

PERSONAL INFORMATION **Giovanni Bellettini**

WORK EXPERIENCE

February 2017 – Present **Full Professor of Mathematical Analysis**

University of Siena, Dipartimento di Ingegneria dell'Informazione e Scienze Matematiche, Università degli Studi di Siena, via Roma 56, 53100 Siena, Italy. E-mail: giovanni.bellettini@unisi.it

November 2001 – January 2017 **Full Professor of Mathematical Analysis**

Università degli Studi di Roma "Tor Vergata", Roma, Italy

November 1998 – October 2001 **Associate Professor of Mathematical Analysis**

Università degli Studi di Roma "Tor Vergata", Roma, Italy

November 1994 – October 1998 **Researcher of Mathematical Analysis**

Università degli Studi di Pisa, Italy

July 1991 – October 1994 **Researcher of Mathematical Analysis**

Università degli Studi di Bologna, Italy

2011 – **ICTP consultant of Mathematical Analysis**2010 – **INFN-LNF associate**2017 – **Member of the collegio dei docenti of the PhD school in Information Engineering and Science, Univ. of Siena**1999 – **Scientific secretary for Ann. Sc. Norm. Sup. Pisa Cl. Sci.**

EDUCATION AND TRAINING

November 1989–October 1993 **Ph.D. in Functional Analysis and Applications**

SISSA-ISAS, International School for Advanced Studies, Trieste

Thesis: "Geometric problems involving curvatures in the Calculus of Variations"

Supervisor: Gianni Dal Maso

November 1982–November 1988 **Degree in Mathematics**

Università di Pisa, Pisa, Italy

Thesis: "Problemi di tipo geometrico nel Calcolo delle Variazioni". Grade: 110/110 cum laude

Advisor: Luciano Modica

1986 **Maturità Scientifica (60/60)**

Liceo Scientifico "Ulisse Dini", Pisa, Italy

PERSONAL SKILLS

Mother tongue Italian

Other languages English (fluent), French (basic), Spanish (beginner), German (beginner).

- Programming Languages** – Basic programming skills in \LaTeX .
 – Rudimental programming skills in C.

TEACHING EXPERIENCE

Teaching activity:

- 1998-2017: lecturer of the course Analysis I (90 hours approximately), or Analysis II (90 hours approximately) for Engineering students, each year, at the University of Roma “Tor Vergata”. Participation to all exam sessions (6 per year).
- 2017-: lecturer of the course Analysis I (90 hours) for Mathematics, Physics, and Engineering students, each year, at the University of Siena. Participation to all exam sessions (6 per year).
- 2017-: lecturer of the course Advanced Analysis (48 hours) for Mathematics students, each year, at the Master Degree in Applied Mathematics, at the University of Siena. Participation to all exam sessions (6 per year).

Advanced minicourses:

- *Some aspects of motion by mean curvature I, II, III, IV*, Crete (Greece), 1998.
- *Geometric Evolution Problems*, Minicorsi di Analisi Matematica, Padova 2003.
- *Anisotropic and crystalline mean curvature flow*, Rome 2004.
- *Variational principles for geometric evolutions I, II*, KTH, Stockholm (Sweden), 2007.
- *An introduction to mean curvature flow I, II, III, IV*, University of Castilla La Mancha (Spain), 2008.
- *An introduction to mean curvature flow*, University of Trieste (Italy), 2009.
- *Soluzioni deboli del flusso per curvatura media: barriere minime*, SISSA (Trieste), Italy, 2009.
- *An introduction to mean curvature flow I, II, III, IV*, Centro De Giorgi, Scuola Normale Superiore di Pisa, Pisa 2009.
- *An introduction to anisotropic and crystalline mean curvature flow I, II, III, IV: tutorial course*, Hokkaido University, Hokkaido, Sapporo (Japan), 2010.
- *Mean curvature flow and singular perturbations I, II, III*, in Winter School on “Geometric Evolution Equations and Related Topics”, Regensburg, October 8-10, 2012.

Ph.D. courses:

- *Geometric evolutions of manifolds, motion by mean curvature*, Pisa 1998.
- *Partial Differential Equations*, Rome 1999.
- *Calculus of Variation in one dimension: classical theory*, Rome 2000.
- *Motion by mean curvature*, Rome 2000.
- *Geometric Measure Theory*, Rome 2001.
- *Calculus of Variations*, Rome 2002.
- *Minimizing movements*, Rome 2003.
- *Una introduzione alle equazioni differenziali*, INDAM, Rome 2005.
- *Anisotropic evolution problems*, Rome 2006.
- *Mean curvature flow and singular perturbations*, SISSA (Trieste), 2012.
- *Variational models depending on curvatures in image reconstruction*, SISSA (Trieste), 2013.
- *Anisotropic and crystalline mean curvature flow*, SISSA (Trieste), 2014.
- *The Plateau problem and related questions*, SISSA (Trieste), 2015.
- *The Plateau problem and related questions*, SISSA (Trieste), 2016.
- *Some results on Plateau’s type problem*, SISSA (Trieste), 2017.
- *An Introduction to Functional Analysis*, Dip. di Ingegneria dell’Informazione e Scienze Matematiche, Siena, 2017.
- *The Plateau problem and related questions*, SISSA (Trieste), 2018.
- *An Introduction to Partial Differential Equations*, Dip. di Ingegneria dell’Informazione e Scienze Matematiche, Siena, 2018.
- *Some aspects of mean curvature flow*, SISSA (Trieste), 2019.
- *Some aspects of mean curvature flow*, SISSA (Trieste), 2021.
- *Some aspects of mean curvature flow*, SISSA (Trieste), 2023.
- *Some aspects of mean curvature flow and minimal surfaces*, SISSA (Trieste), 2024.

Diploma courses at ICTP:

Functional Analysis and/or Partial Differential Equations: 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024.

SUPERVISING ACTIVITY

Supervision of Bachelor degree students

- Rossi R.: *A variational model for cracking in one-dimensional elasticity* (Univ. Roma "Tor Vergata" 2004).
- Doronzo M.: *Applications of Feynman-Kac formulas* (Univ. Roma "Tor Vergata" 2005).
- Palandra A.: *Probability and finance* (Univ. Roma "Tor Vergata" 2006).
- Biasutto S.A.: *Some economics applications of Calculus of Variations in one dimension* (Univ. Roma "Tor Vergata" 2007).
- Gagliardi, D.: *Equazioni di Hamilton-Jacobi e applicazioni* (Univ. Roma "Tor Vergata" 2008).
- De Angelis, F.: *Un approccio variazionale per l'evoluzione di fratture* (Univ. Roma "Tor Vergata" 2017).
- N. Mazur: *Sulla chiusura debole di alcuni spazi di funzionali su funzioni continue tramite delle di Dirac* (Univ. Siena 2019).

Supervision of Master degree students

- Masala M.: *Sulla funzione distanza al quadrato da una varietà* (Univ. Roma "Tor Vergata" 2004).
- Caselli F.: *Γ -convergence and the least squares method: applications to differential equations* (Univ. Roma "Tor Vergata" 2008).
- V. Galeotti: *Studio del rilassato di alcuni funzionali dipendenti dalla curvatura del bordo di sottoinsiemi del piano* (Univ. Siena 2021).
- V. Lorenzini: *Equazioni ellittiche* (Univ. Siena 2021).
- R. Yammine, *Curve shortening flow* (Univ. Siena 2022).

Degree students in collaboration with INFN-LNF:

Bosco A. (2005), Senatore M. (2007), Paoli D. (2007), Gentile, S. (2008), Palandra, L. (2013), Piergentili, F. (2013), Marra, M. (2013), Capotorto, G. (2013).

Supervision of ICTP Diploma students

- Nguyen Thuong Ngoc Quoc: *Reaction-diffusion approximations of mean curvature flow*, 2011.
- Yaptieu Djengue O.S. : *On some properties of mean curvature flow with forcing and a pressure term*, 2011.
- Ngouanfou Fopa E.L. : *Introduction to mathematical optimal control theory*, 2012.
- Gueye Dabakh A.A. : *Some topics on ordinary differential equations in mechanics and geometry*, 2012.
- Khosravi M. : *Minimizing movements for differential equations*, 2012.
- Issa Tahir Bachar: *A recent variational approach to semilinear wave equations*, 2012.
- Batzorig U. : *Spectrum of bounded linear operators*, 2013.
- Ngartelbaye G. : *Elliptic-type regularization for semilinear wave equations*, 2013.
- Ikromova D. : *The Dirichlet problem for Laplace and second elliptic operators: existence*, 2014.
- Alsammani A. : *The Alexander polynomial of a knot*, 2014.
- Aryam F. : *Some notes on the Navier-Stokes equations*, 2014.
- Khachatryan M. : *The Brownian motion*, 2015.
- Abdulrashid I. : *The GN Theorem*, 2015.
- Yousfi N. : *Some classical results in Calculus of Variations in dimension one*, 2016.
- Martinez Marquez R. : *Some classical results on convex functions*, 2017.
- Wahid Ullah: *Some topics on C^* -algebras*, 2018.
- Nguyen Anh Hung: *Knots and graphs*, 2018.
- Alain Didier Noutchequeme, *Disk-type minimal surfaces: the Plateau problem and another proof of the Riemann mapping theorem*, 2020.
- Toshpulatov Gayrat, *Some results on regularity of elliptic partial differential equations and systems*, 2020.

Supervision of PhD students

- L. Mugnai: *Relaxation and variational approximation of curvature-dependent functionals in two dimensions*, Univ. of Pisa, 2003.
- G. Riey: *Partition energies: approximation and first variation*, Univ. of Roma “Tor Vergata”, 2004.
- M. Chermisi: *Crystalline flows of planar networks and a geometric approach for systems of PDEs*, Univ. of Roma “Tor Vergata”, 2006.
- C. Tornese: *Convergence of discrete schemes for the Perona-Malik equation*, Univ. of Roma “Tor Vergata”, 2008.
- L. Tealdi: *The relaxed area of maps from the plane to the plane with a line discontinuity, and the role of semicartesian surface*, SISSA (Trieste), 2015.
- S. Amato: *Some results on anisotropic mean curvature and other phase transition problems for Plateau’s type problem*, SISSA (Trieste), 2015.
- S. Holmatov: *Minimizing movements for mean curvature evolution of droplets and partitions*, SISSA (Trieste), 2017.
- A.A. Elshorbagy: *On the relaxed area of maps from the plane to the plane taking three values*, SISSA (Trieste), 2019.
- S. Carano: *Area functional and relaxation: an approach in dimension 2 and codimension 2 via strict BV-convergence*, SISSA (Trieste), 2023.
- Actual co-advisor of V. Lorenzini (Univ. of Siena).

COORDINATOR OF RESEARCH GROUPS AND ORGANIZING ACTIVITY**Coordinator of research groups:**

- Italian coordinator of the bilateral project "Calculus of Variations: semicontinuity, relaxation, optimal design and approximation", Italia-Spagna, 1996.
- Coordinator of the Gnampa project entitled "Energie anisotrope, policristalline e di partizioni, e loro evoluzione secondo la massima discesa", Rome 2003.
- Coordinator of the Gnampa project entitled "Evoluzioni di interfacce e loro regolarizzazione mediante equazioni del quarto ordine", Rome 2004.
- Coordinator of a research group (2004 - 2015) at the Centro De Giorgi (Scuola Normale Superiore, Pisa) on the subject "Interface Evolutions". Other components: V. Caselles (Barcellona) (up to 2013), A. Chambolle (Ecole Polytechnique, Paris), and M. Novaga (Pisa).

Organization of conferences and workshops:

- Organizer of the workshop "Variational Problems with Free Interfaces", Pisa, 1997.
- Organizer of the workshop "Interface Evolutions and Applications", Centro De Giorgi, Scuola Normale Superiore, Pisa, 2004.
- Organizer of the workshop "Gradient flows of nonconvex functionals and related topics", Centro De Giorgi, Scuola Normale Superiore, Pisa, 2005.
- Organizer of the "Second School on Analysis and Applied Mathematics", Univ. Roma La Sapienza, 2005.
- Organizer of the "One day workshop on geometric evolution problems", Centro De Giorgi, Scuola Normale Superiore, Pisa, 2005.
- Organizer of the workshop "Recent advances on the Perona-Malik equation", Centro De Giorgi, Scuola Normale Superiore, Pisa, 2006.
- Organizer of the workshop "Geometric Evolutions and Applications", Centro De Giorgi, Scuola Normale Superiore, Pisa, 2006.
- Member of the Organizing Committee of the workshop on "Nonlocal and abstract parabolic equations and their applications" Bedlewo (Poland), Banach Center, Polish Academy of Science, 2007.
- Organizer of the workshop "Geometric Evolutions and Minimal Surfaces in Lorentzian Manifolds", Centro De Giorgi, Scuola Normale Superiore, Pisa, 2010. September 7-10, 2010.
- Co-organizer of the focus session "Singular Geometric Evolutions of Free Boundaries", at the Free Boundary Problem 2012 Conference, June 11-15 Chiemsee, Germany.
- Co-director of the School on Extrinsic mean curvature flow, ICTP Trieste, June 4-15, 2018.
- Co-organizer of the minisymposium "Nonlocal minimal surfaces and related equations" Krakow September 16, Krakow, at the DEA conference 2019, Krakow.
- Co-organizer of the workshop "Incontri di Analisi Matematica tra Firenze, Pisa e Siena", Florence May 17, 2019, Pisa November 2020, online June 4, 2021, Florence December 6, 2023.
- Co-organizer of the workshop "Free Boundary Problems and related Evolution Equations", ESI Vienna (Austria), February 21-25, 2022.
- Co-organizer of the workshop "Calculus of Variations in Siena", Univ. of Siena (Italy), January 31-February 2, 2024.

VISITING PROFESSOR

University of Maryland (United States), University of Montpellier II (France), Newton Institute (University of Cambridge, United Kingdom), University of Basel (Switzerland), University of Ciudad Real (Spain), University of Toulon-Du Var (France), Max Planck Institute in the Sciences (Leipzig, Germany), Max Planck Institute for Gravitational Physics (Golm, Germany), Hausdorff Center (University of Bonn, Germany), University Pompeu Fabra (Barcelona, Spain), Stockholm, KTH (Sweden), Newton Institute (Cambridge, UK), NYUAD Abu Dhabi, Emirates, Wien University (Austria).

EDITORIAL ACTIVITY**Associate Editor:**

Interfaces and Free Boundaries (European Mathematical Society), 2013-;
Geometric Flows (De Gruyter), 2014-2020;
Rendiconti dell'Istituto di Matematica dell'Università di Trieste, 2021-.

REVIEW ACTIVITY

Referee for the following journals:

Adv. Calc. Var., Ann. Inst. H. Poincaré Anal. Non Lin., Annali Mat. Pura Appl., Annali Sc. Norm. Sup. Pisa, Arch. Ration. Mech. Anal., Atti Accad. dei Lincei, Bull. London Math. Soc., Calc. Var. Partial Differential Equations, Comm. Cont. Math., Comm. Math. Phys., Comm. Partial Differential Equations, Comm. Pure Appl. Anal., Discrete Cont. Dyn. Systems, Electronic J. Differential Equations, Esaim: Control, Opt. and Calc. Var., Interfaces Free Bound., J. Comp. Phys., J. Control, Opt. Calculus of Variations, J. Convex Anal., J. Differential Equations, J. Differential Geom., J. Evolution Equations, J. Geom. Anal., J. Reine Angew. Math., Manuscripta Math., Math. Ann., Math. Meth. Appl. Sci., Meth. Appl. Anal., Pacific J. Math., Phys. A, Rendiconti Mat. Appl., Rendiconti Univ. Padova, Revista Mat. Iberoamericana, Siam J. Imaging Sci., Siam J. Math. Anal., Transactions Amer. Math. Soc.

Member and referee of evaluating Committees

- 2003: referee for the Swedish Research Council.
- 2004: referee for the award of a Senior Fellowship of the Croucher Foundation (Hong Kong).
- 2007: member of a Committee for a full professorship position in Italy.
- 2008: referee for a Ph.D. thesis at the Univ. de Bretagne Occidentale (France).
- 2009: member of the Committee for the evaluation of a Ph.D. Thesis at the Lab. J. Kuntzmann, Mathématiques Appliquées-Informatique, Univ. de Grenoble (France).
- 2010: member of a Committee for a full professorship position in Italy.
- 2011: member of a Committee for an associate professorship at Georgetown University (Usa).
- 2011: member of a Committee for confirmation of associate professorships in Italy.
- 2011: member of the Committee for assigning the positions for the Laurea Magistrale at SISSA/ISAS (Trieste).
- 2011: referee for a Ph.D. Thesis at the Université Pierre et Marie Curie, Paris.
- 2012 Peer referee VQR for the evaluation of research programs 2004-2010.
- 2014: member of a Committee for confirmation of associate professorships in Italy.
- 2014 External member of the Committee for the Doctoral School in Applied Mathematics at the International School for Advanced Studies SISSA-ISAS, Trieste.
- 2014: member of the Committee for the Laurea Magistrale at SISSA/ISAS (Trieste).
- 2014: referee for a Ph.D. thesis at the Univ. de la Lorraine (France).
- 2015: referee for a professorship position W2 at the University of Hamburg (Germany).
- 2015: referee for a PhD thesis at the University of Ulm (Germany).
- 2016: referee for evaluation of two research projects for FWF Der Wissenschaftsfonds (Austria).
- 2016: member of a PhD Committee at the University of Pisa.
- 2016: referee for a W1 position at the University of Münster (Germany).
- 2017: referee for a Ph.D. thesis at the Univ. of Ulm (Germany).
- 2018: referee for a research proposal submitted to the National Science Centre Narodowe Centrum Nauki, Poland.
- 2018: evaluator for a full professorship at the National Taiwan Normal University.
- 2019: referee for a short-term application to the ESI (Wien).
- 2019: member of a PhD Committee in Pisa.
- 2019: member of a Committee for an RTDB position at the University of Siena.
- 2020: referee for a PhD thesis at the University of Regensburg (Germany).
- 2020: referee of a PhD thesis at the University of Pisa
- 2021: reviewer for a Personal Research Grant, for the Israel Science Foundation (Israel).
- 2021: member of a Committee for an RTDA position at the University of Verona.
- 2021: member of a Committee for an RTDB position at the University of Pisa.
- 2022: member of a Committee for an RTDB position at the University of Siena.
- 2022: reviewer for FWF Der Wissenschaftsfonds (Austria)
- 2022: reviewer for Deutsche Forschungsgemeinschaft (German Research Foundation)
- 2022 External member of the Committee for two PhDs defences, at the International School of Advanced Studies SISSA-ISAS, Trieste.
- 2023: reviewer for Deutsche Forschungsgemeinschaft (German Research Foundation)
- 2023: member of a Committee for the Phd defence at the International School of Advanced Studies SISSA-ISAS, Trieste.
- 2023: member of a PhD Committee at the Politecnico di Torino.
- 2016: referee for evaluation of a research project for FWF Der Wissenschaftsfonds (Austria).
- 2024: referee and member of a PhD Committee at the University of Pisa.
- 2024: member of a Committee for an associate professorship position at the University of Siena (Italy).

PRINCIPAL SEMINARS GIVEN

Seminars held at universities and research centers abroad

Newton Institute, Cambridge (1995), University of Montpellier II (1996), University of Basel (1997), Institute Henry Poincaré, Centre Emile Borel, Paris (1998), Ecole Polytechnique Federale de Lausanne (2003), Max Planck Institute in the Sciences, ETH Zürich (2004), Leipzig (2005), Max Planck Institute for Gravitational Physics, Golm (2006), University of Zürich (2007), University of Freiburg (2008), Hausdorff Center, University of Bonn (2008), Max Planck Institute in the Sciences, Leipzig (2010), Ecole Polytechnique, Paris (2012), Dortmund TU (2014), NYUAD Abu Dhabi (2015), University of Wien, Austria (2018), Univ. of Lisbon, WADE seminar 18 november 2021 (online), Univ. of Athens (2021).

Seminars held at universities and research centers in Italy

University of Trento (1989, 1995, 2002, 2006), University of Milano (1993, 1997), University of Roma "Tor Vergata" (1994, 1997, 1999), University of Roma "La Sapienza" (1994, 1999, 2002, 2005, 2015, 2019), University of Firenze (1996, 2018), University of l'Aquila (1996, 1997, 2004, 2007), Istituto per le Applicazioni del Calcolo, Roma (1999), University of Napoli (2000, 2016), University of Padova (2002), University of Bologna (2003), University of Pisa (2006), University of Trieste (2009, 2020), University of Pavia (2009), University of Udine (2009), University of Brescia La Cattolica (2010, 2016), ICTP Trieste (2011, 2018, 2020), SISSA Trieste (2014), University of Bologna (2015), University of Napoli (2015), University of Trieste (2015), Collegio Fonda Trieste (2016), Bressanone, Geometric Measure Theory (2023).

CONFERENCES AND WORKSHOPS

Invited speaker at international conferences

Pont á Mousson, Metz (1991, 1994), Oberwolfach (1994, 1998, 2000, 2001, 2004(2), 2006, 2007(2), 2008, 2010, 2011 (2), 2013), (2014), (2015), (2018), Berlin (1996), Freiburg (1998), Barcellona (2000), Paris (2000), Debrecen (2003), Edinburgh (2005), Lyon (2005), Roscoff (2007), Bedlewo (2007), Zürich (2007), Hausdorff Center, Bonn (2008), Max Planck Institute, Leipzig (2008), Carnegie Mellon Univ., Pittsburgh PA, USA (2009), Poros, Greece (2009), Max Planck Institute Golm, Germany (2009), Paris XI (2010), Dortmund, Germany (2011), Tuebingen, Germany (2011), Banach Center, Warsaw, Poland (2012), Chiemsee, Germany (2012), Athens, Greece (2012), ICTP (2013), Madrid (2013), Paris (IHP, 2014), Frankfurt (2015), Univ. of Sussex (UK, 2015), KTH (Stockholm, 2016), Lyon (France, 2016) Salzburg (Austria, 2016), Freiburg (Germany, 2016), Hamburg (Germany, 2018), Krakow (Poland, 2019), ESI (Wien, Austria, 2019), Steklov Institute, Moscow (2020), SIAM Conference of Mathematical Aspects of Material Science, Bilbao, online (2021), SIAM Conference Analysis PDEs (2022).

Invited speaker at conferences in Italy

Trento (1990, 1991, 1992, 1993, 1994, 1996, 1999), Catania (1991), Padova (1992, 1995), Perugia (1993), Bologna (1994), Firenze (1994), Montecatini Terme (1995), Pavia (1996), Pisa (1996, 2002, 2019 (twice), 2021), Cortona (1997, 1998, 2000), Capri (1997), Scuola Normale Superiore, Pisa (1997, 2001, 2003, 2006(2), 2008, 2009, 2010, 2012, 2017 (Centro De Giorgi)), Isola d'Elba (1997), Roma (1999, 2000, 2003, 2006, 2010 (Indam)), Levico Terme (2000, 2003, 2004, 2006, 2008, 2009, 2011, 2013, 2018), Ischia (2000), L'Aquila (2002), Lecce (2003, 2004), SISSA, Trieste (2008), Vulcano (2012).

RESEARCH INTERESTS

- Geometric evolution equations. Mean curvature flow. Barriers, minimizing movements, higher order approximations. Anisotropic and crystalline mean curvature flow. The total variation flow and variants. Evolution of partitions. The book by G. Bellettini: *Lecture Notes on Mean Curvature flow, Barriers and Singular Perturbations, Scuola Normale Superiore, Pisa 2013*, pp. xviii-325 (see the list of publications), is an introduction to the evolution of a hypersurface by its mean curvature. The aim of the book is to give an introduction to mean curvature flow using, as much as possible, a parametrization free approach. Some relevant aspects of mean flow are described, such as the role of the signed distance function and the comparison principle, and their use in the theory of barriers. Some examples of singularities are discussed. In the last chapters, also making use of a formal asymptotic inner and outer expansion, the convergence of the parabolic Allen-Cahn's equation to mean curvature flow for sufficiently short times is proven, together with an error estimate.

- Calculus of variations. Minimal surfaces, surfaces with prescribed mean curvature and their variational and numerical approximations. Relaxation (in various topologies) of the area functional for graphs in dimension two and codimension two, and connection with the Plateau's problem. Covering spaces and Plateau's problem. Higher order problems, the elastica functional. Phase transitions and Γ -convergence. Non local functionals. Applications to Image Segmentation.

- Backward-forward parabolic equations. Gradient flows of nonconvex functionals in dimension one. The Perona-Malik equation. Weak solutions, fourth-order approximations, discretizations. The bidomain model.

- Nonlinear hyperbolic equations. Scalar conservation laws. The nonlinear wave equation of Ginzburg-Landau type. Classical relativistic strings.

- Numerical Analysis. Finite differences and finite elements approximations of parabolic partial differential equations. Discrete Γ -convergence.

- Image Segmentation and invariants of surfaces embedded in three-dimensional space. Reconstruction of three-dimensional shapes from apparent contours; topological and variational problems in computer vision. Apparent contours and their invariants. The book by G. Bellettini, V. Beorchia, M. Paolini, F. Pasquarelli, *Shape Reconstruction from Apparent Contours. Theory and Algorithms, Computational Imaging and Vision*, Springer 2015 (see the list of publications), is concerned with the problem of reconstructing a (not necessarily connected) shape starting from information on its apparent contour. Starting from a variational model concerning the depth of the objects in a picture and the problem of hidden and illusory contours, we investigate one of the central problems of computer vision: the topological and algorithmic reconstruction of a smooth three dimensional scene starting from the visible part of an apparent contour. We focus our attention on the manipulation of apparent contours using a finite set of elementary moves, corresponding to diffeomorphic deformations of three dimensional scenes. The book is intended also as a user's guide to the software code `appcontour`, written for the manipulation of apparent contours and their invariants.

- Mathematical aspects of Statistical Mechanics. Nonlocal functionals in phase transitions.

- Miscellanea. Regularization of the two-body problem, systems of PDEs, general relativity, transport equations as limits of discrete games.

BOOKS

1. G. Bellettini: Lecture Notes on Mean Curvature flow, Barriers and Singular Perturbations, *Scuola Normale Superiore, Pisa* (Nuova Serie) 12. Pisa: Edizioni della Normale. pp. xviii-325, (2013). ISBN 978-88-7642-428-1/pbk; ISBN 978-88-7642-429-8/ebook DOI 10.1007/978-88-7642-429-8
2. G. Bellettini, V. Beorchia, M. Paolini, F. Pasquarelli: Shape Reconstruction from Apparent Contours. Theory and Algorithms, *Computational Imaging and Vision, Springer-Verlag*, pp. iii-333, 2015. ISBN 978-3-662-45190-8

In preparation:

3. G. Bellettini, S. Kholmatov: Minimizing Movements for Mean Curvature Flow, De Gruyter, in preparation.

PUBLICATIONS

On Mathscinet, 24/7/2024: 134 documents, 1986 citations in 1232 documents
On Scopus, 28/7/2024: 113 documents, 2084 citations, h index 25

ARTICLES IN SCIENTIFIC JOURNALS

- [1] G. Bellettini: An almost everywhere regularity result for minimal partitions, *Boll. Un. Mat. Ital. B (7)*, **4A** (1990), 57–63.
- [2] G. Bellettini: A numerical approach to a minimum problem with applications in image segmentations, *Ann. Univ. Ferrara XXXVI* (1990), 99–111.
- [3] G. Bellettini, M. Paolini, C. Verdi: Γ -convergence of discrete approximations to interfaces with prescribed mean curvature, *Atti Accad. Naz. Lincei Cl. Sci. Fis. Mat. Natur. Rend. (9) Mat. Appl.* **1** (1990), 317–328.
- [4] G. Bellettini, M. Paolini, C. Verdi: Numerical minimization of geometrical type problems related to calculus of variations, *Calcolo* **27** (1990), 251–278.
- [5] S. Baldo, G. Bellettini: Γ -convergence and numerical analysis: an application to the minimal partitions problem, *Ricerche Mat.* **XL** (1991), 33–64.
- [6] G. Bellettini, M. Paolini, C. Verdi: Convex approximations of functionals with curvature, *Atti Accad. Naz. Lincei Cl. Sci. Fis. Mat. Natur. Rend. (9) Mat. Appl.* **2** (1991), 297–306.
- [7] G. Bellettini, G. Dal Maso, M. Paolini: Semicontinuity and relaxation properties of a curvature depending functional in 2D, *Ann. Scuola Norm. Sup. Pisa Cl. Sci. (4)* **20** (1993), 247–297.
- [8] G. Bellettini, M. Paolini: Two examples of fattening for the curvature flow with a driving force, *Atti Accad. Naz. Lincei Cl. Sci. Fis. Mat. Natur. Rend. (9) Mat. Appl.* **5** (1994), 229–236.
- [9] G. Bellettini, A. Coscia: Discrete approximation of a free discontinuity problem, *Num. Funct. An. Opt* **3,4** (1994), 202–224.
- [10] G. Bellettini, M. Paolini: Convex approximations of an inhomogeneous anisotropic functional. *Atti Accad. Naz. Lincei Cl. Sci. Fis. Mat. Natur. Rend. (9) Mat. Appl.*, **5** (1994), 177–188.
- [11] G. Bellettini, A. Coscia: Approximation of a functional depending on jumps and corners, *Boll. Un. Mat. Ital. (7) B*, **(7)** (1994), 151–181.
- [12] M. Amar, G. Bellettini: A notion of total variation depending on a metric with discontinuous coefficients, *Ann. Inst. H. Poincaré Anal. Non Linéaire* **11** (1994), 91–133.
- [13] G. Bellettini, M. Paolini: Variational properties of an image segmentation functional depending on contours curvature, *Adv. Math. Sci. Appl.* **5** (1995), 681–715.
- [14] G. Bellettini, M. Paolini: Some results on minimal barriers in the sense of De Giorgi applied to driven motion by mean curvature. *Rend. Acc. Naz. Sci. XL Mem. Mat.*, **XIX** (1995), 43–67.
- [15] G. Bellettini, M. Paolini: Quasi-optimal error estimates for the mean curvature flow with a forcing term, *Differential Integral Equations* **8** (1995), 735–752.
- [16] M. Amar, G. Bellettini: Approximation by Γ -convergence of a total variation with discontinuous coefficients, *Asymptotic Anal.* **10** (1995), 225–243.
- [17] G. Bellettini, M. Paolini: Numerical simulations of measurements of capillary contact angles. *IMA J. Numer. Anal.* **16** (1996), 165–178.
- [18] G. Bellettini, M. Paolini, S. Venturini: Some results on surface measures in Calculus of Variations, *Ann. Mat. Pura Appl.* **CLXX** (1996), 329–359.
- [19] G. Bellettini, M. Paolini: Anisotropic motion by mean curvature in the context of Finsler geometry, *Hokkaido Math. J.* **25** (1996), 537–566.
- [20] G. Alberti, G. Bellettini, M. Cassandro, E. Presutti: Surface tension in Ising systems with Kac potentials. *J. Stat. Phys.* **82** (1996), 743–796.

- [21] G. Bellettini, M. Cassandro, E. Presutti: Constrained minima for non local functionals, *J. Stat. Phys.* **84** (1996), 1337–1349.
- [22] G. Bellettini: Variational approximation of functionals with curvatures and related properties. *J. Convex Anal.* **4** (1997), 91–108.
- [23] G. Bellettini: Alcuni risultati sulle minime barriere per movimenti geometrici di insiemi. *Boll. Un. Mat. Ital.* **7** (1997), 485–512.
- [24] G. Bellettini, P. Colli Franzone, M. Paolini: Convergence of front propagation for anisotropic bistable reaction-diffusion equations, *Asympt. Anal.* **15** (1997), 325–358.
- [25] G. Bellettini, M. Novaga: Minimal barriers for geometric evolutions, *J. Differential Equations* **139** (1997), 76–103.
- [26] M. Amar, G. Bellettini, S. Venturini: Integral representation of functionals defined on curves of $W^{1,p}$, *Proc. Roy. Soc. Edinburgh Sect. A*, **128** (1998), 193–217.
- [27] G. Bellettini, A. Coscia, G. Dal Maso: Compactness and lower semicontinuity properties in $SBD(\Omega)$, *Math. Z.* **228** (1998), 337–351.
- [28] G. Alberti, G. Bellettini: A non local anisotropic model for phase transitions. Part 1: the optimal profile problem, *Math. Ann.* **310** (1998), 527–560.
- [29] G. Bellettini, M. Novaga: Comparison results between minimal barriers and viscosity solutions for geometric evolutions, *Ann. Scuola Norm. Sup. Pisa Cl. Sci. (4)* **XXVI** (1998), 97–131.
- [30] G. Alberti, G. Bellettini: A nonlocal anisotropic model for phase transitions: asymptotic behaviour of rescaled energies, *European J. Appl. Math.* **9** (1998), 285–304.
- [31] G. Bellettini, M. Novaga, M. Paolini: An example of three-dimensional fattening for linked space curves evolving by curvature, *Comm. Partial Differential Equations* **23** (1998), 1475–1492.
- [32] G. Bellettini, G. Fusco: Some aspects of the dynamic of $V = H - \overline{H}$, *J. Differential Equations* **157** (1999), 106–146.
- [33] G. Bellettini, M. Novaga: A result on motion by mean curvature in arbitrary codimension, *Diff. Geom. Appl.* **11** (1999), 205–220.
- [34] G. Bellettini, M. Novaga, M. Paolini: Facet-breaking for three-dimensional crystals evolving by mean curvature, *Interfaces Free Bound.* **1** (1999), 39–55.
- [35] G. Bellettini, G. Bouchitté, I. Fragalà: BV functions with respect to a measure and relaxation of metric integral functionals, *J. Convex Anal.* **6** (1999), 349–366.
- [36] G. Bellettini, R. Gogione M. Novaga: Approximation to driven motion by crystalline curvature in two dimensions, *Adv. Math. Sci. Appl.* **10** (2000), 467–493.
- [37] G. Bellettini, M. Novaga: Approximation and comparison for non-smooth anisotropic motion by mean curvature in R^N , *Math. Models Methods Appl. Sci.* **10** (2000), 1–10.
- [38] G. Bellettini, I. Fragalà: Elliptic approximations to prescribed mean curvature surfaces in Finsler geometry, *Asymp. Anal.* **22** (2000), 87–111. v
- [39] G. Bellettini, M. Novaga, M. Paolini: On a crystalline variational problem, part I: first variation and global L^∞ -regularity, *Arch. Ration. Mech. Anal.* **157** (2001), 165–191.
- [40] G. Bellettini, M. Novaga, M. Paolini: On a crystalline variational problem, part II: BV-regularity and structure of minimizers on facets, *Arch. Ration. Mech. Anal.* **157** (2001), 193–217.
- [41] G. Bellettini, P. Buttà, E. Presutti: Sharp interface limits of non local anisotropic interactions, *Arch. Ration. Mech. Anal.* **159** (2001), 109–135.
- [42] G. Bellettini, G. Fusco: Stable dynamics of spikes in solutions to a system of reaction-diffusion equations, *Asymp. Anal.* **26** (2001), 307–357.
- [43] G. Bellettini, M. Novaga, M. Paolini: Characterization of facet-breaking for nonsmooth mean curvature flow in the convex case, *Interfaces Free Bound.* **3** (2001), 415–446.
- [44] G. Bellettini, V. Caselles, M. Novaga: The total variation flow in \mathbb{R}^n , *J. Differential Equations*, **184** (2002), 475–525.
- [45] G. Bellettini, M. Paolini: Errata corrige to the paper: Some results on minimal barriers in the sense of De Giorgi applied to driven motion by mean curvature, *Rend. Acc. Naz. Sci. XL Mem. Mat.*, **XXVI** (2002), 161–165.
- [46] G. Bellettini, G.F. Gronchi: Barriers for systems of ODEs: an application to the two-body problem, *Rend. Atti Acc. Naz. Sci. XL Mem. Mat.* **XXVI** (2002), 145–160.
- [47] G. Bellettini, G. Fusco: Stable dynamics of spikes in solutions to a system of reaction-diffusion equations, II, *Asymp. Anal.* **33** (2003), 9–50.
- [48] G. Bellettini, G. Fusco, G.F. Gronchi: Regularization of the two-body problem via smoothing the potential, *Commun. Pure Appl. Anal.* **2** (2003), 323–353.
- [49] G. Bellettini, M. Novaga, G. Riey: First variation of anisotropic energies and crystalline mean curvature for partitions, *Interfaces Free Bound.* **5** (2003), 331–356.
- [50] G. Bellettini, R. March: An image segmentation variational model with free discontinuities and contour curvature, *Math. Models Methods Appl. Sci.* **14** (2004), 1–45.
- [51] G. Bellettini, L. Mugnai: Characterization and representation of the lower semicontinuous envelope of the elastica functional, *Ann. Inst. H. Poincaré Anal. Non Linéaire* **21** (2004), 839–880.
- [52] G. Bellettini: Barriers, fattening and mean curvature flow, *Int. J. Math. Game Theory and Algebra* **14** (2004), 57–71.
- [53] G. Bellettini: On facets-breaking for crystalline mean curvature in 3D, *Periodica Mathematica Hungarica* **48** (2004), 185–206.
- [54] G. Bellettini, A. Braides, G. Riey: Variational approximation of anisotropic functionals on partitions, *Ann. Mat. Pura Appl.* **184** (2005), 75–93.
- [55] G. Bellettini, V. Caselles, M. Novaga: Explicit solutions of the eigenvalue problem $-\operatorname{div}(Du/|Du|) = u$, *SIAM J. Math. Anal.* **36** (2005), 1095–1129.

- [56] G. Bellettini, L. Mugnai: On the approximation of the elastica functional in radial symmetry, *Calc. Var. Partial Differential Equations*, **24**, (2005), 1–20.
- [57] G. Bellettini, A. De Masi, E. Presutti: Tunnelling for non local evolution equations, *J. Nonlinear Math. Phys.* **12** (2005), 50–63.
- [58] G. Bellettini, A. De Masi, E. Presutti: Energy levels of a non local evolution equations, *J. Math. Phys.* **46** (2005), 1–31.
- [59] G. Bellettini, V. Caselles, A. Chambolle, M. Novaga: Crystalline mean curvature flow of convex sets, *Arch. Ration. Mech. Anal.* **179** (2006), 109–152.
- [60] G. Bellettini, M. Novaga, E. Paolini: Global solutions to the gradient flow equation of a nonconvex functional, *SIAM J. Math. Anal.* **37** (2006), 1657–1687.
- [61] G. Bellettini, M.S. Gelli, S. Luckhaus, M. Novaga: Deterministic equivalent for the Allen-Cahn energy of a scaling law in the Ising model, *Calc. Var. Partial Differential Equations* **26** (2006), 429–445.
- [62] G. Bellettini, G. Fusco, N. Guglielmi: A concept of solution for forward-backward equations of the form $u_t = \frac{1}{2}(\phi'(u_x))_x$ and numerical experiments for the singular perturbation $u_t = -\epsilon^2 u_{xxxx} + \frac{1}{2}(\phi'(u_x))_x$, *Discrete Contin. Dyn. Syst. Ser. A* **16** (2006), 783–842.
- [63] G. Bellettini, B. Dacorogna, G. Fusco, F. Leonetti: Qualitative properties of Lipschitz solutions of eikonal type systems, *Adv. Math. Sci. Appl.* **16** (2006), 259–274.
- [64] G. Bellettini, M. Chermisi, M. Novaga: Crystalline curvature flow of planar networks, *Interfaces Free Bound.* **8** (2006), 481–521.
- [65] G. Bellettini, L. Mugnai: A varifolds representation result of the relaxed elastica functional, *J. Convex Anal.* **14** (2007), 543–564.
- [66] G. Bellettini, M. Masala, M. Novaga: On a conjecture of De Giorgi on the squared distance function, *J. Convex Anal.* **14** (2007), 353–359.
- [67] G. Bellettini, A. De Masi, N. Dirr, E. Presutti: Tunnelling in two dimensions, *Comm. Math. Phys.* **269** (2007), 715–763.
- [68] G. Bellettini, C. Mantegazza, M. Novaga: Singular perturbations of mean curvature flow, *J. Differential Geom.* **75** (2007), 403–431.
- [69] G. Bellettini, M. Chermisi, M. Novaga: The level set method for systems of PDEs, *Comm. Partial Differential Equations* **32** (2007), 1043–1064.
- [70] G. Bellettini, A. De Masi, N. Dirr, E. Presutti: Stability of invariant manifolds in one and two dimensions, *Nonlinearity* **20** (2007), 537–582.
- [71] G. Bellettini, G. Fusco: The Γ -limit and the related gradient flow for singular perturbation functionals of Perona-Malik type, *Trans. Amer. Math. Soc.* **360** (2008), 4929–4987.
- [72] G. Bellettini, L. Mugnai: Some aspect of the variational nature of mean curvature flow, *J. Eur. Math. Soc. (JEMS)* **10** (2008), 1013–1036.
- [73] G. Bellettini, V. Beorchia, M. Paolini: Topological and variational properties of a model for the reconstruction of three-dimensional transparent images with self-occlusions, *J. Math. Imaging Vision* **32** (2008), 265–291.
- [74] G. Bellettini, M. Novaga, M. Paolini, C. Tornese: Convergence of discrete schemes for the Perona-Malik equation, *J. Differential Equations* **245** (2008), 892–924.
- [75] G. Bellettini, V. Caselles, A. Chambolle, M. Novaga: The volume preserving crystalline mean curvature flow of convex sets in \mathbb{R}^N , *J. Math. Pures Appl.* **92**(5) (2009), 499–527.
- [76] G. Bellettini, V. Beorchia, M. Paolini: An explicit formula for a Bennequin-type invariant for apparent contours, *Topology Appl.* **156** (2009), 747–760.
- [77] G. Bellettini, M. Novaga, M. Paolini, C. Tornese: Classification of the equilibria and Γ -convergence for the semi-discrete Perona-Malik functional, *Calcolo* **46** (2009), 221–243.
- [78] G. Bellettini, L. Mugnai: Anisotropic geometric functionals and gradient flows, *Banach Cent. Publ.* **86** (2009), 21–43.
- [79] G. Bellettini, V. Beorchia, M. Paolini: Completion of visible contours, *SIAM J. Imaging Sci.* **2** (2009), 777–799.
- [80] G. Bellettini, L. Bertini, M. Mariani, M. Novaga: Γ -entropy cost for conservation laws, *Arch. Ration. Mech. Anal.* **195** (2010), 261–309.
- [81] G. Bellettini, M. Novaga, G. Orlandi: Time-like lorentzian minimal submanifolds as singular limits of nonlinear wave equations, *Physica D* **239** (2010), 335–339.
- [82] G. Bellettini, F. Caselli, M. Mariani: Quasi-potentials of the entropy functionals for scalar conservation laws, *J. Funct. Anal.* **258** (2010), 534–558.
- [83] G. Bellettini, L. Mugnai: Approximation of the Helfrich’s functional via diffuse interfaces, *SIAM J. Math. Anal.* **42** (2010), 2402–2433.
- [84] G. Bellettini, M. Paolini: On the area of the graph of a singular map from the plane to the plane taking three values, *Adv. Calc. Var.* **3** (2010), 371–386.
- [85] G. Bellettini, J. Hoppe, M. Novaga, G. Orlandi: Closure and convexity properties of closed relativistic strings, *Complex Anal. Oper. Theory* **4** (2010), 473–496.
- [86] G. Bellettini, M. Mariani: Variational convergence of multidimensional conservation laws, *Bull. Greek Math. Soc.* **57** (2010), 31–45.
- [87] G. Bellettini, M. Novaga, M. Paolini: Convergence for long-times of a semidiscrete Perona-Malik equation in one dimension, *Math. Models Meth. Appl. Sci.* **21** (2) (2011), 1–25.
- [88] G. Bellettini, V. Beorchia, M. Paolini: Completeness of Reidemeister-type moves for surfaces embedded in three-dimensional space, *Atti Accad. Naz. Lincei Cl. Sci. Fis. Mat. Natur. Rend. Lincei (9) Mat. Appl.* **22** (2011), 1–19.
- [89] G. Bellettini, M. Novaga: Curvature evolution of nonconvex lens-shaped domains, *J. Reine Angew. Math.* **656** (2011), 17–46.
- [90] R. March, G. Bellettini, R. Tauraso, S. Dell’Agnello: Constraining spacetime torsion with the Moon and Mercury, *Phys. Rev. D* **83** (2011), 104008–18.
- [91] R. March, G. Bellettini, R. Tauraso, S. Dell’Agnello: Constraining spacetime torsion with lageos, *Gen. Rel. Gravitation* **43** (2011), 3099–3126.

- [92] G. Bellettini, M. Novaga, G. Orlandi: Lorentzian varifolds and applications to closed relativistic string, *Indiana Univ. Math. J.* **6** (2012), 2251–2310.
- [93] G. Bellettini, L. Bertini, M. Mariani, M. Novaga: Convergence of the one-dimensional Cahn-Hilliard equation, *SIAM J. Math. Anal.* **44** (2012), 3458–3480.
- [94] G. Bellettini, M. Paolini, F. Pasquarelli: Nonconvex mean curvature flow as a formal singular limit of the nonlinear bidomain model, *Advances in Differential Equations* **18** (2013), 895–934.
- [95] G. Bellettini, C. Geldhauser, M. Novaga, Convergence of a semidiscrete scheme for a forward-backward parabolic equation, *Advances in Differential Equations* **18** (2013), 495–522.
- [96] G. Bellettini, A. Chambolle, M. Goldman: The Γ -limit for singularly perturbed functionals of Perona-Malik type in arbitrary dimension, *Math. Mod. Meth. Appl. Sc.* **24** (2014), 1091–1113.
- [97] G. Bellettini, A-h. Nayam, M. Novaga: Γ -type estimates for the one-dimensional Allen-Cahn’s action, *Asympt. Anal.* **94** (2015), 161–185.
- [98] G. Bellettini, M. Paolini, L. Tealdi: On the area of the graph of a piecewise smooth map from the plane to the plane with a curve discontinuity, *ESAIM: Control, Optimization and Calculus of Variations* **22** (2015), 29–63.
- [99] G. Bellettini, M. Novaga, G. Orlandi: Eventual regularity for the parabolic minimal surface equation, *Discrete Contin. Dyn. Syst.* **35** (2015), 5711–5723.
- [100] S. Amato, G. Bellettini, L. Tealdi: Anisotropic mean curvature on facets and relations with capillarity, *Geometric Flows* **1** (2015), 80–110.
- [101] G. Bellettini, M. Paolini, L. Tealdi: Semicartesian surfaces and the relaxed area of maps from the plane to the plane with a line discontinuity, *Ann. Mat. Pura Appl.* **195** (2016), 2131–2170.
- [102] S. Amato, G. Bellettini, M. Paolini: Constrained BV functions on covering spaces for minimal networks and Plateau’s type problems, *Adv. Calc. Var.* **10** (2017), 25–47.
- [103] G. Bellettini, Sh.Yu. Kholmatov, M. Novaga, Minimizers of anisotropic perimeters with cylindrical norms, *Comm. Pure Appl. Anal.* **16** (2017), 1427–1454.
- [104] G. Bellettini, Sh.Yu. Kholmatov, Minimizing movements for mean curvature flow of droplets with prescribed contact angle, *J. Math. Pures Appl.* **117** (2018), 1–58.
- [105] G. Bellettini, Sh.Yu. Kholmatov, Minimizing movements for mean curvature flow of partitions, *SIAM J. Math. Anal.* **50** (2018), 4117–4148
- [106] G. Bellettini, M. Paolini, F. Pasquarelli, Triple covers and a non-simply connected surface spanning an elongated tetrahedron and beating the cone, *Interfaces Free Bound.* **20** (2018), 407–436.
- [107] G. Bellettini, M. Paolini, F. Pasquarelli, G. Scianna, Covers, soap films and BV functions, *Geometric Flows*, **3** (2018), 57–75.
- [108] G. Bellettini, A. Elshorbagy, M. Paolini, R. Scala, On the relaxed area of the graph of discontinuous maps from the plane to the plane taking three values with no symmetry assumptions, *Ann. Mat. Pura Appl.* **199** (2020), 445–477.
- [109] G. Bellettini, M. Paolini, Y.-S. Wang, A complete invariant for connected surfaces in the 3-sphere, *J. Knot Theory Ramifications* **29** (2020), 1950091 (24 pages).
- [110] G. Bellettini, M. Paolini, Y.S. Wang, Numerical irreducibility criteria for handlebody links, *Topology Appl.* **284** (2020), 1–14. DOI: 10.1016/j.topol.2020.107361
- [111] G. Bellettini, M. Paolini, Y.-S. Wang, A complete invariant for closed surfaces in the 3-sphere, *J. Knot Theory Ramifications* **30** (2021), 1–25.
- [112] G. Bellettini, A. Chambolle, S. Kholmatov, Minimizing movements for forced anisotropic mean curvature flow of partitions with mobilities, *Proc. Roy. Soc. Edinburgh Sect. A* **151** (2021), 1135–1170.
- [113] G. Bellettini, A. Elshorbagy, On the square distance function from a manifold with boundary, *J. Convex Anal.* **29** (2022), 391–410. ISSN: 0944-6532
- [114] G. Bellettini, S. Carano, R. Scala, The relaxed area of S^1 -valued singular maps in the strict BV -convergence, *ESAIM: Control, Optimization and Calculus of Variations* **28** (2022), 1–38.
- [115] G. Bellettini, G. Paolini, M. Paolini, Y.S. Wang, A table of $(n, 1)$ -handlebody links up to six crossings, *Math. Proc. Cambridge Philos. Soc.*, **174** (2023), 199–223.
- [116] G. Bellettini, M. Freguglia, N. Picenni, On a conjecture of the De Giorgi about the phase-field approximation of the Willmore functional, *Arc. Ration. Mech. Anal.* **247** (2023), 37 pp.
- [117] G. Bellettini, A. Betti, M. Paolini, A free boundary singular transport equation as a formal limit of a discrete dynamical system, *J. Differential Equations* **396** (2024), 1–43.
- [118] G. Bellettini, S. Kholmatov, Some aspects of anisotropic curvature flow of planar partitions, *Ensaio Matemáticos 2023*, **XX**, 55–108, Sociedade Brasileira de Matematica.
- [119] G. Bellettini, S. Carano, R. Scala, Relaxed area of graphs of piecewise Lipschitz maps in the strict BV -convergence, *Nonlinear Analysis* **239** (2024), 113424.
- [120] G. Bellettini, R. Scala, G. Scianna. Upper bounds for the relaxed area of S^1 -valued Sobolev maps and its countably subadditive interior envelope, *Rev. Mat. Iberoamer.* **40** (2024), 2135–2178.
- [121] G. Bellettini, R. Marziani, R. Scala, A non-parametric Plateau problem with partial free boundary, to *J. Echole Polytechnique II* (2024), 1035–1098.

Submitted papers:

- [122] G. Bellettini, S. Kholmatov, F. Almuratov, Crystalline hexagonal curvature flow of networks: short-time, long-time and self-similar evolutions, submitted.
- [123] G. Bellettini, S. Kholmatov, Minimizing movements for the generalized power mean curvature flow, submitted.
- [124] G. Bellettini, A. Elshorbagy and R. Scala, The L^1 -relaxed area of the graph of the vortex map: optimal upper bound, submitted.
- [125] G. Bellettini, A. Elshorbagy and R. Scala, Relaxation of the area of the vortex map: a non-parametric Plateau problem for a catenoid containing a segment, submitted.
- [126] G. Bellettini, A. Elshorbagy and R. Scala, The L^1 -relaxed area of the graph of the vortex map: optimal lower bound, submitted.

Papers in preparation:

RESEARCH ANNOUNCEMENTS

- [1] G. Bellettini, M. Paolini: Teoremi di confronto tra diverse nozioni di movimento secondo la curvatura media, *Atti Accad. Naz. Lincei Cl. Sci. Fis. Mat. Natur. Rend. (9) Mat. Appl.*, **6** (1995), 45–54.
- [2] G. Bellettini, M. Novaga: Barriers for a class of geometric evolution problems, *Atti Acc. Naz. Lincei Cl. Sc. Mat. Fis. Natur. (9) Mat. Appl.*, **8** (1997), 119–128.

CONFERENCE PROCEEDINGS

- [1] G. Bellettini, M. Paolini, C. Verdi: Front-tracking and variational methods to approximate interfaces with prescribed mean curvature, *Proc. Numerical Methods for Free Boundary Problems* (Jyväskylä, 1990, P. Neittaanmäki ed.), Birkhäuser, Basel (1991), 83–92.
- [2] G. Bellettini, M. Paolini, C. Verdi: Numerical minimization of functionals with curvature by convex approximations, *Progress in partial differential equations: calculus of variations, applications*, Pitman Research Notes in Mathematics Series (C. Bandle, J. Bemelmans, M. Chipot, M. Grüter and J. Saint Jean Paulin, eds.) Longman Scientific & Technical Harlow **267** (1992), 124–138.
- [3] G. Bellettini, M. Paolini, C. Verdi: Convergence of discrete approximations to sets of prescribed mean curvature, *Free boundary problems involving solids*, Pitman Research Notes in Mathematics Series (J.M. Chadam and H. Rasmussen, eds.) Longman Scientific & Technical Harlow, **281** (1993), 164–169.
- [4] G. Bellettini, G. Fusco: The dynamic of $V = H - \bar{H}$: motion of a small drop on a fixed surface, *Proc. of the Conference on Differential Equations, Lisboa*, (Eds: L. Magalhaes, C. Rocha, S. Sanchez) World Scientific, Singapore (1995), 26–38.
- [5] M. Amar, G. Bellettini: A total variation with discontinuous coefficients: variational properties and approximation by Γ -convergence, *Atti Sem. Mat. Fis. Univ. Modena* **XLIII** (1995), 431–435.
- [6] G. Bellettini, G. Fusco: Stable dynamics of spikes in solutions to a system of activator-inhibitor type. *Proc. of the workshop "New trends in nonlinear partial differential equations"*, (Y. Morita, H. Ninomiya, E. Yanagida and S. Yotsutani eds.) Ryukoku Extension Center, June 7–10 (1999), 1–11.
- [7] G. Bellettini: Some aspect of motion by mean curvature in presence of nonsmooth anisotropies, *Proc. of the 3th European Conference on Mathematics, Barcellona 2000*, Birkhäuser (2001), 245–253.
- [8] G. Bellettini, R. March: Variational properties of a model for image segmentation with overlapping regions, Variational Methods in Discontinuous Structures, Como 2001, in *Progress in Nonlinear Differential Equations and Their Applications*, **51**, 9–17 (2002), Birkhäuser, Boston.
- [9] G. Bellettini, G. Fusco, N. Guglielmi: A possible approach to the dynamic of forward-backward parabolic equations, *Proc. of the Ryukoku Workshop on Mathematical Aspects of Pattern Formation and Dynamics in Dissipative Systems*, 2004.
- [10] G. Bellettini: On gradient flows of some non-convex functionals of Perona-Malik type, Workshop on "Phasenubergänge", *Oberwolfach Report 26/2004*, EMS Zurich.
- [11] G. Bellettini, G. Fusco: A regularized Perona-Malik functional: some aspects of the gradient dynamics, *EQUADIFF 2003 Proceedings of the International Conference on Differential Equations*, Hasselt, Belgium 22 - 26 July 2003 (Freddy Dumortier, Henk Broer, Jean Mawhin, Andre Vanderbauwhede and Sjoerd Verduyn Lunel eds.), 639–644. World Scientific, 2005.
- [12] G. Bellettini: On singular perturbations of some partial differential equations, in *Oberwolfach Reports*, Report No. 38, (2006), 2283–2284, EMS Zurich.
- [13] G. Bellettini, R. March: Asymptotic properties of the Nitzberg-Mumford variational model for segmentation with depth, Proc. of the conference on Free Boundary Problems, Coimbra (Portugal) 2005, *International Series of Numerical Mathematics*, Birkhäuser Verlag, Basel, **154** (2007), 75–84.
- [14] G. Bellettini: On facet breaking for crystalline mean curvature flow in 3D, On the convergence of discrete schemes for the Perona-Malik equation, On some topological and variational properties of a model for reconstructing transparent images with self-occlusions. *Proc. International Conference in Mathematics*, Zürich 2007. *PAMM Proc. Appl. Math. Mech.* **7**, 1041901–1041902, 1023401–1023402, 1041909–1041910 (2007)
- [15] G. Bellettini: Topological and variational properties of a model for reconstructing three-dimensional images, in *Oberwolfach Reports*, Report No. 3, (2007), 147–148, EMS Zurich.

- [16] G. Bellettini: Γ -convergence and one-dimensional scalar hyperbolic conservation laws, in *Oberwolfach Reports*, report No. 28/2007, 1579-1580, EMS Zurich.
- [17] G. Bellettini, F. Caselli, M. Mariani: Some applications of the least squares method to differential equations and related problems, *Singularities in Nonlinear Evolution Phenomena and Applications, Proceedings*, M. Novaga, G. Orlandi Eds. Edizioni della Normale, Pisa, 59–87, 2009.
- [18] G. Bellettini: Minimal timelike lorentzian submanifolds as limits of singularly perturbed wave equations, in *Oberwolfach Reports* 7, Issue 1 (2010), 265-266, EMS Zurich.
- [19] G. Bellettini: Reconstruction of a 3D shape from its apparent contour, in *Oberwolfach Reports*, Report No. 07/2011, (2011), 304–306, EMS Zurich.
- [20] G. Bellettini: Remarks on the limit of the Cahn-Hilliard equation in 1D, in *Oberwolfach Reports*, Report N. 55/2011, (2011), 3209-3211, EMS Zurich.
- [21] S. Amato, G. Bellettini, M. Paolini: The nonlinear multidomain model: a new formal asymptotic analysis, *Geometric Partial Differential Equations, Proceedings*, M. Novaga, G. Orlandi Eds. Pubbl. Cent. Ric. Mat. Ennio De Giorgi, (2013), 33-72.
- [22] G. Bellettini: On the area of the graph of a map from the plane to the plane with a line discontinuity, in *Oberwolfach Reports*, 10, Issue 1, (2013), 878-879, EMS Zurich.
- [23] R. March, G. Bellettini, R. Tauraso, S. Dell'Agnello, Constraining spacetime torsion with the Moon, Mercury and LAGEOS, *Acta Polytechnica* 53 (Supplement) (2013), 817–820.
- [24] G. Bellettini: Wrinkling phenomenon in the bidomain model, in *Oberwolfach Reports, Mechanobiology and Cell Signaling*", February 25-March 03, Oberwolfach-Walke : Mathematisches Forschungsinstitut Oberwolfach Ed., Issue 8, (2018), 65-68, EMS Zurich.

CHAPTERS IN COLLECTIVE VOLUMES

- [1] G. Bellettini: Semicontinuit  di un funzionale dipendente da una funzione convessa della curvatura, *Seminario di Analisi Matematica Univ. Bologna*, Tecnoprint, Bologna (1991), 59–75.
- [2] G. Bellettini, M. Paolini: Approssimazione variazionale di funzionali con curvatura, *Seminario di Analisi Matematica Univ. Bologna*, Tecnoprint, Bologna, (1993) 87–97.
- [3] G. Bellettini: Su un modello di Mumford-Nitzberg per la segmentazione di immagini, *Seminario di Analisi Matematica Univ. Bologna*, Tecnoprint, Bologna (1994), 72–85.
- [4] G. Bellettini: Due esempi di singolarit  per il moto secondo la curvatura media con termine forzante. *Seminario di Analisi Matematica Univ. Bologna*, Tecnoprint Bologna (1994).
- [5] G. Bellettini, A. Coscia: Una caratterizzazione dello spazio $BD(\Omega)$ per sezioni unidimensionali, *Seminario di Analisi Matematica Univ. Bologna*, Tecnoprint, Bologna (1993), 123–129.
- [6] G. Bellettini, M. Novaga: Some aspects of De Giorgi's barriers for geometric evolutions. *Calculus of Variations and Partial Differential Equations*, Springer-Verlag (1999), 115–151.
- [7] G. Bellettini: Anisotropic and crystalline mean curvature flow, A Sampler of Riemann-Finsler Geometry (D. Bao, R. L. Bryant, S.-S. Chern, Z. Shen eds.), *Mathematical Sciences Research Institute Publications*, 50 2004, Cambridge Univ. Press, 49–83.
- [8] G. Bellettini, R. March: Variational problems in image segmentation and Γ -convergence methods, in *Advance in Image and Video Segmentation* (Y.-J. Zhang ed.), IRM Press (2006), 46–71.
- [9] G. Bellettini: An introduction to mean curvature flow, in "*Topics in Mathematical Analysis*", ISAAC Series on Analysis, Applications and Computation, vol. 3, (P. Ciatti, E. Gonzalez, M. Lanza de Cristoforis, G.P. Leonardi eds.), 63–102, World Scientific Publishing, 2008.

CHAPTERS IN ENCYCLOPEDIAS

- [1] L. Ambrosio, G. Bellettini: Movimento secondo la curvatura media. *Enciclopedia Treccani*, Geometria, 751-753, 2000.
- [2] G. Bellettini: Nuova voce sul Dizionario Bompiani delle Opere e dei Personaggi: il teorema di De Giorgi.

PREPRINTS

- [1] G. Bellettini, M. Paolini, C. Verdi: [1] (internal note) G. Bellettini, M. Paolini, C. Verdi: Γ -convergence and numerical approximation of interface problems. *Proc. 9th France-USSR-Italy Joint Symposium in Computational Mathematics and Applications* (Sophia-Antipolis, France, 1991), Public. IAN - CNR, Pavia 807 (1991), 25–48.
- [2] G. Bellettini, M. Paolini, C. Verdi: [2] (internal note) G. Bellettini, M. Paolini, C. Verdi: Approssimazione variazionale di alcuni problemi di tipo geometrico del Calcolo delle Variazioni mediante la Γ -convergenza. *Proc. XIV Congresso Nazionale dell'Unione Matematica Italiana* (1991).
- [3] G. Bellettini, G. Dal Maso, A. Coscia: [11] (internal note) G. Bellettini, G. Dal Maso, A. Coscia: Special functions of bounded deformation, *Preprint Univ. Pisa*, (1995).
- [4] G. Alberti, G. Bellettini: Asymptotic behaviours of a non local anisotropic model for phase transitions, Quaderni del Dipartimento di Matematica Applicata "U. Dini", Universit  degli studi di Pisa, 1996/15.

- [5] G. Bellettini, G. Fusco: Some aspects of the dynamics of $V = H - \overline{H}$, Quaderni del Dipartimento di Matematica Applicata "U. Dini", Università degli studi di Pisa, 1996/18.
- [6] G. Bellettini: An introduction to anisotropic and crystalline mean curvature flow, *Sapporo University, Internal reports*, August 2010.
- [7] G. Bellettini, A. Elshorbagy, R. Scala, The L^1 -relaxed area of the graph of the vortex map, Preprint arXiv 2107.07236, <https://arxiv.org/abs/2107.07236> (2021).

PHYSICS

- [1] LARES collaboration: Applicazioni tecnologiche della camera spaziale climatica dei laboratori nazionali di Frascati, SIS-Pubblicazioni, LNF-06/26 (IR), 14 settembre 2006.
- [2] LARES collaboration: *Int. J. Modern Physics D*, **16** 12A (2007) 2271-2285, World Scientific Publishing Company.
- [3] LARES collaboration: Probing gravity in the Earth-Moon system with ETRUSCO, Moon-LIGHT and LAGEOS, in *Frontier Objects in Astrophysics and Particle Physics, Vulcano Workshop 2008*, F. Giovannelli and G. Mannocchi Eds., Società Italiana di Fisica, Bologna, Atti di Conferenze, vol. 98, Vulcano 26-31 maggio 2008, 533-544.
- [4] ETRUSCO collaboration: ETRUSCO: Extra Terrestrial Ranging to Unified Satellite Constellations, LNF-07/08 (IR), March 2007.
- [5] LARES collaboration: The design of LARES: a satellite for testing general relativity. *58th International Astronautical Congress*, Hyderabad, India, 24-28 September 2007, IAF/IAA.
- [6] moonlight collaboration: MoonLIGHT-R: Moon Laser Instrumentation for General Relativity High-accuracy Tests, *Proc. XLII Rencontres de Moriond, La Thuile, in Gravitational Waves and Experimental Gravity*, (J. Dumarchez and J. Tran Thanh Van eds.), 2007.
- [7] magia collaboration: Fundamental physics and absolute positioning metrology with the MAGIA lunar orbiter, *Experimental Astronomy* **17**, (2010), 1–17.

PERSONAL INTERESTS

Music: diploma of piano (Conservatorio L. Boccherini, Lucca 1988).

HOBBIES

Sport

<