

Luca Nenna

PERSONAL INFORMATION

Born on September, 18, 1988 in Brescia.
Italian and French citizen
<https://lucanenna.github.io>
Laboratoire de Mathématiques d'Orsay Bâtiment 307
Faculté des Sciences d'Orsay Université Paris-Saclay
F-91405 Orsay Cedex, France
luca.nenna@universite-paris-saclay.fr

RESEARCH INTERESTS

Optimal Transport, Calculus of Variations, Numerical Analysis, Mathematical Physics,
Mathematical Economics.

CURRENT POSITION

Septembre 2018-now

- Maître de conférences at Université Paris-Saclay (LMO) .
- January 2023- June 2023 on leave (délégation) at Inria-Paris ([Matherials team](#)).
- January 2024- June 2024 on leave (délégation) at Inria-Paris ([Matherials team](#)).
- January 2024-now member of the Inria-Saclay and LMO team ParMa.
- June 2024-now co P.I. with T. Gallouet of the joint team KarMa between ParMa and the Kantorovich Initiative (PIMS).

September 2017-August 2018

- Post-doc (CNRS) under the supervision of Mathieu Lewin.

October 2016-August 2017,

- Ater at **Université Paris-Dauphine**, Paris.

EDUCATION

University Paris-Saclay, Paris, France

H.D.R., Mathematics, 6th March 2024

- Thesis: *On some generalisation of Optimal Transport problem*
- Referees: Prof. Y. Bernier (CNRS and U. Paris-Saclay), Prof. G. Peyré (CNRS and ENS Paris) and Prof. Y.-H. Kim (UBC)
- Dissertation committee: Y. Brenier, G. Peyré, Y.-H. Kim, J. Delon, J.-M. Mirebeau and S. Rota-Nodari.

Université Paris-Dauphine and **I.N.R.I.A.**, Paris, France

Ph.D., Mathematics, 5th December 2016

- Thesis: *Numerical methods for Multi-Marginal Optimal Transportation*
- Advisors: [Jean-David Benamou](#) and [Guillaume Carlier](#)
- Referees: Prof. Alfred Galichon (NYU) and Prof. Dejan Slepčev (CMU)
- Dissertation committee: J-D. Benamou, G. Carlier, Y. Brenier, M. Lewin, C. Léonard, V. Ehrlacher and D. Slepčev.

Politecnico di Milano, Milan, Italy

Master Degree in Mathematical Engineering (*110/110*), April 2013

- Thesis Topic: Finite element discretization for large eddy simulation of turbulent flows
- Advisor: Lorenzo Valdetaro

Bachelor in Mathematical Engineering, September 2010

- (Reading course) Topic: *Tornadogenesis*
- Advisor: Paolo Biscari

1. Benamou, Jean-David and Carlier, Guillaume and Cuturi, Marco and **Nenna, Luca** and Peyré, Gabriel, *Iterative bregman projections for regularized transportation problems*, SIAM Journal on Scientific Computing, 37, 2, A1111—A1138, 2015, Society for Industrial and Applied Mathematics.
2. Benamou JD., Carlier G., **Nenna L.** (2016) A Numerical Method to Solve Multi-Marginal Optimal Transport Problems with Coulomb Cost. In: Glowinski R., Osher S., Yin W. (eds) Splitting Methods in Communication, Imaging, Science, and Engineering. Scientific Computation. Springer, Cham .
3. Di Marino, S., Gerolin, A., **Nenna, L.** (2017). 9. Optimal transportation theory with repulsive costs. Topological Optimization and Optimal Transport (pp. 204-256). Berlin, Boston: De Gruyter. Retrieved 30 Jan. 2018, from <https://www.degruyter.com/view/books/9783110430417/9783110430417-010/9783110430417-010.xml>
4. Blanchet, A., Carlier, G. , **Nenna, L.** Vietnam J. Math. (2018) 46: 15. <https://doi.org/10.1007/s10017-0255-x>
5. M. Seidl, S. Di Marino, A. Gerolin, **L. Nenna**, K. Giesbertz , P. Gori-Giorgi, *The strictly-correlated electron functional for spherically symmetric systems revisited*, [arXiv:2401.01469](https://arxiv.org/abs/2401.01469), to appear on Physical Review A.
6. JD Benamou, G. Carlier, **L. Nenna**, *Generalized incompressible flows, multi-marginal transport and Sinkhorn algorithm*, Numerische Mathematik 142 (1), 33-54, 2019.
7. JD Benamou, G. Carlier, S. Di Marino, **L. Nenna**, *Quadratic Mean Field Games and Entropic Minimization*, Mathematical Models and Methods in Applied Sciences 29 (08), 1553-1583, 2019.
8. **L. Nenna** and B. Pass, *Variational problems involving unequal dimensional optimal transport*, Journal de Mathématiques Pures et Appliquées, 2020.
9. **L. Nenna** and B. Pass, *Transport type metrics on the space of probability measures involving singular base measures*, Applied Mathematics and Optimization , 2022.
10. **L. Nenna**, B. Pass, *A note on Cournot-Nash equilibria and unequal dimension*, in Optimal Transport Statistics for Economics and Related Topics. Vol. 483. Studies in Systems, Decision and Control, 2023.
11. H. Ennaji, Q. Mérigot, **L. Nenna**, B. Pass, *Robust risk management via multi-marginal optimal transport*, Journal of Optimization Theory and Applications (2024): 1-28.
12. **L. Nenna**, B. Pass, *An ODE characterisation of multi-marginal optimal transport for pair-wise cost*, submitted, 2022.
13. S. Di Marino, A. Gerolin, **L. Nenna**, *Universal diagonal estimates for minimizers of the Levy-Lieb functional*, in Letters in Mathematical Physics , 2023.
14. V. Ehrlicher, **L. Nenna**, *A sparse approximation of the Lieb functional with moment constraints*, submitted, 2023.
15. **L. Nenna**, P. Pegon, *Convergence rate of entropy-regularized multi-marginal optimal transport costs*, in Canadian Journal of Mathematics, 2023.
16. Hiew, J. Z. G., **Nenna, L.**, Pass, B. An ordinary differential equation for entropic optimal transport and its linearly constrained variants. arXiv preprint arXiv:2403.20238, 2024.

17. L. De Pascale and **L. Nenna**. A variational formulation of a Multi-Population Mean Field Games with non-local interactions. In: arXiv preprint arXiv:2408.03118, 2024.
18. S. Di Marino, M. Lewin, and **L. Nenna**. The ground state energy is not always convex in the number of electrons, *The Journal of Physical Chemistry A*, 2024.
19. J. D. Benamou, G. Carlier, M. Cuturi, **L. Nenna** and G. Peyré. A numerical method for regularized transportation problems. Proceedings, Frontiers of Science Award summary paper.
20. S. Di Marino, M. Lewin, **L. Nenna**, *Grand Canonical Optimal Transport*, Arch. Rat. Mech. Anal., 2025.
21. J.B. Casteras, L. Monsaingeon, **L. Nenna**, Large deviations for sticky-reflecting Brownian motion with boundary diffusion. preprint <https://inria.hal.science/hal-04895784>.

PAPERS IN PREPARATION

1. J.B. Casteras, L. Monsaingeon, **L. Nenna**, *Gradient flows and the Sticky-Schödinger problem*.
2. E. Bonnet-Weill, V. Ehrlacher, **L. Nenna**, *Reduced-order modeling for parametrized optimal transport problems*.
3. **L. Nenna**, P. Pegon, L. Tocquec, *On convergence rates of regularized unbalanced optimal transport*
4. L. De Pascale, **L. Nenna**, I. Pinheiro, *Diagonal estimates for moment constraint optimal transport*.
5. **L. Nenna**, B. Pass, *Regularity results for some multi-marginal optimal transport problems*.
6. M. Seidl, S. Di Marino, A. Gerolin, **L. Nenna**, K. Giesbertz, P. Gori-Giorgi, *The strictly-correlated electron functional for spherically symmetric systems revisited II: SGS CONJECTURE*.

PRESENTATIONS **Talks and Poster**

- Analysis seminar, LMB, Besançon, March 2025.
- MACS seminar, ICJ, Lyon, February 2025.
- PNR Kanotrovich seminar+PDE seminar+Math Phys Semianr+Prob seminar, UBC, Vancouver, August 2024.
- Kantorovich initiative meeting, UBC, Vancouver, August 2024.
- International Conference in Basic Science, Benjing, July 2024.
- 4th Italian Meeting on Probability and Mathematical Statistics, Rome, June 2024.
- EMC2 seminar, Sorbonne university, February 2024.
- Kick-off meeting ANR SOCOT, January 2024.
- ANEDP seminar, Université de Nice, January 2024.
- Numerical methods for optimal transport problems, mean field games and multi-agent dynamics, Universidad Federico Santa María, Valparaiso, Chile, January 2024.
- PGMO days, EDF Lab, Palaiseau, November 2023.
- Numerical Analysis seminar, U. de Lille, October 2023.
- Summer school on Optimal Transport, TU Dortmund, Dortmund, September 2023.
- Computational Optimal Transport, FOCM23, Paris, June 2023.
- Emerging topics in applied optimal transport, ETH, Zürich, June 2023.

- Optimization and control in Burgundy, U. de Bourgogne, May 2023.
- GFM seminar, University of Lisbon, Lisbon, April 2023.
- Journée transport optimal, U. of Évry, Évry, February 2023.
- interpolations of Measures, Lagrange center, Paris, January 2023.
- PGMO days, EDF Lab, Palaiseau, November 2022.
- SAMM seminar, Paris, U. Paris 1 Panthéon-Sorbonne, October 2022.
- Numerical Analysis and PDE seminar, Orsay, October 2022.
- Analysis Seminar, Durham, January 2022.
- Lab Seminar, Mulhouse (UHA), December 2021.
- Schrödinger Problem and Mean-field PDE Systems: Computational and Theoretical Advances, CIRM, November 2021
- Seminar CalVa, University of Paris, Paris, October 2021.
- Schrödinger's problem and Optimal Transport, Lisbon, September 2021.
- Entropic Optimal Transport, Banff, June 2021.
- Seminar at School of Applied Mathematics, FGV, Rio, December 2020.
- Analysis Seminar at TUM, Munich, July 2020.
- FGS'19, Nice, September 2019.
- People in Optimal Transportation and Applications, Cortona, June 2019.
- SPO seminar, IHP, Paris, April 2019.
- Optimal Transport tools in Density Functional Theory, BIRS, Banff, February 2019.
- MokaMeeting. Inria-Paris January 2019.
- From Stochastic Geometric Mechanics to Mass Transportation problems, University of Lisbon, Lisbon, 3 septembre 2018.
- Seminar CalVa, University Paris-Sud, Orsay, 26 mars 2018.
- Session on Mean Field Games, PgmDays, Paris, 14 November 2017.
- Mean Field Games, IPAM (UCLA), Los Angeles, 29 August 2017.
- Seminar of Applied Mathematics, University of Alberta, Edmonton, 21 July 2017.
- Optimal Transport meets Density Functional Theory, University of Jyväskylä, Jyväskylä, 1-7 June 2017.
- Optimal Transport and PDEs, GSSI, L'Aquila, 6-7 April 2017.
- Numerical Analysis Seminar, CERMICS, École des Ponts, Paris, 17 November 2016.
- MAD-Stat Seminar, Toulouse School of Economics, Toulouse, 3 November 2016.
- Computational Optimal Transportation, CRM, Montréal, July 2016.
- Smi-MODE congress, ENSEEIHT, Toulouse, March 2016.
- Numerical Analysis and PDEs seminar, Université Paris Sud-Orsay, Orsay, February 2016.
- Ceremade Young Researchers seminar, Université Paris-Dauphine, Paris, February 2016.
- Workshop Optimal Transport: Aspects Numériques et Applications, IMB, Bordeaux, October 2015.
- Young Researchers Summer School, Raveau, September 2015.
- Mini-workshop: DFT and optimal transport with Coulomb cost, VU university, Amsterdam, August 2015.
- SMAI congress, poster "OPTIMAL TRANSPORT AND DENSITY FUNCTIONAL THEORY", Les Karellis, June 2015.
- Matinée des doctorants, Université Paris-Dauphine, Paris, May 2015.
- Inria's Junior Seminar, I.N.R.I.A., Rocquencourt, March 2015
- Optimal Transport in the Applied Sciences, Ricam (JKU), Linz, December 2014.
- MokAlien 1st Meeting, McGill University, Montreal, October 2014.
- Numerical Optimal Transport, Université Paris-Dauphine, Paris, September 2014.

RESEARCH VISITS

- University of Alberta, Edmonton, 24/08-31/08 2024 (collaborator: Brendan Pass).
- University of Lisbon, Lisbon, 03/05-15/05 2024 (collaborator: Leonard Monsaigeon).

- University of Lisbon, Lisbon, 21/06-30/06 2023 (collaborator: Leonard Monsaigeon).
- University of Lisbon, Lisbon, 16/04-23/04 2023 (collaborator: Leonard Monsaigeon).
- University of Alberta, Edmonton, 01/07-17/07 2022 (collaborator: Brendan Pass).
- University of Alberta, Edmonton, 24/08-08/09 2019 (collaborator: Brendan Pass).
- University of Alberta, Edmonton, 05/07-15/07 2018 (collaborator: Brendan Pass).
- University of Alberta, Edmonton, 09/07-30/07 2017 (collaborator: Brendan Pass).
- MFO, Oberwolfach , 22/01 - 04/02 2017, “Research in Pairs” program with Simone Di Marino and Augusto Gerolin.

PH.D. STUDENTS

- Adrien Cancés (co-supervised with Quentin Mérigot), 2022-ongoing.
- Louis Tocquec (co-supervised with Paul Pegon), 2024-ongoing.
- Elise Weill (co-supervised with Virginie Ehrlacher), 2024-ongoing.

MASTER STUDENTS

- Louis Tocquec (2024 M2 MVA), Malkiel Riveline (2023 M1), Médard Govoeyi (2023 M2), Thibault Caillet (2021 M2), Amine Souiri (2021 M1), Timothe Morval (2021 M1) , Jouris Ploux (2021 M2), Jordan Barthoumieu (2020 M2 Agreg), Roméo Leylekian (2020 M1), Celian Charleau (2020 M1) .

AWARDS AND FUNDING

- Young Research prize 2017 (Fondation Paris Dauphine and Accuracy).
- PEDR 2020-2024
- PEPS CNRS (2021), 5k €
- PEPS CNRS (2022), 5.5k €
- PGMO (2022-2023), 6k €
- PGMO (2023-2024), 7k €
- PGMO (2024-2025), 7k €
- H-code Paris-Saclay (2022-2023), 7.72k €
- H-code Paris-Saclay (2023-2024), 12k €
- ANR GOTA (2023-2027), 253k €
- Frontiers of Science Award (2024).
- RIPEC C3 2024-2027

OTHER ACTIVITIES

Article reviewing for: Journal Of Optimization Theory and Applications, SIAM Journal on Mathematical Analysis, Mathematics of Operations Research, Journal of Global Optimization, SIAM Journal on Scientific Computing, ESAIM: Mathematical Modelling and Numerical Analysis, M3AS, JAMS, JFA, etc.

Project reviewing for: DFG (German Research Foundation).

Ph.D. committee:

- Rafaël Coyaud (2020), Xavier Bacon (2022).

Administratives responsibilities:

- Elected member of SMAI-MODE board (2021-2024);
- Erasmus co-coordinator at the Department of mathematics of Paris-Saclay University;
- Member of a maître de conférences hiring committee at LMO.

Organisation of Seminars, Workshop, etc:

- Optimal Transport session at PGMO days, November 2024.
- [Moka10](#), June 2024.
- Optimal Transport session at Canum, May 2024.

- Optimal Transport session at PGM days, November 2023.
- GdT Transport Optimal-EDP-Machine Learning, since September 2021 (with Quentin Mérigot).
- Journées ANR MAGA, Orsay, November 2019 (with Lenaic Chizat).
- Optimal Transport tools in Density Functional Theory, BIRS, Banff, February 2019 (with Mathieu Lewin, Paola Gori-Giorgi and Brendan Pass).

TEACHING EXPERIENCE	Université Paris-Saclay	A.Y. 2024–25
	<ul style="list-style-type: none"> • Optimization (M1- Math I.A. CM+TD+TP); • Introduction to Optimization (M2 CM+TD+TP); • Calculus of Variations (M2 CM+TD+TP); • Optimization (M2 MSV CM); 	
	Université Paris-Saclay	A.Y. 2023–24
	<ul style="list-style-type: none"> • Optimization (M1- Math I.A. CM+TD+TP); • Introduction to Optimization (M2 CM+TD+TP); • Introduction to Numerical Analysis for PDE (M2 CM+TD+TP); • Optimization (M2 MSV CM); 	
	Université Paris-Saclay	A.Y. 2022–23
	<ul style="list-style-type: none"> • Numerical Analysis for EDO (3rd year CM); • Optimization (M1- Math I.A. CM+TD+TP); • Introduction to Optimization (M2 CM+TD+TP); 	
	Université Paris-Saclay	A.Y. 2021–22
	<ul style="list-style-type: none"> • Numerical Analysis for EDO (3rd year CM); • Optimization (3rd year TD+TP); • Optimization (M1-Ensta TD+TP); • Optimization (M1-MA CM+TD+TP); • Numerical Analysis for PDE (M1-MFA CM+TD+TP); • Optimal Transport (M2-Optimization CM); 	
	Université Paris-Saclay	A.Y. 2020–21
	<ul style="list-style-type: none"> • Numerical Analysis for EDO (3rd year CM+TD+TP); • Optimization (3rd year TD+TP); • Optimization (M1-Ensta TD+TP); • Optimization (M1-MA CM+TD+TP); • Numerical Analysis for PDE (M1-MFA CM+TD+TP); • Optimal Transport (M2-Optimization CM); 	
	Université Paris-Sud	A.Y. 2019–20
	<ul style="list-style-type: none"> • Numerical Analysis for EDO (3rd year TD+TP); • Optimization (3rd year TD+TP); • Optimization (M1-Ensta TD+TP); • Optimization (M1-MA CM+TD+TP); • Numerical Analysis for PDE (M1-MFA TD+TP); • Optimal Transport (M2-Optimization); 	
	Université Paris-Sud	A.Y. 2018–19
	<ul style="list-style-type: none"> • Numerical Analysis for EDO (3rd year CM+TD+TP); • Optimization (3rd year TD+TP); • Optimization (M1-Ensta TD+TP); • Optimization (M1-MA CM+TD+TP); • Numerical Analysis (M1-MFA TD+TP); 	
	Teaching Assistant (Université Paris-Dauphine)	A.Y. 2016–17
	<ul style="list-style-type: none"> • Calculus II (1st year); • Calculus III (2nd year); • Numerical Analysis (2nd year); 	
	Teaching Assistant (Université Paris-Dauphine)	2nd semester 2015–16
	<ul style="list-style-type: none"> • Numerical Analysis (2nd year); 	

- Numerical Analysis: Optimization (3rd year)
- Teaching Assistant (Université Paris-Dauphine)
- Numerical Analysis (2nd year);
 - Numerical Analysis: Optimization (3rd year)

2nd semester 2014–15

HARDWARE AND SOFTWARE SKILLS Computer Programming:
• C, C++, MATLAB, Maple, FreeFem++, Julia, Python.

LANGUAGES • Italian (Mother Tongue);
• English (Fluent);
• French (Fluent).