Enrico Le Donne

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PERSONAL INFORMATION

Family name: Le Donne First name: Enrico Nationality: Italian Date of birth: October 9, 1981

EDUCATION

2009 PhD

Department of Mathematics - Yale University, Connecticut, USA – Advisor: Bruce Kleiner 2004 Master/Diploma Scuola Normale Superiore di Pisa, Italy – Advisor: Marco Abate

CURRENT POSITIONS

9.2015 - 8.2020Research Fellow of the Finnish Academy (Akatemiatutkija)since 2017 -Associate Professor with tenure-track as full professorsince 2012 -Permanent position as Senior Lecturer (Yliopistonlehtori)Department of Mathematics and Statistics, University of Jyväskylä, Finland

PREVIOUS POSITIONS

2013 Visiting professor Institute for Pure and Applied Mathematics (IPAM) UCLA, California, USA

2012 Postdoctoral Fellow

Département de Mathématiques d'Orsay, Université Paris-Sud 11, Orsay, France – Mentor: Emmanuel Breuillard

2011 Postdoctoral Fellow Mathematical Sciences Research Institute (MSRI) Berkeley, California, USA – Mentor: Emmanuel Breuillard

2009-2011 Postdoctoral Fellow Department of Mathematics, ETH Zürich, Switzerland – Mentor: Urs Lang

RESEARCH INTERESTS

Metric and Differential Geometry, Geometric Measure Theory, Geometric Analysis. In particular: Carnot groups, Sub-Riemannian Geometry, Analysis on Metric Spaces, Group Actions, Geometric Group Theory, Asymptotic Geometry, Embedding problems, Optimal Control.

SUPERVISION OF STUDENTS

2011-2017 Valerio Gianella (PhD Student)

2012-2017 Sebastiano Nicolussi Golo (PhD Student)

since 2013 Ville Kivioja (Master Student, then PhD Student)

since 2015 Eero Hakavuori (PhD Student) since 2016 Terhi Moisala (PhD Student) since 2017 Fares Essebei (PhD Student)

TEACHING ACTIVITIES

18 courses since Spring 2006: 4 calculus sessions at Yale University and 14 differential geometry courses at ETH Zürich and at the University of Jyväskylä.

ORGANIZATION OF SCIENTIFIC MEETINGS

February 2018: Main organizer of the conference 'SubRiemannian geometry and beyond' at University of Jyväskylä, Finland.

Spring 2015: Co-organizer of the workshop 'Analysis and Geometry on Metric Spaces' at ICMAT in Madrid, Spain, together with D. Azagra, E. Durand Cartagena, L. Guijarro, J. Jaramillo, and M. Ritoré

May 2010: Co-organizer of the workshop 'Non-Riemannian mapping theory and geometry' at Bern University, Switzerland, together with Z. Balogh, U. Lang, and J. Tyson.

INSTITUTIONAL RESPONSIBILITIES

Since 2012: Organizer of the 'Jyväskylä Geometry Seminar' in Jyväskylä, Finland

- 2012: Organizer of the 'Seminaire de géométrie sous-riemannienne' at IHP, Paris
- 2011: Organizer of the 'PostDoc seminar' at MSRI

2009-2011: Co-organizer of the Geometry Seminar at ETH Zürich.

WORK AS EDITOR AND REFEREE

Since 2012: Assistant Editor of the journal 'Analysis and Geometry in Metric Spaces'.

Referee for more than 30 different mathematical journals, including Acta Math., Inventiones Math. Ann. Sci. École Norm. Supér., Calc. Var. PDE, Advances in Math., Geometry and Topology, Proc. London Math. Soc., Rev. Mat. Iberoamericana, Journal of Geometric Analysis, Geometriae Dedicata.

MAJOR COLLABORATIONS

Luigi Ambrosio, Costante Bellettini, Ugo Boscain, Emmanuel Breuillard, Luca Capogna, Katrin Fässler, Bruce Kleiner, Pekka Koskela, Gian Paolo Leonardi, Richard Montgomery, Roberto Monti, Alessandro Ottazzi, Pierre Pansu, Tapio Rajala, Severine Rigot, Mario Sigalotti, Davide Vittone.

PAST GRANTS

ETH Fellowship: personal grant of 20.000 CHF (from September 2009 to August 2011).

Marie-Curie Action program: 'MANET - Metric Analysis for Emergent Technologies' coordinated by G. Citti (Bologna), total of circa 3663k Euro.

Instituto de Ciencias Matemticas (ICMAT) Madrid: conference budget of 50k Euro (for organizing the workshop 'Geometry and Analysis on Metric Spaces').

Fondation Sciences Mathmatiques de Paris, IHP: financial support of 7600 Euro (for attending the workshop 'Geometry, Analysis and Dynamics on Subriemannian Manifolds').

Academy Research Fellowship from the Academy of Finland. Salary paid for 5 years and personal budget of 210k Euro for the first 3 years plus possibility of 2-more-year extension.

ERC Starting Grant 2016. Budget of 1,249k Euro for 5 years.

OTHER MERITS

Ernst Lindelöf prize for the master thesis of the student Ville Kivioja.

Fellowships for supporting students: Emil Aaltonen Foundation (for Ville Kivioja), Väisälä Foundation (for Eero Hakavuori), Finnish Cultural Fundation (for Terhi Moisala).

Publications in Refereed Journals (in reverse order with respect to the submission on arXiv.org)

- 38. Universal differentiability sets and maximal directional derivatives in Carnot groups (with A. Pinamonti, G. Speight) To appear in *Journal de mathématiques pures et appliquées*
- 37. Isometric embeddings of snowflakes into finite-dimensional Banach spaces (with T.Rajala, E.Walsberg) Proceedings of the American Mathematical Society, 146 (2018), no. 2
- 36. Smooth surjections and surjective restrictions (with R. Aron, J. Jaramillo) Annales Academiae Scientiarum Fennicae Mathematica, no. 2
- 35. A primer on Carnot groups: homogenous groups, CC spaces, and regularity of their isometries Analysis and Geometry on Metric Spaces, 5 (2017)
- 34. Conformality and Q-harmonicity in sub-Riemannian manifolds(with L.Capogna, G.Citti, A.Ottazzi) To appear in *Journal de mathématiques pures et appliquées*
- Lusin approximation for horizontal curves in step 2 Carnot groups (with G. Speight) Calculus of Variations and PDE's, 55 (2016), no. 5
- 32. Isometries of nilpotent metric groups (with V. Kivioja) Journal de l'École polytechnique. Mathématiques, 4 (2017)
- 31. Besicovitch Covering Property on graded groups and applications to measure differentiation (with S.Rigot) To appear in *Journal für die reine und angewandte Mathematik*
- 30. Non-minimality of corners in subriemannian geometry (with E. Hakavuori) Inventiones mathematicae, 206 (2016), no. 3
- 29. Regularity properties of spheres in homogeneous groups (with S. Nicolussi Golo) Transactions of the AMS, 370 (2018), no. 3
- Asymptotic behavior of the Riemannian Heisenberg group and its horoboundary (with S. Nicolussi Golo, A. Sambusetti) Annali di Matematica Pura ed Applicata, (4) 196 (2017), no. 4
- 27. Ahlfors-regular distances on the Heisenberg group without biLipschitz pieces (with S.Li, T.Rajala) Proceedings of the London Mathematical Society (3) 115 (2017), no. 2,
- 26. SubFinsler structures from the time-optimal control viewpoint for some nilpotent distributions (with D. Barilari, U. Boscain, M. Sigalotti) Journal of Dynamical and Control Systems, 23 (2017), no. 3
- 25. Remarks about Besicovitch covering property in Carnot groups of step 3 and higher(with S.Rigot) *Proceedings of the American Mathematical Society*, 144 (2016), no. 5

- Sard Property for the endpoint map on some Carnot groups (with R.Montgomery, A.Ottazzi, P.Pansu, D.Vittone) Annales de l'Institut Henri Poincaré (C) Analyse non linéaire, 33 (2016), no. 6
- 23. Rigidity of fiber-preserving quasisymmetric maps (with X. Xie) Revista Matemática Iberoamericana, 32 (2016), no. 4
- 22. A metric characterization of snowflakes of Euclidean spaces (with K. Kinneberg) Annali della Scuola Normale Superiore di Pisa, Classe di Scienze (5) 16 (2016), no. 2
- Besicovitch covering property for homogeneous distances on the Heisenberg groups (with S. Rigot) Journal of the European Mathematical Society, 19 (2017), no. 5
- 20. Corners in non-equiregular sub-Riemannian manifolds (with Leonardi, Monti, Vittone) ESAIM: Control, Optimisation and Calculus of Variations, 21 (2015), no. 3
- Closed BLD-elliptic manifolds have virtually Abelian fundamental groups (with P. Pankka) New York Journal of Mathematics, 20 (2014)
- Nonexistence of quasiconformal maps between certain metric measure spaces (with K. Fässler, P. Koskela) International Mathematics Research Notices, (2015), no. 16
- 17. Extremal polynomials in stratified groups (with G.P. Leonardi, R. Monti, D. Vittone) To appear in *Communications in Analysis and Geometry*
- Assouad dimension, Nagata dimension, and uniformly close metric tangents (with T. Rajala) Indiana University Mathematics Journal, 64 (2015), no. 1
- 15. Smoothness of subRiemannian isometries (with L. Capogna) American Journal of Mathematics, 138 (2016), no. 5
- 14. A metric characterization of Carnot groups, Proceedings of the American Mathematical Society, 143 (2015), no. 2
- Isometries of Carnot groups and subFinsler homogeneous manifolds (with A. Ottazzi) Journal of Geometric Analysis, 26 (2016), no. 1
- Extremal curves in nilpotent Lie groups (with G.P. Leonardi, R. Monti, D. Vittone) Geometric And Functional Analysis, 23 (2013), no. 4
- 11. Some properties of Hölder surfaces in the Heisenberg group (with R. Züst) Illinois Journal of Mathematics, 57 (2013), no. 1
- On the rate of convergence to the asymptotic cone for nilpotent groups and subFinsler geometry (with E. Breuillard) Proceedings of the National Academy of Sciences of the USA, 110 (2013), no. 48
- 9. Regularity of sets with constant horizontal normal in the Engel group (with C. Bellettini) Communications in Analysis and Geometry, 21 (2013), no. 3
- 8. Properties of isometrically homogeneous curves, International Mathematics Research Notices, (2013) no. 12
- Ultra-rigid tangents of sub-Riemannian nilpotent groups (with A. Ottazzi & B. Warhurst) Annales de l'Institut Fourier, 64 no. 6 (2014)

- Metric spaces with unique tangents, Annales Academiae Scientiarum Fennicae Mathematica, 36 (2011), no. 2
- Lipschitz and path isometric embeddings of metric spaces, Geometriae Dedicata, 166 (2013)
- 4. Doubling property for biLipschitz homogeneous geodesic surfaces, Journal of Geometric Analysis, 21 (2011), no. 4
- Measure of submanifolds in the Engel group (with V. Magnani) Revista Matematica Iberoamericana, 26 (2010), no. 1
- 2. Geodesic manifolds with a transitive subset of smooth biLipschitz maps, Groups, Geometry, and Dynamics, 5 (2011) no. 3
- Rectifiability of sets of finite perimeter in Carnot groups: existence of a tangent hyperplane (with L. Ambrosio and B. Kleiner) Journal of Geometric Analysis, 19 (2009), no. 3

Peer-reviewed conference proceedings

- 1. Geodesic metric spaces with unique blow-up almost everywhere: properties and examples, *Oberwolfach Reports*, Differentialgeometrie im Großen, 33 (2011)
- Time-optimal synthesis for three relevant problems: the Brockett integrator, the Grushin plane and the Martinet distribution (with D. Barilari, U. Boscain, M. Sigalotti) 2015 IEEE 54th Annual Conference on Decision and Control (CDC)

Papers Under Review (available on arXiv.org)

- 1. Conformal equivalence of visual metrics in pseudoconvex domains (with L. Capogna)
- 2. From homogeneous metric spaces to Lie groups (with M.Cowling, V.Kivioja, S.NicolussiGolo, A.Ottazzi)

Work in Progress - Ongoing Papers

Continuous sub-Riemannian structures on the plane

Nilpotent groups, asymptotic cones and SubFinsler geometry (with E. Breuillard)

Sets with constant horizontal normal in Carnot groups (with C. Bellettini)

The space of signatures of paths as a geodesic metric tree (with R. Züst)

Asymptotic comparison of Stoll distances and word distances on nilpotent groups (with V.Gianella)

Homogeneous distances on Lie groups (with S. Nicolussi Golo)

Unpublished Papers

Semicontractions for Banach spaces (2005)

Geodetically closed neighborhoods (2009)

A note on Nagata dimension of Carnot groups (with U. Lang) (2012)

BiLipschitz vs Topological Homogeneity (with T. Rajala) (2015)

References

Main references Prof. Bruce Kleiner (PhD advisor) New York University +1-212-998-3214 bkleiner@cims.nyu.edu

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Prof. Urs Lang ETH Zürich +41-(0)44-632-6011 lang@math.ethz.ch Prof. Luigi Ambrosio Scuola Normale di Pisa +39-050-509255 l.ambrosio@sns.it

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Prof. Zoltan Balogh Universität Bern

Prof. Mario Bonk University of California, Los Angeles

Prof. Ugo Boscain Ecole polytechnique

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Prof. Michael Cowling University of New South Wales

Prof. Pertti Mattila University of Helsinki

Prof. Roberto Monti Universitá di Padova

Prof. Richard Montgomery University of California, Santa Cruz

Prof. Pierre Pansu Université Paris-Sud 11, Orsay Sevérine Rigot Université Nice

Prof. Raul Serapioni Universitá di Trento

Prof. Jeremy Tyson University of Illinois, Urbana-Champaign

Prof. Stefan Wenger Université de Fribourg

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