

Curriculum Vitae

Roberto Monti

Name:	Roberto Monti
Place and date of birth:	Novafeltria (PU), Italy, 1968 August 1st Married with 2 children, 2 and 10 years old
Position:	Associate Professor in Mathematical Analysis University of Padova, Italy Dipartimento di Matematica
Academic qualifications:	National Qualification for Full Professor (2013) Associate Professor (Padova September 2010) Privat Dozent (Habilitation, Bern CH 2004) Assistant Professor (Padova IT 2004) PhD in Mathematics (Trento IT 2001) Master Degree cum laude in Mathematics (Bologna IT 1997) Master Degree cum laude in Philosophy (Macerata IT 1991)
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homepage:	http://www.math.unipd.it/~monti/index.html
Languages:	Italian, English, German, French (basic)

1 Studies and positions

October 2010, Associate Professor at the University of Padova
September 2008 – August 2009, Visiting Professor at the Math. Institut, Uni. Bern
November 2004, Habilitation at the University of Bern
January 2004 – September 2010, Assistant professor of Analysis at the University of Padova
November 2001 – January 2004, postdoc position at the Mathematisches Institut, Bern
1997-2001, Graduate studies in Mathematics, University of Trento
1993-1997, Undergraduate studies in Mathematics, University of Bologna
1988-1991, Undergraduate studies in Philosophy, University of Macerata

2 List of publications

Published and accepted papers

- [38] E. Le Donne, G. P. Leonardi, R. Monti, D. Vittone, Extremal polynomials in stratified groups, *Communications in Analysis and Geometry*, accepted 2016.
- [37] M. Fogagnolo, R. Monti, D. Vittone, Variation formulas for H -rectifiable sets, *Annales Academiae Scientiarum Fennicae*, accepted 2016.
- [36] V. Franceschi, R. Monti, Isoperimetric problem in H -type groups and Grushin spaces, *Revista Mat. Iberoam.* (to appear) 2016.
- [35] V. Franceschi, R. Monti, G. P. Leonardi, Quantitative isoperimetric inequalities in \mathbb{H}^n , *Calc. Var. Partial Differential Equations* 54 (2015), no. 3, 3229–3239.
- [34] R. Monti, Minimal surfaces and harmonic functions in the Heisenberg group. *Nonlinear Anal.* 126 (2015), 378–393.
- [33] R. Monti, D. Vittone, Height estimate and slicing formulas in the Heisenberg group. *Anal. PDE* 8 (2015), no. 6, 1421–1454.
- [32] R. Monti, Isoperimetric problem and minimal surfaces in the Heisenberg group, in *Geometric Measure Theory and Real Analysis*, pp. 57–130, L. Ambrosio Ed., CRM Series, Vol. 17 (2015).
- [31] E. Le Donne, G. P. Leonardi, R. Monti, D. Vittone, Corners in non-equiregular sub-Riemannian manifolds. *ESAIM Control Optim. Calc. Var.* 21 (2015), no. 3, 625–634.
- [30] R. Monti, A family of nonminimizing abnormal curves, *Ann. Mat. Pura Appl.* (4) 193 (2014), no. 6, 1577–1593.
- [29] R. Monti, Rearrangements in metric spaces and in the Heisenberg group, *J. Geom. Anal.* (2014) 24: 1673–1715.
- [28] R. Monti, The regularity problem for sub-Riemannian geodesics, in *Geometric Control Theory and Sub-Riemannian Geometry*, Springer INDM Series, Stefani, G., Boscain, U., Gauthier, J.-P., Sarychev, A., Sigalotti, M. (Eds.) 2014, 313–332.
- [27] R. Monti, Lipschitz approximation of H -perimeter minimizing boundaries, *Calc. Var.* 50 (2014), no. 1-2, 171–198.
- [26] R. Monti, Regularity results for sub-Riemannian geodesics, *Calc. Var.* 49 (2014), no. 1-2, 549–582.

- [25] E. Le Donne, G. P. Leonardi, R. Monti, D. Vittone, Extremal curves in nilpotent Lie groups, *Geom. Funct. Anal.* **23** (2013), no. 4, 1371–1401.
- [24] Z. Balogh, R. Monti, J. Tyson, Frequency of Sobolev and quasiconformal dimension distortion, *J. Math. Pures Appl.* (9) **99** (2013), no. 2, 125–149.
- [23] R. Monti, D. Vittone, Sets with finite H -perimeter and controlled normal, *Math. Z.* **270** (2012), no. 1-2, 351–367.
- [22] R. Monti, D. Morbidelli, Pseudohermitian invariants and classification of CR mappings in generalized ellipsoids, *J. Math. Soc. Japan* **64** (2012), no. 1, 153–179
- [21] G. Arena, A. O. Caruso, R. Monti, Regularity properties of H -convex sets, *J. Geom. Anal.* **22** (2012), Number 2, 583–602
- [20] Z. Balogh, R. Berger, R. Monti, J. Tyson, Exceptional sets for the self-similar dimension in Carnot groups, *Math. Proc. Cambridge Philos. Soc.* **149** (2010), no. 1, 147–172.
- [19] R. Monti, M. Rickly, Convex isoperimetric sets in the Heisenberg group, *Ann. Sc. Norm. Super. Pisa Cl. Sci. (5)* **8** (2009), no. 2, 391–415
- [18] R. Monti, F. Serra Cassano, D. Vittone, A negative answer to the Bernstein problem for intrinsic graphs in the Heisenberg group, *Boll. Unione Mat. Ital.* (9) **1** (2008), no. 3, 709–727
- [17] G. L. Leonardi, R. Monti, End-point equations and regularity of sub-Riemannian geodesics, *Geom. Funct. Anal.* **18** (2008), no. 2, 552–582
- [16] R. Monti, Heisenberg isoperimetric problem. The axial case, *Adv. Calc. Var.* **1** (2008), 93–121
- [15] R. Monti, D. Morbidelli, Positive solutions of anisotropic Yamabe-type equations in \mathbb{R}^n , *Proc. Amer. Math. Soc.* **136** (2008), no. 12, 4295–4304
- [14] R. Monti, D. Morbidelli, Levi umbilical surfaces in complex space, *J. Reine Angew. Math.* **603** (2007), 113–131
- [13] R. Monti, D. Morbidelli, Kelvin transform for Grushin operators and semilinear critical equations, *Duke Math. J.* **131**, no. 1 (2006), 167–202
- [12] R. Monti, Sobolev inequalities for weighted gradients, *Comm. Part. Diff. Eq.* **31** (2006), 1479–1504
- [11] R. Monti, D. Morbidelli, Non-tangentially accessible domains for vector fields. *Indiana Univ. Math. J.* **54** (2005), no. 2, 473–498

- [10] R. Monti, D. Morbidelli, Regular domains in homogeneous groups, *Trans. Amer. Math. Soc.* **357** (2005), no. 8, 2975–3011
- [9] R. Monti, M. Rickly, Geodetically convex sets in the Heisenberg group, *J. Convex Anal.* **12** (2005), no. 1, 187–196
- [8] R. Monti, D. Morbidelli, Isoperimetric inequality in the Grushin plane. *J. Geom. Anal.* **14** (2004), no. 2, 355–368
- [7] Z. Balogh, R. Monti, Accessible domains in the Heisenberg group, *Proc. Amer. Math. Soc.* **132**, No.1, 97–106 (2004)
- [6] R. Monti, D. Morbidelli, John domains for the control distance of diagonal vector fields, *J. Anal. Math.* **92** (2004), 259–284
- [5] R. Monti, Brunn–Minkowski and isoperimetric inequality in the Heisenberg group, *Ann. Acad. Sci. Fenn. Math.* **28** (2003), no. 1, 99–109
- [4] R. Monti, F. Serra Cassano, Degenerate perturbations of a two-phase transition model. *J. Convex Anal.* **10** (2003), no. 1, 1–34
- [3] R. Monti, D. Morbidelli, Trace theorems for vector fields, *Math. Z.* **239** (2002), 747–776
- [2] R. Monti, F. Serra Cassano, Surface measures in Carnot–Carathéodory spaces, *Calc. Var.* **13** (2001), no. 3, 339–376
- [1] R. Monti, Some properties of Carnot–Carathéodory balls in the Heisenberg group, *Rend. Mat. Accad. Lincei*, s.9 v.11 (2000) 155–167

Submitted papers

- [3] V. Franceschi, F. Montefalcone, R. Monti, Constant Mean Curvature spheres in H^1 , 2016
- [2] R. Monti, A. Pigati, D. Vittone, Tangent lines to CC length-minimizing curves, submitted 2016
- [1] R. Monti, G. Stefani, Improved Lipschitz approximation of H-perimeter minimizing boundaries, submitted 2016

Academic works

- [4] R. Monti, Isoperimetric inequality, semilinear equations and regular domains in Grushin spaces, *Habilitationsschrift*, Bern 5 January 2004.

- [3] R. Monti, Distances, boundaries and surface measures in Carnot-Carathéodory spaces, PhD Thesis in Mathematics, Università di Trento, 2001. Advisor: Prof. F. Serra Cassano
- [2] R. Monti, Teorema di Rellich–Kondrachov per spazi di Sobolev generalizzati, Degree Thesis in Mathematics, Università di Bologna, 1997. Advisor: Prof. E. Lanconelli.
- [1] R. Monti, Husserl: evidenza e ragione, Degree Thesis in Philosophy, Università di Macerata, 1991. Advisor: Prof. F. Voltaggio.

Other pubblications

- [3] R. Monti, Ordine e disordine. Analisi epistemologica ed ideologica, in “Chaos”, Quaderni della Biblioteca di Chiaravalle, n. 5 (2001), 25–37.
- [2] R. Monti, Origini delle guerre e democrazia internazionale, in “L’arte del conflitto”, Quaderni del Consiglio Regionale delle Marche, n. 2 (1997), 121–141.
- [1] R. Monti, La teoria Husseriana dell’io trascendentale, Aquinas **36** (1993), 181–192.

Link to the papers

<http://www.math.unipd.it/~monti/pubblicazioni.html>

3 Research directions

- i) Regularity of sub-Riemannian geodesics.
- ii) Isoperimetric problems. Pansu’s conjecture.
- iii) Regularity of H -minimal surfaces.
- iv) Alexandrov problem in complex space.

4 Scientific acknowledgements

- 1) L. Rifford, Singulières minimisantes en géométrie sous-riemannienne, Séminaire Bourbaki, Mars 2016 68ème année, 2015–2016, no. 1113.

The author gives account of the recent results of my research group on the problem about the regularity of sub-Riemannian geodesics. New results are obtained in the work [2] in the list of submitted papers.

- 2) L. Capogna, D. Danielli, S. D. Pauls, J. T. Tyson, An Introduction to the Heisenberg Group and the Sub-Riemannian Isoperimetric Problem, Progress in Mathematics, Birkhäuser 2007.

In this book, Chapter 8, the authors give account of my results on the Heisenberg isoperimetric problem. New results are in [35]-[36] and in the submitted paper [3].

5 Editorial positions

Associate editor of the journal Nonlinear Analysis.

As a referee, 20 manuscripts reviewed in the years 2011–2016.

6 Invited Lectures

Lectures “The regularity problem for Carnot-Carathéodory geodesics”
at the *Eight School on Analysis and Geometry in Metric Spaces*,
Levico, 16-20 June 2014

Lectures “Isoperimetric problem and minimal surfaces in the Heisenberg group”
at the *ERC School on Geometric Measure Theory and Real Analysis*
Pisa, Centro De Giorgi, 30 September – 4 October 2013

7 Invited Talks (since 2010)

- Nevanlinna Colloquium, Zürich June 2017
 Sub-Riemannian conference in Crete, 18-20 June 2017, invitation
 ETH Zürich, spring 2017, invitation
 Workshop *Singular Phenomena and Singular Geometries*,
 Mathematics Department, Pisa 20-23 June 2016
 Conference *Two-day Meeting on linear and nonlinear PDE's in honor of the
 65th birthday of Cristian Gutierrez*, Math. Department, Bologna 9-10 June 2016
 Conference *Geometric Analysis in Control and Vision Theory*,
 Bergen (Norway) May 8-14, 2016. Declined
 Conference on *Nonlinear Control and Geometry*
 Banach Center, Poland, August 23-29, 2015. Declined
 Workshop *Analysis and Geometry in Metric Spaces*
 ICMAT, Madrid, 1-5 June 2015
 Workshop on *Geometric Analysis in the Heisenberg group*
 Bologna, 6th March 2015
 Workshop *Sub-Riemannian Analysis, PDEs and Applications*,
 Bern, 26 - 30 January 2015
 Thematic Day *Riemannian and sub-Riemannian geometry on Lie groups*

and homogeneous spaces, IHP Paris, November 14, 2014 (declined)
Conference *Geometry, Analysis and Dynamics on Subriemannian Manifolds*
IHP, Paris, 29 September - 3 October, 2014
Math. Department Universität Zürich, 18th November 2013
Oberwolfach meeting on *Partial Differential Equations*,
4-9 August 2013 (invitation)
Conference *Sub-Riemannian Geometry and PDEs*,
Levico 5-7 July 2012
Conference *Geometric control and sub-Rimannian geometry*,
Cortona 21-25 May 2012
Conference *Martin's days*, Bern 11-13 November 2011
ERC Workshop on geometric analysis on sub-Riemannian and metric spaces,
Pisa 10-14 October 2011
Conference *Non-Riemannian Mapping Theory and Geometry*,
Bern 12 - 15 May 2010
Conference *New trends in sub-Riemannian Geometry*,
Nice 29 March - 2 April 2010
ETH Zürich, 17 March 2010

8 National projects

PRIN 2010-2011 Calcolo delle variazioni, Coordinator G. Dal Maso.

PRIN 2008 Disuguaglianze e problemi variazionali in strutture metriche riemaniane e subriemaniane, Coordinator L. Ambrosio.

PRIN 2006 Teoria geometrica della misura e problemi variazionali in strutture metriche riemaniane e subriemaniane, Coordinator L. Ambrosio.

PRIN 2004 Calcolo delle Variazioni. 1) Teoria geometrica della misura in spazi euclidi e in gruppi di Carnot. 2) Funzionali di Ginzburg-Landau. 3) G-convergenza. Coordinator L. Ambrosio.

9 Postdocs

Starting January 2017: 18 months postdoc position. Topic: Heisenberg isoperimetric problem.

May 2016 - October 2016: Valentina Franceschi.

10 Students

PhD students

V. Franceschi, Isoperimetric problems in Heisenberg and Grushin spaces, 2016. Now INRIA postdoc position in Paris.

Master Thesis students (since 2013)

- A. Merlo, Non-differentiability set of typical Lipschitz functions, September 2016 (coadvisor with D. Preiss). Now PhD at SNS Pisa.
G. Stefani, Intrinsic Lipschitz approximation of H-perimeter minimizing boundaries, July 2016. Now PhD at SNS Pisa.
M. Fogagnolo, Second variation of H -perimeter, 2015. Now PhD in Trento.
G. Vescovo, Length minimality of corners in SR geometry, 2015. Now PhD at SISSA
A. Noiato, Rademacher theorem in metric spaces, 2014.
F. Palmurella, Length-Minimizing Curves on Sub-Riemannian Manifolds: Necessary Conditions Involving the End-Point Mapping, 2014. Now PhD at ETH Zürich.
C. Rigoni, Rectifiable sets and their characterization through tangent measures, 2013. Now PhD at SISSA.

Degree Thesis students (since 2014)

- G. Vecchiato, Le ipersuperfici immerse in \mathbb{R}^n compatte e stabili sono sfere, luglio 2016.
M. Vedovato, Contenuto di Minkowski e misure di Hausdorff in \mathbb{R}^n , luglio 2016.
S. Farinelli, Soluzione Fondamentale per il Laplaciano di Kohn, Febbraio 2016.
S. Mammola, Γ -convergenza, 2015.
L. Falcone, Disuguaglianza isoperimetrica quantitativa in \mathbb{R}^n , 2015.
M. Zaccaron, Funzioni con gradiente prescritto, 2015.
D. Gerosa, Metrica di Hausdorff-Gromov ed esistenza di geodetiche, 2015.
J. Dianetti, Misure uniformi in \mathbb{R}^n , 2014.
M. F. Pivetta, Reti separate ed equazione del determinante Jacobiano, 2014.
M. Fraccaroli, Equazione di Yamabe: analisi e soluzioni attraverso il Metodo delle Sfere Mobili, 2014. Now finishing master in Bonn, Hausdorff Zentrum.
A. Merlo, Struttura di insiemi di misura nulla, 2014.
M. Stecconi, Teorema di Sard e controes. in dim. infinita, 2014. Now PhD at SISSA.
D. Valloni, Distribuzione dei numeri primi e funzione Zeta, 2014. Now finishing master in Bonn, Hausdorff Zentrum
G. Stefani, Equazioni Differenziali Ordinarie. Dal Teorema di Cauchy-Lipschitz alle teorie di DiPerna-Lions e Crippa-De Lellis, 2014.

11 Organizing activity

Coorganizer of the Schools:

School in Analysis, 2005–8 and 2010-2013, <http://minicourses.dmsa.unipd.it/>

Coorganizer of the Conferences:

Focus Meeting on Geometric Measure Theory and Least-Area Problems,

University of Modena 15-17 February 2007

Borel Seminar, 2002-2003 University of Bern

12 Teaching

For all lectures I wrote lecture notes that can be found here:

<http://www.math.unipd.it/~monti/didattica.html>

Teaching at the Department of Mathematics, Padova

2017 Calculus of Variations (64 hours)

2014-2016 Real Analysis (56 hours) 2 years

2013-2014 Analysis 1 (62 hours)

2012-2013 Analysis 2 (60 hours)

2011-2012 Theory of Functions 2 (64 hours)

2011-2012 Analysis 1 (62 hours)

2010-2011 Partial Differential Equations (24 hours)

2009-2010 Partial Differential Equations (64 hours)

2007-2008 Partial Differential Equations (48 hours)

Teaching at the Department of Physics, Padova

2010-2011 and 2015-2017 Analysis 2 (64 hours) 3 years

Teaching at the School of Engineering, Padova

2012-2015 Analysis 1 (72 hours) 3 years

2009-2010 Analysis 2 (78 hours)

2004-2008 Analysis 1 (90 hours) 4 years

2003-2004 Analysis 2 (30 hours)

Teaching at the Doctoral School of Mathematics, Padova

2007 Course “Inequalities in Analysis” (20 hours)

2006 Course “Vector Fields And Metric Spaces” (20 hours)

Teaching at the Mathematisches Institut, Bern

2009 Summer semester: Ordinary Differential Equations

2009 Summer semester: Analysis 2

2008 Winter semester: Analysis 1

2006 Summer semester: Block-course “Introduction to the Yamabe equation”

Assistantship, Bern

2003-2004, Winter semester: Assistant of Analysis 3

2002-2003, Summer semester: Assistant of Harmonic Analysis

2002-2003, Winter semester: Assistant of Minimal Surfaces

2001-2002, Summer semester: Assistant of Partial Differential Equations

2001-2002, Winter semester: Assistant of Analysis 1

Teaching at the Galilei School of Higher Studies, Padova

2005-2006 Assistant of Mathematics (240 hours)

Other teaching

2007 Uni. Padova “Introduction to the Yamabe equation” (4 hours)

2006 Uni. Padova “Serrin’s overdetermined problem” (4 hours)

2005 Uni. Fribourg (CH) “Introduction to BV functions” (4 hours)

2002 Uni. Bern “Two dimensional Mumford–Shah functional (6 hours)

Nonmathematical teaching

1995-1996 (2 years) Teacher of Modern History and History of Philosophy, Ancona

13 Department offices

Commissione di Programmazione Didattica del Dipartimento di Matematica

GAV (Gruppo Accreditamento e Valutazione) del Corso di Laurea in Matematica

Fino al 2015 Commissione Paritetica della Scuola di Scienze

Referente per la Disabilità nel Dipartimento di Matematica

14 Other interests

Philosophy, music, epistemology, brain and neurophysiology, history.

Padova, November 2016

Roberto Monti