



Ludovico Battista

Contact Information

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Education

- 2018/2019 - **Ph.D. Student in Pure Mathematics, Università di Pisa, Pisa.**
present I am focusing on the study of hyperbolic 4-manifolds. My work deals with manifolds obtained by colorations of polytopes, and I use tools from the theory of Coxeter groups, cubical complexes and deformation of representations.
- 2016/2017 - **Graduate Student in Pure Mathematics, Università di Pisa, Pisa, Master Degree**
2017/2018 in Mathematics, 110/110 cum laude, 26/10/2018.
Master Thesis: "Principal congruence Link complements"
Dissertation Topic: The topic is the study of hyperbolic manifolds that are both principal congruence manifolds and link complements in S^3 , which were classified by Baker, Goerner and Reid in the article "All pincipal congruence link complements". After a brief introduction to the basic results in hyperbolic geometry, we exhibit the two main results that prove that there exists only a finite number of such manifolds. We show the main algorithm that allow to prove that a principal congruence manifold is indeed a link complement and several methods to prove the opposite. At the end, we follow a construction due to Goerner that allows to construct a link whose complement is a specific principal congruence manifold.
Advisor: Prof. Bruno Martelli.

2013/14 - **Bachelor Student in Pure Mathematics**, *Università di Pisa*, Pisa, Bachelor Degree in Mathematics, 110/110 cum laude, 13/05/2016.

Bachelor Dissertation: "Crescita di gruppi: un gruppo con crescita intermedia" (Group growth: a group with intermediate growth).

Dissertation Topic: The topic is the existence of a group with intermediate growth. At the beginning there are the definitions of group growth and the exposition of some of its properties. Then some connections with the fundamental group of Riemannian manifold are studied: the main results in this section are two Milnor's theorems that link the growth of the volume of universal cover's balls with the growth of the fundamental group of a manifold. At the end, we show a group with intermediate growth, following a Grigorchuk's example.

Advisor: Prof. Roberto Frigerio.

2008/09 - **High School Student**, *Classical Lyceum "Mario Pagano"*, Campobasso (CB), High School Diploma, 100/100, July 2013.

Scholarship

2016/17 - **Scholarship for Mathematics Master students**, *Istituto Nazionale di Alta Matematica*.

I ranked first in the national test for this scholarship. It consisted in a written exam with several problems about Analysis, Probability, Geometry and Algebra.

2013/14 - **Scholarship for Mathematics students**, *Istituto Nazionale di Alta Matematica*.

2015/16 I won this scholarship for academic achievement, and I succeeded in renewing it for the whole duration of my Bachelor's Degree.

Positions

28/12/2018 - **Expert on the subject for the course *Geometry and Differential Topology***,
28/12/2021 *Department of Mathematics, Pisa*.

19/06/2019 - **Expert on the subject for the course *Principles of geometry***, *Department of*
19/06/2021 *Mathematics, Pisa*.

Work experience

February 2019 - **Support to teaching for the course *Principles of Geometry* - Department of Mathematics, Pisa**.

July 2019 I won a competition announcement to begin this collaboration. My job was to correct some exercises made by the students during the course.

February 2018 - **Semestral course in Arithmetic to reduce early university leaving - Department of Mathematics, Pisa**.

July 2018 I won a competition announcement to begin a collaboration with the university. This was really different from my other jobs in the Department: I taught a class in collaboration with another Master student in order to help first year students who couldn't pass the Arithmetic exam in January-February. I had the chance to focus on an argument which is not too wide and to take care of a limited number of students. This experience helped me a lot in understanding the problems of teaching and gave me motivation to improve both as a student and as a teacher.

- September **Part-time Counseling (Counseling) - Department of Mathematics, Pisa.**
2017 - I won a competition announcement to begin a collaboration with the university. My job was
February to conceive and write a brochure to promote the university's educational offer to high-school
2018 students. I also held a lecture where I introduced the graph theory.
- June 2016 - **Part-time Tutoring (Tutorato alla Pari) - Department of Mathematics, Pisa.**
July 2017 I won a competition announcement to begin a collaboration with the university, and I
succeeded in renewing it for the second half of the year. My job was to tutor other students,
assisting them with their queries and problems: for example, how to draft a study plan, the
documents necessary to enroll in the faculty and helping (especially first-year students) with
problems in mathematics.

Experience

- 9-14 September 2019 **Conference**, *Of coarse! Quasi-isometries and groups: rigidity and classification*, Ventotene.
- 24-28 June 2019 **School**, *Géométrie, topologie et arithmétique de façon hyperbolique*, Les Diablerets.
- 17-21 June 2019 **Conference**, *Knot concordance and low-dimensional manifolds*, Le Croisic.
- 6-10 May 2019 **School**, *Trisections of smooth 4-manifolds*, Matemale.
- 17-22 February 2019 **School**, *Geometry, Algebra and Combinatorics of Moduli Spaces and Configurations III*, Dobbiaco.
- 14-18 January 2019 **Conference**, *Conference on Geometric Structures in Nice*, Nice.
- 7-11 January 2019 **School**, *Winter School on Geometric Structures in Nice*, Nice.
- 28-30 November 2018 **Workshop**, *Workshop on Topology and Neuroscience*, Lausanne.
I attended this workshop during which several connections between the Topology (in particular Topological Data Analysis) and Neuroscience were presented.
- 11-15 June 2018 **Research school**, *3-Manifolds and Geometric Group Theory*, Marseille.
I had the chance to take part in this school during which I attended some mini-courses about 3-Manifolds, Cube Complexes, Relatively Hyperbolic Groups and Boundary of CAT(0) spaces.

Skills

Language skills

Italian	Mother tongue
English	Intermediate
French	Basic, A1

Computer skills

Python	Intermediate
Matlab	Intermediate
\LaTeX	Intermediate
C Language	Basic