Filippo Sarti - CV

Personal Information

Date of birth	December, 15th 1993
Nationality	Italian
Address	Department of Mathematics, University of Pisa
	Office 25, Via Buonarroti, 1/c, 56127 Pisa (PI), Italy
Webpage	sites.google.com/view/filipposarti/home-page
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Research interests

measured group theory, dynamics, ergodic theory, bounded cohomology, simplicial volume, rigidity theory.

Current and past employments

04/2024 - today	**PostDoctoral Fellowship, University of Pisa** (until 03/2026)
	supervisor: Prof. Bruno Martelli
07/2023 - 03/2024	PostDoctoral Fellowship, University of Bologna
	supervisor: Prof. Stefano Francaviglia
10/2022 - 07/2023	PostDoctoral Fellowship, University of Torino
02/2022 - 09/2022	Math teacher in high school (18h/week, full-time), Imola (Italy)

Education

10/2018 – 01/2022	PhD student, University of Bologna
	Thesis *Numerical invariants for measurable cocycles* defended on 20/06/2022
	Supervisors: Prof. Stefano Francaviglia and Dt. Alessio Savini
	Referees: Prof. Bruno Duchesne, Prof. Alessandra Iozzi
	Committee: Prof. Michelle Bucher, Prof. Giovanni Mongardi, Prof. Beatrice Pozzetti
09/2015 – 07/2018	M.Sc. in Mathematics, University of Pisa
	Final score: 110/110 cum laude
	thesis: *Surface branched covers and Hurwitz numbers* defended on 07/2018,
	supervisor: Prof. Carlo Petronio
09/2012 – 07/2015	Bachelor of Science in Mathematics, University of Bologna
	Final score: 110/110.
	thesis: *Branched covers in dimension 3* defended on 17/07/2015
	supervisor: Prof. Alessia Cattabriga

Talks in conferences and workshops

2025	*Topology and Geometry in Cyprus*, held in Nicosia-Cyprus, August 5-8
2023	*Groups and Rigidity Around the Zimmer Program* - held in Ventotene, September 11-16
	Leaning into Topology Workshop, held in Pisa, September 18-19
2021	*Counting problems* - held in Ventotene, September 6-11

Talks in research seminars

2026	Milan - Bicocca (January), Karlsruhe (February)
2025	Karlsruhe (February), online (June), Pisa (November)
2023	online (January), Bologna (January), Paris - Orsay (April), Milan - Politecnico (November)
2022	Geneva (April), Padova (May)
2020	online (June, November)
2019	Bologna (march), Pisa (December)
2017	Pisa (April)

Visits

02/2026	Karlsruhe Institute of Technology, Karlsruhe, hosted by Tobias Hartnick
02/2025	Karlsruhe Institute of Technology, Karlsruhe, hosted by Tobias Hartnick
04/2023	University of Paris Saclay, Orsay, hosted by Camille Horbez, Bruno Duchesne and Jean Lecureux
09/2021 – 12/2021	University of Geneva, hosted by Michelle Bucher
06/2018	University of Pisa, hosted by Carlo Petronio

Awards

2026	My project proposal *Bounded Cohomology in Measured Group Theory*, submitted under the Marie Sklodowska-Curie Actions (MSCA) Postdoctoral Fellowships 2025 call of the Horizon Europe programme, has been awarded the **Seal of Excellence** by the European Commission (Total score: 91/100).
2026	French habilitation for **maître de conférences** (2026-2030), Section CNU 25 - Mathematics.

Organizational experience

2025	Workshop *Manifolds and groups in Bologna, IV*, held in Bologna, April 8-10 Co-organizers: G. Bargagnati, F. Milizia, M. Moraschini, G. Rago, S. Riolo, N. Rungi, A. Seppi, webpage
2024 – 2025	*Geometry and Topology seminars*, University of Pisa Co-organizer: C. Collari
2025	Workshop *Manifolds and groups in Bologna, III*, held in Bologna, April 14-16 Co-organizers: G. Bargagnati, M. Moraschini, S. Riolo, webpage
2024	Workshop *Manifolds and groups in Bologna, II*, held in Bologna, April 17-19 Co-organizers: M. Moraschini, S. Riolo, webpage
spring 2023	*Seminari di Topologia e Geometria delle Varietá (TGV)*, University of Bologna Co-organizer: M. Moraschini, webpage
2023	Workshop *Non-positive curvature in manifolds and groups*, held in Bologna, march 24 Co-organizers: L. Battista, S. Francaviglia, M. Moraschini, S. Riolo, webpage
2023	Workshop *Manifolds and groups in Bologna, I*, held in Bologna, march 22-23 Co-organizers: L. Battista, S. Francaviglia, M. Moraschini, S. Riolo, webpage
2019 – 2021	Co-organizer of the *BAD seminars*, for graduate students, University of Bologna
spring 2020	Organizer of the PhD course *Lie groups and lattices*, given by Alessio Savini, University of Bologna

Teaching and tutoring

2024/25	University of Bologna Teacher for *Geometria e Algebra*, Bachelor in Engineering, 60 h
2023/24	University of Bologna Co-Teacher for *Introduction to bounded cohomology and simplicial volume*, PhD course, 10 h (25 in total)
2022/23	University of Bologna Teaching assistant for *Istituzioni di Matematica - Geometria*, Bachelor in Engineering, 30 h
2021/22	University of Bologna Teaching assistant for *Linear Algebra*, Bachelor in Engineering, 30 h Teaching assistant for *Mathematics*, Bachelor in Management and Marketing, 30 h Teaching assistant for *Mathematics*, Bachelor in Business and Economics, 50 h
2020/21	University of Bologna Teaching assistant for *Mathematics*, Bachelor in Management and Marketing, 40 h Teaching assistant for *Linear Algebra*, Bachelor in Engineering, 30 h Teaching assistant for *Mathematics*, Bachelor in Management and Marketing GII, 50 h
2019/20	University of Bologna Teaching assistant for *Linear Algebra*, Bachelor in Engineering, 15 h

2018/19	University of Bologna Teacher for *Alignment math course*, Bachelor in Management and Marketing, 60 h

Projects

2024 - 2026	Member of PRIN *Geometry and topology of manifolds*, funded by Italian Government (PI: Prof. Bruno Martelli)
03/2023 - 02/2024	Member of INdAM - GNSAGA Project *Bounded cohomology and simplicial volume: new computations and applications* (PI: Dt. Marco Moraschini)
01/2019 - present	Member of GNSAGA - INdAM
02/2019 - 01/2021	Member of PRIN *Real and Complex Manifolds: Topology, Geometry and Holomorphic Dynamics*, funded by Italian Government (PI: Prof. Filippo Bracci)

Participation in conferences and schools

2025	*LiT III: Living in Topology*, held in Pisa (Italy), September 22-25 *Higher dimensional hyperbolic geometry*, held in Ventotene (Italy), September 8-13 *Topology and Geometry in Cyprus* held in Nicosia (Cyprus), august 4-8 *Groupoids from a measurable, topological and geometric perspective* held in Paris (France), June 23-27
2024	*Metric topology of aspherical spaces* held in Oberwolfach (Germany) October 20-25 *Lost in Topology Workshop* held in Pisa (Italy), September 17-20 *Moving to higher rank: from hyperbolic to Anosov* held in Cetraro (Italy), July 15-19
2023	*Leaning into Topology Workshop* held in Pisa (Italy), September 18-19 *Groups and Rigidity Around the Zimmer Program* held in Ventotene (Italy), September 11-16 *Measured Group Theory* held in Montreal (Italy), march 6-17
2022	*Complex hyperbolic geometry and related structures* held in CIRM - Luminy (France), July 4-8
2021	*Counting problems* held in Ventotene (Italy), September 6-11
2020	*Virtual workshop: Simplicial Volumes and Bounded Cohomology* held online September 20-25 *Young Geometric Group Theory* held in Saint Jacut de la mer (France) February 23-28
2019	*Of coarse! Quasi-isometries and groups: rigidity and classifica- tion* held in Ventotene (Italy), September 8-14 *Arbeitstagung 2019 on Geometry* held in MPIM Bonn (Germany), July 8-12 *Young Geometric Group Theory* held in Bilbao (Spain), June 20 - July 5 *Workshop: Riemannian and Simplicial Volume* held in Karlsruhe (Germany), April 8-12 *Workshop su varietá reali e complesse: geometria, topologia e analisi armonica* held in SNS Pisa (Italy), February 21-23

Research fellowships and grants

2023	Scholarship for traveling, GNSAGA - INdAM (€ 1000), March 6-17
2022	Scholarship for traveling, GNSAGA - INdAM (€ 500), July 4-8 Kovalevskaya Grant for ICM 2022 in Saint Petersburg, IMU (declined due to COVID)
11/2018 - 01/2022	PhD Scholarship, University of Bologna.
09/2021 - 12/2021	Marco Polo Scholarship - University of Bologna (€ 3450)
2020	Scholarship for traveling, GNSAGA - INdAM (€ 400), February 23-28
2019	Scholarship for traveling, GNSAGA - INdAM (€ 400), July 8-12 Scholarship for traveling, GNSAGA - INdAM (€ 400), June 30 - July 5 Scholarship for traveling, GNSAGA - INdAM (€ 400), April 8-12

Languages

Italian	Mothertongue
English	Fluent
Spanish	Basic

Publications and research

Published or accepted for publications

[1] (with Alessio Savini) *Boundaries and equivariant maps for ergodic groupoids*, in **Glasgow Mathematical Journal** Volume 68 (2026), pages 164 - 195 arxiv:2402.15355, DOI

[2] (with Alessio Savini) *Boundary maps and reducibility for cocycles into the isometries of CAT(0)-spaces*, in **Groups, Geometry and Dynamics**, Volume 19 (2025), n. 3, pages 1013-1040, arxiv:2005.10529, DOI

[3] (with Alessio Savini) *Parametrized Kähler class and Zariski dense orbital 1-cohomology*, in **Mathematical Research Letters**, Volume 30 (2023), pages 1895-1929, arXiv:2106.02411, DOI

[4] (with Ludovico Battista, Stefano Francaviglia, Marco Moraschini, Alessio Savini) *Bounded cohomology classes of exact form*, in **Proceedings of the American Mathematical Society**, Volume 152 (2024), pages 71-80, arXiv:2211.16125, DOI

[5] (with Alessio Savini) *Superrigidity of maximal measurable cocycles of complex hyperbolic lattices*, in **Mathematische Zeitschrift**, Volume 300 n. 1 (2022), pages 21-443, arXiv:2002.03628, DOI

[6] (with Carlo Petronio) *Counting surface branched covers*, in **Studia Scientiarum Mathematicarum Hungarica, Volume** 56(3) (2019), pages 309-322, arXiv:1901.08316, DOI

Preprints

[7] (with Alessio Savini) *Superrigidity for representations of transverse measured groupoids*, (2026), arXiv:2603.20548

[8] (with Tobias Hartnick) *Bounded cohomological induction for transverse measured groupoids*, (2025), arXiv:2510.20656

[9] *Simplicial volume via foliations and duality*, (2025), arXiv:2506.02962

[10] (with Alessio Savini) *Measurable bounded cohomology of t-discrete measured groupoids via resolutions*, (2025), arXiv:2503.22350

[11] (with Alessio Savini) *Measurable bounded cohomology of measured groupoids*, (2023), arXiv:2304.07765

Book chapters

[12] *The Proportionality Principle via Hyperbolic Geometry*, in C. Campagnolo, F. Fournier-Facio, N.Heuer, M. Moraschini (Eds.), Bounded Cohomology and Simplicial Volume, **London Mathematical Society Lecture Note Series**, pages 20-27 (2022), DOI

Thesis

[13] *Numerical invariants for measurable cocycles*, PhD thesis, Bologna (2022)

Brief description of the research

I carry my research at the interface of geometry, dynamics and algebra. As a mathematician, I sinks my roots in geometric topology, whose interest has characterized his undergraduate studies. During my PhD, fascinated by Mostow rigidity theorem and by the variegated range of techniques used in its proof, I became interested in *rigidity theory* in a wider sense. Influenced by my advisor Alessio Savini, my PhD thesis develops the theory of *numerical invariants for measurable cocycles*. Beyond the results, the work was a priceless occasion to enrich my knowledge in different area of Mathematics, such as *bounded cohomology*, *boundary theory*, *ergodic theory*, *lattices in semisimple Lie groups*. Recently, my focus settled on *measured group theory* and, in particular, on *measured groupoids*. His theory of *bounded cohomology for measured groupoids* developed with Savini is the cornerstone of current and future projects. Remarkable applications have already been addressed, for instance in the context of *transverse groupoids* and of *simplicial volume*.

Measured groupoids ([1], [4], [10], [11])

In a series of foundational papers, together with Savini we set the basic of a new theory of *bounded cohomology* for *measured groupoids*. The motivation comes from our previous works and from older papers by Monod and Shalom and by Bader, Furman and Sauer, where bounded cohomology of groups is adapted in a dynamical context to study measurable cocycles and orbit equivalences.

Bounded cohomology of measured groupoids ([10], [11]). The definition appeared first in [11], where the authors adapt the notion of bounded cohomology of groups given in terms of essentially bounded functions on the group to the groupoid framework. The main results are: the exponential isomorphism ([Theorem 1, [4]]) connecting the bounded cohomology of a p.m.p action with the one of the acting group, a series of functorial results concerning orbit equivalences and measure equivalences, and the vanishing for *amenable groupoids*. In the sequel [10], for discrete measured groupoids, the authors gives a homological algebraic characterization of bounded cohomology, following the classic case studied by Ivanov and Monod. The main achievement is that bounded cohomology of such groupoids can be computed via essentially bounded functions on any *amenable space* (for instance any boundary, see [1]).

Boundaries of measured groupoids ([1]). In this work, motivated by the role of boundaries and boundary maps in rigidity theory, the authors introduce a general notion of *boundary* for measured groupoids, inspired by works by Bader and Furman. They show that the Poisson boundaries introduced in the groupoid context by Kaimanovich are instances of the given definition. The second part of the paper is due to *boundary maps*, whose existence is proved for representations of ergodic groupoids into algebraic groups.

Bounded cohomological induction ([8]). In the recent joint paper [8] with Hartnick, we extend the Eckmann-Shapiro induction isomorphism due to Burger and Monod to the much general setting of transverse groupoids. For any p.m.p action of a locally compact group admitting a separated cross-section, we show that the bounded cohomology of the action coincide with the one of the restriction groupoid (equipped with a suitable measured structure). This discretization result opens the door for several applications. For instance, it gives an invariant to distinguish transverse groupoids coming from *aperiodic tiling*. More importantly, it is a starting point to retrace several results about lattices and their rigidity in the wider context of *FLC sets*, a particular class of discrete subsets of locally compact groups.

Simplicial volume ([9])

In [9] I address a dynamical approach to simplicial volume proposed by Gromov. Following some constructions due to Sauer, I use *foliated singular simplices* to build a homology theory and a new way to compute the simplicial volume of manifolds. Via homological algebra the dual theory is showed to be connected with the bounded cohomology of p.m.p actions settled in [11], in complete analogy with the Gromov-Ivanov Mapping Theorem for classic singular (co)homology. By duality, new vanishing criteria for the simplicial volume are obtained, in particular, thanks to the results obtained in [8], in terms of the vanishing of the bounded cohomology of transverse groupoids.

Numerical invariant for measurable cocycles ([2], [3], [5], [13])

During my PhD under the supervision of Stefano Francaviglia and Alessio Savini [13], I studied the theory of numerical invariant for measurable cocycles. The theory, introduced in the previous years by Moraschini and Savini, is a generalization of the important approach to rigidity via bounded cohomology developed by Burger, Iozzi, Wienhard and many others. In [5] the main results are two: the existence of boundary maps for Zariski dense cocycles into simple Lie groups of non-compact type with values into the Furstenberg boundary. A Zimmer-type superrigidity result for such Zariski dense maximal cocycles in SU(p,q), that generalizes a result by Pozzetti for representations. The infinite-dimensional analogue, namely the case of cocycles in $\mathrm{SU}(1,\infty)$, is analysed in [2]. Here a second existence result for boundary maps is proved in a quite general context, namely when the cocycle takes values in the isometry group a CAT(0)-space with finite telescopic dimension. In [3] the authors classifies Zariski dense cocycles with values into Hermitian Lie groups of non-tube type, via the pullback of the Kähler class in bounded cohomology, extending results of Burger, Iozzi and Wienhard.

Bounded cohomology of exact forms ([4])

A celebrated result by Barge and Ghys shows that the set of differential forms on a surface of genus at least 2 can be embedded in the second bounded cohomology of the surface. In particular, this implies that the latter is infinite dimensional. In [4] the proof is retraced in higher dimension for generic oriented negatively curved closed manifolds. Indeed, the authors prove that the second bounded cohomology of such manifolds contains, as an infinite dimensional subspace, the set of Barge-Ghys classes obtained by straightening closed (equivalently exact) differential forms.

Surface branched covers ([6])

My master thesis, written under the supervision of Carlo Petronio, studies a classic problem of realizing branched covers between surfaces. In particular, for a given cover its branch datum encodes its combinatorics, and the problem asks whether an abstract datum can be realized by an effective cover. A more refined question asks *how many* these covers exist, up to a suitable equivalence one regards them. In [6], that collects the main results of the thesis, the authors focus on the possible natural definitions of *equivalence* between covers. An hierarchy between such notions is established and, using the technique of *dessin d'enfants*, the given equivalences are shown to be actually different.