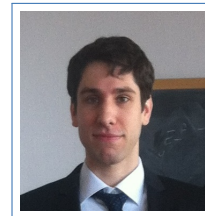


# Luca Rizzi

## Curriculum Vitae

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🌐 <http://rizzilu.perso.math.cnrs.fr/>  
Nationality: Italian



## Positions

- from Oct. 16 **CNRS Research Fellow**, *Institut Fourier, Grenoble*.  
June 14–Sep. 16 **Postdoc fellow**, *CMAP, École Polytechnique*.

## Education

- 29 May 14 **Ph.D. cum laude in geometry**, *SISSA - International School for Advanced Studies, Trieste*.  
○ Thesis: *The curvature of optimal control problems and applications to sub-Riemannian geometry*  
○ Adviser: Prof. Andrei A. Agrachev  
○ Referees: Prof. L. Rifford, Prof. U. Boscain  
○ SISSA Lutman Prize for the Best Ph.D. Thesis in Mathematics
- April 10 **MSc in Physics, 110/110 cum laude**, *Universitas Studiorum Insubriae, Como*.  
○ Thesis: *Dielectric black holes and analogue Hawking radiation*  
○ Advisers: Prof. S. Cacciatori, Prof. V. Gorini, Prof. Francesco Belgiorno
- Dec. 06 **BSc in Physics, 110/110 cum laude**, *Universitas Studiorum Insubriae, Como*.  
○ Thesis: *Hyperbolically symmetric vacuum solutions of Einstein's Field Equations*  
○ Advisers: Prof. V. Gorini, Prof. S. Cacciatori

## Research interests

Riemannian and sub-Riemannian geometry, curvature, geometric control theory, hypoelliptic diffusion, optimal transport, quantum completeness for Schrödinger operators

## Awards and fellowships

- 2017 Recipient of the Elsevier Mathematical Sciences Sponsorship Fund 2017 for young researchers  
2016-19 Prime d'Encadrement Doctoral et de Recherche (PEDR)  
2015 SISSA Lutman Prize for the Best Ph.D. Thesis in Mathematics  
2010–2014 PhD fellowship SISSA

## Grants

- 2017 Member of the PEPS: *Transport optimal en géométrie sous-riemannienne*  
2017-18 PI of the IRS project: *Spectral Geometry of Singular Structures*, IRS IDEX Université Grenoble Alpes  
2015-19 Member of the ANR project SRGI  
2015-17 PI of the PGMO project: *sub-Riemannian geometry and geometric optimal control*, financed by the Fondation Jacques Hadamard (with M. Sigalotti)  
2015-16 PI of the SMAI project "BOUM" for young mathematicians (with D. Prandi and M. Seri)  
2015 Grant "Research in Paris" for a research period at the IHP, with D. Prandi and M. Seri (3 weeks)  
2013 Grant INDAM GDRE-CONEDP for a research visit at the IHP (2 weeks)  
2013 Grant "Research in Paris" for a research period at the IHP, with D. Barilari (5 weeks)

## PhD students

- 2015 **Pavel Silveira**, co-advisor with A. Agrachev, *SISSA*, defended on the 26th Oct. 2015.

## Published or accepted papers

- 1 **Curvature: a variational approach**, with A. Agrachev and D. Barilari.  
Memoirs of AMS (in press), arXiv:1306.5318, 120 pages

- 2 **Comparison theorems for conjugate points in sub-Riemannian geometry**, with D. Barilari.  
ESAIM Control Optim. Calc. Var. 22 (2016), no. 2, 439–472, arXiv:1401.3193, 36 pages
- 3 **On conjugate times of LQ optimal control problems**, with A. Agrachev and P. Silveira.  
J. Dyn. Control Syst. 21 (2015), no. 4, 625–641, arXiv:1311.2009, 14 pages
- 4 **A formula for Popp’s volume in sub-Riemannian geometry**, with D. Barilari.  
Anal. Geom. Metr. Spaces 1 (2013), 42–57, arXiv:1211.2325, 16 pages
- 5 **How many geodesics joint two points on a contact sub-Riemannian manifold?**, with A. Lerario.  
J. Symp. Geometry 15 (2017), no. 1, 247–305, arXiv:1405.4294, 36 pages
- 6 **Sub-Riemannian curvature in contact geometry**, avec A. Agrachev et D. Barilari.  
J. Geom. Anal. 27 (2017), no. 1, 366–408, arXiv:1505.04374, 31 pages
- 7 **Measure contraction properties of Carnot groups**.  
Calc. Var. Partial Differential Equations 55 (2016), no. 3, Paper No. 60, arXiv:1510.05960, 17 pages
- 8 **On the cut locus of free, step two Carnot groups**, with U. Serres.  
Proceedings of the AMS (in press), arXiv:1610.01596, 13 pages
- 9 **On Jacobi fields and canonical connection in sub-Riemannian geometry**, with D. Barilari.  
Arch. Math., 53 (2017), no. 2, 77–92, arXiv:1506.01827, 13 pages
- 10 **Intrinsic random walks and sub-Laplacians in sub-Riemannian geometry**, with U. Boscain and R. Neel.  
Adv. Math. 314, 124–184, arXiv:1503.00725, 36 pages
- 11 **Intrinsic random walks in Riemannian and sub-Riemannian geometry via volume sampling**, with A. Agrachev, U. Boscain and R. Neel.  
ESAIM Control Optim. Calc. Var. (in press), arXiv:1601.03304, 32 pages
- 12 **Sub-Riemannian Ricci curvatures and universal diameter bounds for 3-Sasakian manifolds**, with P. Silveira.  
J. Inst. Math. Jussieu (in press), arXiv:1509.05415, 33 pages
- 13 **A sub-Riemannian Santaló formula with applications to isoperimetric inequalities and first Dirichlet eigenvalue of hypoelliptic operators**, with D. Prandi and M. Seri.  
J. Diff. Geom. (in press), arXiv:1509.05410, 33 pages
- 14 **Quantum confinement on non-complete Riemannian manifolds**, with D. Prandi and M. Seri.  
J. Spectr. Theor. (in press), arXiv:1609.01724, 40 pages
- 15 **Sharp measure contraction property for generalized H-type Carnot groups**, with D. Barilari.  
Communications in Contemporary Mathematics (in press), arXiv:1702.04401, 17 pages

## Submitted papers

- 16 **Sub-Riemannian interpolation inequalities: ideal structures**, with D. Barilari.  
arXiv:1705.05380, 45 pages
- 17 **On the essential self-adjointness of sub-Laplacians**, with D. Prandi and V. Franceschi.  
arXiv:1708.09626, 21 pages

## Published papers (physics)

- 18 **Dielectric black holes induced by a refractive index perturbation and the Hawking effect**, with F. Belgiorno et al., Phys. Rev. D 83, 024015 (2011).
- 19 **Hawking radiation from ultrashort laser pulse filaments**, with F. Belgiorno et al., Phys. Rev. Lett. 105, 203901 (2010), more than 170 citations.
- 20 **Spacetime geometries and light trapping in travelling refractive index perturbations**, with F. Belgiorno et al., New J. Phys. 12 095021 (2010).
- 21 **Dark matter effects in vacuum spacetime**, with S. Cacciatori et al., Phys. Rev. D 82, 027301 (2010).
- 22 **The Step-Harmonic Potential**, with O.F. Piattella et al., Am. J. Phys. Volume 78, Issue 8 (2010).
- 23 **Scattering and delay time for 1D asymmetric potentials: the step-linear and the step-exponential cases**, with O.F. Piattella et al., “Revista Brasileira de Ensino de Física” (2016).

## Invited seminars and conferences

- Feb. 18 **University of Jyväskylä**, Conference: Sub-Riemannian geometry and beyond.  
TBA
- Oct. 17 **Max-Planck Institute for Mathematics**, Bonn, Metric Measure Spaces and Ricci Curvature.  
Sub-Riemannian interpolation inequalities

- Sept. 17 **Château de la Baume, Seyssins**, Journée de la rentrée de l'Institut Fourier.  
*Quelques aspect de geometrie sous-riemannienne (exposé grand public)*
- Apr. 17 **IHP, Paris**, Sub-Riemannian geometry seminars.  
*Sub-Riemannian interpolation inequalities*
- Mars 17 **Universität Bern, Switzerland**, Geometric Analysis Seminars.  
*Sub-Riemannian interpolation inequalities*
- Dec. 16 **Institut Fourier, Grenoble**, Séminaire de théorie spectrale et géométrie.  
*The geodesic dimension of metric measure spaces*
- Dec. 16 **Universität Bern, Switzerland**, Mathematical Colloquium.  
*Some topics in sub-Riemannian geometry*
- Dec. 16 **Domaine de Chalès, France**, Conference: New trends in semiclassical analysis.  
*Confinement quantique sur variétés riemanniennes non-complètes*
- Sept. 16 **Institut Fourier, Grenoble**, Séminaire de physique mathématique.  
*Confinement quantique sur variétés riemanniennes non-complètes*
- June 16 **Leibniz Universität, Hannover**, Analysis seminar.  
*Quantum confinement via singular measures*
- May 16 **Voss, Norway**, Conference: Geometric Analysis in Control and Vision Theory.  
*Quantum confinement via singular measures*
- Apr. 16 **Université Pierre et Marie Curie, Paris**, Séminaire de géométrie hamiltonienne.  
*Curvature: a Hamiltonian approach*
- Mar. 16 **University of Jyväskylä, Jyväskylä** analysis seminar.  
*A Santaló formula in sub-Riemannian geometry and applications*
- Mar. 16 **University of Jyväskylä, Jyväskylä** geometry seminar.  
*The geodesic dimension of metric measure spaces*
- Feb. 16 **Institut de Recherche Mathématique Avancée, Strasbourg**, Séminaire Calcul stochastique.  
*Nonholonomic random walks*
- Feb. 16 **Institut de Mathematique de Bourgogne, Dijon**, Séminaires Probabilités Optimisation et Contrôles.  
*Nonholonomic random walks*
- Jan. 16 **Institut Fourier, Grenoble**, Séminaire de théorie spectrale et géométrie.  
*A Santaló formula in sub-Riemannian geometry and applications*
- Dec. 15 **IHP, Paris**, Sub-Riemannian geometry seminars.  
*A Santaló formula in sub-Riemannian geometry and applications*
- Nov. 15 **Université Pierre et Marie Curie - Paris 6**, Groupe de Travail Contrôle.  
*Curvature: a variational approach*
- Oct. 15 **SISSA, Trieste**, Geometric control seminars.  
*A Santaló formula in sub-Riemannian geometry and applications*
- Oct. 15 **SISSA, Trieste**, Geometric control seminars.  
*Intrinsic random walks in Riemannian and sub-Riemannian geometry via volume sampling*
- July 15 **Paris**, 2015 SIAM Conference on Control and Its Applications.  
*Intrinsic random walks and diffusion in sub-Riemannian geometry*
- Nov. 14 **RICAM, Linz**, Workshop: Geometric control and related fields.  
*Curvature: a variational approach*
- Oct. 14 **IHP, Paris**, Thematic day on Optimal transport and sub-Riemannian manifolds.  
*On measure contraction properties of sub-Riemannian manifolds*
- Aug. 14 **Baikal lake, Russia**, Conference: Geometric control theory and analysis on metric structures.  
*How many geodesics join two points on a contact sub-Riemannian manifold?*
- June 14 **Institut Camille Jordan, Lyon**.  
*How many geodesics join two points on a contact sub-Riemannian manifold?*
- Apr. 14 **Steklov Mathematical Institute, Moscow**, Conference: Geometry and Control.  
*Comparison theorems in sub-Riemannian geometry*
- Apr. 14 **SISSA, Trieste**, Geometric control seminars.  
*Enumerative geometry for geodesics in corank 1 Carnot groups*
- Feb. 14 **SISSA, Trieste**, Geometric control seminars.  
*On the curvature of Carnot groups*

- Dec. 13 **SISSA**, *Trieste*, Conference: Mathematical control in Trieste.  
*On conjugate times of LQ optimal control problems*
- Oct. 13 **IHP**, *Paris*, Sub-Riemannian geometry seminars.  
*Comparison theorems in sub-Riemannian geometry*
- June 13 **ICTP**, *Trieste*, Conference: Geometry and Dynamics.  
*Sub-Riemannian curvature*
- Apr. 13 **UniFi**, *Florence*, Conference: Nonlinear Control: geometric approach and applications.  
*Asymptotic measure contraction property in sub-Riemannian geometry*
- Mar. 11 **UniBo**, *Bologna*, Conference Bo11.  
*Dynamical effects in the pseudo-Schwarzschild vacuum*

## Research visits ( $\geq 1$ week)

- June 16 **Leibniz Universität**, *Hannover*, (W. Bauer, P. Silveira), 1 week.
- March 16 **University of Jyväskylä**, *Finland*, (E. Le Donne), 1 week.
- Feb. 16 **Rutgers University**, *New Jersey*, (B. Piccoli), 1 week.
- Jan. 16 **Institut Fourier**, *Grenoble*, (with G. Besson, G. Charlot, H. Pajot, E. Russ, Y. Colin de Verdière), 1 week.
- Dec. 15 **IHP**, *Paris*, (Research in Paris, with D. Prandi and M. Seri), 3 weeks.
- Oct. 15 **SISSA**, *Trieste*, (A. Agrachev), 1 week.
- June 15 **SISSA**, *Trieste*, (P. Silveira), 1 week.
- Feb. 15 **IHP**, *Paris*, (U. Serres), 1 week.
- March 15 **Newton Institute**, *Cambridge*, (M. Seri), 1 week.
- Sept.–Dec. 14 **IHP**, *Paris*, (trimester *Geometry, Analysis and Dynamics*), 3 months.
- Oct.–Nov. 13 **IHP**, *Paris*, (Research in Paris, with D. Barilari), 6 weeks.
- Nov.–Dec. 12 **Chinese University of Hong Kong**, *Hong Kong*, (P.W.Y. Lee), 6 weeks.

## Other activities

- 2017 Organizer of the workshop “Sub-Riemannian days 2017” (Institut Fourier, Grenoble)
- 2015 Organizer of the Thematic day: *Spectral properties of hypoelliptic operators* (Institut Henri Poincaré, Paris)
- 2014 Organizer of the geometric control theory seminars (SISSA, Trieste)
- 2014 Webmaster of the seminar’s blog <http://geomcontrol.wordpress.com/>

## Languages

Italian (mother tongue), English (C1), French (B2)