Michele Dolce

MA B2 473, EPFL FSB SMA, Station 8, 1015 Lausanne
✉ Email: michele.dolce@epfl.ch
Website: https://michele.docler.me/

Position

2025– **SNSF Ambizione Fellow**, *EPFL*, Lausanne, 1 Jan 2025.
PI of SNF Ambizione Grant PZ00P2_223294.

2022-2024 **Postdoc**, *École polytechnique fédérale de Lausanne (EPFL)*, Lausanne, 1 Sep 2022.
AMCV group, Head of Laboratory: Prof. Maria Colombo

2020–2022 **Research Associate**, *Imperial College London*, London, 1 Sep 2020–31 Aug 2022.
In the group of Prof. Michele Coti Zelati

Education

2017–2020 **PhD in Mathematics**, *Gran Sasso Science Institute*, L'Aquila.
Advisor: Michele Coti Zelati (Imperial College London)
Thesis title: "*Linear stability analysis of stationary Euler flows for passive scalars and inhomogeneous fluids*"
Date of degree: 11 November 2020

2015–2017 **Master's degree in Mathematics**, *University of L'Aquila*, *110/110 cum laude*,
Advisor: Donatella Donatelli.

2014–2015 **Erasmus**, *University of Granada*, September 2014–July 2015.

2012–2015 **Bachelor's degree in Mathematics**, *University of L'Aquila*, *110/110 cum laude*,
Advisor: Donatella Donatelli.

Grants and awards

2024 **SNSF Ambizione grant**, "*Long-time behavior of PDEs in Fluid Dynamics and Kinetic Theories*", PZ00P2_223294.
Funds: 835.680 CHF

2023 **INdAM-UMI-SIMAI Prize 2023**, for the best doctoral theses discussed at Italian universities on mathematical topics in the period 2020-2023.

2022 **Progetto GNAMPA**, "*Dispersion and stability in incompressible fluid dynamics*".
P.I: Scrobogna Stefano. With Roberta Bianchini, Biagio Cassano. Funds: 4.000€

2019 **Grant UMI-MIT**, Support for visiting students at Massachusetts Institute of Technology.
Funds: 2.500€

2018 **Thesis award Prof. Aldo Biancofiore**, Award for the best master thesis for students of University of L'Aquila, in memory of the Prof. Aldo Biancofiore.

Publications/Preprints

16. Dolce, M. and Mescolini, G. *Self-similar instability and forced nonuniqueness: an application to the 2D Euler equations* , (2024), arxiv: 2411.18452
15. Dolce, M., Knobel, N. and Zillinger, C. *Large norm inflation of the current in the viscous, non-resistive magnetohydrodynamics equations*, (2024), arxiv: 2410.22804
14. Dolce, M. and Gallay, T. *The long way of a viscous vortex dipole*, (2024), arxiv: 2407.13562
13. Dolce, M., Johansson, C.J.P., and Sorella, M. *Dissipation enhancing properties for a class of Hamiltonian flows with closed streamlines*, Communications in Partial Differential Equations, 1-52, (2025), doi: 10.1080/03605302.2024.2447497
12. Dolce, M. and Grande, R. *On the convergence rates of discrete solutions to the Wave Kinetic Equation*, Mathematics in Engineering **6**, 4 (2024), doi: 10.3934/mine.2024022
11. Bianchini, R. , Coti Zelati, M. and Dolce, M. *Symmetrization and asymptotic stability in non-homogeneous fluids around stratified shear flows* , Note for the seminar Laurent Schwartz, (2023), arxiv: 2309.12738
10. Dolce, M. *Stability threshold of the 2D Couette flow in a homogeneous magnetic field using symmetric variables*, Communications in Mathematical Physics, **405**, 94, (2024) doi: 10.1007/s00220-024-04982-z.
9. Coti Zelati, M., Dolce, M. and Lo, C-C *Diffusion enhancement and Taylor dispersion for rotationally symmetric flows in discs and pipes*, Journal of Mathematical Fluid Mechanics, **26**, 12, (2024) doi: 10.1007/s00021-023-00845-0
8. Bedrossian, J., Coti Zelati, M. and Dolce, M. *Taylor dispersion and phase mixing in the non-cutoff Boltzmann equation on the whole space*, Proceedings of the London Mathematical Society, **(3) 129**, (2024) doi: 10.1112/plms.12616
7. Dolce, M., and Drivas, T. D. *On maximally mixed equilibria of two-dimensional perfect fluids* , Archive for Rational Mechanics and Analysis, **246**, 735–770, (2022) doi: 10.1007/s00205-022-01825-w
6. Bedrossian, J., Bianchini, R. , Coti Zelati, M. and Dolce, M. *Nonlinear inviscid damping and shear-buoyancy instability in the two-dimensional Boussinesq equations*, Communications on Pure and Applied Mathematics (2023) doi: 10.1002/cpa.22123
5. Coti Zelati, M., Dolce, M., Feng, Y., and Mazzucato, A.L. *Global Existence for the Two-dimensional Kuramoto-Sivashinsky equation with a Shear Flow*, Journal of Evolution Equations, **21**, 5079–5099, (2021) doi: 10.1007/s00028-021-00752-9
4. Antonelli, P. , Dolce, M. and Marcati, P. *Linear stability analysis of the homogeneous Couette flow in a 2D isentropic compressible fluid*, Annals of PDE, **7**, 24, (2021) doi: 10.1007/s40818-021-00112-3

3. Bianchini, R. , Coti Zelati, M. and Dolce, M. *Linear inviscid damping for shear flows near Couette in the 2D stably stratified regime*, Indiana University Mathematics Journal, **71**, 4, 1467–1504, (2022) doi: 10.1512/iumj.2022.71.9040.
2. Coti Zelati, M. and Dolce, M. *Separation of time-scales in drift-diffusion equations on* $\mathbb{R}^2$, Journal de Mathématiques Pures et Appliquées **142**, 58-75, (2020), doi: 10.1016/j.matpur.2020.08.001.
1. Dolce, M. and Donatelli, D. *Artificial compressibility method for the Navier-Stokes-Maxwell-Stefan system*, Journal of Dynamics and Differential Equations, **33**, 35-62, (2021), doi: 10.1007/s10884-019-09808-4.

Talks (past and upcoming)

2025 Vortices, Boundary Layers, and Instabilities (Grenoble, France, March), Seminar at ULB Bruxelles (Bruxelles, Belgium, March), PRIN conference in SISSA (Trieste, Italy, February), Fluids @PoliMi (Milan, Italy, January),

2024 The 14th AIMS Conference (Abu Dhabi, UAE, December), Patterns in solutions to the incompressible Euler equations (Bedlewo, Poland, August), Alhambra Pde Days (Granada, Spain, July), The equadiff conference 2024 (Karlstad, Sweden, June), LAMA - Maths In Fluids, ENS Lyon (Lyon, May), Instabilities in geophysical fluids (Rome, May), Phase mixing, kinetic theory and fluid mechanics (Les Diablerets, Switzerland, February), Fluids in Seoul 2024 (Seoul, Korea, January)

2023 Early Career Math Colloquium University of Oklahoma (November, online), KIT analysis seminar (Karlsruhe, November), Duke University Applied Math & Analysis seminar (November 2023, online), PDE & Mathematical Physics seminar in Zurich (October), Congresso UMI 2023, (Pisa, September), ICIAM 2023 (Tokyo, August), Workshop on Stability, Mixing and Fluid Dynamics (Münster, Germany, August), Summer school "New trends in Mathematical Fluid Dynamics", (*Institut Fourier*, Grenoble, June), The 13th AIMS Conference on Dynamical Systems, Differential Equations and Applications (Wilmington, USA, June), GSSI (L'Aquila, Italy, February)

2022 University of Basel Analysis Seminar (Basel), Recent trends in fluid mechanics (*ICMAT*, Madrid), 12th Meeting on Nonlinear evolution PDEs, fluid dynamics and transport equations (*University of L'Aquila*), Small Scale Dynamics in Fluid Motion (*Simons center for Geometry and Physics*, Stony Brook), London PDE Seminar (online), Conference on Mathematics of Wave Phenomena 2022 (in the minisymposium "Stability and Instability in Fluids", *KIT*, online), Transport, Fluids and Mixing (*Centro De Giorgi*, online)

2021 Bath Analysis seminar (*University of Bath*)

2020 Workshop Dispersive equations of Math Physics (*University of Pisa*), AMS Fall Eastern Sectional Meeting (online talk), PDE-Applied Math Seminar (*University of Maryland*, online talk), Analysis Junior Seminar (*SISSA*, Trieste, online talk), IMS PDE Seminar (*IMS*, Hong Kong, online talk)

2019 SIAM Conference on Analysis of Partial Differential Equations PD19 (La Quinta, California), Summer School in Analysis of PDEs and Fluid Dynamics (*University of Edinburgh*), IperPa2019, (Palermo, Italy), EMS School in Applied Math "Mathematical Aspects of Fluid Flows", (Kácov, Czech Republic), Junior Analysis Seminar (*Imperial College London*), Analysis Junior Seminar (*SISSA*, Trieste, Italy)

Visiting periods

Dec 2023 *New York University Abu Dhabi*, Abu Dhabi, (UAE). Invited by: Weiren Zhao (1 week)

June 2022 *Simons Center for Geometry and Physics*, Stony Brook, New York (US). Invited to participate in the program "Singularity and Prediction in Fluids: May 31-July 1, 2022", organized by: T. D. Drivas, T. Elgindi, D. Sullivan

Dec 2019 *Princeton University*, Princeton, New Jersey (US). Invited by: Theodore D. Drivas (1 week)

Sep-Dec 2019 *Massachusetts Institute of Technology*, Cambridge, Massachusetts (US). Hosted by: Gigliola Staffilani

May 2019 *Imperial College London*, London, England. Invited by: Michele Coti Zelati (1 week)

Professional Service

Sept 2025 Organizer of the Bernoulli Workshop: *"Long-Time Dynamics in Random and Deterministic Systems"*, Bernoulli center, EPFL (together with Tommaso Rosati.)

Sept 2023 Organizer of the Bernoulli Workshop: *"Enjoying Probability and Fluids in Lausanne"*, Bernoulli center, EPFL (together with Massimo Sorella, Lucio Galeati.)

July 2023 Organizer of the Summer school *"Deterministic and random features of fluids"*, EPFL (together with Maria Colombo, Massimo Sorella, Lucio Galeati.)

March 2022 Organizer of the event *"Decay, Stability and Growth in Fluids and Wave Systems"*, SIAM Conference on Analysis of Partial Differential Equations (PD22) (online), (together with Roberta Bianchini)

Supervision and mentoring

Master theses.

2025 Numero Francesco Pio (Università degli studi di Pisa, co-advised with Maria Colombo)
Vescovo Giacinta (Università degli studi di Trieste and SISSA, co-advised with Alberto Maspero)

2023 Mescolini Giulia (EPFL and Politecnico di Milano, co-advised with Maria Colombo and Maurizio Grasselli)

2022 Chia-Chun Lo (Imperial College London, co-advised with Michele Coti Zelati)

Master projects.

2024 Numero Francesco Pio (Università degli studi di Pisa, co-advised with Maria Colombo)

2023 Deligny Léon Louis Frédéric (EPFL, co-advised with Maria Colombo)

Teaching

Spring 2024 "Functional Analysis II", *EPFL*
"Dynamics of vortex pairs at large Reynolds number in 2D fluids", PhD course (10 hrs) *Gran Sasso Science Institute*

Spring 2023 Teaching assistant for the course "Analysis IV", *EPFL*

Fall 2021 "Theory of partial differential equations", *Imperial College London*

Spring 2019 Ph.D. short course on "Shear flows problems", *Gran Sasso Science Institute*

Languages

Italian, native language

English and Spanish, fluent

French, basic