

FILIPPO SARTI

Curriculum vitae

PERSONAL DATA

Born in Castel San Pietro Terme, Bologna, Italy on December 15, 1993.
Email: filippo.sarti@unito.it

POSITIONS

Università di Torino, Torino
PostDoctoral researcher

October 2022 - present

EDUCATION

Università di Bologna, Bologna

November 2018 - June 2022

PhD student

Advisors: Stefano Francaviglia, Alessio Savini

Thesis: *Numerical invariants for measurable cocycles*

Università di Pisa, Pisa

September 2015 - July 2018

Master degree in Mathematics

110/110 cum laude

Supervisor: Carlo Petronio

Thesis: *Surface branched covers and Hurwitz numbers*

Università di Bologna, Bologna

September 2012 - July 2015

Bachelor degree in Mathematics

110/110

Supervisor: Massimo Ferri

Co-supervisor: Alessia Cattabriga

Thesis: *Branched coverings in dimension 3*

PREPRINTS

[SS21c] F. Sarti - A. Savini, *Boundary maps and reducibility for cocycles into the isometries of $CAT(0)$ -spaces*, submitted (2021), [arXiv:2005.10529](https://arxiv.org/abs/2005.10529).

[SS21b] F. Sarti - A. Savini, *Parametrized Kähler class and Zariski dense orbital 1-cohomology*, submitted (2021), [arXiv:2106.02411](https://arxiv.org/abs/2106.02411).

PUBLISHED PAPERS

[SS21a] F. Sarti - A. Savini, *Superrigidity of maximal measurable cocycles of complex hyperbolic lattices*, **Math. Z.** **300** (2022), n. 1, 421-443, [arXiv:2002.03628](https://arxiv.org/abs/2002.03628).

[PS19] C. Petronio - F. Sarti, *Counting surface branched covers*, **Studia Sci. Math. Hungar.** **56(3)** (2019), 309-322, [arXiv:1901.08316](https://arxiv.org/abs/1901.08316).

BOOK CHAPTERS

[...] F. Sarti, *Proportionality principle via hyperbolic geometry*, (2021) chapter in *Bounded Cohomology and Simplicial Volume*, accepted for publication in **London Mathematical Society - Lecture Note Series**, *preprint*.

PHD THESIS

[S22] F. Sarti, *Numerical invariants for measurable cocycles*, PhD thesis, Bologna (2022).

RESEARCH INTERESTS

Numerical invariants for measurable cocycles. In 2020/21, Moraschini and Savini have formalized *numerical invariants* for measurable cocycles. Inspired by Zimmer's superrigidity result about cocycles from lattices in connected simple Lie groups of rank at least 2, the aim is to exploit numerical invariants to study cocycles from lattices in rank one groups. [S22, SS21a, SS21b, SS21c]

Cocycles and simplicial volume. In some works by Bader-Furmann-Sauer and Löh-Pagliantini, cocycles coming from couplings have been employed to study *integral foliated simplicial volume*. A possible straightening of this idea could lead to a notion of *parametrized volume*, that may help in the study of this measurable version of simplicial volume.

Boundary maps for measurable cocycles. A fruitful approach in the study of numerical invariants makes use of boundary maps, that are equivariant maps between boundaries, to implement the pullback in bounded cohomology. I am interested in proving existence results for such maps in the context of measurable cocycles. [SS21a, SS21c]

The spectrum of Toledo invariant. For representations (or cocycles) of complex hyperbolic lattices into the group $\mathrm{PU}(p, q)$ one can define the *Toledo invariant*, which has been exploited in the study of rigidity of such objects. So far, no explicit computations of the spectrum of this invariant are known. I would like first to understand which are the possible values for representations and what happens in the measurable setting of cocycles.

Surface branched covers and Prime Degree Conjecture. In the setting of the old Hurwitz existence problem that asks whether an abstract datum is realized by a surface branched cover, I studied the possible notions of equivalence between covering in terms of equivalence between *dessins d'enfant* [PS19]. I also focused on a topological Cut and Paste technique to study dessins d'enfant and surface covers, developing an algorithm to establish realizability for a given abstract data. Recently, in collaboration with S. Francaviglia (Università di Bologna) and G. Faraco (MPIM Bonn), the project has been resumed.

TALKS

- *May, 25 2022* - **Numerical invariants for measurable cocycles** - First UMI meeting of Ph.D. students - Padova.
- *April, 26 2022* - **Numerical invariants for measurable cocycles and rigidity** - Séminaire Groupes et géométrie - University of Geneva.
- *September, 6 2021* - **Numerical invariants for measurable cocycles** (lightening talk) - Counting problems - Ventotene .
- *November, 9 2020* - **The proportionality principle via hyperbolic geometry** - International young seminar on bounded cohomology and simplicial volume WS20 - online seminar.
- *June, 15 2020* - **Numerical invariants and bounded cohomology** - International young seminar on bounded cohomology and simplicial volume SS20 - online seminar.
- *December, 5 2019* - **Problema di esistenza di Hurwitz e Cut&Paste tra rivestimenti** - Baby Geometry - Università di Pisa.
- *March, 7 2019* - **The Hurwitz existence problem and bipartite graphs** - Talk given for the course Graph Theory (Prof. Marilena Barnabei), Università di Bologna.

- *April, 7 2017* - **Invariante di Witten per 3-varietà** - Baby Geometry - Università di Pisa.

TEACHING EXPERIENCE

- *Fall 2021* - Teaching assistant for the course **Linear Algebra**, Ingegneria informatica, Università di Bologna.
- *Fall 2021/Spring 2022* - Teaching assistant for the course **Mathematics**, Management and Marketing, Università di Bologna.
- *Fall 2021/Spring 2022* - Teaching assistant for the course **Mathematics**, Business and Economics, Università di Bologna.
- *Fall 2020/Spring 2021* - Teaching assistant for the course **Mathematics**, Management and Marketing, Università di Bologna.
- *Fall 2020* - Teaching assistant for the course **Linear Algebra**, Ingegneria informatica, Università di Bologna.
- *Fall 2020* - Teaching assistant for the course **Mathematics**, Management and Marketing GII, Università di Bologna.
- *Spring 2019* - Teaching assistant for the course **Linear Algebra**, Informatica per il Management, Università di Bologna.
- *Fall 2019* - **Aligment math course**, Management and marketing, Università di Bologna.

VISITING PERIODS

- *September, 2021 - December 2021* - Research period hosted by Michelle Bucher and Alessio Savini - Université de Genève.
- *June, 2019* - Collaboration with Carlo Petronio - Università di Pisa.

SCIENTIFIC ACTIVITIES

- *2019-2021* - Co-organizer of the **BAD seminars** for graduate students, Università di Bologna.
- *Spring 2020* - Co-organizer of the PhD course **Lie groups and lattices** given by Alessio Savini, Università di Bologna.
- *2021-today* - Reviewer for **zbMATH**.

PROJECTS

- *January, 2019 - present* - Member of **GNSAGA**, founded by INDAM.
- *February, 2019 - 2021* - Member of **PRIN 2017 “Real and Complex Manifolds: Topology, Geometry and Holomorphic Dynamics”**, founded by INDAM.

PRIZE AND AWARDS

- *June 2019* - Fondazione Premi, Borse di studio e Provvidenze dell'Università di Pisa; prize for graduate students.
- *May 2019* - Credito Cooperativo Ravennate, Forlivese e Imolese and Fondazione Giovanni dalle Fabbriche; prize for graduate students cum laude.

SCHOLARSHIPS AND GRANTS

- *July, 6-14 2022* - **Kovalevskaya Grant for ICM 2022 in Saint Petersburg** - IMU
- *November, 2018 - January, 2022* - **Ph.D Scholarship**, Università di Bologna.
- *September, 20 2021 - December, 23 2021* - **Marco Polo Scholarship** - Università di Bologna (euro 3450).
- *February, 23-28 2020* - **GNSAGA Scholarship** - INDAM (euro 400).
- *July, 8-12 2019* - **GNSAGA Scholarship** - INDAM (euro 400).
- *June, 30 - July, 5 2019* - **GNSAGA Scholarship** - INDAM (euro 400).
- *April, 8-12 2019* - **GNSAGA Scholarship** - INDAM (euro 400).

CONFERENCES ATTENDED

- *July, 4-8 2022* - **Complex hyperbolic geometry and related structures** - CIRM Luminy, France.
- *September, 6-11 2021* - **Counting problems** - Ventotene, Italy.
- *September, 20-25 2020* - **Virtual workshop: Simplicial Volumes and Bounded Cohomology** - online.
- *February, 23-28 2020* - **Young Geometric Group Theory** - Saint Jacut de la mer, France.
- *September, 8-14 2019* - **Of coarse! Quasi-isometries and groups: rigidity and classification** - Ventotene, Italy.
- *July, 8-12 2019* - **Arbeitstagung 2019 on Geometry** - MPIM, Bonn.
- *June, 30 - July, 5 2019* - **Young Geometric Group Theory** - Bilbao.
- *April, 8-12 2019* - **Workshop: Riemannian and Simplicial Volume** - KIT, Karlsruhe.
- *February, 21-23 2019* - **Workshop su varietà reali e complesse: geometria, topologia e analisi armonica** - SNS, Pisa.

OTHER SKILLS

Software skills

I'm quite familiar with the following softwares: L^AT_EX, Python, Mathematica, Excel.

Language skills

Italian - mother tongue

English - intermediate

Spanish - basic