Curriculum Vitæ - Lorenza D'Elia

September 05th, 2025

Personal Details

Work address Institute of Analysis and Scientific Computing, TU Wien

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Positions

From July 2024 to present - Principal Investigator of FWF ESPRIT " *Effective theories for quasi-crystalline microstructures*" at Institute of Analysis and Scientific Computing, TU Wien, Austria.

From April 2022 to June 2024 - Post-doctoral researcher in the Research Group *Multiscale Calculus of Variations* (Group Leader: E. Davoli) at Institute of Analysis and Scientific Computing, TU Wien, Austria.

From March 2021 to February 2022 - Post-doctoral researcher within the Research Project *Homogenization of non-local variational problems* (PI: A. Braides) at Department of Mathematics, Università degli Studi di Roma Tor Vergata, Italy.

Research Interests

Calculus of Variations, Γ-convergence, periodic and aperiodic homogenization and their applications in Materials Science.

Education

26/10/2020 **Ph.D in Matematica Pura e Applicata**, *Università degli Studi di Torino and Politecnico di Torino*, Italy.

Title: *Asymptotic analysis of a stiff Neumann problem and homogenization of some degenerate functionals.*

Supervisor: Professor V. Chiadò Piat.

20/07/2017 **M.Sc. in Mathematics**, *Università degli Studi di Torino*, Italy.

Title: *Boundedness of pseudodifferential operators on modulation spaces.*

Advisor: Professor E. Cordero.

14/07/2015 **B.Sc. in Mathematics**, *Università degli Studi di Torino*, Italy.

Title: *A study of stability for the Hill equation.*

Advisor: Professor V. L. Barutello.

Additional academic qualification

19.02.2021 French Qualification to function as *maître de conférences* in Mathematics (Sector 25). Expiry date: 31.12.2025

10.02.2021 French Qualification to function as *maître de conférences* in Applied Mathematics (Sector 26). Expiry date: 31.12.2025

Talks & Poster presentations

Invited Talks

- September 2025 - ÖMG-DMV Annual Meeting 2025, Linz, Austria.
- June 2025 - Workshop "*Geometric-Analytic Methods for PDEs and Applications*", Turin, Italy.
- May 2025 - Workshop "*Singularities in Discrete Systems*", Oberwolfach, Germany.
- July 2024 - Conference "*2nd Joint meeting AMS-UMI*", Palermo, Italy.
- June 2024 - Meeting "*Calculus of Variations and Nonlinear Analysis in the Applied Sciences*", Rome, Italy.
- July 2022 - IMSE Online 2022, 16th International Conference on Integral Methods in Science and Engineering, on-line.
- December 2021 - Meeting "*Variational Problems in Domains with Complex Geometrical Structure*", Turin, Italy.
- January 2020 - Mini-Workshop "*Mathematical Models in Continuum Mechanics*", Turin, Italy.

Contributed Talks

- February 2025 - Fifth Austrian Day of Women in Mathematics, Vienna, Austria.
- November 2023 - Third Austrian Calculus of Variations Day, Vienna, Austria.
- February 2023 - Third Austrian Day of Women in Mathematics, on-line.
- December 2021 - Winter School "*Analytical Methods in Quantum and Continuum Mechanics*", Turin, Italy.
- October 2019 - Conference "*Asymptotic Analysis and Spectral Theory*", Orsay, France
- May 2019 - Conference "*International Conference on Elliptic and Parabolic Problems*", Gaeta, Italy.

Invited seminars

- April 2025 - Seminar at Leeds University, UK.
- November 2024 - PDE Afternoon, University of Vienna, Austria.
- October 2024 - Seminar at Bielefeld University, Germany.
- May 2023 - Seminar at Radboud University, the Netherlands.
- March 2023 - PDE Afternoon, University of Vienna, Austria.
- November 2021 - Seminar on Differential Equations, University of Roma Tor Vergata, Italy.

Poster presentations

- April 2023 - Workshop "*Taming Complexity in Partial Differential Systems*", Vienna, Austria.
- October 2019 - Workshop "*Calculus of Variations and applications*", Trani, Italy.

Organization activity

- November 2023 - Workshop *3rd Austrian Calculus of Variations Day* co-organized with A. Daniilidis, E. Davoli, C. Gavioli, L. Happ, K. Nik, F. Stark-McNeilly, S. Riccò, S. Tapia-García, M. Tommasini at TU Wien, Austria.
- January 2023 - *Young Researchers' Meeting* embedded in the *22nd GAMM Seminar on Micro-structures* co-organized with V. Pagliari at TU Wien, Austria.

Teaching

Fall 2023 Course "*VO: An introduction to homogenization theory*" for master and PhD students at TU Wien, Austria.

Fall 2022 Exercise Course "*UE: Modelling with Partial Differential Equations*" for master students at TU Wien, Austria.

Fall 2020 PhD course "*Introduction to Homogenization Methods for multi-scale problems*" in collaboration with Professor V. Chiadò Piat for PhD students at Politecnico di Torino, Italy.

Fall 2019 Teaching assistant for *Analysis 1* for bachelor students in Engineering at Politecnico di Torino, Italy.

Fall 2017 Tutor for *Analysis* for master students in Stochastic and Data Science at Università degli Studi di Torino, Italy.

Research visits

- April 28th - May 2nd, 2025, Leeds University, Leeds (UK). Host: A. Rucklidge.
- October 7th - 10th, 2024, Bielefeld University, Bielefeld (Germany). Host: M. Baake.
- May 15th - 19th, 2023, Radboud University, Nijmegen (the Netherlands). Host: R. Cristoferi.
- February 2nd - July 15th, 2020, INSA de Rennes, Rennes (France). Host: M. Briane.
- July 29th - August 6th, 2019, University of Helsinki, Helsinki (Finland). Host: J. Taskinen and S. A. Nazarov.
- December 6th - 21st, 2018, University of Helsinki, Helsinki (Finland). Host: J. Taskinen and S. A. Nazarov.

Third-party funding

Third-party funding obtained as Principal Investigator

- 2024: FWF ESPRIT "*Effective theories for quasi-crystalline microstructures*" .

Other grants

- 2024: Research Funding Program "*International Communication*" of the Austrian Research Foundation (ÖFG)
- 2024: Research Funding Program "*International Communication*" of the Austrian Research Foundation (ÖFG)

Honours and awards

- 2024: Research in Teams "*Novel effective theories of phase separation in quasi-crystals*" awarded from BIRS Research Center, Banff, Canada.
- 2024: Research in Residence "*Phase separations in quasi-crystalline structures*" awarded from CIRM, Luminy, France.
- 2022: Project "*Variational modeling of quasi-crystalline microstructures*" awarded a MSCA Seal of Excellence.

Publications & Preprints

Submitted paper

[11] L. D'Elia, E. Zappale. Relaxation of variational problems in the space of functions with $\mathcal{B}$-variation: interaction with measures and lack of concentration phenomena. *Submitted* (2025). ArXiv: 2507.18781.

[10] R. Cristoferi, L. D'Elia. First-order homogenization. *Submitted* (2025). ArXiv: 2505.18848.

Accepted Papers

[9] L. D'Elia, M. Eleuteri, E. Zappale. Homogenization of supremal functionals in vectorial setting (via power-law approximation). *Anal. Appl.* **22** (2024), 1255-1302. DOI: 10.1142/S0219530524500179.

[8] E. Davoli, L. D'Elia, J. Ingmanns. Stochastic homogenization of micromagnetic energies and emergence of magnetic skyrmions. *J. Nonlinear Sci.* **34** (2024), 30. Preprint: 10.1007/s00332-023-10005-3.

[7] A. Braides, L. D'Elia. Homogenization of discrete thin structures. *Nonlinear Anal.* **231** (2023), 112951. DOI: 10.1016/j.na.2022.112951.

[6] L. D'Elia. Γ-convergence of quadratic functionals with non uniformly elliptic conductivity matrices. *Netw. Heterog. Media* **17** (2022), 15-45. DOI: 10.3934/nhm.2021022.

[5] L. D'Elia, S.A.Nazarov. Gaps in the spectrum of two-dimensional square packing of stiff disks. *Appl. Anal.* **102** (2022), 2611–2627. DOI: 10.1080/00036811.2022.2033230.

[4] V. Chiadò Piat, L. D'Elia, S.A. Nazarov. The stiff Neumann problem: asymptotic specialty and "kissing" domains. *Asymptot. Anal.* **128** (2022), 113-148. DOI: 10.3233/ASY-211701.

[3] A. Braides, V. Chiadò Piat, L. D'Elia. An extension theorem from connected sets and homogenization of non-local functionals. *Nonlinear Anal.* **208** (2021), 112316. DOI: 10.1016/j.na.2021.112316.

[2] E. Cordero, L. D'Elia, S.I. Trapasso. Norm estimates for τ-pseudodifferential operators in Wiener amalgam and modulation spaces. *J. Math. An. Appl.* **471** (2019), 541-563. DOI: 10.1016/j.jmaa.2018.10.090.

[1] L. D'Elia, S.I. Trapasso. Boundedness of pseudodifferential operators with symbols in Wiener Amalgam spaces on modulation spaces. *J. Pseudo-Differ. Oper. Appl.* **9** (2017), 1-10. DOI: 10.1007/s11868-017-0220-1.

Proceedings

[1] L. D'Elia. Stochastic homogenization in micromagnetics. *Oberwolfach Reports* **23** (2025), 30. Preprint: mfo/4281.

Participation in scientific projects

- 2023: Member of the Research Project: *Perspectives in materials science: variational models, analysis asymptotic and homogenization* awarded by INdAM - GNAMPA.
- 2020: Member of the Research Project: *Variational analysis of non-local models* in applied sciences awarded by INdAM - GNAMPA.
- 2019: Member of the Research Project: *An asymptotic approach to complex structures in biology and engineering* awarded by INdAM - GNAMPA.