Chiara Gavioli

Curriculum Vitae

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Research interests

My research focuses on problems arising in continuum physics and materials engineering, which are approached using techniques from the theory of **partial differential equations** and from the **calculus of variations**. I have been mainly interested in models involving **porous (perforated) media**, both on the macro- and microscale and possibly accounting for **hysteresis effects**, and in **phase transition/separation** problems.

Current position

1 Feb 2024 – present **Postdoctoral Researcher**, Marie Skłodowska-Curie fellow under the supervision of P. Krejčí, Faculty of Civil Engineering, Czech Technical University in Prague, Prague, Czech Republic.

Employment

15 Mar 2021 – 31 Jan 2024 **Postdoctoral Researcher**, FWF postdoc in the Multiscale Calculus of Variations Research Group led by E. Davoli, Institute of Analysis and Scientific Computing, TU Wien, Vienna, Austria.

1 Feb – 14 Mar 2021 **Project Assistant (prae-doc)**, Multiscale Calculus of Variations Research Group led by E. Davoli, Institute of Analysis and Scientific Computing, TU Wien, Vienna, Austria.

Education

Nov 2017 – Dec 2020 **PhD in Mathematics**, Department of Physics, Informatics and Mathematics, University of Modena and Reggio Emilia, Modena, Italy, joint program involving three universities: Modena and Reggio Emilia, Parma, Ferrara.

- Title of the thesis: *New perspectives in phase transition problems*
- Advisor: Michela Eleuteri
- Award date: 26 Feb 2021

Sep 2015 – Oct 2017 **Master degree in Mathematics – curriculum *Advanced Mathematics***, Department of Mathematics, University of Trento, Trento, Italy.

Advanced Mathematics is generally for students who want to continue their studies at doctorate level, as it includes a large spectrum of areas of Mathematics.

- Title of the thesis: *On the null-controllability of the semilinear heat equation with hysteresis*
- Advisor: Fabio Bagagiolo

Grade: 110/110 cum laude

Sep 2012 – Sep 2015 **Bachelor degree in Mathematics**, Department of Physics, Informatics and Mathematics, University of Modena and Reggio Emilia, Modena, Italy.

- Title of the thesis: *Studio del pendolo sferico mediante le funzioni ellittiche di Weierstrass*
- Advisor: Andrea Sacchetti

Grade: 110/110 cum laude

Funding

Personal grants and fellowships

- FWF ESPRIT grant: *Homogenization of porous media flow with Preisach hysteresis.*
  Decision board no. 92 of 2023/03/06. Duration: 36 months. Amount: 316.036,52 EUR.
  Declined due to award of a Marie Skłodowska-Curie fellowship on a similar topic.

- Marie Skłodowska-Curie Actions fellowship: *A multiscale approach to unsaturated flow in porous media with Preisach hysteresis*.
  Call HORIZON-MSCA Postdoctoral Fellowships 2022. Host institution: Czech Technical University in Prague. Starting date: 1 February 2024. Duration: 24 months. Amount: 166.278,72 EUR.
- Doctoral scholarship (Cycle XXXIII) provided by the Italian Ministry of Education, University and Research (MIUR). Duration: 36+2 months.

Participation in research projects

- OeAD multilaterale WTZ Donauraum project: *Mathematical investigation of hysteresis in material modeling*.
  PIs: V. Kovtunenko (Austria), G. A. Monteiro (Czech Republic), A. Petrov (France).
  Starting date: 1 July 2023. Duration: 2 years. Amount: 10k EUR.
- INdAM – GNAMPA project: *Prospettive nelle scienze dei materiali: modelli variazionali, analisi asintotica e omogeneizzazione*.
  PI: E. Zappale.
  Starting date: 1 May 2023. Duration: 1 year. Amount: 3,5k EUR.
- OeAD WTZ project: *Multiscale problems in materials science*.
  PIs: V. Pagliari – since 1 September 2023: E. Davoli (Austria), S. Krömer (Czech Republic).
  Starting date: 1 January 2023. Duration: 2 years. Amount: 6,7k EUR.
- OeAD WTZ project: *Modeling, analysis, and simulation of magnetoelastic materials*.
  PIs: D. Praetorius (Austria), M. Kružík (Czech Republic).
  Starting date: 1 January 2022. Duration: 2 years. Amount: 6,8k EUR.

Honors and Awards

- Selected participant in the 12th Heidelberg Laureate Forum (September 13 – 20, 2025), a highly selective international forum bringing together recipients of the Abel Prize, Fields Medal, Turing Award, and Nevanlinna Prize with 200 promising young researchers in mathematics and computer science.
- Award "Tullio Levi-Civita" – 2a edizione (1st place) for the best PhD thesis defended in Italy within 29 November 2020 – 19 September 2022, and concerning one or more of the following fields: Analytical Mechanics, Differential Geometry, Variational Problems.
- "Premio di merito, edizione 2018" (prize for high academic performance) provided by the University of Trento.
- "Premio di laurea UNIMORE" for the A. Y. 2014/2015 (prize for high academic performance) provided by the University of Modena and Reggio Emilia.
- "Premio di studio UNIMORE" for the A. Y. 2013/2014 (prize for high academic performance) provided by the University of Modena and Reggio Emilia.
- Award for the enrollment in undergraduate courses in Mathematics for the A. Y. 2012/2013 provided by the Istituto Nazionale di Alta Matematica "Francesco Severi" (INdAM) and assigned following a selection on a national basis after a written mathematical test.

Research visits

28 May – 19 Jun 2025	South East Technological University, Waterford, Ireland. Hosted by D. Flynn.
24 Mar – 4 Apr 2025	Faculty of Advanced Science and Technology, Ryukoku University, Shiga, Japan. Hosted by T. Fukao.
1 – 31 Jul 2024	Department of Civil Engineering, Faculty of Engineering, Universität Duisburg-Essen, Essen, Germany. Hosted by B. Detmann.
2017 – 2023	Institute of Mathematics of the Czech Academy of Sciences, Prague, Czech Republic. Hosted by P. Krejčí. Periodic visits for a total of 16 weeks.

Organization of scientific events

23 – 24 Nov 2023 **Workshop *3rd Austrian Calculus of Variations Day***, Campus Gußhaus, TU Wien, Vienna, Austria.
Member of the organizing committee together with: A. Daniilidis, E. Davoli, L. D'Elia, L. Happ, K. Nik, F. Stark-McNeilly, S. Riccò, S. Tapia-García, M. Tommasini.

11 – 12 Apr 2018 **Workshop *Modena meets hysteresis***, Department of Physics, Informatics and Mathematics, University of Modena and Reggio Emilia, Modena, Italy.
Member of the scientific and organizing committee together with: M. Eleuteri, E. Ipocoana, P. Krejčí.

Invited seminars

26 Mar 2025 ***Seminar on Nonlinear Evolution Equations @KUE***, Kyoto University of Education, Kyoto, Japan.

10 Feb 2025 Department of Mathematics, Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University in Prague, Prague, Czech Republic.

16 Jul 2024 ***Oberseminar Angewandte Analysis***, TU Dortmund, Dortmund, Germany.

12 Jul 2024 ***Seminar Numerische Mathematik und Mechanik***, Universität Duisburg-Essen, Essen, Germany.

15 May 2024 ***Seminar on Mathematical Analysis***, Silesian University, Opava, Czech Republic.

30 Apr 2024 ***Nečas Seminar on Continuum Mechanics***, Charles University, Prague, Czech Republic.

20 Feb 2024 ***Seminar on Partial Differential Equations***, Institute of Mathematics, Czech Academy of Sciences, Prague, Czech Republic.

28 Nov 2023 ***Mathematical Analysis Seminar***, University of Modena and Reggio Emilia, Modena, Italy.

24 Oct 2023 Institute of Theoretical and Applied Mechanics, Czech Academy of Sciences, Prague, Czech Republic.

21 Apr 2021 ***Mathematical Analysis Seminar***, University of Modena and Reggio Emilia, Modena, Italy.

24 Mar 2021 ***PDE Afternoon***, University of Vienna, Vienna, Austria.

20 Nov 2017 Department of Mathematics, Faculty of Civil Engineering, Czech Technical University in Prague, Prague, Czech Republic.

Talks at workshops, conferences, and schools

Invited

2025 ***Current Research at the Interface of Continuum Physics and Applied Mathematics***, Weierstrass Institute (WIAS), Berlin, Germany, 8 – 10 Oct 2025.

Three Days in Calculus of Variations, TU Wien, Vienna, Austria, 25 – 27 Jun 2025.

2024 ***Italian-Japanese Workshop on Variational Perspectives for PDEs***, University of Pavia, Pavia, Italy, 9 – 13 Sep 2024.

MURPHYS 2024 – Interdisciplinary Conference on Multiple Scale Systems and Systems with Hysteresis, University of Sannio, Benevento, Italy, 18 – 21 Jun 2024.

STAMM 2024 – XXIII Symposium on Trends in Applications of Mathematics to Mechanics, University of Würzburg, Würzburg, Germany, 3 – 5 Apr 2024.

2021 **Workshop *Two days on Regularity Results for Variational Problems and PDEs***, hybrid event hosted by the University of Modena and Reggio Emilia, Italy, 2 – 3 Dec 2021.

2019 ***International Conference on Elliptic and Parabolic Problems***, Gaeta, Italy, 20 – 24 May 2019.
Invited short talk in the minisymposium "Degenerate problems with general growth".

Contributed

2023 ***HMM 2023 – 13th International Symposium on Hysteresis Modelling and Micromagnetics***, TU Wien, Vienna, Austria, 5 – 7 Jun 2023.

GAMM 2023 – 93rd Annual Meeting of the International Association of Applied Mathematics and Mechanics, TU Dresden, Dresden, Germany, 30 May – 2 Jun 2023.

ADWiM 2023 – 3rd Austrian Day of Women in Mathematics, online event hosted by the Austrian Association of Women in Mathematics, 28 Feb 2023.

2022 ***MURPHYS 2022 – Interdisciplinary Conference on Multiple Scale Systems, Systems with Hysteresis and Fluid Mechanics***, Ostravice, Czech Republic, 29 May – 3 Jun 2022.

2021 ***GAMM 2020@21 – 91st Annual Meeting of the International Association of Applied Mathematics and Mechanics***, online event hosted by the University of Kassel, Germany, 15 – 19 Mar 2021.

2019 ***ISCAMI 2019 – International Student Conference on Applied Mathematics and Informatics***, Czech Technical University in Prague, Prague, Czech Republic, 16 – 19 May 2019.

2018 ***DDSA 2018 – Summer School on Dissipative Dynamical Systems and Applications***, University of Modena and Reggio Emilia, Modena, Italy, 3 – 7 Sep 2018.

MURPHYS-HSFS 2018 – Workshop on Multi-Rate Processes, Slow-Fast Systems and Hysteresis, CRM Centre de Recerca Matemàtica, Bellaterra, Spain, 28 May – 1 Jun 2018.

Workshop ***Modena meets hysteresis***, University of Modena and Reggio Emilia, Modena, Italy, 11 – 12 Apr 2018.

Poster presentations

2019 ***MURPHYS-HSFS 2019 – Summer School on Multi-Rate Processes, Slow-Fast Systems and Hysteresis***, Politecnico di Torino, Torino, Italy, 17 – 21 Jun 2019.

2017 ***MURPHYS-HSFS 2017 – Summer School on Multi-Rate Processes, Slow-Fast Systems and Hysteresis***, Politecnico di Torino, Torino, Italy, 19 – 23 Jun 2017.

Non-scientific talks

Workshop ***How to write a competitive proposal for the MSCA Postdoctoral Fellowships 2023 call***, online event hosted by the Technology Centre Prague, 14 Jun 2023.
Online invited talk: "MSCA grant holder (success story) – motivation, tips and recommendations".

Publications

Papers in peer-reviewed scientific journals

18. C. Gavioli, L. Happ, V. Pagliari. On the existence of extensions for manifold-valued Sobolev maps on perforated domains. *J. Funct. Anal.* (2025). DOI: 10.1016/j.jfa.2025.111142
17. J. Runcziková, J. Chleboun, C. Gavioli, P. Krejčí. Some remarks on a mathematical model for water flow in porous media with competition between transport and diffusion. *Acta Polytech.* 65(3) (2025), 341–348. DOI: 10.14311/AP.2025.65.0341
16. C. Gavioli, P. Krejčí. Diffusion in porous media with hysteresis and bounded speed of propagation. *Z. Angew. Math. Phys.* 76 (2025), 118. DOI: 10.1007/s00033-025-02492-z
15. C. Gavioli, P. Krejčí. Deformable porous media with degenerate hysteresis in gravity field. *Math. Eng.* 7(1) (2025), 35–60. DOI: 10.3934/mine.2025003
14. C. Gavioli, P. Krejčí. Degenerate diffusion in porous media with hysteresis-dependent permeability. *Discrete Contin. Dyn. Syst.* 45(5) (2025), 1523–1542. DOI: 10.3934/dcds.2024137
13. E. Davoli, C. Gavioli, V. Pagliari. Homogenization of high-contrast media in finite-strain elasto-plasticity. *Nonlinear Anal. Real World Appl.* 81 (2025), 104198. DOI: 10.1016/j.nonrwa.2024.104198
12. E. Davoli, C. Gavioli, L. Lombardini. Existence results for Cahn-Hilliard-type systems driven by nonlocal integrodifferential operators with singular kernels. *Nonlinear Anal.* 248 (2024), 113623. DOI: 10.1016/j.na.2024.113623
11. C. Gavioli, P. Krejčí. Long-time behaviour of a porous medium model with degenerate hysteresis. *Philos. Trans. Royal Soc. A* 382 (2024), 20230299. DOI: 10.1098/rsta.2023.0299
10. E. Davoli, C. Gavioli, V. Pagliari. A homogenization result in finite plasticity. *Calc. Var. Partial Differential Equations* 63 (2024), 72. DOI: 10.1007/s00526-024-02673-0

9. C. Gavioli, P. Krejčí. Degenerate diffusion with Preisach hysteresis. *Discrete Contin. Dyn. Syst. Ser. S* 16(12) (2023), 3677–3708. DOI: 10.3934/dcdss.2023154
8. C. Gavioli, P. Krejčí. Phase transitions in porous media. *Nonlinear Differ. Equ. Appl.* 29 (2022), 72. DOI: 10.1007/s00030-022-00805-z
7. B. Detmann, C. Gavioli, P. Krejčí, J. Lamač, Y. Namlyeyeva. A model for lime consolidation of porous solids. *Nonlinear Anal. Real World Appl.* 65 (2022), 103483. DOI: 10.1016/j.nonrwa.2021.103483
6. C. Gavioli, P. Krejčí. Control and controllability of PDEs with hysteresis. *Appl. Math. Optim.* 84 (2021), 829–847. DOI: 10.1007/s00245-020-09663-6
5. C. Gavioli, P. Krejčí. On a viscoelastoplastic porous medium problem with nonlinear interaction. *SIAM J. Math. Anal.* 53(1) (2021), 1191–1213. DOI: 10.1137/20M1340617
4. C. Gavioli. Higher differentiability for a class of obstacle problems with nearly linear growth conditions. *Atti Accad. Naz. Lincei Rend. Lincei Mat. Appl.* 31(4) (2020), 767–789. DOI: 10.4171/RLM/914
3. M. Eleuteri, C. Gavioli, J. Kopfová. Fatigue and phase transition in an oscillating elastoplastic beam. *Math. Model. Nat. Phenom.* 15 (2020), 41. DOI: 10.1051/mmnp/2019052
2. C. Gavioli. A priori estimates for solutions to a class of obstacle problems under p, q-growth conditions. *J. Elliptic Parabol. Equ.* 5(2) (2019), 325–347. DOI: 10.1007/s41808-019-00043-y
1. C. Gavioli. Higher differentiability of solutions to a class of obstacle problems under non-standard growth conditions. *Forum Math.* 31(6) (2019), 1501–1516. DOI: 10.1515/forum-2019-0148

Peer-reviewed conference papers

1. C. Gavioli, P. Krejčí. On the null-controllability of the heat equation with hysteresis in phase transition modeling. In: Korobeinikov A., Caubergh M., Lázaro T., Sardanyés J. (Eds.) *Extended Abstracts Spring 2018*. Trends in Mathematics, vol 11. Birkhäuser, Cham (2019), 63–71. DOI: 10.1007/978-3-030-25261-8_10

Other activities

Editorial activity

- Editorial Board member for the *13th International Symposium on Hysteresis Modelling and Micromagnetics (HMM 2023)*, TU Wien, Vienna, Austria, 5 – 7 Jun 2023.

Peer-reviewer activity

Referee for: Acta Polytechnica, Applied Mathematics and Optimization, Asymptotic Analysis, Journal of Mathematical Sciences, Physica B: Condensed Matter.

Reviewer for Mathematical Reviews since 2020.

Scientific associations

since Jul 2024 Member of MCAA (Marie Curie Alumni Association).

since Jan 2023 Member of ISIMM (International Society for the Interaction of Mechanics and Mathematics).

since Jan 2018 Member of the Research Group GNAMPA (Gruppo Nazionale per l'Analisi Matematica, la Probabilità e le loro Applicazioni) of INdAM.

Teaching

Exercise classes

Fall 2020 **Analisi Matematica**, degree program in Computer Science, University of Modena and Reggio Emilia.

Spring 2020 **Analisi Matematica A II**, degree programs in Mathematics and Physics, University of Modena and Reggio Emilia.

Fall 2019 **Analisi Matematica A I**, degree programs in Mathematics and Physics, University of Modena and Reggio Emilia.

Analisi Matematica, degree program in Computer Science, University of Modena and Reggio Emilia.

Spring 2019 **Analisi Matematica A II**, degree programs in Mathematics and Physics, University of Modena and Reggio Emilia.

Other tutoring activities

Fall 2019 **Project *Competenze Trasversali – Didattica per competenze***, University of Modena and Reggio Emilia, number of hours: 32.
Experimental tutoring for the course "Analisi Matematica" for the program course in Computer Science, with the aim of developing soft skills like problem solving and team working.

A. Y. 2017/2018 **Project *Piano Lauree Scientifiche***, University of Modena and Reggio Emilia, number of hours: 50.
Individual support to first-year students in the degree program in Mathematics with the aim of overcoming any disciplinary deficiencies or difficulties in studying.

Personal skills

Language skills

- **Italian**: Native speaker.
- **English**: Fluent. Certification: *Cambridge ESOL Level 2 Certificate in ESOL International (Council of Europe Level C1)*, May 2011.
- **French**: Intermediate. 24-hour course of level B1 at CLA (Centro Linguistico di Ateneo) UniMORE, Jan – Feb 2018.
- **German**: Intermediate.
- **Czech**: Beginner.

Prague, July 29, 2025