Curriculum Vitae et Studiorum

Dario Mazzoleni

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Complete name: Dario Cesare Severo
Surname: Mazzoleni
Date and place of birth: December 19th, 1987 in Bergamo (Italy)
Nationality: Italian
Address: Dipartimento di Matematica "F. Casorati"
Università degli Studi di Pavia
Via Ferrata, 5
27100 Pavia (Italy)
Office C15 (first floor)
Office phone: +39 0382 985633
Email address: dario.mazzoleni@unipv.it

Current position

Associate Professor of Mathematical Analysis at the University of Pavia, from December 16th, 2022.

Former positions

Assistant Professor of Mathematical Analysis (RTDB) at the University of Pavia, from April 1st, 2020 to December 15th, 2022.
Assistant Professor of Mathematical Analysis (RTDA) at the Catholic University of Brescia from October 1st, 2017 to March 31st, 2020.
PostDoc at the University of Pavia from March 1st, 2017 to September 30th, 2017, supervisor: Prof. Giuseppe Savaré.
PostDoc at the University of Torino from December 1st, 2014 to February 28th, 2017, for the ERC grant "Complex patterns for strongly interacting dynamical systems" (https://compaterc.wordpress.com/), principal investigator: Prof. Susanna Terracini.

Studies

Ph.D. in Mathematics at the University of Pavia with a cotutelle agreement with the Friedrich-Alexander Universität of Erlangen-Nürnberg, obtained on December 2nd, 2014 in Pavia.
Title of the Thesis: Existence and regularity results for solutions of spectral problems

Advisors: Prof. Aldo Pratelli and Prof. Giuseppe Savaré

Members of the Committee:
President: Prof. Giuseppe Buttazzo (University of Pisa)
Prof. Aldo Pratelli (University of Erlangen)
Prof. Giuseppe Savaré (University of Pavia)
Prof. Frank Duzaar (University of Erlangen)

Referees:
Prof. Dorin Bucur (University of Savoy)
Prof. Giuseppe Buttazzo (University of Pisa)
Prof. Aldo Pratelli (University of Erlangen)

Previous studies

- Diploma of the **IUSS** (Institute of advanced studies of Pavia, `www.iusspavia.it`) obtained on January 31st, 2012 with mark: Excellent. Title of the thesis: *Minimizing movements and spatial discretization for functionals with free discontinuities*, advisor: Prof. Enrico Vitali, co-advisor: Prof. Franco Brezzi.

- *Laurea Magistrale* (**Master's degree**) in Mathematics, achieved on July 12th, 2011 at University of Pavia with grade 110/110 cum laude. Title of the Thesis: *Extremum problems, quantitative estimates and connectedness of optimal sets for spectral inequalities*, advisor: Prof. Aldo Pratelli.

- Fellow of *Almo Collegio Borromeo* (Pavia, `www.collegioborromeo.it`) during the years 2006-2011.

- *Laurea Triennale* (**Bachelor's degree**) in Mathematics, achieved on September 22nd, 2009 at University of Pavia with grade 110/110 cum laude. Title of the Thesis: *Stime del gradiente nei problemi con discontinuità libera* [Gradient bounds in free-discontinuity problems], advisor: Prof. Enrico Vitali.

- High school degree (scientific oriented) achieved in July 2006 at *Liceo Scientifico* "Filippo Lussana" of Bergamo (Italy), with grade 100/100.

Prizes and awards

- The paper (M1) in collaboration with Aldo Pratelli was awarded as a **Highly cited research** by the editors of J. Math. Pures Appl.

- Prize "Proff. Silvio Cinquini e Maria Cinquini Cibrario" for the best master's degree thesis in Mathematics at the University of Pavia in the period from 01.09.2010 to 31.08.2012.

- **Best student award** from the Faculty of Mathematics, Physics and Natural Sciences of the University of Pavia for the academic year 2010/11.

- IUSS study prize in the years 2006/07, 2007/08, 2008/09, 2009/10, 2010/11.

Coordination of research projects

1. **Principal investigator** of the INdAM-GNAMPA project "Ottimizzazione spettrale non lineare (nonlinear spectral optimization)", March 2019-February 2020.

2. **Head of Pavia unit** ("responsabile di unità di ricerca") of the national PRIN 2022 project "NO^3 – Nodal Optimization, NOnlinear elliptic equations, NOnlocal geometric problems, with a focus on regularity" (other units: Pisa, Torino, Bologna, Polimi).

Editorial activity

1. **Guest Editor** with Benedetta Pellacci of the special issue "Calculus of Variations and Nonlinear Analysis: Advances and Applications" of Mathematics in Engineering, AIMS press.

Other scientific activities

1. **Referee** for "JEMS", "Ann. Inst. H. Poincaré Anal. Non Linéaire", "Calc. Var. & PDEs", "Journal of Functional Analysis", "SIAM J. Math. Anal.", "Rev. Mat. Iberoamericana", "ESAIM:COCV", "Discrete and Continuous Dynamical Systems", "J. Differential Equations", "J. Optimization Theory and Applications", "J. Math. Biology", "Appl. Math. and Optimization", "Nonlinear Analysis", "Advances in Nonlinear Analysis", "Bullettin of the London Mathematical Society", "Nonlinearity", "Mathematics in Engineering", "Math. Control Relat. Fields", "Math. Nach.", "Rendiconti Circolo Matematico Palermo", "Mathematics", "Rend. Sem. Mat. Univ. Politec. Torino". **Reviewer** for MathSciNet since February 2016.

2. "Qualification aux fonctions de maître de conférences" for teaching in French Universities in the section of Mathematics (25) and Applied Mathematics (26) for the periods 2015-2019 and 2020-2024.

3. Since January 2015, member of the research group GNAMPA of INDAM (group of calculus of variations in the italian institute of high mathematics). Moreover I was a member of the projects

   - **OptiFrac**, p.i. Giovanni Franzina, March 2016–February 2017,
   - **Variational methods for nonlocal problems**, p.i. Eleonora Cinti, March 2017– May 2017
   - **Geometric and spectral optimization**, p.i. Davide Zucco, March 2018 – February 2019,
   - **Analysis and asymptotic optimization for domains with holes**, p.i. Laura Abatangelo, April 2020-September 2020,
   - **Problems with aspects of competition for spectral energies**, p.i. Berardo Ruffini, April 2022-March 2023.
   - **Regularity and singularity in problems with free boundaries**, p.i. Giorgio Tortone, April 2023 – ongoing.
   - **Geometric properties and regularity in variational problems, local and nonlocal**, p.i. Francesca Prinari, January 2024–ongoing

4. Member of the Admission Committee of IUSS (Institute of Advanced Studies of Pavia) for the admission to the first year students in the academic year 2020/21.

5. Member of the examination committe for a Postdoc in Mathematical Analysis at the University of Pavia in 2021 (president of the committe Prof. Colli), in 2022/23 (president of the committe Prof.ssa Mora) and in 2023/24 (president of the committe Prof. Luca Rondi).

6. Member of the examination committe for the "Prof. Luigi Berzolari" study prize 2021.

Talks

1. "XXII Convegno nazionale di Calcolo delle Variazioni" (Levico Terme, February 5-10, 2012): *Existence of minimizers for spectral problems in $\mathbb{R}^N$*.

2. "Workshop on Calculus of Variation and Partial Differential Equations" (Erlangen, November 9th, 2012): *Existence of minimizers for spectral problems in $\mathbb{R}^N$*.

3. Workshop "New trends in shape optimization" (Erlangen, September 23-27, 2013): *Existence and regularity for spectral problems*.

4. "XXIV Convegno nazionale di Calcolo delle Variazioni" (Levico Terme, January 27-31, 2014): *A regularity result for spectral problems*.

5. "School on free discontinuity problems" (Pisa, July 7-11, 2014): *A regularity result for spectral problems*.

6. Chambéry, September 12th, 2014, Seminar at the LAMA, invited by Dorin Bucur: *A regularity result for spectral problems*.

7. Berlin, March 6th, 2015, Seminar at WIAS, invited by Enrico Valdinoci: *Existence, regularity and surgery results for solutions of spectral problems*.

8. Lyon, April 7th, 2015, Seminar at the Université Lyon 1, invited by Louis Dupaigne: *Surgery and regularity results for spectral problems*.

9. "Lions-Magenes days" (Pavia, April 13-14, 2015): *A surgery result for the spectrum of the Dirichlet Laplacian*.

10. Workshop "Shape optimization and spectral geometry" (Edinburgh, June 29th- July 3rd, 2015): *A surgery result for the spectrum of the Dirichlet Laplacian*.

11. XX Congresso U.M.I. (Siena, September 7-12th, 2015): *Surgery results for spectral problems*.

12. Workshop "Calculus of variations and PDEs" (Chambéry, September 24-25th, 2015): *Geometric properties of optimal sets for some spectral optimization problems*.

13. Trieste, January 12th, 2016, Seminar at the SISSA, invited by Davide Zucco: *Surgery results for spectral problems*.

14. Workshop "Analytical and Geometric properties of solutions of PDEs" (Napoli, January 25-27th, 2016): *Geometric properties of optimal sets for some spectral optimization problems*.

15. Marseille, March 31st, 2016, Seminar at the FRUMAM - Université Aix-Marseille, invited by Enea Parini: *Existence et régularité pour des problems spectraux*.

16. Workshop "Geometric aspects of PDE's and functional inequalities" (Cortona, April 28-30th, 2016): *Geometric properties of optimal sets for some spectral optimization problems*.

17. Workshop "Bruxelles-Torino talks in PDE's" (Torino, May 2-5th, 2016): *Geometric properties of optimal sets for some spectral optimization problems*.

18. Workshop "Geometric and analytic inequalities" (BIRS, Banff–Canada, July 10-15th, 2016): *Regularity of optimal sets for spectral functionals*.

19. Workshop "GMT, shape optimisation and free boundaries" (SISSA Trieste, October 25th-28th, 2016): *Regularity of the optimal sets for some spectral functionals*.

20. Workshop "Shape Optimization and Isoperimetric and Functional Inequalities" (CIRM Marseille, November 21st-25th, 2016): *Regularity of the optimal sets for spectral functionals. Part II, some generalizations*.

21. Brescia, December 7th, 2016, Seminar at the Department of Maths and Physics of Università Cattolica, invited by Marco Squassina: *Regularity of the optimal sets for spectral functionals*.

22. Bruxelles, February 14th, 2017, Seminar at the Departément de Mathématique of ULB, invited by Denis Bonheure: *Regularity of the optimal sets for spectral functionals*.

23. Workshop "Brescia-Trento nonlinear days" (Trento, May 26th, 2017): *Regularity of the optimal sets for some (also nonlinear) spectral functionals.*

24. Workshop " VII PDEs, optimal design and numerics" (Benasque, August 20th-September 1st, 2017): *Some estimates for the higher eigenvalues of sets close to the ball.*

25. Rome, November 16th, 2017, Seminar at the Dipartimento di Matematica G. Castelnuovo of Sapienza University of Rome, invited by Benedetta Pellacci: *Gradient flows for eigenvalues of potentials.*

26. Workshop "Intensive week of PDE's at Spa" (Spa, December 11–15th 2017): *Some estimates for the higher eigenvalues of sets close to the ball.*

27. Workshop "Young PDE@Rome" (Rome, February 19–22nd, 2018): *Gradient flows for eigenvalues of potentials.*

28. Workshop "Recent advances in Calculus of Variations and PDEs" (Parma, March 15th, 2018): *Regularity of the free boundary for a vector-valued Bernoulli problem with no sign assumptions.*

29. Workshop "Topics in Nonlinear Analysis: Calculus of Variations and PDEs" (Lisbon, October 10-12th, 2018): *Regularity of the free boundary for a vector-valued Bernoulli problem.*

30. Workshop "Variational approaches in PDE's" (Rome Tor Vergata, March 13-14th 2019): *Asymptotic spherical shapes in some spectral optimization problems.*

31. "Intensive week of PDE's at Cogne" (Cogne (Aosta), June 3-7th 2019): *Asymptotic spherical shapes in spectral optimization problems.*

32. "Rencontre ANR SHAPO" (Montpellier (France), June 12-14th 2019): *Asymptotic spherical shapes in spectral optimization problems.*

33. "XXI Congresso U.M.I." (Pavia (Italy), September 2nd-7th 2019): *Asymptotic spherical shapes in some spectral optimization problems*

34. "Dynamics, Equations and Applications" (Kraków (Poland), September 16-20th 2019): *Asymptotic spherical shapes in some spectral optimization problems*

35. "Shape optimization and isoperimetric and functional inequalities" (Levico Terme (Italy), September 23-27th 2019): *Optimization of the higher eigenvalues of the p-Laplacian*

36. Bruno Pini Seminar, University of Bologna, invited by Elenora Cinti (October 23rd, 2019): *Optimization of the higher eigenvalues of the p-Laplacian*

37. "PDE's Session in Bicocca" (Milano (Italy), November 11th 2019): *Asymptotic spherical shapes in some spectral optimization problems*

38. Napoli, 20th November 2019, Talk at Dipartimento di Matematica e Applicazioni R. Caccioppoli, invited by Bozhidar Velichkov: *Optimization of the higher eigenvalues of the p-Laplacian*

39. "Calculus of Variations and Free Boundary Problems III" (Napoli (Italy), 21st-22nd November 2019): *On principal frequencies, volume and inradius in convex sets*

40. Milano, 11th December 2019, Talk at Dipartimento di Matematica F. Enriques, UniMi, invited by Giulio Ciraolo: *Optimization of the higher eigenvalues of the p-Laplacian*

41. Online Workshop "Journées SHAPO" (26-27th November 2020): *A spectral shape optimization problem with a nonlocal competing term*

42. Online Cardiff Analysis & PDE Seminar (8th February 2021): *A spectral shape optimization problem with a nonlocal competing term*

43. Online Lisbon WADE Seminar (4th March 2021): *Regularity of the optimal sets for the second Dirichlet eigenvalue*

44. Online PDE Afternoon Vienna (14th April 2021): *An introduction to spectral shape optimization*

45. Workshop "Regularity Theory for Free Boundary and Geometric Variational Problems" (Levico Terme (Italy), 6-10th September 2021): *A spectral shape optimization problem with a nonlocal competing term*

46. Pisa, 6th April 2022, Talk at Dipartimento di Matematica e Applicazioni, invited by Bozhidar Velichkov: *L^2-gradient flows of spectral functionals*

47. "XXXI Convegno Nazionale di Calcolo delle Variazioni" (Levico Terme (Italy), 9-13th May 2022): *L^2-gradient flows of spectral functionals*

48. "Nonlinear Meeting in Bologna" (Bologna, 6-7th June 2022): *Singular analysis of the optimizers of the principal eigenvalue in indefinite weighted Neumann problems*

49. "Geometric Analysis at Garda Lake" (Gargnano (BS), 8-10th June 2022): *Singular analysis of the optimizers of the principal eigenvalue in indefinite weighted Neumann problems*

50. "Summer school in analysis and PDEs" (Caserta, 4-8th July 2022): *A spectral shape optimization problem with a nonlocal competing term*

51. Brescia, 2nd September 2022, Talk at DICATAM, invited by Riccarda Rossi: *L^2-gradient flows of spectral functionals*

52. "Anisotropic isoperimetric problems and related topics" (Rome, 5th-9th September 2022): *A variational approach to the (spectral) Gamow and Hartree functionals*

53. Workshop "Shape Optimisation and Geometric Spectral Theory" (Edinburgh, 19th-23rd September 2022): *A variational approach to the (spectral) Gamow and Hartree functionals*

54. Weekend di lavoro su calcolo delle variazioni (Montecatini Terme, 25th-27th November 2022): *Regularity of the minima of integral shape functionals: the non-degenerate case*

55. L'Aquila, 22nd March 2023, Talk at joint seminar GSSI-UNIVAQ, invited by Emanuela Radici: *Regularity of the minima of integral shape functionals: the non-degenerate case*

56. WADE Seminar Lisbon (Portugal), 26th July 2023: *Regularity of the minima of integral shape functionals*

57. Three days on Shape Optimization and PDEs (Napoli), 27th-29th November 2023: *Singular analysis of the optimizers of the principal eigenvalue in indefinite weighted Neumann problems*

Schools and workshops attended (without giving a talk)

- *ERC Summer School on Calculus of Variation, Continuum Mechanics and Quantitative inequalities* in Ischia, 5-10 June 2011. Organizers: A. Pratelli and F. Maggi.

- Workshop in memory of Enrico Magenes *Analysis and Numerics of Partial Differential Equations* in Pavia, 2-4 November 2011.

- Workshop *Variational Methods for Evolution* at MFO (Mathematisches Forschungsinstitut Oberwolfach), 5-9 December 2011. [Organizers: A. Mielke, F. Otto, G. Savaré, U. Stefanelli]

- Workshop *Trends in Mathematical Analysis* in Milan-Politecnico, 1-3 March 2012.

- Workshop *Shape optimization and spectral problems* at CIRM (Marseille), 28 May-1 June 2012. [Organizers: D. Bucur, G. Buttazzo, A. Henrot, M. Pierre]

- School on *Shape optimization* at Centro De Giorgi (Pisa), 4-8 June 2012. [Courses held by D. Bucur, B. Kawohl, M. Pierre]

- Workshops *Geometric inequalities in Calculus of Variation* and *New trends in Shape Optimization* at Centro De Giorgi (Pisa) 9-20 July 2012. [Organizers: N. Fusco & A. Pratelli, A. Henrot]

- *XXIII Convegno nazionale di Calcolo delle Variazioni*, Levico Terme, 4-8 February, 2013.

- *Seventh summer school in analysis and applied mathematics*, Rome, 17-21 June, 2013. [Courses held by F. Otto, G. Savaré & L. Truskinowsky]

- Workshop *Variational views in mechanics and materials*, Pavia, 24-26 June, 2013. [Organizers:G. Dal Maso et al.]

- *Vector-valued partial differential equations and applications*, Cetrato (CS), 8-12 July, 2013. [Courses held by: B. Dacorogna, N. Fusco, S. Müller & V. Sverak]

- *ERC school "Geometric functional inequalities and shape optimization"*, Napoli, 9-13 September 2013. [Courses held by: D. Bucur, F. Maggi & M. Morini]

- Workshop *"Calculus of Variations and Optimization. A conference to celebrate the 60th birthday of Giuseppe Buttazzo"*, Pisa, 21-23 May 2014. [Organizers: L. Brasco, A. Briani, G. Dal Maso, L. De Pascale, I. Fragalà, F. Santambrogio, P. Trebeschi]

- Workshop *Isoperimetric problems between analysis and geometry*, Pisa, 16-20 June 2014. [Organizers: G. De Philippis, A. Pratelli, F. Morgan]

- Workshop *Complex Patterns in nonlinear phenomena*, Torino, 26-30 January 2015.
- *XXV Convegno nazionale di Calcolo delle Variazioni*, Levico Terme, 2-6 February, 2015.
- Winter school/workshop *Spectral theory and shape optimization problems for elliptic PDEs*, Milano, 9-13 February 2015.
- Summer school *Geometric measure theory and calculus of variations*, Grenoble, June 22-26, 2015
- Workshop "Calculus of variations and PDEs" (Chambéry, September 24-25th, 2015).
- *XXVI Convegno nazionale di Calcolo delle Variazioni*, Levico Terme, January 18th-22nd, 2016.
- *Pde's at the Gran Paradis*, Cogne, June 20th-24th, 2016.
- *A mathematical tribute to Ennio de Giorgi*, Pisa, September 19th-23rd, 2016.
- *Roma Caput PDE*, Roma, January 23rd-26th, 2017.
- *XXVI Convegno nazionale di Calcolo delle Variazioni*, Levico Terme, February 6th-10th, 2017.
- *Geometry of PDE's and related problems*, CIME school, Cetraro, June 19th-23rd, 2017.
- *XXVII Convegno nazionale di Calcolo delle Variazioni*, Levico Terme, February 12th-15th, 2018.
- *Nonlinear days in New York*, New York, April 25-28th, 2018.
- *Nonlinear analysis and PDEs in Caserta*, Caserta, September 10-14th, 2018.
- *Alessio Figalli, Fields medallist*, Pisa, January 14-17th, 2019.
- *XXIX Convegno nazionale di Calcolo delle Variazioni*, Levico Terme, February 4-8th, 2019.
- *EMS Summer school on PDE's from theory to applications*, Milano, July 1st-5th, 2019.
- *XI Workshop in nonlinear differential equations*, Varese July 29th, August 2nd, 2019.
- *XXX Convegno nazionale di Calcolo delle Variazioni*, Levico Terme, February 3-7th, 2020.
- Workshop "Regularity Theory for Free Boundary and Geometric Variational Problems II" (Pisa (Italy), 10-15th July 2022)
- Workshop/Winter School "PDEs in Cogne: a friendly meeting in the snow" (Cogne (Italy), 9-13th January 2023)

Organization

1. *Local organizer* of the Workshop "New trends in shape optimization", held in Erlangen on September 23-27, 2013.

2. *Organizer* of the Workshop "Brescia-Trento Nonlinear Day, second edition", held in Brescia on May 25th, 2018.

3. *Organizer* of the Workshop "Brescia-Trento Nonlinear Day, third edition", held in Trento on May 31st, 2019.

4. *Organizer* of the "Brescia Winter School on Reaction Diffusion PDE's and Optimization", held in Brescia on 13-15th January 2020.

Teaching

At the University of Pavia (2009-2012)

1. Tutor for the course of Mathematics for first year students in Chemistry in the years 2009/10 and 2010/11. Lecturer: Prof. Enrico Vitali.

2. Teaching assistant for the course of Ordinary differential equations in the year 2011/12. Lecturer: Prof. Enrico Vitali.

3. Teaching assistant for the course of Sobolev spaces in the year 2011/12. Lecturer: Prof. Aldo Pratelli.

At the University of Torino (2014-2017)

1. Responsible of the exercise group "Problem solving" (mainly exercises of functional analysis and measure theory) in the year 2014/15 and 2015/16.

2. Tutor for the course of Calculus I, for first year students in Mathematics, in the year 2015/16.

3. Ph.D. course (jointly taught with Eleonora Cinti): "An introduction to geometric measure theory", in the year 2016/17.

At the Catholic University of Brescia (2017-2020)

1. Master course (jointly taught with Maurizio Paolini) "Mathematical Biology II", in the years 2017/18, 2018/19 and 2019/20.

2. Master course (jointly taught with Marco Degiovanni) "Stochastic processes", in the year 2017/18.

3. Master course "Stochastic processes", in the year 2018/19 and 2019/20.

At the University of Pavia (2020-ongoing)

1. Master course "Evolution Equations" in the Master in Mathematics, in the year 2019/2020.

2. Bachelor course for the degree in Bioengineering "Mathematical Analysis 1", in the years 2020/21, 2021/22, 2022/23 and 2023/24.

3. Master course "Calculus of Variations" for the Master degree in Mathematics, jointly taught with Antonio Segatti in the year 2022/2023 and jointly taught with Luca Rondi in the year 2023/2024.

4. Bachelor course for the degree in Electronic and Informatic Engineering "Mathematical Analysis 2", jointly taught with Maria Giovanna Mora in the year 2023/24.

Supervision of students for Master's and Bachelor's degree

I was supervisor (relatore) of the Master thesis of D. Guion (Univ. Cattolica Brescia, 2018/19, mark 110/110),
co-supervisor of the Master thesis of G. D'Onofrio (Univ. Cattolica Brescia, 2018/19, 110/110 cum laude),
co-supervisor of the Master thesis of A. Amanti (Univ. Cattolica Brescia 2019/20, 110/110 cum laude).
I am currently supervising the Master Thesis in Mathematics of Rebecca Sempio (Univ. Pavia)

Since January 2022 I am **Senior Tutor** for the Math students of Almo Collegio Borromeo, mentoring them and coordinating some lectures on advanced Analysis topics (isoperimetric inequality, Hausdorff measures, moving plane method).

Spoken languages

Italian (mother tongue); English (fluent); French (good); German (basic).

Long periods abroad

1. From November 1st, 2012 to August 31st, 2014 I was in Erlangen (Germany) as a Ph.D. student.

2. From September 1st, 2014 to October 31st, 2014 I was in Chambéry (France) as a guest of Dorin Bucur.

Computer skills

1. Good knowledge both of Windows and Linux (Ubuntu) systems, of the Office package and of LaTeX.

2. Basic knowledge of the languages "C" and "Matlab".

Other activities

1. Member of the school council of Liceo Scientifico "Filippo Lussana" during the school year 2005/06.

2. Representative of PostDocs at the council of the Department of Mathematics in Torino from September 2015 to February 2017.

3. Representative of the researchers in the council of the Faculty of Sciences of the Catholic University from January 2019 to March 2020.

4. Member of "Commissione paritetica studenti-docenti" of the Faculty of Engineering at the University of Pavia, since April 2022.

Research publications and preprints

One can find a preprint version of all my publications here: `http://cvgmt.sns.it/person/977/`.

M1) D. Mazzoleni, A. Pratelli, *Existence of minimizers for spectral problems*, J. Math. Pures Appl. **100** (3) 433–453 (2013).
This paper was awarded the certificate of **highly cited research**.

M2) M. Iversen, D. Mazzoleni, *Minimising convex combinations of low eigenvalues*, ESAIM:COCV **20** (2) 442–459 (2014).

M3) D. Bucur, D. Mazzoleni, A. Pratelli, B. Velichkov, *Lipschitz regularity of the eigenfunctions on optimal domains*, Arch. Ration. Mech. Anal. **216** (1) 117–151 (2015).

M4) D. Bucur, D. Mazzoleni, *A surgery result for the spectrum of the Dirichlet Laplacian*, SIAM J. Math. Anal. **47** (6) 4451–4466 (2015).

M5) D. Mazzoleni, *Boundedness of minimizers for spectral problems in $\mathbb{R}^N$*, Rend. Sem. Mat. Univ. Padova **135** (2016) 207–221.

M6) D. Mazzoleni, D. Zucco, *Convex combinations of low eigenvalues, Fraenkel asymmetries and attainable sets*, ESAIM:COCV, **23** (3) (2017) 869–887.

M7) D. Mazzoleni, S. Terracini, B. Velichkov, *Regularity of the optimal sets for some spectral functionals*, Geom. Funct. Anal., **27** (2) (2017) 373–426.

M8) D. Mazzoleni, A. Pratelli, *Some estimates on the higher eigenvalues of sets close to the ball*, J. Spectral Theory, **9** (4) (2019) 1385–1403.

M9) D. Mazzoleni, S. Terracini, B. Velichkov, *Regularity of the free boundary for the vectorial Bernoulli problem*, Analysis & PDE **13** (3) (2020), 741–764.

M10) D. Mazzoleni, B. Pellacci, G. Verzini, *Asymptotic spherical shapes in some spectral optimization problems*, J. Math. Pures Appl., **135** (2020) 256–283.

M11) D. Mazzoleni, B. Pellacci, G. Verzini, *Quantitative analysis of a singularly perturbed shape optimization problem in a polygon*, In: Wood D., de Gier J., Praeger C., Tao T. (eds) 2018 MATRIX Annals. MATRIX Book Series, vol 3. Springer, Cham (2020) 275–283. `https://doi.org/10.1007/978-3-030-38230-8_18`

M12) M. Degiovanni, D. Mazzoleni, *Optimization results for the higher eigenvalues of the p-Laplacian associated with sign-changing capacitary measures*, J. London Math. Soc., **104** (2021) 97–146.

M13) L. Brasco, D. Mazzoleni, *On principal frequencies, volume and inradius in convex sets*, Nonlinear Differ. Equ. Appl. (2020) 27: 12.

M14) D. Mazzoleni, B. Ruffini, *A spectral shape optimization problem with a nonlocal competing term*, Calc. Var. PDE (2021) **60**, 114.

M15) D. Mazzoleni, B. Trey, B. Velichkov, *Regularity of the optimal sets for the second Dirichlet eigenvalue*, Ann. Inst. H. Poincaré Anal. Non Linéaire, 39 (2022), 529–573.

M16) D. Mazzoleni, B. Pellacci, G. Verzini, *Singular analysis of the optimizers of the principal eigenvalue in indefinite weighted Neumann problems*, SIAM J. Math. Anal., Vol. 55, No. 4 (2023) 4162–4192.

M17) D. Mazzoleni, G. Savaré, L^2-*gradient flows of spectral functionals*, Discr. Cont. Dyn. Syst. **43**, Issue 3 & 4: (2023), 1560–1594.

M18) G. Buttazzo, F. P. Maiale, D. Mazzoleni, G. Tortone, B. Velichkov, *Regularity of the optimal sets for a class of integral shape functionals*, to appear on Arch. Rational Mech. Anal., preprint available at `https://cvgmt.sns.it/paper/5836/`

M19) I. Lucardesi, D. Mazzoleni, B. Ruffini, *On a Cheeger–Kohler-Jobin inequality*, to appear in the Springer Conference proceedings of the workshop "Anisotropic Isoperimetric Problems and Related Topics", preprint available at `https://cvgmt.sns.it/paper/5932/`

M20) D. Mazzoleni, G. Tortone, B. Velichkov, *On the dimension of the singular set in optimization problems with measure constraint*, J. Convex Analysis, **31** (2024), 689–708.

M21) D. Mazzoleni, E. Radici, F. Riva, *On a degenerate second order traffic model: existence of discrete evolutions, deterministic many-particle limit and first order approximation*, preprint avaialble at

Surveys and editorials

MS1) D. Mazzoleni, *Recent existence results for spectral problems*, chapter of the book: "New trends in shape optimization", G. Leugering and A. Pratelli eds., Birkhäuser, 2015.

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