Giulia Mescolini

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Education

Sep 2023– ongoing **École Polytechnique Fédérale de Lausanne**,
École doctorale de Mathématiques.
- PhD candidate in the group of Mathematical Analysis and Calculus of Variations, supervised by prof. M. Colombo and prof. D. Albritton (University of Wisconsin–Madison)
- **Research interests:** analysis of PDEs, instability and non-uniqueness phenomena in fluid dynamics.

Sep 2021– Jul 2023 **École Polytechnique Fédérale de Lausanne**,
Computational Science and Engineering, MSc (Double Degree Program with Politecnico di Milano).
- **Master Thesis:** "Forward self-similar solutions for the forced 3D Navier Stokes Equations", supervised by prof. M. Colombo (EPFL) and prof. M. Grasselli (Politecnico di Milano).

Jan 2021– Sep 2022 **Alta Scuola Politecnica**,
Politecnico di Milano, Multidisciplinary excellence program.

Sep 2020– Jul 2023 **Politecnico di Milano**,
Mathematical Engineering, MSc, 110/110 *cum laude*.

Sep 2017– Sep 2020 **Politecnico di Milano**,
Ingegneria Matematica, BSc, 110/110 *cum laude*.

Publications

Apr 2026 *Topological entropy is generically infinite for non-Lipschitz velocity fields*, Johansson, C., Mescolini, G., arXiv:2604.01077.

Jul 2025 *Vanishing viscosity non-unique solutions to the forced 2D Euler Equations*, Albritton, D., Colombo, M., Mescolini, G., arXiv:2507.19257.

Dec 2024 *Self-similar instability and forced nonuniqueness: an application to the 2D Euler equations*, Dolce, M., Mescolini, G., Journal of the London Mathematical Society (2025).

Dec 2024 *On vanishing diffusivity selection for the advection equation*, Mescolini, G., Pitcho, J., Sorella, M., Annali di Matematica Pura ed Applicata (2025).

Invited Talks

Jul 2026 *Fluids, Waves and Sand Beach*, Santa Margherita di Pula (IT).

Jun 2026 *Singularities, non-uniqueness and complex dynamics of incompressible fluids*, University of Bath (UK).

Apr 2026 *Swiss Mathematical Society Doctoral Day*, ETH Zurich (CH).

Apr 2026 *FostEring MAth taLEntS*, University of Freiburg (DE).

Dec 2025 *Nonlinear PDEs Seminar*, Karlsrhue Institute of Technology (DE).

Nov 2025 *Junior Analysis Seminar*, Imperial College (UK).

Sep 2024 *PDE Geometric Analysis seminar*, *University of Wisconsin–Madison (US)*.

May 2024 *International Conference on Elliptic and Parabolic Problems*, Gaeta (IT).

Apr 2024 *Bernoullis Tafelrunde*, University of Basel (CH).

Seminar Organization

Sep 2025 Workshop: *New challenges in Hyperbolic problems* (with De Nitti, N. and Johansson, C.), Bernoulli Center, EPFL, Lausanne (CH).

Achievements

Oct 2025 SB Dean's Teaching Award, EPFL.

Sep 2023 Best Thesis Poster, EPFL.

July 2021 Basic Sciences Fellowship, EPFL.

Feb 2019 Best Freshmen Prize, Politecnico di Milano.

Participation in conferences, schools and workshops

Jan 2026 *Turbulence and Mixing in Fluid Dynamics*, SwissMAP Research Station, Les Diablerets (CH).

July 2025 *3rd Simons Math Summer Workshop: Partial Differential Equations of Classical Physics*, Simons Center for Geometry and Physics, Stony Brook (USA).

June 2025 *Blurring the lines between pure and applied through mixing*, Sabhal Mor Ostaig, Isle of Skye (UK).

Apr 2025 *Coherent structures and (in)stabilities in fluids*, GSSI, L'Aquila (IT).

May 2024 *(In)-stability phenomena in fluids*, CY Cergy Paris Université, Paris (FR).

May 2024 *International Conference on Elliptic and Parabolic Problems*, Gaeta (IT).

Feb 2024 *Phase mixing, kinetic theory and fluid mechanics*, SwissMAP Research Station, Les Diablerets (CH).

Sep 2023 *Enjoying Probability and Fluids in Lausanne*, EPFL, Lausanne (CH).

Jul 2023 *Exotic solutions and well-posedness in ODEs and PDEs*, RISM, Varese (IT).

Jul 2023 *Deterministic and random features of fluids*, EPFL, Lausanne (CH).

Jun 2023 *New trends in mathematical fluid-dynamics*, Institut Fourier, Grenoble (FR).

Teaching and mentoring

A.Y. 2025-26 Teaching assistant for *Introduction to PDEs* (Fall) and *Analysis IV* (Spring), EPFL.
Supervisor of Guillaume Follonier (BSc) for the project "Maximum principle and global existence for the Muskat Equation" and Emma Meregalli (MSc) for the project "Stability shifting in the Muskat equation".

A.Y. 2024-25 Teaching assistant for *Introduction to PDEs* (Fall) and *Analysis IV* (Spring), EPFL.
Supervisor of Ivan Pouly (BSc) for the project "Theory of stable/unstable manifolds and applications".

A.Y. 2023-24 Teaching assistant for *Calculus of Variations* (Fall) and *Analysis IV* (Spring), EPFL.
Supervisor of Francesco Muci (BSc) for the project "Global existence of solutions to Navier-Stokes with small data".

Outreach

Fall 2025 Cours Mathilda, *Gymnase Cantonal de Nyon.* "Nœuds et turbulence" (French).

Fall 2025 TecDays, *Lycée-Collège de la Planta (Sion).* "Des curiosités mathématiques" (French).

Spring 2024 Outreach workshop, *EPFL.* "Teoria dei nodi e equazioni differenziali" (Italian).

Fall 2023 Journée des gymnasiens, EPFL. "L'inégalité isopérimétrique" (French).

Work Experience

Aug 2022–Feb 2023 **R&D Intern in Machine Learning for Digital Nutrition**, Nestlé Research, Lausanne.

Extracurricular Activities

Sep 2022 – Jan 2025 **SIAM Chapter at EPFL**.
- Vice-President (Sep 2023–Jan 2025), Treasurer (Sep 2022–Sep 2023)

Skills

Languages Italian (Mother tongue), English (C1), French (B2)

Coding Python, C, C++, SQL, MATLAB, R, FreeFem++

Frameworks TensorFlow, Keras, PyTorch

Utilities Anaconda, Git, LaTeX, Jupyter Notebook, Docker, SQL Server Management Studio

CFD Software COMSOL Multiphysics, Ansys Fluent, PHOENICS