



# Ludovico Battista

---

Updated Sep 2025

---

## Contact Information

E-mail [ludox73@gmail.com](mailto:ludox73@gmail.com)  
Address Rovereto (TN), 38068, Italy  
Birth 10/04/1994, in Campobasso (CB), Italy  
Website <https://ludox73.github.io/>

---

## Positions

'23 - current **Post-doc**, *FBK - Fondazione Bruno Kessler*, FM - Formal Methods, Trento.  
'22 - '23 **Post-doc**, *Alma Mater Studiorum - University of Bologna*, Department of Mathematics, Bologna.

---

## Education

'18-'22 **Ph.D. in Pure Mathematics**, *Università di Pisa*, Pisa, 08/04/2022, cum laude.  
**PhD Thesis**: "Hyperbolic 4-manifolds, perfect circle-valued Morse functions and infinitesimal rigidity"  
**Supervisor**: Prof. Bruno Martelli.  
'16-'18 **Graduate Student in Pure Mathematics**, *Università di Pisa*, Pisa, Master Degree in Mathematics, 110/110 cum laude, 26/10/2018.  
**Master Thesis**: "Principal congruence Link complements"  
**Advisor**: Prof. Bruno Martelli.  
**Reward**: the thesis was awarded a prize by *Istituto Nazionale di Alta Matematica*.  
'13-'16 **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).  
**Advisor**: Prof. Roberto Frigerio.

---

## Publications

- 1 **Hyperbolic 4-manifolds with perfect circle-valued Morse functions**, *j.w. with Martelli, B.*, Transactions of the American Mathematical Society 375.04: 2597-2625, 2022.  
arXiv Journal

- 2 **Infinitesimal Rigidity for Cubulated Manifolds**, *Geom Dedicata* 217, 33, 2023.  
arXiv Journal
- 3 **Dodecahedral  $L$ -spaces and hyperbolic 4-manifolds**, *j.w. with Leonardo Ferrari and Diego Santoro*, Accepted in *Communications in Analysis and Geometry*, 2022.  
arXiv Journal
- 4 **Bounded Cohomology Classes of Exact Forms**, *j.w. with S. Francaviglia, M. Moraschini, F. Sarti, A. Savini*, *Proceedings of the American Mathematical Society*, 2022.  
arXiv Journal
- 5 **SMT-Based Stability Verification of an Industrial Switched PI Control Systems**, *j.w. with S. Basagiannis, A. Becchi, A. Cimatti, G. Giantamidis, S. Mover, A. Tacchella, S. Tonetta, V. A. Tsachouridis*, 53rd Annual IEEE/IFIP International Conference on Dependable Systems and Networks, DSN Workshop VERDI, 2023.  
Journal
- 6 **Stability Verification of an Industrial Switched PI Control Systems**, *j.w. with S. Basagiannis, A. Becchi, A. Cimatti, G. Giantamidis, S. Mover, A. Tacchella, S. Tonetta, V. A. Tsachouridis*, *Proceedings of the 11th Int. Workshop on Applied Verification for Continuous and Hybrid Systems*, 2024.  
EasyChair
- 7 **Formal Verification of Stability for Parametric affine Switched Systems**, *j.w. with S. Tonetta*, 8th IFAC Conference on Analysis and Design of Hybrid Systems ADHS 2024, 2024.  
ScienceDirect
- 8 **Deriving Liveness Properties of Hybrid Systems from Reachable Sets and Lyapunov-like Certificates**, *j.w. with S. Tonetta*, To be presented at ATVA25, 2025.  
ATVA25 Extended version

## Talks

- Sep '20 **Seminar of Geometry group, Pisa**, *A Hyperbolic 4-manifold with a perfect circle valued Morse function.*
- Apr '22 **Seminario di Algebra e Geometria, Bologna**, *Hyperbolic 4-manifolds, perfect circle valued Morse functions and infinitesimal rigidity.*
- Oct '22 **Geometry seminars, Neuchâtel**, *Dodecahedral  $L$ -spaces and Hyperbolic 4-manifolds.*
- Nov '22 **Geometry seminars, Luxembourg**, *Hyperbolic 4-manifolds, perfect circle-valued Morse functions and infinitesimal rigidity.*
- Jul '24 **Analysis and Design of Hybrid Systems, Boulder, Colorado, Stati Uniti**, *Formal Verification of Stability for Parametric affine Switched Systems.*
- (planned) Oct '25 **Automated Technology for Verification and Analysis, Bangalore, India**, *Deriving Liveness Properties of Hybrid Systems from Reachable Sets and Lyapunov-like Certificates.*

**More,** I have took part in many informal seminars both online (especially during COVID pandemic, GT GAPS, Exotic LS) and offline (Pisa, Bologna, Nice, Ventotene).

## Organized activities

- Mar '23 **Non-positive curvature in manifolds and groups**, *Math Day funded by INdAM*.  
Link
- Mar '23 **Manifolds and groups in Bologna**, *Workshop funded by GNSAGA (INdAM)*.  
Link
- '22 **TGV: Seminari di Topologia e Geometria delle Varietà**, *Department of Mathematics, Bologna*, with Stefano Francaviglia, Marco Moraschini e Stefano Riolo, We organized a weekly meeting with master students to introduce them to some research topics in differential topology.
- '18-'21 **BabyGeometri**, *Department of Mathematics, Pisa*, Weekly metttings for early-career geometers in Pisa.  
Link

## Referee activity

**Reviewer**, I have served as (sub)reviewer for several international conferences as FM, TACAS, SAFECOMP.

## Scholarships

- '16-'18 **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.
- '13-'16 **Scholarship for Mathematics students**, *Istituto Nazionale di Alta Matematica*.  
I won this scholarship for academic achievement, and I succeeded in renewing it for the whole duration of my Bachelor's Degree.

## Visiting

- Nov '22 **Research visit**, *University of Luxembourg*.  
During my visit a gave a talk in the framework of the research seminars of the geometry group, and I collaborated with prof. Jean-Marc Schlenker and his research team.
- Oct '22 **Research visit**, *University of Neuchâtel*.  
During my visit a gave a talk in the framework of the research seminars of the geometry group, and I collaborated with prof. Aleksandr Kolpakov and his research team.

## Teaching experience

- '21 - '22 **Support to teaching for the course *Differential Geometry*** - Department of Physics, Pisa.
- '21 - '22 **Support to teaching for the course *Geometria e algebra lineare -modulo Geometria*** - Department of Civil and Industrial Engineering, Pisa.

- '19 **Support to teaching for the course *Principles of Geometry* - Department of Mathematics, Pisa.**
- '18 **Semestral course in Arithmetic to reduce early university leaving - Department of Mathematics, Pisa.**
- '17 - '18 **Part-time Counseling (Counseling) - Department of Mathematics, Pisa.**
- '16 - '17 **Part-time Tutoring (Tutorato alla Pari) - Department of Mathematics, Pisa.**

## Schools and Conferences

- (planned) **Conference**, *International Symposium on Automated Technology for Verification and Analysis*, Bangalore, India, Paper published.
- Nov 2025 **Conference**, *Higher Dimensional Hyperbolic Geometry*, Ventotene, Italy.
- Sep '25 **Conference**, *The 8th IFAC Conference on Analysis and Design of Hybrid Systems*, Boulder, Colorado, Paper published.
- Jul '24 **Conference**, *GRAZP: Groups and Rigidity Around the Zimmer Program*, Ventotene, Italy.
- Sep '23 **Conference**, *VERDI workshop*, Porto, Portugal.
- Sep '22 **Conference**, *Recent Advances in Bounded Cohomology*, Regensburg.
- Sep '22 **Conference**, *4-Manifolds: From Above and Below*, Marseille, Flash talk given.
- July '22 **Conference**, *Geometry and Dynamics of Moduli Spaces*, Bologna.
- May '22 **Conference**, *Arithmetic Groups and 3-Manifolds*, Bonn.
- Dec '21 **Conference**, *Winter Braids XI*, Dijon, Flash talk given, poster presented.
- Sep '21 **Conference**, *Counting problems*, Ventotene, Flash talk given.
- Jul '21 **Conference**, *Swiss Knots 2021*, Fribourg.
- June '21 **Conference**, *Trisections and the Thom conjecture*, Matemale.
- Feb '20 **Conference**, *Winter Braids X*, Pisa.
- Sep '19 **Conference**, *Of coarse! Quasi-isometries and groups: rigidity and classification*, Ventotene.
- Jun '19 **School**, *Géométrie, topologie et arithmétique de façon hyperbolique*, Les Diablerets.
- Jun '19 **Conference**, *Knot concordance and low-dimensional manifolds*, Le Croisic.
- May '19 **School**, *Trisections of smooth 4-manifolds*, Matemale.
- Feb '19 **School**, *Geometry, Algebra and Combinatorics of Moduli Spaces and Configurations III*, Dobbiaco.
- Jan '19 **Conference**, *Conference on Geometric Structures in Nice*, Nice.
- Jan '19 **School**, *Winter School on Geometric Structures in Nice*, Nice.
- Nov '18 **Workshop**, *Workshop on Topology and Neuroscience*, Lausanne.
- Jun '18 **Research school**, *3-Manifolds and Geometric Group Theory*, Marseille.

## Skills

### Language skills

Italian	Mother tongue
English	Advanced, C1
French	Basic, A1

### Programming skills

Python	Advanced
MATLAB	Advanced
$\text{\LaTeX}$	Advanced
Sage	Intermediate
C Language	Basic

### Code samples

- Paper 2 The results presented in Paper 2 were obtained using some code provided alongside the publication. This consists mainly of Sage and MATLAB scripts.
- Paper 3 The results presented in Paper 3 were obtained using some code provided alongside the publication. This consists mainly of Sage scripts. Written in collaboration with Leonardo Ferrari.
- Paper 7 Paper 7 underwent an experimental evaluation conducted with the code provided alongside the publication. This consists mainly of Python scripts. A repeatability evaluation was available, and the paper obtained the corresponding badge.
- Paper 8 Paper 8 underwent an experimental evaluation conducted with the code provided alongside the publication. This consists of a large software written in Python and MATLAB, which makes use of several software and packages like PySMT, z3, cvc5, CORA, and nuXmv. A repeatability evaluation was available, and the paper obtained the Available and Functional badges.