CV Prof. Luca Capogna

Education
- *B. S. (Laurea) Mathematics, Second University of Rome, 1990.*
- *Ph.D. Mathematics, Purdue University, 1996. Advisor: Nicola Garofalo.*
- *Postdoc NYU-Courant Institute, 1996-1998. Postdoc advisors: Luis Caffarelli, Fang Hua Lin.*
- *Postdoc University of Pennsylvania, 1998-1999. Advisor: Charlie Epstein.*

Professional Preparation and administrative positions

Management Development Program, Harvard Graduate School of Education, 2017

2013-2020 - Department Head, Mathematical Sciences, Worcester Polytechnic Institute.

2011- 2013: Associate director, Institute for Mathematics and its Applications (IMA).   University of Minnesota, Minneapolis, MN

Employment

- *2021-present: Professor, Smith College, Northampton, MA*
- *2013- present Professor, Worcester Polytechnic Institute. Worcester, MA*
- *2008- 2014 : Professor, University of Arkansas. Fayetteville, AR*
- *2003- 2008 : Associate professor, University of Arkansas. Fayetteville, AR*
- *1999-2003 : Assistant professor, University of Arkansas. Fayetteville, AR*
- *1998-1999 : Lecturer, University of Pennsylvania. Philadelphia, PA*
- *1996-1998 : Courant Instructor, New York University. New York, NY*
- *1991-1996 : Graduate teaching assistant, Purdue University. West Lafayette,*

Individual research grants

NSF DMS 1955992 (2020-2023) $187,987. Applications of Quasiconformal Geometry and Partial Differential Equations

Simons Foundation, Mathematics and Physical Sciences-Collaboration Grants for Mathematicians 585688, (2018-2023) $42,000. Topics in nonlinear PDE and in quasiconformal mappings.

NSF DMS 1503683 (2015-2018) $261,269. Topics in quasiconformal mappings and subelliptic PDE

NSF DMS 1101478 (2011-2015) $171,773. Topics in Quasiconformal mappings and in PDE

NSF DMS 0800522 (2008-2011) $135,000. Topics in Nonlinear Subelliptic Partial Differential Equations

NSF Early Career Award DMS 0134218 (2002-2008) $360,000. Integration of Research and Education in the Study of Analysis and Partial Differential Equations in Carnot-Caratheodory Spaces

NSF DMS 9800794 (1998-2001). Boundary and Interior Regularity for Minimizers of the p-Energy and Related Functionals in Carnot-Caratheodory Spaces $77,276

Conference funding

NSF DMS 0548644, Conference series in geometric analysis and sub-Riemannian geometry, c0-PI

NSF DMS 0751330, Two Spring Lecture Series in Analysis and PDE, $72,345, 2008-2010. PI

NSF DMS 0503695, Workshop on Minimal Surfaces, Sub-Elliptic PDE's and Geometric Analysis, co-PI.

NSF DMS 0100599, $15,000, PI, 2001-2002. Conference on Solutions of PDE's in periodic media.

NSF DMS 0070592, Conference in Harmonic Analysis. 2000-2001, $11,000. PI

list of recent conferences.
- *. April 2022, Machine Learning Reading seminar, UMASS.*
- *. April 2022, Analysis and Probability in Sub-Riemannian Geometry, AMS Sectional Meeting, Purdue (virtual).*
- *. August 2021, Summer Analysis on Metric Spaces Seminar, Okinawa Institute of Science and Technology (virtual).*
- *. June 2021, AMS Mathematics Research Communities, Analysis in Metric Spaces (co-organizer with Mario Bonk, Piotr Hajlasz, Nageswari Shanmugalingam and Jeremy Tyson).*
- *. April 2021, Colloquium, Wesleyan College*
- *. May 2020, Sub-Riemannian Geometry and Beyond III, University of Pisa (minicourse on quasiconformal geometry and Gromov hyperbolic spaces). - postponed because of COVID*
- *. April 2020, Analysis and Geometry of Metric Spaces - a Bridge between Smooth and Fractal Views (20w5105), Banff, BIRS - postponed because of COVID*
- *. April 2020, Analysis and Probability in Sub-Riemannian Geometry, AMS Sectional Meeting, Purdue University - postponed because of COVID*
- *. January 2020, Analysis Seminar, University of Jyväskylä*
- *. November 2019, AMS Meeting, UC Riverside,*

- . November 2019, Geometry and Topology seminar, Brown University,
- . October 2019, Northeastern Analysis Meeting, Syracuse University,
- . June 2019, Conference on Nonlinear Averaging and PDE, Levico Terme, Italy,
- . May 2019, Geometric and Functional Analysis Seminar, University of Helsinki,
- . April 2019, Colloquium, University of Syracuse,
- . April 2019, Special session Analysis, Geometry, and PDEs in Non-smooth Metric Spaces, Sectional Meeting, AMS Hartford,CT
- . March 2019, Ohio River Analysis Meeting, University of Cincinnati, Cincinnati OH
- . February 2019, Conference: Subriemannian Geometry and Beyond II, Jyväskylä, Finland
- . November 2018, Analysis Seminar, University of Massachussetts, Amherst, MA.
- . May 2018, Asymptotically Hyperbolic Manifolds, Banff BIRS, Banff, CA
- . April 2018, Complex Analysis and Geometry Seminar, Rutgers University, New Brunswick, NJ
- . April 2018, Barnett Lecture, University of Cincinnati, Cincinnati, OH
- . April 2018, Analysis seminar University of Cincinnati, Cincinnati, OH
- . March 2018, PDE, Complex Analysis, Geometry Seminar, University of Notre Dame, South Bend, IN
- . February 2018, Analysis Seminar, McGill University, Montreal, CA
- . November 2017, Analysis and geometry on pseudohermitian manifolds, American Institute of Mathematics, CA.
- . March 2017, Analysis and Probability seminar, Department of Mathematics, University of Connecticut.
- . March 2017, Analysis in Metric Spaces Conference, Department of Mathematics, University of Pittsburgh..
- . October 2016, Analysis seminar, Department of Mathematics, Syracuse University.
- . September 2016, AMS Fall Easter Sectional Meeting 1115, Bowdoin College,
- Special Session on Nilpotent Lie Groups, Slides of a joint presentation with J. Tyson
- Special Session on Geometric methods in harmonic analysis,
- . May 2016, Lehigh University Geometry/Topology Conference invited speaker.
- . May 2016, University of California, Los Angeles. Analysis Seminar.
- . May 2016, University of Illinois, Urbana-Champaign. Analysis Seminar
- . April 2016, SUNY Albany, Colloquium.
- . December 2015, IPAM Interaction Between Analysis and Geometry, Lake Arrowhead
- . December 2015, Special semester in Nonsmooth analysis, Colloquium speaker, University of Connecticut.
- · December 2014, IPAM Interaction Between Analysis and Geometry, Lake Arrowhead-UCLA.

- · December 2014, Analysis and Geometry in Several Complex Variables, Academia Sinica, Taipei, Taiwan.
- · Fall 2014, Institut Henri Poincare, Conference on Geometric Analysis on Sub-Riemannian Manifolds.
- · Fall 2013, Analysis Seminar, University of Kentucky, Analysis Seminar, Rutgers University,
- AMS Sectional Meeting Temple University, Analysis Seminar CUNY Graduate Center.
- · April 19-20. 2013, presentation, QEM (Quality Education for Minorities) Workshop for Research Initiation.
- · March 11-June 14, 2013. Invited participant to the program "Interactions between analysis and geometry", Institute for Pure and Applied Mathematics (IPAM).
- · March 14-16, 2013 International workshop "Advances in nonlinear analysis", University of Pittsburgh
- · February 2013. Geometry Seminar, University of Jyvaskyla, Finland,
- · February 2013, Joint geometric analysis and functional analysis, University of Helsinki, Finland.
- · October 2012. PDE Seminar, University of Minnesota.
- · July, 2012. C.I.M.E course, Cetraro, Italy, Invited lecturer.
- · July 2-5, 2012, "Sub-Riemannian geometry and PDE", Levico Terme (Trento), Italy.
- · March 2012. George Washington University (applied math. seminar).
- · March 2012. Spring Eastern Sectional Meeting AMS, George Washington University.
- Special Session on Self-organization Phenomena in Reaction Diffusion Equations.
- · February, 2012. Seminar, University of Uppsala, Sweden..
- · November 10-12, 2011, Martin's Days. A conference in Honor of Hans Martin Reimann 75th Birthday.
- University of Bern, Bern, Switzerland.
- · November 2011. PDE seminar, University of Minnesota.
- · May, 2011, Hot topics IMA workshop "Strain induced shape formation, analysis, geometry and material sciences", Institute for Mathematics and its Applications, Minneapolis.
- · May, 2011, Analysis seminar, Temple University.
- . April 9-10, 2011, Special session "Special Session on Topics in Partial Differential Equations and Geometric Analysis" AMS Sectional Meeting #1070
- · April 7, 2011, Colloquium, Dartmouth, Hanover, NH.
- · March 24, 2011, Geometry and Analysis seminar, Columbia University.
- · March 18, 2011, Colloquium, University of Pittsburgh.
- · March 4, 2011, Differential Geometry and Geometric Analysis seminar, Princeton University.
- · February 17, 2011, Analysis seminar, Courant Institute, NYU.
- · Dec.18-19, 2010: Workshop on Mean Curvature Equation in Heisenberg Geometry,
- Institute of Mathematics, Academia Sinica, Taipei.

- · October 11, 2010, Seminar, Freie Universitat Berlin, Germany.
- · June 7-11, 2010: Convegno Analisi Armonica, Gargnano, Italy.
- · May 12-15, 2010: Bern, Switzerland. Conference on Mapping Theory in Non-Euclidean spaces.
- · April 29th, 2010; Colloquium at University of Cincinnati.

List of recent publications

- *Neumann problems for p-harmonic functions, and induced nonlocal operators in metric measure spaces. (joint with Josh Kline, Riikka Korte, Nageswari Shanmugalingam, Marie Snipes), under review (2022) arXiv:2204.00571.*

- *A Neural Network Ensemble approach to System Identification. (joint with E. Negrini and G. Citti), under review. (2021) arXiv:2110.08382*

- *Lipschitz regularity for the parabolic p-Laplacian in the Heisenberg group. (joint with G. Citti and X. Zhong).(2021) arXiv:2106.05998*

- *System Identification Through Lipschitz Regularized Deep Neural Networks. (joint with E. Negrini and G. Citti), Journal of Computational Physics, 444 (2021), Paper No. 110549, 23 pp arXiv:2009.03288*

- *Existence and Uniqueness of Green functions for the Cheeger p-Laplacian in PI spaces. (joint with M. Bonk and X. Zhou). Preprint.*

- *Regularity for quasilinear degenerate parabolic equations in the Heisenberg group. (joint with G. Citti and N. Garofalo). Mathematics in Engineering, 2021, 3(1): 1-31, arXiv:2001.08303*

- *Conformal equivalence of visual metrics in pseudo convex domains. arXiv:1703.00238 (joint with Enrico Le Donne). Mathematische Annalen 379 (2021), no. 1-2, 743–763*

- *Analysis on Metric Spaces. (joint with M. Bonk, P. Hajlasz, N. Shanmugalingam, and J. T. Tyson). Notices Amer. Math. Soc. 67 (2020), no. 2, 253–256.*

- *Conformality and Q-harmonicity in Subriemannian manifolds. arXiv:1603.05548 (joint with Giovanna Citti, Enrico Le Donne and Alessandro Ottazzi).   J. Math. Pures Appl. (9) 122 (2019), 67–124*

- *Strong Comparison Principle for $p-$harmonic functions in Carnot-Caratheodory spaces.   (joint with Xiaodan Zhou). arXiv:1707.06272   Proc. Amer. Math. Soc. 146 (2018), no. 10, 4265–4274(2018).*

· *Smoothness of subRiemannian isometries, arXiv:1305.5286 (with Enrico Le Donne). American Journal of Mathematics, 138 (2016), no. 5, 1439-1454.*

- *Regularity for subelliptic PDE through uniform estimates in multiscale geometries. arXiv:1504.04762 (Joint with G. Citti), Bulletin of Mathematical Sciences, 6 (2016) no. 2, 173-230.*

- *Regularity of mean curvature flow of graphs on Lie groups free up to step 2. arXiv:1502.00874 (joint with G. Citti and M. Manfredini), Nonlinear Analysis: Theory, Methods and Applications, 126 (2015), 437-450..*

· *$L^\infty-$ extremal mappings in AMLE and Teichmueller theory,. Fully nonlinear PDEs in real and complex geometry and optics, 1–46, Lecture Notes in Math., 2087, Springer, Cham, 2014.*

· *Harnack estimates for degenerate parabolic estimates modeled on the subelliptic p-Laplacian. Adv. Math. 257 (2014), 25–65. arXiv:1306.5650 (with Benny Avelin, Giovanna Citti and Kaj Nystrom).*

· *Uniform Gaussian bounds for subelliptic heat kernels and an application to the total variation flow of graphs over Carnot groups. Anal. Geom. Metr. Spaces 1 (2013), 255–275, arXiv :1212.6665 (with Giovanna Citti and Maria Manfredini).*

· *Sub-Riemannian Heat Kernels and Mean Curvature of graphs, Jour. of Functional Analysis, Volume 264, Issue 8, 15 April 2013, Pages 1899–1928, arXiv:1208.6211 (with Giovanna Citti and Cosimo Senni Guidotti Magnani). (2013)*

· *A subelliptic analogue of Aronson-Serrin's Harnack Inequality. Math. Ann. 357 (2013), no. 3, 1175–1198.arXiv:1109.4596v1 (with Giovanna Citti and Garrett Rea). (2013)*

· *An Aronsson type approach to extremal Quasiconformal mappings, arXiv:1011.2988v1 Jour. Diff. Equations 253, 3 (2012) 851-877. (with Andrew S. Raich).*

· *Convexity and horizontal second fundamental forms for hypersurfaces in Carnot groups Trans. Amer. Math. Soc. 362 (2010), 8, 4045-4062 (with S. D. Pauls and J. Tyson)*

· *Smoothness of Lipschitz intrinsic minimal graphs in the Heisenberg group H^n, n>1 , Crelle's Journal (2010) vol. 648, 75-110 (with Giovanna Citti and Maria Manfredini).*

· *Generalized mean curvature flow in Carnot groups, Communications in PDE, 34 (2009), 7-9, 937-956 arXiv:0808.3467 (with Giovanna Citti)*