

# Carlo Alberto Antonini

## Curriculum Vitae

### Personal Information

First name Carlo Alberto

Last name Antonini

Date of birth

Nationality

Email

### Education

February 2024–ongoing **Post-doctoral student**, *University of Florence*, Florence

Supervisor: Prof. Andrea Cianchi

2020–2024 **Ph.D. student in Mathematical Sciences**, *Università degli Studi di Milano*, Milano

Research interests: Local and nonlocal PDEs, Regularity theory

Supervisors: Prof. Giulio Ciraolo, Prof. Alberto Farina

Thesis title: *Regularity results for quasilinear equations of anisotropic and mixed local-nonlocal type*

Final evaluation: Cum Laude

2018–2020 **Master's degree in Mathematics**, *Università degli Studi di Milano*, Milano

Curriculum: General Mathematics (Mathematical Analysis)

Thesis title: *Symmetry results for critical points of the Sobolev inequality*

Supervisor: Prof. Giulio Ciraolo

Final degree mark: 110/110 cum laude

Average exam score: 30 out of 30

2013–2016 **Bachelor's degree in Mathematical Engineering**, *Politecnico di Milano*, Milano

Curriculum: Mathematical Engineering

Final degree mark: 110/110 cum laude

Average exam score: 29.34 out of 30

2008–2013 **Secondary school diploma**, *Liceo Scientifico "Marie Curie"*, Giulianova (TE)

### Publications

- [1] C.A. Antonini, G. Ciraolo, A. Farina, *Interior regularity results for inhomogeneous anisotropic quasilinear equations*, **Mathematische Annalen** 387, pages 1745-1776 (2022)
- [2] C.A. Antonini, *Smooth approximation of Lipschitz domains, weak curvatures and isocapacitary estimates*, **Calculus of Variations and Partial Differential Equations**, Vol. 63, Nr. 91, (2024) (Online first)

### Preprints

- [1] C.A. Antonini, A. Cianchi, G. Ciraolo, A. Farina, V.G. Maz'ya, *Global second-order estimates in anisotropic elliptic problems*, submitted, arXiv:2307.03052 (2023)

- [2] C.A. Antonini, M. Cozzi, *Global gradient regularity and a Hopf lemma for quasilinear operators of mixed local-nonlocal type*, submitted, arXiv:2308.06075 (2023)

## Research activity

My research activity has been mainly focused on the study of quasilinear Partial Differential Equations of  $p$ -Laplace type, with particular attention on the regularity theory of solutions to these equations. I have also dealt with quasilinear elliptic equations either purely nonlocal, such as the  $(s, q)$ -fractional Laplacian, or of mixed local-nonlocal type.

I have recently been studying embedded hypersurfaces of  $\mathbb{R}^n$  enjoying weak regularity properties, with particular attention to Lipschitz-continuous boundaries of domains endowed with a weak second fundamental form, and their connection with boundary value problems in elliptic PDEs.

**Research topics:** Linear and Nonlinear PDEs, Calculus of Variations, Regularity theory, Local and Nonlocal equations, Maximum principles, Differential Geometry, Geometric measure theory,

## Referee activities

- Proceedings of the American Mathematical Society
- Israel Journal of Mathematics

## Communications

- 2024 **Invited speaker**, “A school on regularity theory in the south of Italy”, University of Calabria”, Cosenza  
July 8-12
- 2024 **Invited speaker**, *Invited speaker at the university of Parma*, UniPr, Parma  
May 21
- 2024 **Invited speaker**, “Phd days at UniMi”, University of Milan, Milan  
March 25 - 27
- 2023 **Invited speaker**, “Lavrentiev’s phenomenon, approximation and regularity”, University of Warsaw, Warsaw  
November 20 - 22
- 2022 **Invited speaker**, “Qualitative and quantitative aspects of nonlinear PDEs”, Università degli studi di Bari e Politecnico di Bari, Bari  
September 5 - 9

## Students

- 2024 **Master thesis**, *Co-advisor of the master thesis of Francesco Pagliarin “Second-order regularity for some degenerate elliptic problems” (with Prof. Giulio Ciraolo)*  
July 18

## Organization of Events

- 2022 **Local organizer**, “Geometric Analysis and PDE on Garda Lake”, Università degli Studi di Milano, Gargnano del Garda (BS)  
June 8 - 10

## Participation in Research Projects

- Progetto GNAMPA-INdAM 2024, “Problemi di ottimizzazione di forma e problemi spettrali”, coordinator Prof. Gloria Paoli, 12 months

- Progetto GNAMPA-INdAM 2023, “*Problemi non locali: teoria cinetica e non uniforme ellitticità*”, coordinator Prof. Cristiana De Filippis, 12 months
- Progetto GNAMPA-INdAM 2022, “*Fractional and anisotropic PDEs arising from geometric and functional inequalities*”, coordinator Prof. Giulio Ciraolo, 12 months

## Visiting Positions

2022 **Visiting PhD Student**, *University of Western Australia*, under the supervision of Prof. Serena Dipierro and Prof. Enrico Valdinoci, Perth, WA (AUS)  
20 September - 1 December

## Teaching

- 2023-2024 **Tutor**, *Istituzioni di Matematica*, Università degli Studi di Milano, Dipartimento di Chimica (32 hours)  
Head of the course: Prof. Chiara Camere, Prof. Matteo Cozzi
- 2022-2023 **Tutor**, *Analisi Matematica 4*, Università degli Studi di Milano, Dipartimento di Matematica (20 hours)  
Head of the course: Prof. Kevin Ray Payne
- 2021-2022 **Tutor**, *Analisi Matematica 4*, Università degli Studi di Milano, Dipartimento di Matematica (20 hours)  
Head of the course: Prof. Kevin Ray Payne

## Schools and conferences attended

- Summer School “*A school on regularity theory in the south of Italy*”, University of Calabria, July 8-12 2024
- Conference “*Geometric measure theory and applications 2024*”, Cortona, June 16-21 2024
- Conference “*Calculus of variations and geometric measure theory*”, Pisa, June 11-16 2023
- Conference “*Nonlinear PDEs in Cosenza*”, Cosenza (CS), May 15-19 2023
- Summer School “*Geometric and Analytic Aspects of Functional Variational Principles*”, Fondazione CIME, Cetraro (CS), June 27 - July 1 2022
- Summer School “*Convex Geometry*”, Fondazione CIME, Cetraro (CS), August 30 - September 3 2021
- Summer School “*SMI Summer course: Function spaces and generalized regularity*”, held by Prof. Giovanni Leoni and Prof. Ian Tice, Cortona, Arezzo (online via Zoom), July 5 - 16 2021

## PhD Courses attended

- “*Differential inclusions and convex integration*”, held by Prof. Riccardo Tione, Università degli studi di Milano, March 2024
- “*An introduction to the mean curvature flow and its regularity theory*”, held by Prof. Salvatore Stuvard, Università degli studi di Milano, February - March 2023
- “*Equazioni ellittiche non lineari in domini non limitati: proprietà qualitative e classificazione*”, Università degli Studi di Milano, Prof. Alberto Farina, March 2022
- “*An introduction to free boundary problems*”, held by Prof. Daniela de Silva and Prof. Ovidiu Savin, Alma Mater Studiorum–Università di Bologna, April - May 2021

- “*A tour on Kirchhoff type problems*”, held by Prof. Cristina Tarsi, Università degli Studi di Milano, April - May 2021
- “*Analytical aspects of local and nonlocal minimal surfaces*”, held by Dr. Matteo Cozzi and Prof. Enrico Valdinoci, Università degli Studi di Milano, March - April 2021

## Language skills

Italian    Mothertongue  
English    Advanced

## Computer skills

Programming languages    C,C++, MATLAB, R,  $\LaTeX$