Curriculum Vitae

Goldman Michael

CMAP, École Polytechnique
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French Nationality
Born 05/03/1985 in Paris.

Positions

2025– : Vice Director of the CMAP.
2022– : CNRS researcher at CMAP, Polytechnique.
2021– : Professeur Chargé de Cours à temps partiel, CMAP, Polytechnique.

2014–2022 : CNRS researcher in the Laboratoire Jacques-Louis Lions, Université Paris 7.

2012–2014 : Von Humboldt Post-Doc fellow at the Max Planck Institute in Leipzig (Germany) in the group of F. Otto.

Spring 2012 : Post-Doc stay at the University of Carnegie Mellon (USA) under the supervision of I. Fonseca and G. Leoni.

Education

2018 : Habilitation, Université Paris 7.

2009–2011 : PhD at the Ecole Polytechnique (France) under the supervision of A. Chambolle.

Papers

Preprints:

1. **Quantitative rigidity of the Wasserstein contraction under convolution**, with M. Fathi and D. Tsodyks, submitted.

2. **Curvature penalization of strongly anisotropic interfaces models and their phase-field approximation**, with J.F. Babadjian and B. Buet, submitted.

3. **Dynamics of screened particles towards equi-spaced ground states**, with L. De Luca and M. Ponsiglione, submitted.

4. **Asymptotics for Random Quadratic Transportation Costs**, with M. Huesmann and D. Trevisan, submitted.

5. **A charged liquid drop model with Willmore energy**, with M. Novaga and B. Ruffini, submitted.

6. **Subadditivity and optimal matching of unbounded samples**, with E. Caglioti, F. Pieroni and D. Trevisan, submitted.

7. **Non-convex functionals penalizing simultaneous oscillations along two independent directions: structure of the defect measure**, with B. Merlet, submitted.

Published Journal Papers:

1. **New dimensional bounds for a branched transport problem**, with A. Cosenza and M. Koser, accepted in SIAM J. Math. Anal.

2. **A Γ-convergence result for 2D type-I superconductors**, with A. Cosenza and A. Zilio, accepted in Interfaces and free boundaries.

3. **From energy bounds to dimensional estimates in a branched transport model for type-I superconductors**, with G. De Philippis and B. Ruffini, accepted in American Journal of Mathematics.

4. **Partial regularity for optimal transport with p-cost away from fixed points**, with L. Koch, accepted in the Proc. AMS.

5. **Tensor rectifiable G-flat chains**, with B. Merlet, accepted in the Transactions of the AMS.

6. **An exterior optimal transport problem**, with J. Candau-Tilh and B. Merlet, accepted in Calc. Var. and PDEs.

7. **Uniform $C^{1,\alpha}$-regularity for almost-minimizers of some nonlocal perturbations of the perimeter**, with B. Merlet and M. Pegon, Archive for Rational Mechanics and Analysis 248.6 (2024): 102.

8. **Set-decomposition of normal rectifiable G-chains *via* an abstract decomposition principle**, with B. Merlet, Rev. Mat. Iberoam. 40 (2024), no. 6, pp. 2073–2094.

9. **On the concave one-dimensional random assignment problem and Young integration theory**, with D. Trevisan, accepted in the Ann. Sc. Norm. Super. Pisa Cl. Sci.

10. **Optimal transport methods for combinatorial optimization over two random point sets**, with D. Trevisan, Probability Theory and Related Fields (2023): 1-70.

11. **Existence and regularity of minimizers for a liquid drop model with strong repulsion**, with M. Novaga and B. Ruffini, accepted in JEMS.

12. **Compactness and structure of zero-states for unoriented Aviles–Giga functionals** with B. Merlet, M. Pegon and S. Serfaty, Journal of the Institute of Mathematics of Jussieu 23.2 (2024): 941–982.

13. **On the quadratic random matching problem in two-dimensional domains**, with L. Ambrosio and D. Trevisan, Electronic Journal of Probability (2022), vol. 27, 1–35.

14. **Existence and stability results for an isoperimetric problem with a non-local interaction of Wasserstein type**, with J. Candau-Tilh, accepted at ESAIM COCV.

15. **A fluctuation result for the displacement in the optimal matching problem**, with M. Huesmann, Annals of Probability (2022), vol. 50, no 4, p. 1446-1477.

16. **Reifenberg flatness for almost-minimizers of the perimeter under minimal assumptions**, with M. Novaga et B. Ruffini, Proc. AMS. (2022), vol. 150, no 03, 1153–1165.

17. **Convergence of asymptotic costs for random Euclidean matching problems**, with D. Trevisan, Prob. and Math. Phy. (2021), vol. 2, no 2, 341–362.

18. **An $\varepsilon-$regularity result for optimal transport maps between continuous densities**, Atti Accad. Naz. Lincei Rend. Lincei Mat. Appl. 31 (2020), no. 4, 971–979.

19. **Quantitative linearization results for the Monge-Ampère equation**, with M. Huesmann and F. Otto, Com. Pure and Appl. Math. (2021), vol. 74, no 12, 2483–2560.

20. **Non-convex functionals penalizing simultaneous oscillations along independent directions: rigidity estimates** with B. Merlet, Ann. Sc. Norm. Super. Pisa Cl. Sci. (5) 22 (2021), no. 3, 1473–1509.

21. **A Ginzburg-Landau model with topologically induced free discontinuities**, with B. Merlet and V. Millot, Ann. Inst. Fourier (Grenoble) 70 (2020), no. 6, 2583–2675.

22. **A two-point function approach to connectedness of drops in convex potentials** with G. De Philippis, Com. Anal. Geom. 30, No. 4 (2022).

23. **On the optimality of stripes in a variational model with non-local interactions**, with E. Runa, Calc. Var. and PDE, 58, 103 (2019).

24. **A variational proof of partial regularity for optimal transportation maps**, with F. Otto, Annales de l'ENS, volume 53, issue 5 (2020).

25. **A gradient flow approach to relaxation rates for the multi-dimensional Cahn-Hilliard equation**, with L. De Luca et M. Strani, Math. Annalen, 374 (2019).

26. **Quantitative estimates for bending energies and applications to non-local variational problems**, with M. Novaga and M. Röger, Proc. Roy. Soc. Edimburgh, 150, 1 (2020).

27. **Self-similar minimizers of a branched transport functional**, Indiana Univ. Math. J. 69 (2020), no. 4, 1073–1104.

28. **A branched transport limit of the Ginzburg-Landau functional**, with S. Conti, F. Otto and S. Serfaty, J. École Polytechnique, 5:317–375 (2018).

29. **On minimizers of an isoperimetric problem with long-range interactions and convexity constraint**, with M. Novaga and B. Ruffini, Analysis and PDEs, 11(5):1113–1142 (2018).

30. **Phase segregation for binary mixtures of Bose-Einstein Condensates**, with B. Merlet, SIAM J. Math. Anal. 49 (2017), no. 3, 1947–1981.

31. **New bounds for the inhomogenous Burgers and the Kuramoto-Sivashinsky equations**, with M. Josien and F. Otto, Comm. Partial Differential Equations 40 (2015), no. 12, 2237–2265.

32. **Study of island formation in epitaxially strained films on unbounded domains**, with P. Bella and B. Zwicknagl, ARMA, 218, (2015), no. 1, 163–217.

33. **Sharp interface limit for two components Bose-Einstein condensates**, with J. Royo-Letelier, ESAIM COCV (2015), no.3 603-624.

34. **Nucleation barriers at corners for a cubic-to-tetragonal phase transformation**, with P. Bella, Proc. Roy. Soc. Edimburgh, 145 A (2015), 715-724.

35. **Existence and stability for a non-local isoperimetric model of charged liquid drops**, with M. Novaga and B. Ruffini, ARMA, 217 (2015), no. 1, 1–36.

36. **Fine properties of the subdifferential for a class of one-homogeneous functionals**, with A. Chambolle and M. Novaga, Adv. Calc. Var, vol. 8 n. 1 (2015), 31-42.

37. **Scaling law and reduced models for epitaxially strained films**, with B. Zwicknagl, SIAM J. Math. Analysis, 46 (2014), no. 1, 1–24.

38. **The Γ-limit for singularly perturbed functionals of Perona-Malik type in arbitrary dimension**, with G. Bellettini and A. Chambolle, M3AS, vol. 24, Issue 6 (2014).

39. **Plane-like minimizers and differentiability of the stable norm**, with A. Chambolle and M. Novaga, J. Geometric Analysis, vol. 24, Issue 3 (2014).

40. **Representation, relaxation and convexity for variational problems in Wiener spaces**, with A. Chambolle and M. Novaga, J. Math. Pures Appl, vol. 99 (2013), 419-435.

41. **A geometric approach for convexity in some variational problem in the Gauss space**, Rend. Sem. Mat. Padova, vol. 129 (2013).

42. **Approximation and relaxation of perimeter in the Wiener space**, with M. Novaga, Annales IHP - Analyse Non linéaire, vol. 29, (2012), 525-544.

43. **Volume-constrained minimizers for the prescribed curvature problem in periodic media**, with M. Novaga, Calc. Var. and PDE, vol. 44, Issue 3 (2012), 297-318.

44. **Continuous Primal-Dual Methods for Image Processing**, SIAM Journal of Imaging Science vol. 4, no. 1, (2011).

Conference Proceedings and Review Papers:

1. **Almost sharp rates of convergence for the average cost and displacement in the optimal matching problem**, with M. Huesmann and F. Otto, accepted in the Abel Proceedings.
2. **On a branched transport model for type-I superconductors**, Conference Geometric Measure Theory and applications in Cortona 2024, under review.
3. **Recent results on non-convex functionals penalizing oblique oscillations**, with B. Merlet, Rend. Sem. Mat. Torino (2019).
4. **A variational approach to regularity theory in optimal transportation**, Séminaire Laurent Schwartz, Exposé n. XIII, 1-14 (2019).
5. **Equilibrium shapes of charged droplets and related problems: (mostly) a review**, with B. Ruffini, Geometric flows, vol. 2, 1 (2017).
6. **Existence and qualitative properties of isoperimetric sets in periodic media**, with A. Chambolle and M. Novaga, "Geometric Partial Differential Equations", Edizioni della Normale, CRM Series, vol. 15, (2013).

Mentoring

Post-docs:

- 2024–2025: Mentor for P. Perstneva (Lectrice Hadamard).

PhD thesis:

- 2025–: W. Ford (co-advisor: C. Letrouit).
- 2025–: M.L. Pasinato (co-advisor: J.M. Roquejoffre).
- 2023–: A. Prade (co-advisor: M. Novaga).
- 2022–2025: A. Cosenza (co-advisor: A. Zilio).
- 2021–2024: J. Candau-Tilh (co-advisor: B. Merlet).
- May/June 2023 : Mentoring M. Koser, visiting PhD student, advisor: B. Zwicknagl (HU Berlin).

Master thesis:

- April-August 2025: W. Ford (co-advisor: C. Letrouit).
- April-July 2023: A. Prade.
- 2020–2021: Pre-thesis year, J. Candau-Tilh.

Undergraduate:

- 2024-2024 : Supervisor for the M2 year of W. Ford (PhD track, IPP).
- 2022 : Advisor of the L3 thesis of E. Moulinier (ENS Lyon).
- 2021 : Advisor of the L3 thesis of S. Cherf (ENS Lyon).
- Spring 2014 : Co-advisor together with F. Otto of the M1 thesis of M. Josien (École Polytechnique).
- Summer 2012 : Project Director for the Summer Undergraduate Applied Mathematics Institute of the University of Carnegie Mellon (mentoring 4 students).

Talks

Workshops and conferences:

- Conference 'Calculus of Variations in Material Science', Banach International Mathematical Center at Bedlewo (2026).
- Workshop 'Frontiers in Calculus of Variations and Applied Analysis', TUM, Munich (2025).
- Workshop 'Geometric methods in Calculus of Variations', Centro De Giorgi, Pisa (2025).
- Workshop 'Geometric variational problems', ESI, Vienna, (2025).
- Workshop 'Rencontre à Nancy sur le thème des Varifolds', Nancy, (2024).
- Workshop 'Geometric Measure Theory and applications', Cortona, (2024).
- Workshop 'Optimal Transport and the Calculus of Variations', ICMS, Edinburgh (2023).
- Conference for the 60th birthday of S. Bobkov, Toulouse (2023).
- BIRS Workshop on "Compensated Compactness and Applications to Materials" (2023).
- Workshop 'Théorie de la mesure géométrique et Calcul des variations", Nancy (2022).
- Workshop 'Optimal Transport and Uncertainty', Naples, Italy (2022).
- Workshop 'Nonlinear meeting in Bologna', Bologna, Italy (2022).
- BIRS Workshop 'Stochastic Mass Transports', Banff, Canada (2022).
- Workshop 'Calculus of Variations in Lille - 3rd edition', Lille, France (2022).
- Workshop 'Encounters in Analysis on singular spaces', Münster, Germany (2021).
- Workshop 'Calculus of Variations and Applications in Trani', Trani, Italy (2019).

- Workshop 'Modeling of crystalline Interfaces and Thin Film Structures: a Joint Mathematics-Physics Symposium', ESI Vienna, Austria (2019).
- Workshop 'Analysis and Applications. Contributions from young researchers', Politecnico di Torino, Italy (2019).
- ANR Shapo starting conference, Université Grenoble Alpes, France (2018).
- Workshop on kinetic and fluid Partial Differential Equations, Université Paris Diderot, France (2018).
- Workshop 'Curves and Networks in Geometric Analysis', Centro De Giorgi, Pisa, Italy (2017).
- Workshop 'Transport problems in Zurich', University of Zurich, Switzerland (2017).
- Workshop 'Geometric Measure Theory, Shape Optimisation and Free Boundaries', SISSA, Trieste, Italy (2016).
- Mini-Symposium, 9th European Conference on Elliptic and Parabolic Problems, Gaeta, Italy (2016).
- Mini-Symposium, British Applied Maths Colloquium, Oxford, UK (2016).
- Journée ANR GEOMETRYA, Nice, France (2014).
- Workshop 'Trends in Non-Linear Analysis', IST Lisbon, Portugal (2014).
- Workshop 'Isoperimetric Problems between Analysis and Geometry', Centro De Giorgi, Pisa, Italy (2014).
- Workshop 'Geometric PDEs', Centro De Giorgi, Pisa, Italy (2012).
- Mini-Symposium, ISMP International Conference, Berlin, Germany (2012).
- Contributed talk, The 5th Symposium on Analysis & PDEs, Purdue University, USA (2012).
- Contributed talk, PICOF International Conference, École Polytechnique, France (2012).
- Joint day of GdR Isis and MSPC, IHP, France (2010).

Seminar talks:

- Munich (2021), Erlangen (2014), Würzburg (2014), Leipzig (2012, 2015, 2017, 2019,2022, 2023), Bonn (2013, 2016), Collège de France (2024), Versailles (2024), Séminaire du LJLL (2015,2023), IMJ (2022), P5 (2022), CalVa X/Orsay/Paris VI/Paris Dauphine (2010, 2012, 2013, 2019, 2021), AN-EDP Paris 6/Paris 7/ENS (2015), GT EDP Sophie Germain (2022), Séminaire Laurent Schwartz (2019), CMAP (2021), CMAP Proba. (2024), INRIA MOKAPLAN (2021), Orsay (2013, 2018×2), Creteil (2017), Nantes (2022), EHESS (2016), Physique Mathématique IHP (2016), Grenoble (2012, 2016), Lyon (2012,2022), Marseille (2012), Toulon (2013), Carnegie Mellon (2012), NCSU (2025), Padova (2011), Pisa (2011, 2016, 2017), SISSA (2018), Vito Volterra seminar (2024), GSSI (2025), Lisbon online seminar (2020).

Long research visits

- 1 month at Università di Roma Sapienza, Italy (2025).
- 6 months at the UMI Fibonacci, Pisa (2020).
- 5 months in the Scuola Normale Superiore di Pisa (2011).

Fundings and awards

- Thesis Prize from the Ecole Polytechnique.
- PI of a CNRS project PEPS Jeunes Chercheur-e-s (2016). Co-PI of two CNRS project PEPS Jeunes Chercheur-e-s (2017 and 2018).
- Member of the project "Connexions Optimales, Calcul et Approximations" funded by the PGMO program, (2016-2018).
- Member of the ANR project Shapo (2019-2023).
- Member of the project "Optimisation et interaction de structures" funded by the PGMO program, (2020-2021).
- Member of the project " Optimisation d'interfaces anisotropes" funded by the PGMO program, (2023-2024).
- French PI of the franco-italian PHC "Variational methods for geometric and optimal matching problems" (2024-2025).
- Member of the ANR project Stoiques (2024-2029).
- PI of the project "Stability in optimal transport and applications to the optimal matching problem " funded by the PGMO program, (2025–).

Responsabilities

Organization of scientific meetings:

- Co-Organizer of the Conference "Calculus of Variations, Optimization and Image Processing - on the occasion of Antonin Chambolle's 60th birthday", 2027.
- Co-Organizer of the Conference "Calculus of variations and applications", CIRM, 2026.
- Co-Organizer of a Conference for F. Otto 60th birthday, 2026.

- Co-Organizer of the Conference celebrating the 50 years of the CMAP, 2024.
- Co-Organizer of the Workshop "Calculus of variations and applications", Paris, 2023.
- Co-Organizer of the Workshop "Rencontre en Calcul des Variations', Nancy, 2021.
- Co-Organizer of the Workshop "Variational methods and applications", Centro De Giorgi, 2021.
- Co-Organizer of the conference "Modélisation, analyse et simulation - Le Laboratoire Jacques-Louis Lions fête ses 50 ans", 2019.
- Co-Organizer of a Calculus of Variation day to celebrate the 50 years of the LJLL, 2019.
- Co-Organizer of the ANR SHAPO meeting in Paris-Diderot, 2019.
- Co-Organizer of the conference "Calculus of Variation at Paris-Diderot", 2018.
- Organizer of the "Journées internes du LJLL", 2015–2022.
- Organizer of the calculus of variations workgroup first in Polytechnique, 2010–2011 and then joint Orsay/Dauphine/LJLL 2015–2019.
- Co-Organizer of the CNA-PIRE Working Group on Variational methods for phase transitions and copolymers, Carnegie Mellon University, Pittsburgh, Spring 2012.
- Co-Organizer of a minisymposium on Variational models in elasticity and plasticity at the GAMM meeting 2014.

Local duties:

- 2025– Vice Director of the CMAP.
- 2023– Member of the 'Vie de Labo' comittee.
- 2023– 2025 Elected member of the CMAP Lab council.
- 2019–2022 : Member of the Scientific Comittee of the Math. Department of the Université Paris Diderot.

National duties:

- 2024– Coordinator of the Axis Calculus of Variations of the RT Optimization of CNRS.
- 2019–2023 Member of the Organization comittee of the GDR Calva.

Expertise:

- Member of Hiring comittees for Maitre de Conference positions: Université Paris Cité (2017, 2024), Université Paris Dauphine (2021), Toulouse (2025).
- Member PhD defense comittee : G. Vescovo (SISSA, reviewer, 2019), A. Kubin (Sapienza, reviewer, 2021), F. Onoue (SNS Pisa, reviewer, 2022), R. Prunier (Sorbonne Université, reviewer, 2023), R. Mougenot (U. Nancy, reviewer, 2025).
- Member of HDR defense comittee : J. Feneuil (U. Paris-Saclay, 2025).

- Grant reviews: the Dutch Research Council (2022), ECOSUD (2025).
- Member of the scientific comittee of the conference 'Calculus of Variations in Lille - 4th edition', 2024.
- Reviewer for: JAMS, JEMS, ARMA, SIAM J. Math. Anal., An. Appl. Prob., Inverse Problems and Imaging, Appl. Math. Optim., ESAIM COCV, J. École Polytechnique, Interfaces and free boundaries, Annales IHP, Adv. Calc. Var., J. Convex Analysis, Bul. London Math. Society, Manuscripta Math., Com. Contemp. Math., Lecture Notes SNS, Mathscinet.

Teaching Experience and Mentoring

Advanced classes:

- 2024: 'Recent progress on the optimal matching problem' (3h) at the Conference interactions PDE/Probabilities, CIRM.
- 2020: 'A variational approach to regularity in optimal transport and applications to the optimal matching problem' at SNS Pisa (6h).
- 2013: 'Introduction to Weak KAM theory and Hamilton-Jacobi equations' at MPI Leipzig (25h).

Undergraduate:

- 2021–: Instructor for the class Numerical methods for ODEs, Bachelor Program, Polytechnique.
- 2021–: TA for Optimization and Optimal control for 2nd year students from Polytechnique.
- 2014–2019: TA for undergraduate and graduate courses Advanced Algebra and Analysis, Optimisation, Analysis, Université Paris Diderot.
- 2009–2012: One course of Probability and one of Statistics to first year students in the IUT de Sceaux (64h per year).