

Paolo Bonicatto – Curriculum Vitæ

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Personal Information

DATE OF BIRTH	15/12/1990	PLACE OF BIRTH	Turin (Italy)
NATIONALITY	Italian	CIVIL STATUS	Married

Current and previous positions

- 10/2020 - **Research Fellow (Post-Doc)**, University of Warwick (United Kingdom)
Supervisor: Prof. Dr. Filip Rindler
ERC-funded Project “SINGULARITY – Singularities and Compactness in Nonlinear PDEs”
- 10/2017 - 09/2020 **Wissenschaftlicher Mitarbeiter (Post-Doc)**, University of Basel (Switzerland)
Supervisor: Prof. Dr. Gianluca Crippa
ERC-funded Project “FLIRT – Fluid Flows and Irregular Transport”

Education

- 10/2014-09/2017 **PhD in Mathematical Analysis, Modelling and Applications**, SISSA, Trieste (Italy)
Thesis title: *Untangling of trajectories for non-smooth vector fields and Bressan’s Compactness Conjecture*
Supervisor: Prof. Dr. Stefano Bianchini
- 10/2012-07/2014 **Master Degree in Mathematics**, (110/110 cum laude) SISSA - Università di Trieste (Italy)
Thesis title: *Renormalization for nearly incompressible BV vector fields*
Supervisor: Prof. Dr. Stefano Bianchini Co-advisor: Dr. Nikolay A. Gusev
- 10/2009-07/2012 **Bachelor Degree in Mathematics**, (110/110 cum laude), Università di Torino (Italy)
Thesis title: *Invarianti simplettici per problemi ai limiti lineari* (in italian)
Supervisor: Prof. Dr. Anna Capietto

Awards, scholarships and grants

- 11/2021 *Kovalevskaya grant* (to attend ICM 2022 in St. Petersburg)
- 07/2020 *INdAM-SIMAI-UMI prize* for PhD thesis in Mathematics
- 12/2017 *Cuozzo prize* (Università di Roma Tor Vergata) for PhD thesis in Mathematics
- 05/2016 *Marco Reni prize* (Università di Trieste) for Master thesis in Mathematics
- 09/2014-09/2017 Scholarship for PhD in Mathematical Analysis, Modelling and Applications, SISSA, Trieste
- 09/2012-07/2014 Scholarship for joint master program SISSA - Università di Trieste

Publications

PREPRINTS

- A. ARROYO-RABASA, P. BONICATTO, AND G. DEL NIN, *Representation of the total variation as a Γ -limit of BMO-type seminorms*. Preprint (2021)
- P. BONICATTO, G. CIAMPA, AND G. CRIPPA, *Advection-diffusion equation with rough coefficients: weak solutions and vanishing viscosity*. Submitted (2021)
- A. ARROYO-RABASA AND P. BONICATTO, *A Bourgain–Brezis–Mironescu representation for functions with bounded deformation*. Submitted (2021)
- S. BIANCHINI, P. BONICATTO, AND E. MARCONI, *A Lagrangian approach for scalar multi-dimensional conservation laws*. Preprint (2017)
- P. BONICATTO, *Lagrangian representations of vector fields with special structure*. Preprint (2017)

PUBLISHED

- P. BONICATTO, G. DEL NIN, AND E. PASQUALETTO, *Decomposition of integral metric currents*, to appear in *J. Funct. Anal.*, (2021)
- P. BONICATTO AND N. A. GUSEV, *On the structure of divergence-free measures in \mathbb{R}^2* , to appear in *Adv. Calc. Var.*, (2021)
- P. BONICATTO AND E. MARCONI, *Regularity estimates for the flow of BV autonomous divergence free vector fields in \mathbb{R}^2* , *Comm. Partial Differential Equations*, 46 (2021), pp. 2235–2267
- S. BIANCHINI AND P. BONICATTO, *Forward untangling and applications to the uniqueness problem for the continuity equation*, *Discrete Contin. Dyn. Syst.*, 41 (2021), pp. 2739–2776
- S. BIANCHINI AND P. BONICATTO, *A uniqueness result for the decomposition of vector fields in \mathbb{R}^d* , *Invent. Math.*, 220 (2020), pp. 255–393
- P. BONICATTO, E. PASQUALETTO, AND T. RAJALA, *Indecomposable sets of finite perimeter in doubling metric measure spaces*, *Calc. Var. Partial Differential Equations*, 59 (2020), pp. 39, Paper No. 63
- P. BONICATTO AND N. A. GUSEV, *Non-uniqueness of signed measure-valued solutions to the continuity equation in presence of a unique flow*, *Atti Accad. Naz. Lincei Rend. Lincei Mat. Appl.*, 30 (2019), pp. 511–531
- S. BIANCHINI AND P. BONICATTO, *Failure of the chain rule in the non steady two-dimensional setting*, in *Current research in nonlinear analysis*, vol. 135 of *Springer Optim. Appl.*, Springer, Cham, (2018), pp. 33–60
- S. BIANCHINI, P. BONICATTO, AND N. A. GUSEV, *Renormalization for autonomous nearly incompressible BV vector fields in two dimensions*, *SIAM J. Math. Anal.*, 48 (2016), pp. 1–33

- PROCEEDINGS
- P. BONICATTO AND N. A. GUSEV, *Weak superposition principle for signed measure-valued solutions of the continuity*. Preprint (2021)
 - S. BIANCHINI AND P. BONICATTO, *Untangling of trajectories for non-smooth vector fields and Bressan's Compactness Conjecture*, in Proceedings of the 17-th Conference on Hyperbolic Problems, 2020
 - P. BONICATTO, *On uniqueness of weak solutions to transport equation with non-smooth velocity field*, in Theory, numerics and applications of hyperbolic problems. I, vol. 236 of Springer Proc. Math. Stat., Springer, Cham, (2018), pp. 191–203
 - S. BIANCHINI, P. BONICATTO, AND E. MARCONI, *Lagrangian representations between linear transport and scalar conservation laws*, in Nonlinear analysis in geometry and applied mathematics. Part 2, vol. 2 of Harv. Univ. Cent. Math. Sci. Appl. Ser. Math., Int. Press, Somerville, MA, (2018), pp. 1–22
 - P. BONICATTO AND N. A. GUSEV, *Superposition principle for the continuity equation in a bounded domain*, J. Phys. Conf. Ser., 990 (2018)

Long term visits

- 01/2022-02/2022 **HIM - Hausdorff Research Institute for Mathematics** (Bonn, Germany)
- 10/2016 **Steklov Mathematical Institute** (Moscow, Russian Federation)
- 04/2016-05/2016 **CMSA - Harvard University** (Cambridge, MA - United States of America)

Invited and contributed talks

- 11/2021 *Advection-diffusion equations with rough coefficients: weak solutions and vanishing viscosity*
Online talk, **Convex Integration and Nonlinear PDEs ICMS** Edinburgh (UK)
- 11/2021 *An invitation to Regular Lagrangian Flows (Part I & II)*
Internal seminars, **University of Warwick** (UK)
- 05/2021 *Decomposition of integral metric currents*
Online talk, **University of Padova** (IT), upon invitation by prof. F. Ancona
- 05/2021 *Decomposition of integral metric currents*
Online talk, **University of Trento** (IT), upon invitation by prof. A. Marchese
- 10/2020 *Lagrangian representations in linear transport theory*
Online talk, **University of Warwick** (UK), upon invitation by prof. D. Bate
- 02/2020 *Uniqueness and non-uniqueness phenomena for the transport equation in \mathbb{R}^d*
Seminar, **Sapienza Università di Roma** (Italy), upon invitation by prof. A. Malusa
- 09/2019 *Untangling of trajectories for non-smooth vector fields and Bressan's Compactness Conjecture*
Seminar, **University of Jyväskylä** (Finland), upon invitation by prof. T. Rajala and V. Julin
- 07/2019 *Untangling of trajectories for non-smooth vector fields and Bressan's Compactness Conjecture*
Talk, **ICIAM 2019** Valencia (Spain)
- 06/2019 *On the Superposition Principle for signed measure-valued solutions to the continuity equation*
Talk, **MPDSIDA 2019** Moscow (Russian Federation)

- 06/2019 *Untangling of trajectories for non-smooth vector fields and Bressan's Compactness Conjecture*
Seminar, **Università di Torino** (Italy), upon invitation by prof. A. Capietto
- 05/2019 *On the Superposition Principle for signed measure-valued solutions to the continuity equation*
Talk, **IperPA2019 XVIII Italian Meeting on Hyperbolic Equations** Palermo (Italy)
- 07/2018 *Untangling of trajectories for non-smooth vector fields and Bressan's Conjecture - Part 3*
Invited talk, **International Workshop on Hyperbolic and Kinetic Problems** Academia Sinica, Taipei (Taiwan)
- 07/2018 *Untangling of trajectories for non-smooth vector fields and Bressan's Conjecture - Part 2*
Talk, **12th AIMS Conference on Dynamical Systems, Differential Equations and Applications** Taipei (Taiwan)
- 06/2018 *Untangling of trajectories for non-smooth vector fields and Bressan's Conjecture - Part 1*
Talk, **XVII International Conference on Hyperbolic Problems** Penn State University (USA)
- 06/2018 *Untangling of trajectories for non-smooth vector fields and Bressan's Compactness Conjecture*
Seminar, **Universität Aachen** (Germany), upon invitation by prof. M. Westdickenberg
- 06/2018 *Untangling of trajectories for non-smooth vector fields and Bressan's Compactness Conjecture*
Seminar, **Universität Leipzig** (Germany), upon invitation by prof. L. Székelyhidi Jr.
- 05/2018 *Untangling of trajectories for non-smooth vector fields and Bressan's Compactness Conjecture*
Seminar, **University of Oxford - Mathematical Center** (UK), upon invitation by prof. G.-Q. G. Chen and A. Bressan
- 03/2018 *Untangling of trajectories for non-smooth vector fields and Bressan's Compactness Conjecture*
Seminar, **Universität Zürich** (Switzerland), upon invitation by prof. C. De Lellis
- 09/2017 *A uniqueness result for the decomposition of vector fields in \mathbb{R}^d*
Talk, **IPERPV2017 XVII Italian Meeting on Hyperbolic Equations** Pavia (Italy)
- 10/2016 *Flows of weakly differentiable vector fields*
Seminar, **Moscow State University (MGU)** (Russian Federation), upon invitation by prof. Oleg G. Smolyanov
- 10/2016 *On uniqueness of weak solutions to transport equation with non-smooth velocity field*
Talk, **New Trends in Theoretical and Mathematical Physics** Steklov Institute, Moscow (Russian Federation)
- 08/2016 *On uniqueness of weak solutions to transport equation with non-smooth velocity field*
Talk, **XVI International Conference on Hyperbolic Problems** RWTH, Aachen (Germany)
- 06/2016 *Uniqueness of weak solutions to transport equation with 2D nearly incompressible BV vector field*
Seminar, **Universität Basel** (Switzerland), upon invitation by prof. G. Crippa

Conferences and workshops

Organized conferences are marked with a ★

- 2021 • **Convex Integration and Nonlinear Partial Differential Equations**, Edinburgh (UK)
- 2020 • **Winter School: Turbulence in fluids and PDEs**, EPFL Lausanne, Switzerland

- 2019
 - **ICIAM 2019**, Valencia (Spain)
 - ★ **“GMT and PDEs in Basel – A young researchers meeting”**, local organizer
 - **MPDSIDA**, Moscow Institute of Physics and Technology (Russian Federation)
 - **IPERPA2019 XVIII Italian Meeting on Hyperbolic Equations**, Palermo (Italy)

- 2018
 - **International Workshop on Hyperbolic and Kinetic Problems: Theory and Applications**, Institute of Mathematics Academia Sinica, Taipei (Taiwan)
 - **The 12th AIMS Conference on Dynamical Systems, Differential Equations and Applications**, Taipei (Taiwan)
 - **XVII International Conference on Hyperbolic Problems**, Penn State University, State College (USA)

- 2017
 - **IPERP2017 XVII Italian Meeting on Hyperbolic Equations**, Pavia (Italy)
 - **Workshop “Irregular transport: analysis and applications”**, Basel (Switzerland)

- 2016
 - **New Trends in Theoretical and Mathematical Physics**, Steklov Mathematical Institute of Russian Academy of Sciences, Moscow (Russian Federation)
 - **XVI International Conference on Hyperbolic Problems**, Aachen (Germany)
 - **Admitted to Nonlinear Waves 2016: Summer School**, Institut des Hautes Études Scientifiques, Paris (France)
 - **11th Meeting on Nonlinear Hyperbolic PDEs**, SISSA Trieste (Italy)

- 2015
 - **Winter School in Nonlinear function spaces in Mathematics and Physical Sciences**, École Normale Supérieure Lyon (France)
 - **Workshop Analysis in Lyon**, École Normale Supérieure Lyon (France)
 - **16th Italian Meeting on Hyperbolic Equations**, G.S.S.I. L'Aquila (Italy)
 - **XX Congresso dell'Unione Matematica Italiana (UMI)**, Siena (Italy)
 - **Summer school in Transport, Fluids and Mixing**, Levico Terme (Italy)
 - **Mathematical Thermodynamics of complex fluids**, Convegno C.I.M.E., Cetraro (Italy)

- 2014
 - **Admitted (after international selection among 2000+ candidates) to the 2nd Heidelberg Laureate Forum**, Heidelberg (Germany)
 - **Transport microscales and fluids**, G.S.S.I. L'Aquila (Italy)
 - **First Joint ENS-Lyon - SNS School of Mathematics**, Centro De Giorgi - Scuola Normale Superiore Pisa (Italy)

- 2013
 - **Two days on Hyperbolic PDEs, Geometric Measure Theory and Optimal Transport**, SISSA Trieste (Italy)

- 2010
 - **Admitted to α -Class project**, Summer school organised by Università di Torino and Politecnico di Torino, (Italy)

- 2008
 - **Admitted to (after national selection) 56° Corso di Orientamento**, Scuola Normale Superiore di Pisa (Italy)

Teaching activity

Autumn 2019	Lecturer & Teaching Assistant Undergraduate course “Reelle Analysis” (Basel), with E. Marconi
Autumn 2018	Lecturer & Teaching Assistant Undergraduate course “Reelle Analysis” (Basel), with E. Marconi
Spring 2018	Teaching Assistant (in German) Undergraduate course “Proseminar: (Gegen)Beispiele in der Analysis” (Basel)
Autumn 2017	Teaching Assistant (in German) Undergraduate course “Reelle Analysis” (Basel)

Other activities and skills

- **Referee for several journals, including:**
Differential Integral Equations
Calc. Var. Partial Differential Equations
Comm. Partial Differential Equations
J. Differential Equations
Arch. Ration. Mech. Anal.
Interfaces Free Bound.
- **Organization of the Analysis Junior Seminars at SISSA, Trieste**
Organized 20+ seminars within the SISSA SIAM Chapter, 2017
- **Communication and linguistic skills**
Italian - Native speaker
English - Fluent (FCE, Grade A - 2008)
German - Intermediate (Goethe Zertifikat B1, Ergebnis: 93/100 - 2015)
French - Intermediate (DELF B1, Note Finale: 94,50/100 - 2007)
Russian - Basics
- **IT skills**
L^AT_EX, T_EX - Proficient
Python, JavaScript - Basics
Linux Kernel - Basics
Git - Basics