

Dario Prandi

date of birth

04 sep 1986

contacts

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languages

italian mother tongue
english fluent
french fluent
german notions

programming

Python, Julia,
Haskell, C++, Mathematica,
Latex, HTML5, Linux

research field

neuro-geometry of vision and image processing, geometric control theory, motion planning, sub-Riemannian geometry, diffusions and stochastic processes on manifolds with singularities.

positions

From oct 2016 **Chargé de Recherche CR2** CNRS at L2S CentraleSupélec
2015 – oct 2016 **Post-doctorat** CNRS at CEREMADE Université Paris-Dauphine
Supervisors: G. Peyré and J.-M. Mirebeau
2014 – 2015 **Post-doctorat** of LabEx Archimede (Aix-Marseille Université) Université de Toulon
Supervisor: J.-P. Gauthier

education

2010 – 2014 **Ph.D.** in Mathematics École Polytechnique, Paris
Thesis: Geometry and analysis of control-affine systems: motion planning, heat and Schrödinger evolution.
Advisor: U. Boscain, Co-advisors: F. Jean & M. Sigalotti
2008 – 2010 **Master M2 in Mathematics with 110/110 cum laude** Università di Padova
Thesis: Rearrangements in Metric Spaces
Advisor: R. Monti
2005 – 2008 **B.Sc. in Mathematics with 110/110 cum laude** Università di Modena e Reggio Emilia
Thesis: Area and Coarea Formulae
Advisor: G. P. Leonardi
2005 **Italian high school diploma** Liceo R. Corso, Correggio, Italy
Specialization in scientific disciplines

grants and awards

2016 **PEPS Blanc INS2I Project**
"Cortical Inspired Non-holonomic Control for Imaging (CINCIN)"
2016 **ERC Proof of Concept**
"An artificial visual cortex for image processing (ARTIV1)"
2016 **BOUM SMAI Project for young researchers**
"Quantum confinement and spectral properties of singular operators"
2015 **BOUM SMAI Project for young researchers**
"Formule de Santalò en géométrie sous-riemannienne et applications"
2009 **Premio di Studio della Fondazione Cassa di Risparmio di Carpi**
Study prize for the results obtained in the undergraduate studies.

supervising activities

- Co-advisor for the thesis of A. Bohi, Univ. of Toulon
- L. Suriano, INRIA Saclay engineer supervised in collaboration with M. Sigalotti

publications

papers in refereed journals

A sub-Riemannian Santaló formula with applications to isoperimetric inequalities and Dirichlet spectral gap of hypoelliptic operators

Dario Prandi, Luca Rizzi, Marcello Seri

To appear on Journal of Differential Geometry (2017)

[arXiv: 1507.06617 (math.DG)]

Fourier Descriptors Based on the Structure of the Human Primary Visual Cortex with Applications to Object Recognition

Amine Bohi, Dario Prandi, Vincente Guis, Frédéric Bouchara, Jean-Paul Gauthier

Journal of Mathematical Imaging and Vision (2016) pp. 1–17

[arXiv: 1507.06617 (cs.CV)]

Spectral analysis and the Aharonov-Bohm effect on certain almost-Riemannian manifolds

U. Boscain, D. Prandi, M. Seri

Comm. Partial Differential Equations 41.1 (2016) pp. 32–50

[arXiv: 1406.6578 (math.SP)]

Self-adjoint extensions and stochastic completeness of the Laplace-Beltrami operator on conic and anticonic surfaces

Ugo Boscain, Dario Prandi

J. Differential Equations 260.4 (2016) pp. 3234–3269

[arXiv: 1305.5271 (math.AP)]

Complexity of control-affine motion planning

Frédéric Jean, Dario Prandi

SIAM J. Control Optim. 53.2 (2015)

[arXiv: 1305.2571 (math.OC)]

Hölder equivalence of the value function for control-affine systems

Dario Prandi

ESAIM: COCV 20.4 (2014) pp. 1224–1248

[arXiv: 1304.6649 (math.OC)]

conference proceedings

Image processing in the semidiscrete group of roto-translations

Dario Prandi, Ugo Boscain, Jean-Paul Gauthier

2nd Conference on Geometric Science of Information, 2015, Paris–Saclay

<http://www.darioprandi.com/docs/papers/GSI15.pdf>

Image reconstruction via non-isotropic diffusion in Dubins/Reed-Shepp-like control systems

Ugo Boscain, Jean-Paul Gauthier, Dario Prandi, Alexey Remizov

53rd IEEE Conference on Decision and Control, 2014, Los Angeles

<http://www.darioprandi.com/docs/CDC-mumford.pdf>

preprints

On the essential self-adjointness of sub-Laplacians

Valentina Franceschi, Dario Prandi, Luca Rizzi

[arXiv: 1708.09626 (math.DG)]

A semidiscrete version of the Petitot model as a plausible model for anthropomorphic image reconstruction and pattern recognition

Dario Prandi, Jean-Paul Gauthier

[arXiv: 1704.03069 (cs.CV)]

Generalized Fourier-Bessel operator and almost-periodic interpolation and approximation

Jean-Paul Gauthier, Dario Prandi

[arXiv: 1612.00056 (cs.CV)]

Highly corrupted image inpainting through hypoelliptic diffusion

Roman Chertovskih, Jean-Paul Gauthier, Dario Prandi, Alexey Remizov

<http://www.darioprandi.com/docs/papers/inpainting.pdf>

organization of conferences and seminars

28 nov 2017	Cortical Inspired Non-holonomic Control for Imaging	IHP, Paris
	Workshop co-organised with L. Calatroni and V. Franceschi	
oct 2016 - pres	Séminaire d'Automatique du Plateau de Saclay	L2S, CentraleSupélec
	Website: https://icode-seminars.github.io	
2 may 2017	A day in control theory	CMAP, École Polytechnique
	Thematic day in honour of A. Agrachev 65th birthday	
9 dec 2015	Journée "Propriétés spectrales des opérateurs hypoelliptiques"	IHP, Paris
	Website: http://webusers.imj-prg.fr/davide.barilari/seminar.php	
21-25 may 2012	INDAM meeting on Geom. Control and sub-Riemannian Geom.	Cortona, Italy
	Website: http://www.cmap.polytechnique.fr/geometric-control-srg/	

teaching

2017	Analyse et Topologie (CM and TD, 60h)	PSL Research University, Paris
	L2 students at CPES	
2016	Analyse et Topologie (CM and TD, 60h)	PSL Research University, Paris
	L2 students at CPES	
2016	Contrôle geometrique (TD, 10h)	Paris-Sud Orsay
	M2 Equations aux dérivées partielles et au calcul scientifique	
2015	Analyse et Topologie (CM and TD, 56h)	PSL Research University, Paris
	L2 students at CPES	
2014	Outils Logiciels (TP, 18h)	IUT Toulon
	2nd year students of DUT Génie Industriel et Maintenance	
2014	Outils Logiciels (TP, 32h)	IUT Toulon
	1st year students of DUT Génie Electrique et Informatique Industrielle	
2013	Contrôle geometrique (TD, 10h)	Paris-Sud Orsay
	M2 Equations aux dérivées partielles et au calcul scientifique	

talks in international conferences

24 nov 2017	Delays and constraints in distributed parameter systems	Gif-sur-Yvette, France
	Anthropomorphic image reconstruction via sub-Riemannian geometry and hypoelliptic diffusion	
22 aug 2017	VII Partial differential equations, optimal design and numerics	Benasque, Spain
	Quantum confinement and spectral analysis of degenerate operators on Riemannian manifolds	
11 may 2016	Geometric Analysis in Control and Vision Theory	Voss, Norway
	A variational formulation of the sub-Riemannian model of the primary visual cortex	
30 oct 2015	2nd Conference on Geometric Science of Information	École Polytechnique, Palaiseau
	Image processing in the semidiscrete group of rototranslations	
28 oct 2015	PGMO Days 2015	ENSTA ParisTech, Palaiseau
	A sub-Riemannian Santaló formula with applications to isoperimetric inequalities and Dirichlet spectral gap of hypoelliptic operators	
15 jan 2015	Thematic programme ``Infinite-dimensional Riemannian geometry with applications to image matching and shape analysis''	Schrödinger Insitute, Vienne, Autriche
	Reconstruction and pattern recognition via the Petitot model of the primary visual cortex	
03 dec 2014	Thematic day on Analysis and geometry of almost-Riemannian manifolds	IHP, Paris
	Self-adjointness of intrinsic diffusions in almost-Riemannian structures	
06 nov 2014	Thematic day on Hypoelliptic diffusion: analysis and control	IHP, Paris
	Intrinsic hypoelliptic diffusions in sub-Riemannian and almost-Riemannian geometry	

02 jul 2014	First International Joint Meeting Spectral properties and Aharonov-Bohm effect on Grushin-like structures	Bilbao, Spain
17 apr 2014	Geometry and Control The Laplace-Beltrami operator on conic and anti-conic surfaces	Steklov Institute, Moscow, Russia
02 apr 2014	Control of PDEs Heat and Schrödinger equation on conical and anticonical-type manifolds	CNAM, Paris
05 12 2013	Mathematical Control in Trieste Complexity in control-affine systems	SISSA, Trieste
31 may 2013	Conical Intersections in Mathematical Physics Dynamics of a quantum particle on a conical-like surface	IHP, Paris, France
19 apr 2013	Non Linear Control: Geometric Methods and Applications The Laplace-Beltrami operator on conic-type surfaces	Firenze, Italy

other talks

30 nov 2017	Séminaire de Théorie spectrale et géométrie Loi de Weyl avec reste et estimés du noyau de la chaleur sur variétés riemanniennes non-completes	Insitut Fourier, Grenoble
09 nov 2017	Séminaire d'Analyse Sur le caractère auto-adjoint et la théorie spectrale des opérateurs de type Hörmander singuliers	U. de Tours
04 oct 2017	Séminaire de Géométrie sous-riemannienne Quantum confinement and spectral theory of (sub-)Laplacians	IHP, Paris
02 mar 2017	25e colloque Jeunes Chercheurs Alain Bouyssy Quantum confinement in non-complete Riemannian manifolds	U. Paris-Sud Orsay
11 feb 2016	Seminario FIM Neuro-geometry of vision and applications to image processing	U. Modena e Reggio Emilia
26 nov 2015	Séminaire "Analyse numérique et EDP" A variational formulation of the sub-Riemannian model for the primary visual cortex	U. Paris-Sud Orsay
19 jan 2015	Séminaire "Statistique et imagerie" Reconstruction and pattern recognition via the Citti-Petitot-Sarti model	U. Paris-Dauphine, Paris
19 jan 2015	Séminaire "Statistique et imagerie" Reconstruction and pattern recognition via the Citti-Petitot-Sarti model	U. Paris-Dauphine, Paris
30 jan 2014	Séminaire de Théorie du Contrôle de Toulon Complexity of control-affine motion planning	IUT, Toulon
18 dec 2013	Gdt Problèmes spectraux et physique mathématique The heat and Schrödinger equations on conic and anticonic-type	U. Paris-Sud Orsay, Paris
02 oct 2013	Seminaire de géométrie sous-riemannienne Complexity of control-affine motion planning	IHP, Paris
27 sep 2013	A Geometry Day in Bicocca The heat and Schrödinger equations on conic and anticonic-type surfaces	Milan
25 jun 2012	Journée GECO Complexity in affine control systems	UPMC, Paris, France
19 apr 2012	Functional Analysis sector's seminar Complexity in affine control systems	SISSA, Trieste, Italy

posters

- 10 nov 2015 **Conference "Contrôle des EDP et applications"** CIRM, Marseille
Hardy-type inequalities and spectral bounds for hypoelliptic operators of Hörmander type
http://dprn.github.io/docs/posters/poster_cirm.pdf
- 23 oct 2014 **Workshop on Geometrical Models in Vision** IHP, Paris
Highly corrupted image inpainting through hypoelliptic diffusion
http://dprn.github.io/docs/posters/poster_reconstr.pdf

other conferences

- sep–dec 2014 **IHP Trimester on sub-Riemannian Geometry** IHP, Paris
- 05-09 nov 2012 **Contrôle des EDP, interactions et enjeux applicatifs** CIRM, Luminy, France
- 03-07 sep 2012 **New Trends in Optimal Control** Ravello, Italy
- 02-05 jul 2012 **Sub-Riemannian Geometry and PDEs** Levico, Italy
- 20-24 jun 2011 **Seventh School on Analysis and Geometry in Metric Spaces** Levico, Italy
- 05-10 jun 2011 **Calculus of Variations, Continuum Mechanics and Geom. Ineq.** Ischia, Italy
- 30-31 may 2011 **Workshop on Control and Topology** Topolò, Italy

referee activities

Journal of Mathematical Imaging and Vision, SIAM Journal on Control and Optimization, ESAIM: Control, Optimisation and Calculus of Variations, European Journal of Control, IEEE Transactions on Automatic Control, IEEE Conference on Decision and Control.

language certificates

nov 2009 **TOEFL iBT Test with 110/120**

other activities

may 2013 **Jury member for the TFJM²**
Tournoi Français des Jeunes Mathématiciennes & Mathématiciens