Giacomo Enrico Sodini

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Research Interests

My main research interests lie at the intersection of Optimal Transport, Non-Smooth analysis, and Calculus of Variations. I work on Unbalanced Optimal Transport, on metric Sobolev and BV spaces on metric-measure spaces, and I study geometry and evolutions in spaces of (probability) measures.

Academic Positions

University Assistant *Oct 2022 – Present*
Fakultät für Mathematik - Universität Wien, Vienna

Education

Ph.D. in Mathematics *Nov 2019 – Sept 2022*
TUM-IAS, Munich
Thesis: *Optimal transport: unbalanced positive measures, dissipative evolutions and Sobolev spaces*
Supervisors: Prof. M. Fornasier and Prof. G. Savaré
Grade: *summa cum laude*

M.Sc. in Mathematical Engineering *Oct 2017 – Oct 2019*
Politecnico di Milano

B.Sc. in Mathematical Engineering *Oct 2014 – Jul 2017*
Politecnico di Milano

Publications

Preprints

[14] Giulia Cavagnari, Giuseppe Savaré, and Giacomo Enrico Sodini. "Stochastic Euler Schemes and Dissipative Evolutions in the Space of Probability Measures". 2025. arXiv: 2505.20801.

[13] Pierre-Cyril Aubin-Frankowski, Giacomo Enrico Sodini, and Ulisse Stefanelli. "Evolution variational inequalities with general costs". 2025. arXiv: 2505.00559.

[12] Enrico Pasqualetto and Giacomo Enrico Sodini. "Functions of bounded variation and Lipschitz algebras in metric measure spaces". 2025. arXiv: 2503.21664.

[11] Nicolò De Ponti, Giacomo Enrico Sodini, and Luca Tamanini. "The infimal convolution structure of the Hellinger-Kantorovich distance". 2025. arXiv: 2503.12939.

[10] Lorenzo Dello Schiavo and Giacomo Enrico Sodini. "The Hellinger-Kantorovich metric measure geometry on spaces of measures". 2025. arXiv: 2503.07802.

[9] Giulia Cavagnari, Giuseppe Savaré, and Giacomo Enrico Sodini. "A Lagrangian approach to totally dissipative evolutions in Wasserstein spaces". 2023. arXiv: 2305.05211.

Journal Articles

[8] Massimo Fornasier, Pascal Heid, and Giacomo Enrico Sodini. "Approximation Theory, Computing, and Deep Learning on the Wasserstein Space". *Mathematical Models and Methods in Applied Sciences* 35.04 (2025), pp. 825–903. DOI: 10.1142/S0218202525500113.

[7] Giulia Cavagnari, Giuseppe Savaré, and Giacomo Enrico Sodini. "Extension of monotone operators and Lipschitz maps invariant for a group of isometries". *Canad. J. Math.* 77.1 (2025), pp. 149–186. DOI: 10.4153/S0008414X23000846.

[6] Giuseppe Savaré and Giacomo Enrico Sodini. "A relaxation viewpoint to unbalanced optimal transport: duality, optimality and Monge formulation". *J. Math. Pures Appl.* 188 (9 2024), pp. 114–178. DOI: 10.1016/j.matpur.2024.05.009.

[5] Giacomo Enrico Sodini. "The general class of Wasserstein Sobolev spaces: density of cylinder functions, reflexivity, uniform convexity and Clarkson's inequalities". *Calc. Var. Partial Differential Equations* 62.7 (2023), Paper No. 212, 41. DOI: 10.1007/s00526-023-02543-1.

[4] Massimo Fornasier, Giuseppe Savaré, and Giacomo Enrico Sodini. "Density of subalgebras of Lipschitz functions in metric Sobolev spaces and applications to Wasserstein Sobolev spaces". *J. Funct. Anal.* 285.11 (2023), Paper No. 110153, 76. DOI: 10.1016/j.jfa.2023.110153.

[3] Giulia Cavagnari, Giuseppe Savaré, and Giacomo Enrico Sodini. "Dissipative probability vector fields and generation of evolution semigroups in Wasserstein spaces". *Probab. Theory Related Fields* 185.3-4 (2023), pp. 1087–1182. DOI: 10.1007/s00440-022-01148-7.

[2] Giuseppe Savaré and Giacomo Enrico Sodini. "A simple relaxation approach to duality for optimal transport problems in completely regular spaces". *J. Convex Anal.* 29.1 (2022), pp. 1–12.

[1] Mattia Martini and Giacomo Enrico Sodini. "Numerical methods for a system of coupled Cahn-Hilliard equations". *Commun. Appl. Ind. Math.* 12.1 (2021), pp. 1–12. DOI: 10.2478/caim-2021-0001.

Books

[B1] Mauro D'Amico et al. "Mathematical Analysis - Module 1 Exercises". Vol. 1. BAI Series. Università Bocconi, EGEA, 2021.

Theses

[T1] Giacomo Enrico Sodini. "Optimal Transport: unbalanced positive measures, dissipative evolutions and Sobolev spaces". PhD thesis. Technische Universität München, 2022, p. 296.

Talks

- **04.2025** *Seminar on Calculus of Variations*, University of Vienna, Vienna
- **01.2025** *Dolomites Winter School*, Folgarida
- **11.2024** *Math department seminar*, University of Jyväskylä, Jyväskylä
- **11.2024** *Austrian Calculus of Variations day*, University of Innsbruck, Innsbruck
- **10.2024** *Analysis group seminar*, University of Durham, Durham
- **09.2024** *MeRiOT*, Varenna
- **05.2024** *Lions-Magenes days 2024*, University of Pavia, Pavia
- **04.2024** *Variational Analysis, Models and Methods in Measure Spaces*, CIRM, Marseille
- **11.2023** *Austrian Calculus of Variations day*, TU Wien, Vienna
- **11.2023** *Probability group seminar*, Université Côte d'Azur, Nice
- **11.2023** *Probability group internal seminar*, University of Vienna, Vienna
- **09.2023** *The Mathematics of Subjective Probability*, Bicocca University, Milano
- **05.2023** *PDE Afternoon*, University of Vienna, Vienna
- **04.2023** *OTMFML*, IAS/TUM, Munich
- **01.2023** *Maas group weekly seminar*, ISTA, Klosterneuburg
- **11.2022** *Geometric Analysis and PDEs at PoliMi*, Politecnico di Milano, Milano
- **11.2022** *Austrian Calculus of Variations day*, University of Salzburg, Salzburg
- **11.2022** *Smooth Functions on Rough Spaces and Fractals with Connections to Curvature Functional Inequalities*, BIRS, Banff
- **10.2022** *Seminar on Calculus of Variations*, University of Vienna, Vienna
- **10.2022** *Optimal Transportation and Application*, SNS, Pisa
- **07.2022** *KU-LMU-TUM Joint Seminar*, TUM, Munich
- **06.2022** *PIMS-IFDS-NSF Summer School on Optimal Transport*, University of Washington, Seattle
- **05.2022** *Oberseminar*, TUM, Munich
- **11.2021** *Mathematics Department Seminars*, Politecnico di Milano, Milano
- **04.2020** *SeMiNarri di Matematica*, University of Pavia, Pavia

Teaching

Lecturer

- **University of Vienna**
  - Topics in the Calculus of Variations (SoSe 2025)

Teaching Assistant

- **University of Vienna**
  - Analysis 3 (SoSe 2025)
  - Topologie und Funktionalanalysis (WiSe 2024-2025, WiSe 2023-2024)
  - Analysis 2 (SoSe 2024)
- **Bocconi University**
  - Mathematical Analysis - Module 1 (2024-2025, 2023-2024, 2022-2023, 2021-2022, 2020-2021)
- **TU Munich**
  - Foundations in Data Analysis (SoSe 2022, SoSe 2021, SoSe 2020)
- **Politecnico di Milano**
  - Mathematical Analysis II (2021-2022, 2020-2021)