FILIPPO SARTI

Curriculum vitae

PERSONAL DATA

Born in Castel San Pietro Terme, Bologna, Italy on December 15, 1993.
PhD student at the Math Department, University of Bologna, Piazza di Porta San Donato 5, 40126 Bologna, Italy.
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POSITIONS

Universitá di Bologna, Bologna   *November 2018 - June 2022 (expected)*
PhD student
Advisors: Stefano Francaviglia, Alessio Savini
Thesis (tentative title): *Numerical invariants for measurable cocycles*

EDUCATION

Universitá 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*

Universitá 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.

[SS21b] F. Sarti - A. Savini, *Parametrized Kähler class and Zariski dense Eilemberg-MacLane cohomology*, submitted *(2021)*, arXiv:2106.02411.

PUBLISHED PAPERS

[SS21a] F. Sarti - A. Savini, *Superrigidity of maximal measurable cocycles of complex hyperbolic lattices*, **Math. Z.** *(2021)*, arXiv:2002.03628.

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

RESEARCH INTERESTS

Optimal integral cycles on Riemannian manifolds. Given a Riemannian manifold, optimal cycles are those which minimize both the length and the number of connected components among the representatives of their cohomology classes. The first aim is to find estimates from above for the maximum number of connected components of an optimal cycle of a given Riemannian manifold. Secondly, we want to construct explicit examples for which such a bound does not exist. Joint with A. Sambusetti (Sapienza Universitá Roma).

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. [SS21a,SS21b,SS21c]

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]

Surface branched covers and Prime Degree Conjecture. In the setting of the old Hurwitz existence problem that asks weather 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 (Universitá di Bologna) and G. Faraco (MPIM Bonn), the project has been resumed.

TALKS

- *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 - Universitá di Pisa.

- *March, 7 2019* - **The Hurwitz existence problem and bipartite graphs** - Talk given for the course Graph Theory (Prof. Marilena Barnabei), Universitá di Bologna.

- *April, 7 2017* - **Invariante di Witten per 3-varieta'** - Baby Geometry - Universitá di Pisa.

TEACHING EXPERIENCE

- *Fall 2021* - Teaching assistant for the course **Linear Algebra**, Ingegneria informatica, Universitá di Bologna.

- *Fall 2021/Spring 2022* - Teaching assistant for the course **Mathematics**, Management and Marketing, Universitá di Bologna.

- *Fall 2021/Spring 2022* - Teaching assistant for the course **Mathematics**, Business and Economics, Universitá di Bologna.

- *Fall 2020/Spring 2021* - Teaching assistant for the course **Mathematics**, Management and Marketing, Universitá di Bologna.

- *Fall 2020* - Teaching assistant for the course **Linear Algebra**, Ingegneria informatica, Universitá di Bologna.

- *Fall 2020* - Teaching assistant for the course **Mathematics**, Management and Marketing GII, Universitá di Bologna.

- *Spring 2019* - Teaching assistant for the course **Linear Algebra**, Informatica per il Management, Universitá di Bologna.

- *Fall 2019* - **Aligment math course**, Management and marketing, Universitá di Bologna.

VISITING PERIODS

- *September, 2021 - December 2021* - Research period hosted by Michelle Bucher and Alessio Savini - Université de Genve.

- *June, 2019* - Collaboration with Carlo Petronio - Universitá di Pisa.

SCIENTIFIC ACTIVITIES

- *2019-today* - Co-organizer of the **BAD seminars** for graduate students, Universitá di Bologna.

- *2020* - Co-organizer of the PhD course **Lie groups and lattices** given by Alessio Savini, Universitá 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'Universitá 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**, Universitá di Bologna.

- *September, 20 2021 - December, 23 2021* - **Marco Polo Scholarship** - Universitá 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

- *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, Karlsrhue.

- *February, 21-23 2019* - **Workshop su varietá reali e complesse: geometria, topologia e analisi armonica** - SNS, Pisa.

OTHER SKILLS

Software skills
I'm quite familiar with the following software: LaTeX, Python, Mathematica, Excel.

Language skills
Italian - mother tongue
English - intermediate
Spanish - basic