

DAVIDE BARILARI

APPOINTMENTS

<i>Present position</i>	2020 – now	Professore Associato, UNIVERSITÀ DI PADOVA
		From Sept 2020: Associate Professor at Dipartimento di Matematica “Tullio Levi-Civita”, Università degli Studi di Padova
<i>Previous positions</i>	2013 – 2020	Maître de Conférence, UNIVERSITÉ DE PARIS
		Université de Paris, UFR Math. Laboratoire:IMJ-PRG
<i>PostDoc</i>	2011 – 2013	ERC-CNRS Postdoc, ÉCOLE POLYTECHNIQUE
		ERC-CNRS PostDoc at CMAP, École Polytechnique, Paris - INRIA GECO.

EDUCATION

<i>Ph.D.</i>	2008 – 2011	SISSA, Trieste, Italy
		Ph.D. in Applied Mathematics, SISSA, Trieste, defended on Oct 27, 2011 Supervisor: Andrei Agrachev
<i>Master’s degree</i>	2006 – 2008	Università di Trieste & SISSA, Italy
		Master’s Degree in Mathematics, Università degli Studi di Trieste, July 18, 2008. Diploma Percorso Formativo Comune, SISSA, Trieste. 110/110 cum laude.
<i>Bachelor’s degree</i>	2003 – 2006	Università di Bologna, Italy
		Bachelor’s Degree in Mathematics, 21/07/06 – 110/110 cum laude.

HABILITATIONS AND AWARDS

2020	Italian Habilitation as Full Professor, Sector 01/A3 “Mathematical Analysis”
2018	Italian Habilitation as Full Professor, Sector 01/A2 “Algebra and Geometry”
2012	SISSA Lutman Prize for the Best Ph.D. Thesis in Mathematics

MONOGRAPHS AND BOOKS

1. A. Agrachev, D. Barilari and U. Boscain, *A Comprehensive Introduction to sub-Riemannian geometry*, Cambridge Studies in Advanced Mathematics, Cambridge University Press, 2019, xviii+764 pp.
2. A. Agrachev, D. Barilari and L. Rizzi, *Curvature: a variational approach*. Memoirs of the AMS, 256 (2018), no. 1225, vi+142 pp.
3. A. Agrachev, D. Barilari and U. Boscain, *Introduction to geodesics in sub-Riemannian geometry*, in “Geometry, Analysis and Dynamics in sub-Riemannian manifolds”, vol. II, 1-83, EMS Lecture Notes series (2016)

ACCEPTED PAPERS

4. *On the Hausdorff volume in sub-Riemannian geometry* (with A. Agrachev and U. Boscain). Calculus of Variations and PDE, 43 (2012), no. 3-4, 355-388.
5. *Sub-Riemannian structures on 3D Lie groups* (with A. Agrachev). Journal of Dynamical and Control Systems (2012), v.18, 21-44.
6. *Trace heat kernel asymptotics in 3D contact sub-Riemannian geometry*. Journal of Mathematical Sciences, 195 (2013), no. 3, 391-411.
7. *On 2-step, corank 2 sub-Riemannian metrics* (with U. Boscain and J.P. Gauthier). SIAM, Journal of Control and Optimization, 50 (2012), no. 1, 559-582.
8. *Small time asymptotics for heat kernel at the sub-Riemannian cut locus* (with U.

- Boscain and R.W. Neel). *Journal of Differential Geometry*, 92 (2012), no.3, 373-416.
9. *Small time heat kernel asymptotics at cut-conjugate points on 2-spheres of revolution* (with J. Jendrej). *Ann. Inst. Henri Poincaré-Anal. Non Linéaire* 31 (2014), pp. 281-295.
 10. *A formula for Popp's volume in sub-Riemannian geometry* (with L. Rizzi). *Analysis and Geometry in Metric Spaces*, 1 (2014), 42-57.
 11. *Comparison theorems for conjugate points in sub-Riemannian geometry* (with L. Rizzi). *ESAIM: COCV* v.22, n.2 (2016) 439-472.
 12. *Sub-Riemannian curvature in contact geometry* (with A. Agrachev, L. Rizzi). *The Journal of Geometric Analysis* (2017) 27: 366-408.
 13. *On the heat diffusion at the cut locus for generic Riemannian and sub-Riemannian structures* (with U. Boscain, G. Charlot and R. Neel). *Int Math Res Notices* (2017) 15: 4639-4672.
 14. *Sub-Finsler geometry from the time-optimal control viewpoint for some nilpotent distributions* (with U. Boscain, E. Le Donne and M. Sigalotti). *J. Dynamical and Control Systems* (2017) 23: 547-575.
 15. *On Jacobi fields and canonical connection in sub-Riemannian geometry* (with L. Rizzi). *Archivum Mathematicum*, 53 (2017), 77-92.
 16. *Curvature terms in small time heat kernel expansion for a model class of hypoelliptic Hörmander operators* (with E. Paoli). *Nonlinear Analysis*, 164 (2017) 118-134.
 17. *Heat kernel asymptotics on sub-Riemannian manifolds with symmetries and applications to the bi-Heisenberg group* (with U. Boscain and R.W. Neel). *Annales Faculté Sciences Toulouse*, accepted.
 18. *Sharp measure contraction exponent for generalized H-type groups* (with L. Rizzi). *Communications in Contemporary Mathematics*, 20 (2018), no. 06, 1750081.
 19. *On the points of smoothness of the value function for affine optimal control problems* (with F. Boarotto). *SIAM, Journal of Control and Optimization*, 56 (2018), no. 2, 649-671.
 20. *Kolmogorov-Fokker-Planck operators in dimension two: heat kernel and curvature* (with F. Boarotto), *Journal of Evolution Equations*, 18 (2018), no. 3, 1115-1146.
 21. *Volume geodesic distortion and Ricci curvature for Hamiltonian dynamics* (with A. Agrachev and E. Paoli). *Annales de l'Institut Fourier*, 69 (2019) no. 3, 1187-1228.
 22. *Sub-Riemannian interpolation inequalities* (with L. Rizzi). *Inventiones Mathematicae*, 215 (2019), no 3, 977-1038.
 23. *On the regularity of abnormal minimizers for rank 2 sub-Riemannian structures* (with Y. Chitour, F. Jean, D. Prandi, M. Sigalotti). *Journal of Mathématiques Pures et Appliquées*, online (2019).
 24. *Volume of small balls and sub-Riemannian curvature in 3D contact manifolds* (with I. Beschastnyi, A. Lerario). *Journal of Symplectic Geometry*, 18 (2020), no. 2.
 25. *A Bonnet-Myers theorem for quaternionic contact structures* (with S. Ivanov). *Calculus of Variations and PDE*, (2019) 58: 37.
 26. *Bakry-Émery curvature and model spaces in sub-Riemannian geometry* (with L. Rizzi). *Mathematische Annalen*, 377 (2020), 435-482.
 27. *On the geodesic curvature in 3D contact sub-Riemannian geometry* (with M. Kohli). *Advances in Calculus of Variations*, to appear.
 28. *Strichartz estimates and Fourier restriction theorems in the Heisenberg group* (with H. Bahouri and I. Gallagher). *Journal of Fourier Analysis and Applications*, 27, 21 (2021).
 29. *Stochastic processes on surfaces in 3D contact sub-Riemannian manifolds* (with U. Boscain, D. Cannarsa, K. Habermann). *Annales IHP Probabilité et Statistiques*, to appear.
 30. *On the induced geometry on surfaces in 3D contact sub-Riemannian manifolds* (with U. Boscain, D. Cannarsa). Preprint ArXiv.

RESEARCH TEAMS, GRANTS AND PROJECTS

- 2018 P.I. of French PEPS JCJC project “Courbure en géométrie sous riemannienne”.
- 2017 Member of French PEPS project “Transport optimale en géométrie sous riemannienne” (with Roberta Ghezzi (P.I.) and Luca Rizzi)
- 2017 – 2019 Member of the French-Chinese “COSTAGE” CNRS-NSFC project 271392 “Maximum Principle and Sensitivity Relations in Stochastic Optimal Control” (P.I. Helene Frankowska), Ref. PRC1451.
- 2015 – 2020 Member of the ANR project SRGI “Sub-Riemannian geometry and interactions” (P.I. Emmanuel Trélat) Contract number ANR-15-CE40-0018

INVITED (MINI)-COURSES AND COLLOQUIUMS

- 2021 A Topological Theory of Tangent Distributions, Leiden, Sept 2021.
“Sub-Riemannian curvature in 3D contact manifolds” (2 lectures)
Scuola Galileiana and PhD in Mathematics, Padova, March 2021.
“Topics in sub-Riemannian Geometry” (7 lectures)
- 2019 Journées de rentrée, Fondation Hadamard, IHES, Sept 2019.
“The geometry of the Heisenberg group” (3 lectures)
- 2016 Mathematics-Physics Colloquium, Leibniz Universität Hannover, Oct 2016.
“From thermodynamics to image reconstruction: an invitation to SR geometry”
- 2015 Mathematical Sciences Colloquium, Florida Atlantic University, Sept 2015.
“The geometry of the isoperimetric problem and beyond”
Rencontres Mathématiques de Rouen, Rouen, June 2015.
Minicourse on “Introduction to geodesics in sub-Riemannian geometry” (2 lectures)

INVITED TALKS IN CONFERENCES (LAST 5 YEARS)

- 2022 SR Geometry and Interactions, AMS-SMF-EMS Meeting, Grenoble, Jul 2022.
- 2021 Stochastic Differential Geometry and Mathematical Physics, Rennes, Jun 2021.
Variational and PDE problems in Geometric Analysis, III, Bologna, May 2021.
- 2020 Workshop “Geometry and Analysis in Control Theory”, Padova, Apr 2020.
Dispersive and subelliptic PDEs, Centro Ennio De Giorgi, Pisa, Feb 2020.
- 2019 New trends in Hamilton-Jacobi: PDE, Control and Geometry, Shangai, Jul 2019.
AMS meeting “SR and CR geometric analysis”, Connecticut, USA, Apr 2019.
Sub-Riemannian Geometry and Beyond, II, Jyväskylä, Finland, Feb 2019.
- 2018 Analysis, Control and Inverse Problems for PDE, Napoli, Italy, Nov 2018.
Analysis and PDEs, Hannover, Germany, Oct 2018.
Riemannian Geometry and Generalized Functions, Paris, Oct 2018.
The Cut Locus 2018, Sapporo, Japan, Sept 2018.
Workshop in sub-Riemannian geometry and Topolò(gy), Topolò, Italy, Jun 2018.
New trends in Control of Evolution Equations, GSSI, L’Aquila, Italy, Apr 2018.
- 2017 Mathematical Control Theory, Porquerolles, France, Jun 2017.
- 2016 New trends in semiclassical analysis, Domaine de Chalès, France, Dec 2016.
Singular phenomena and singular geometry, Pisa, Italy, Oct 2016.
Geometric Analysis in Control & Vision, Bergen-Voss, Norway, May 2016.
Three days in evolution PDE’s, Salerno, Italy, April 2016

INVITED SEMINARS (LAST 5 YEARS)

- 2021 Online “Analysis and Differential Geometry Seminar”, Aveiro Univ., Apr 2021.
Online “Symplectic geometry seminar”, Heidelberg University, Feb 2021
- 2020 Online Seminar at Nanjing University, China, Dec 2020.

- Online “Geometric Control Seminar”, Moscow University, Russia, May 2020.
 Séminaire “Géométrie, Dynamique, Topologie”, Univ. Aix-Marseille, Jan 2020.
 Oberseminar “Geometrie, Topologie und Analysis”, Koln University, Jan 2020
 Séminaire “EDP-Analyse”, Univ. Lyon 1, Jan 2020.
- 2019 Séminaire “Géométrie et Topologie”, Sorbonne Université, Dec 2019.
 Analysis Seminar, WPI, Worchester, USA, Apr 2019.
 GdT Contrôle du LJLL, Sorbonne Université, Mar 2019.
- 2018 Seminar of Mathematics, Università di Padova, Oct 2018.
 CalVa Seminar Paris, Université Paris Dauphine, Mar 2018.
- 2017 Analysis Seminar, SISSA, Nov 2017.
 Analysis Seminar, Warwick University, Oct 2017.
 Mathematics Seminar, Sichuan University, Chengdu, China, Oct 2017.
 Séminaire d’Analyse Fonctionnelle, UMPC, Paris, June 2017.
 Seminar of Mathematics, NUI Galway, Ireland, May 2017.

ORGANIZATION OF SCIENTIFIC EVENTS

- 2022 Organizer of the conference “Geometry and Control in Florence” (with U. Boscain, D. Prandi, L.Rizzi.), March, 2022, Florence.
 Website: [TBA](#)
- 2021 Organizer of the conference “PaPa Padua Paris Seminar” (with V. Franceschi, R. Monti, M. Sigalotti), Sept 6-7, 2021, Padova.
 Web: sites.google.com/site/franceschivale/workshops-seminars/papa
- 2020 Organizer of the conference “Sub-Riemannian Geometry and Interactions” (with U. Boscain, Y. Chitour, D. Prandi, E. Trélat, L.Rizzi.), Sept 7-11, 2020, Paris.
 Website: www.ljll.math.upmc.fr/~trelat/SRGI/SRGI_conference.html
- 2012 – 2020 Organizer of the “Séminaire de géométrie sous-riemannienne” at IHP, Paris till 2019, at LJLL in 2020
webusers.imj-prg.fr/~davide.barilari/seminar.php
- 2017 Organizer of conference “From students to mathematicians: an excellence Master program in Trieste” (with U.Bruzzo, G.Dal Maso, D.Del Santo, F.Fanelli, A.Lerario, E.Mezzetti, F.Sala), June 14-16, 2017, UniTS/SISSA, Trieste.
 Website: http://math.univ-lyon1.fr/~fanelli/PFC/pfc_conf.html
- 2014 Organizer of the “IHP Trimester on Geometry, Analysis and Dynamics on sub-Riemannian manifolds” (with A. Agrachev, U. Boscain, M. Sigalotti, F. Jean, L. Rifford, Y. Chitour), Paris, Sept 1-Dec 14, 2014.
 Website: <http://www.cmap.polytechnique.fr/subriemannian/>
- 2014 Member of the Program Committee of the “International Youth Conference Geometry & Control”, Moscow, 14-18 Apr, 2014.
 Website: http://gc2014.mi.ras.ru/index_e.html
- 2012 Organizer of the “INDAM Meeting on Geometric Control and Sub-Riemannian Geometry”, Cortona, May 2012. (with U. Boscain, D. Prandi, A. Sarychev, M. Sigalotti, G. Stefani)
 Website: <http://www.cmap.polytechnique.fr/geometric-control-srg/>

SUPERVISION ACTIVITY (LAST 5 YEARS)

- 2020 – now Tania Bossio, PhD Thesis, Università degli Studi di Padova.
- 2018 – 2021 Daniele Cannarsa, PhD Thesis “MathInnov”, Université Paris Diderot. (co-advised with Ugo Boscain 50%)
- 2016 – 2019 Mathieu Kohli, PhD, Paris Saclay. (co-advised with Ugo Boscain 50%)
 “On geodesic curvature in sub-Riemannian geometry”.
- 2020 Hyppolite Charvin, Stage M2, Université Paris Diderot, Feb-Jun 2020.
 “Hallucinations and visual cortex”.
- 2018 Daniele Cannarsa, Stage M2, Université Paris Diderot, Feb-Jun 2018.

PARTICIPATION IN JURY

- 2018 Jury member for the PhD thesis of Lorenzo Pinna
University Rome La Sapienza, Italy 26/01/2018.
- 2017 Referee and External examiner for the Master thesis of Stine Marie Eik
Bergen University, Norway 08/06/2017.
Referee and jury member for the PhD Thesis of Stefano Biagi
Università di Bologna, Italy 09/05/2017.
- 2015 Referee and jury member for the PhD Thesis of Pavel Silveira,
SISSA, Trieste, 26/10/2015.

PARTICIPATION IN HIRING COMMITTEES

- 2021 Member of the selection committee, "Laurea Magistrale SISSA".
SISSA. June 2021
- 2020 Member of a hiring committee, "RTDA in Analisi Matematica".
Università dell'Aquila. March 2020
- 2018 Vice-président and member of the MCF hiring committee, "Analyse et EDP".
Université Paris Diderot. May 2018
- 2017 Vice-président and member of the MCF hiring committee, "Géométrie et
Dynamique". Université Paris Diderot. May 2017
- 2015 Member of the MCF hiring committee, "Géométrie et Dynamique".
Université Paris Diderot. May 2015

EDITORIAL ACTIVITY

- 2015 Editor of the EMS Series of Lecture notes (with. U. Boscain and M. Sigalotti)
"IHP Trimester on Geometry, Analysis and Dynamics on sub-Riemannian
manifolds." Volume I and II .
- 2011 – now Referee activity for 3 books and referee for more than 30 international journals
(JAMS - Invent. Math. - Adv. in Math - JDG - JGEA - CPAM - Annales ENS -
Annali SNS - Math. Z - JDEQ - JIMJ - JMPA - Trans AMS - JGP - Proc AMS etc.)

TEACHING AT UNIVERSITÀ DEGLI STUDI DI PADOVA

- 2020 – now Topics in sub-Riemannian geometry, Scuola Galileiana & Phd (15h, 2021)
Differential Geometry, LM-Math (64h, 2020, 2021)
Analisi Matematica 1, LT-Info (64h, 2020), LT-Phys (64h, 2021)

TEACHING AT UNIVERSITÉ PARIS DIDEROT

- 2013 – 20 Introduction à la géométrie sous-riemannienne, M2Math (36h - 2018)
Équations Différentielles, L3Math (40 h - 2017, 2018, 2019)
Analyse Elementaire II, L1Math (81h - 2014, 2015, 2016)
Algèbre et Analyse Elementaire I, L1Math (56h - 2019)
Préparation à l'oral du CAPES (15h - 2017, 2018; 30h - 2019)
Équations Différentielles pour biologistes, L2Bio (50h - 2014, 2015, 2016)
Micro-économie de l'assurance, M2ISIFAR (45h - 2020)
(TD) Théorie de la mesure, Intégration, Séries de Fourier, L3Math (27h - 2020)
(TD) Géométrie Différentielle, M1Math (36 h - 2016, 2017, 2018)
(TD) Algèbre et Analyse Elementaire II, L1Info (54 h - 2019)
(TD) Équations Différentielles, L3Math (40 h - 2014, 2015, 2016)
(TD) Systèmes Dynamiques: Stabilité et Commande (at ENSTA, 12h - 2012)
Projets et Interrogations Orales, L1Math (24h - 2017, 2019)

September 14, 2021