: Claire-Hélène DEMARTY and Frédéric LEFEBVRE
- 2020: **Turing Centre for Living Systems (INMED)**, internship (computer vision)
 (3 months) *Image processing and dimensionality reduction for neuronal coactivity detection in the brain* [5]
 Supervisors: Rosa COSSART and Julien DENIS
- 2019–2020: **Mines Paris – Center for Mathematical Morphology**, internship (deep learning)
 (6 months) *Image segmentation by superpixels* [4]
 Supervisor: Bruno FIGLIUZZI

PUBLICATION LIST

See also my [Google Scholar](#) page.

3.1. Optimal transport and geometry.

- [1] [T. Dumont](#), T. Lacombe, and F. X. Vialard. “Learning Monge maps by lifting and constraining Wasserstein gradient flows”. In: *to appear* (2026). [POSTER](#)
- [2] [T. Dumont](#), T. Lacombe, and F. X. Vialard. “On the existence of Monge maps for the Gromov–Wasserstein problem”. In: *Foundations of Computational Mathematics* (2024), pp. 1–48. [PDF](#) [CODE](#) [SLIDES](#) [POSTER](#).

3.2. Applied ML and image analysis.

- [3] [T. Dumont](#), J. S. Hevia, and C. L. Fosco. “Modular Memorability: Tiered Representations for Video Memorability Prediction”. In: *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*. 2023, pp. 10751–10760. [PDF](#) [CODE](#).
- [4] D. Paulovics, B. Figliuzzi, [T. Dumont](#), and F. Blanc. “A supervised algorithm entirely trained on a synthetic dataset to segment granular suspension images”. Preprint. 2023. [PDF](#) [CODE](#).
- [5] R. F. Dard, E. Leprince, J. Denis, S. R. Balappa, D. Suchkov, R. Boyce, C. Lopez, M. Giorgi-Kurz, T. Szwagier, [T. Dumont](#), et al. “The rapid developmental rise of somatic inhibition disengages hippocampal dynamics from self-motion”. In: *Elife* 11 (2022), e78116. [PDF](#) [CODE](#).

TALKS AND POSTERS

Here are listed talks on my original research (●) and talks on other people’s work (○). Posters are indicated with ☆.

- **Learning Monge maps by lifting and constraining Wasserstein gradient flow** [1] [POSTER](#)
 - ☆ Oct 2025 | *GdR IASIS: “Modèles génératifs : diffusion, flow matching et leurs applications”*, ENS Lyon, France.
 - Jan 2025 | *Infinite-dimensional Geometry: Theory and Applications*, ESI Vienna, Austria.
- **Existence of Monge maps for the Gromov–Wasserstein problem** [2] [SLIDES](#) [POSTER](#)
 - Oct 2024 | *Congrès des Jeunes Chercheur.e.s en Mathématiques Appliquées (CJC-MA)*, ENS Lyon, France.
 - ☆ Aug 2024 | *Machine Learning in Infinite Dimensions*, Bath, UK.
 - ☆ May 2024 | *Geometric Sciences in Action: from geometric statistics to shape analysis*, CIRM, Marseille, France.
 - Jan 2024 | *MAP5 lab PhDs’ seminar*, Université Paris Cité, France.
 - Oct 2023 | *Oberwolfach seminar: “Variational and information flows in ML and OT”*, Oberwolfach, Germany.
- **Gradient flows on Riemannian manifolds and on the space of probability measures**
- **Logarithmic Sobolev inequalities and related topics** [NOTES](#)
 - Oct 2024 | *New Monge problems*, Paris, France.

- **Infinite-dimensional Riemannian geometry of optimal transport and Gromov–Wasserstein**

Nov 2023 | [Shape analysis seminar](#), INRIA Paris, France.

SUMMER SCHOOLS, CONFERENCES, WORKSHOPS AND SEMINARS

Here is a list of my participation in events, with indication of whether I presented a talk on my original research (●), a talk on other people's work (○), or a poster (☆).

- **Summer schools**

Sept 2024	Metric Measure Spaces, Ricci Curvature, and Optimal Transport , Lake Como, Italy.
July 2024	Festum Pi: “Modern research in analysis” , Chania, Greece.
● Oct 2023	Oberwolfach seminar: “Variational and information flows in ML and OT” , Oberwolfach, Germany.
Jun 2022	An optimization perspective on sampling using optimal transport (my notes) , Paris, France.

- **Conferences**

● Jan 2025	Infinite-dimensional Geometry: Theory and Applications , ESI Vienna, Austria.
☆ Aug 2024	Machine Learning in Infinite Dimensions , Bath, UK.
☆ May 2024	Geometric Sciences in Action: from geometric statistics to shape analysis , CIRM, Marseille, France, awarded the first place for the poster competition.
Oct 2022	Geometry, Topology and Statistics in Data Sciences , IHP, Paris, France.

- **Workshops**

☆ Oct 2025	GdR IASIS: “Modèles génératifs : diffusion, flow matching et leurs applications” , ENS Lyon, France.
July 2025	Labos 1point5: Enseigner les transitions écologiques et sociales dans le supérieur , Université Lyon 1, France.
June 2025	Rencontres Archipel , Université Lyon 1, France.
● Oct 2024	Congrès des Jeunes Chercheur.e.s en Mathématiques Appliquées (CJC-MA) , ENS Lyon, France.

- **Seminars**

○ Oct 2024	New Monge problems , Paris, France.
● Jan 2024	MAP5 lab PhDs’ seminar , Université Paris Cité, France.
● Nov 2023	Shape analysis seminar , INRIA Paris, France.

COMPUTER AND LANGUAGE SKILLS

Computer skills

Proficient: Python, PyTorch, git, Unix, L^AT_EX,
BASH, SQL, Tikz, Adobe Suite

Intermediate: Java, OCaml, HTML, CSS, Coq

Language skills

English:	Fluent	(C1, TOEFL 113/120)
French:	Native speaker	

Italian:	Intermediate	(B1)
Japanese:	Basic	(A2)

See also my GitHub, [theodumont](#).