

Cosimo Perini Brogi

Current position

since ASSISTANT PROFESSOR
Nov. 2023 SySMA Research Unit, IMT School for Advanced Studies Lucca
within the MUR-NextGenEU-2022 Project “SERICS-SWOPS” [↗](#)

Professional experience

- Spring 2025 LECTURER, Long seminar “*Introduction to logic and formalized reasoning*”
Co-instructor: Gustavo Cevolani
PhD programs of IMT, IMT School for Advanced Studies Lucca
- Winter 2024 LECTURER, Undergraduate/MSc course “*Interactive theorem proving*”
Organiser: Stefania Centrone
Technische Universität München
- April 2023 – RESEARCH COLLABORATOR
Nov. 2023 SySMA Research Unit, IMT School for Advanced Studies Lucca
Supervised by Rocco De Nicola, and within the MIUR-PRIN-2017 Project “IT Matters” [↗](#)
- Oct. 2022 – SOFTWARE DEVELOPER, *University of Barcelona & Formal Vindications SL*
Febr. 2023 Industrial PhD Projects of Generalitat de Catalunya
Academic supervisor: Joost J. Joosten
- Nov. 2021 VIDEO CONFERENCE ASSISTANT, “*Geometric Logic, Constructivisation, and Automated Theorem Proving*”(Dagstuhl-Seminar 21472)
Organisers: Thierry Coquand, Hajime Ishihara, Sara Negri, Peter M. Schuster
Schloss Dagstuhl – *Leibniz-Zentrum für Informatik*, 21-26 November 2021
- Spring 2021 TEACHING ASSISTANT, Compact course “*Proof theory for modal and non-classical logics*”
Teacher in charge of the course: Sara Negri
Department of Mathematics, *University of Genoa*

Education

- 2018 – 2022 PHD IN MATHEMATICS AND APPLICATIONS, *University of Genoa*
Thesis title: Investigations of Proof Theory and Automated Reasoning for Non-classical Logics
Advisors: Sara Negri, Giuseppe Rosolini
Examiners: Martin Hyland, Eugenio Orlandelli, Daniele Porello
Defended on July 12th, 2022

- 2015 – 2018 MASTER IN LOGIC, PHILOSOPHY AND HISTORY OF SCIENCE, *University of Florence*
 Thesis title: Kleisli Triples in Homotopy Type Theory
 Advisor: Marco Maggesi
 Co-Advisor: Pierluigi Minari
 Defended on March 2nd, 2018
 Final Grade: First Class with Distinction (110/110 *summa cum laude*)
- 2013 – 2015 BACHELOR IN PHILOSOPHY, *University of Florence*
 Thesis title: Modal Logics of Provability and Interpretability (in Italian)
 Advisor: Pierluigi Minari
 Defended on October 8th, 2015
 Final Grade: First Class with Distinction (110/110 *summa cum laude*)

Grants & awards

- Oct. 2022 – DOCTORATS INDUSTRIALS PROJECT GRANT DI 008 2022
 Febr. 2023 Department of Mathematics & Computer Science
 Department of Philosophy
 University of Barcelona
 Formal Vindications SL
- Nov. 2018 – PHD STUDENTSHIP IN MATHEMATICS AND APPLICATIONS
 Jan. 2022 Department of Mathematics – University of Genoa
- Oct. 2012 – DSU FULLY FUNDED STUDENT GRANT
 March 2018 Agency for the University Study Right of the Tuscany Regional Council (Regione Toscana) – University of Florence
- May 2016 SILFS GRANT
 For attending the AILA Logic Summer School 2016
 Awarded by the SILFS Italian Society for Logic and Philosophy of Sciences

Publications

Books

- Cosimo Perini Brogi.
Investigations of Proof Theory and Automated Reasoning for Non-classical Logics
 PhD Thesis, University of Genoa, July 2022, Open Access [↗](#)

Articles published in journals with selection committee

- Gianluca Amato, Matteo Calosci, Marco Maggesi, Cosimo Perini Brogi.
Universal Algebra in UniMath
 Mathematical Structures in Computer Science 2024;34(8):869-891, Open Access [↗](#)
- Marco Maggesi, Cosimo Perini Brogi. *Mechanising Gödel-Löb logic in HOL Light*
 Journal of Automated Reasoning 67.3 (2023): 29, Open Access [↗](#)
- Cosimo Perini Brogi. *La matematica delle dimostrazioni*
 Archimede 2/2022, October 2022, DOI [↗](#)
- Cosimo Perini Brogi. *Curry-Howard-Lambek Correspondence for Intuitionistic Belief*
 Studia Logica, Volume 109 Issue 3, June 2021, Open Access [↗](#)
- Cosimo Perini Brogi. *L'enigma del compleanno*
 Archimede 3/2020, December 2020, DOI [↗](#)

Contributions published in the proceedings of conferences with selection committee

- Antonella Bilotta, Marco Maggesi, Cosimo Perini Brogi, Leonardo Quartini.
Growing HOLMS, a HOL Light library for modal systems
6th International Workshop on Artificial Intelligence and Formal Verification, Logic, Automata, and Synthesis, OVERLAY 2024, November 28-29, 2024, Bolzano
CEUR Workshop Proceedings Vol.3904, Open Access [↗](#)
- Stefania Centrone, Cosimo Perini Brogi, Stefan Reifberger.
Machine translation: early criticisms revisited
The 2nd Human-Centred AI: Education & Practice Conference, December 02-03, 2024 Naples
ACM Proceedings of the 2024 Conference on Human Centred Artificial Intelligence - Education and Practice, HCAIep 2024, Open Access [↗](#)
- Cosimo Perini Brogi, Rocco De Nicola, Omar Inverso.
Simpson's proof systems for process verification: A fine-tuning
25th Italian Conference on Theoretical Computer Science, Sept. 11-13, 2024 Turin
CEUR Workshop Proceedings, Volume 3811, 25th Italian Conference on Theoretical Computer Science ICTCS 2024, Open Access [↗](#)
- Marco Maggesi, Cosimo Perini Brogi.
Rigorous analysis of idealised pathfinding ants in higher-order logic
In: Margaria, T., Steffen, B. (eds) - Leveraging Applications of Formal Methods, Verification and Validation. Rigorous Engineering of Collective Adaptive Systems. ISoLA 2024
Springer Lecture Notes in Computer Science, volume 15220, DOI [↗](#)
- Cosimo Perini Brogi, Marco Maggesi.
Analysing collective adaptive systems by proving theorems
In: Margaria, T., Steffen, B. (eds) - Leveraging Applications of Formal Methods, Verification and Validation. REoCAS Colloquium in Honor of Rocco De Nicola. ISoLA 2024.
Springer Lecture Notes in Computer Science, volume 15219, DOI [↗](#)
- Gabriele Costa, Silvia De Francisci, Letterio Galletta, Cosimo Perini Brogi, Marinella Petrocchi, Fabio Pinelli, Roberto Pizziol, Manuel Pratelli, Margherita Renieri, Simone Soderi, Mirco Tribastone, Serenella Valiani.
Systems Security Modeling and Analysis at IMT Lucca
In: Margaria, T., Steffen, B. (eds) - Leveraging Applications of Formal Methods, Verification and Validation. REoCAS Colloquium in Honor of Rocco De Nicola. ISoLA 2024.
Springer Lecture Notes in Computer Science, volume 15219, DOI [↗](#)
- Gabriele Costa, Cosimo Perini Brogi.
Toward dynamic epistemic verification of zero-knowledge protocols
CEUR Workshop Proceedings, Volume 3731, 8th Italian Conference on Cyber Security ITASEC'24, Open Access [↗](#)
- Cosimo Perini Brogi. *Results and ideas on proof theory for interpretability logics*
The Proof Society Autumn School and Workshop 2022
Abstract of the contributed talk [↗](#)
- Marco Maggesi, Cosimo Perini Brogi. *A formal proof of modal completeness for provability logic*
LIPIcs, Volume 193, Interactive Theorem Proving 2021, Open Access [↗](#)

- Gianluca Amato, Marco Maggesi, Maurizio Parton, Cosimo Perini Brogi.
Universal Algebra in UniMath
Workshop on Homotopy Type Theory/Univalent Foundations 2020
Abstract of the contributed talk [↗](#)

Preprints

- Cosimo Perini Brogi. *An analytic calculus for intuitionistic belief*
ArXiv preprint [↗](#)

Other

- Cosimo Perini Brogi. *Perché leggere i classici (delle dimostrazioni matematiche)*
An informal article in Proof Mining for the large audience, January 2022 [↗](#)
- Cosimo Perini Brogi. *L'evoluzione della scienza umana?*
MaddMaths! blog post, February 2021 [↗](#)
- Cosimo Perini Brogi. *Kleisli Triples in Homotopy Type Theory*
MA Dissertation, March 2018
Code in the official UniMath Repository [↗](#)
- Cosimo Perini Brogi. *An overview of Simple Type Theory*
Final Year Report at the University of Florence
Spring Term 2017, manuscript [↗](#)

Conferences & workshops

Participation and presentation of contributions

- PACMAN WORKSHOP 2025
A proof theoretic framework for process verification
University of Rome 3 (May 14-16, 2025), slides [↗](#)
- 13TH INTERNATIONAL SYMPOSIUM ON LEVERAGING APPLICATIONS OF FORMAL METHODS, VERIFICATION AND VALIDATION
Rigorous analysis of idealised pathfinding ants in higher-order logic
Crete (October 27-31, 2024), slides [↗](#)
- 13TH INTERNATIONAL SYMPOSIUM ON LEVERAGING APPLICATIONS OF FORMAL METHODS, VERIFICATION AND VALIDATION
Analysing collective adaptive systems by proving theorems
Crete (October 27-31, 2024), slides [↗](#)
- 25TH ITALIAN CONFERENCE ON THEORETICAL COMPUTER SCIENCE
Simpson's proof systems for process verification: A fine-tuning
University of Turin (Sept. 11-13, 2024), slides [↗](#)
- SECOND SECURE SOFTWARE FROM FIRST PRINCIPLES WORKSHOP
Toward dynamic epistemic verification of zero-knowledge protocols
IMT School for Advanced Studies Lucca (June 13-14, 2024), slides [↗](#)
- ITALIAN CONFERENCE ON CYBERSECURITY 2024
Toward dynamic epistemic verification of zero-knowledge protocols
Salerno (April 8-11, 2024), slides [↗](#)

- PACMAN WORKSHOP 2024
Proof systems for interpretability logics
University of Verona (March 19-21, 2024)
- INTERACTIONS OF PROOF ASSISTANTS AND MATHEMATICS 2023
Theorem provers within theorem provers. Experiments with modal logic in HOL Light
University of Regensburg (September 18-29, 2023), slides [↗](#)
- IT-MATTERS WORKSHOP 2023
Towards a proof analysis of processes
IMT School for Advanced Studies Lucca (July 12-14, 2023), slides [↗](#)
- THE PROOF SOCIETY AUTUMN SCHOOL AND WORKSHOP 2022
Results and ideas on proof theory for interpretability logics
University of Utrecht (Nov. 6-12, 2022), slides [↗](#)
- INTERACTIVE THEOREM PROVING 2021
A formal proof of modal completeness for provability logic
Rome/Online (June 30, 2021), video [↗](#) , slides [↗](#)
- HOMOTOPY TYPE THEORY/UNIVALENT FOUNDATIONS 2020
Universal Algebra in UniMath
Paris/Online (July 7, 2020), video [↗](#) , slides [↗](#)

Participation

IRN “LOGIC AND INTERACTION” KICKOFF MEETING
University of Rome 3 (May 12 - 13, 2025)

HOMOTOPY TYPE THEORY/UNIVALENT FOUNDATIONS 2025
University of Genoa/online (April 15 - 16, 2025)

FSCD 2024
Tallinn University of Technology/Online (July 10 - 13, 2024)

MATHEMATICALLY STRUCTURED FUNCTIONAL PROGRAMMING 2024
Tallinn University of Technology/Online (July 8, 2024)

LINDSTRÖM LECTURES 2023: RINEKE VERBRUGGE
University of Gothenburg/Online (May 11 - 12, 2023)

MATHCOMP WORKSHOP 2022
INRIA Sophia Antipolis (December 5 - 9, 2022)

AIML 2022, Advances in Modal Logic 2022
University of Rennes 1 (August 22 - 25, 2022)

TICAMORE MEETING, Translating and Discovering Calculi for Modal and Related Logics
Online (January 17 - 18, 2022)

GEOMETRIC LOGIC, CONSTRUCTIVISATION, AND AUTOMATED THEOREM PROVING
Schloss Dagstuhl – Leibniz Zentrum für Informatik (November 21 - 26, 2021)

INFINITY AND INTENSIONALITY COLLOQUIA
University of Oslo/Online (October 2021 - March 2023)

FROCCOS 2021, International Symposium on Frontiers of Combining Systems
University of Birmingham (September 8 - 10, 2021)

TABLEAUX 2021, International Conference on Automated Reasoning with Analytic Tableaux
and Related Methods
Birmingham (September 6 - 9, 2021)

CATEGORY THEORY 20→21
University of Genoa (August 30 - September 4, 2021)

MFPS 2021, Conference on Mathematical Foundations of Programming Semantics
Paris Lodron University of Salzburg/Online (August 30 - September 3, 2021)

CIE 2021, Computability in Europe
Ghent University/Online (July 5 - 9, 2021)

LICS 2021, Logic in Computer Science
University of Rome La Sapienza (June 29 - July 1, 2021)

TYPES 2021, International Conference on Types for Proofs and Programs
Online (June 14 - 18, 2021)

100 YEARS OF COMBINATORY LOGIC
Swansea University/Online (January 22, 2021)

WORLD LOGIC DAY 2021
Vienna Centre for Logic and Algorithms/Online (January 14, 2021)

PROOF THEORY VIRTUAL SEMINAR
Online (October 2020 - December 2021)

AIML 2020, Advances in Modal Logic
University of Helsinki/Online (August 24 - 28, 2020)

FSCD 2020, Formal Structures for Computation and Deduction
Paris/Online (June 29 - July 6, 2020)

LINEARITY AND TLLA 2020, Trends in Linear Logic and Applications
Paris/Online (June 29 - 30, 2020)

IJCAR 2020, International Joint Conference on Automated Reasoning
Paris/Online (June 29 - July 6, 2020)

LFMTP 2020, Logical Frameworks and Meta-Languages: Theory and Practice
Paris/Online (June 29 - 30, 2020)

ALGOUK 2020, British Colloquium on Theoretical Computer Science
Swansea University/Online (April 6 - 8, 2020)

OWLS, Online Worldwide Logic and Semantics Seminar
Online (April 2020 - December 2021)

A|C SEMINAR, Algebra | Coalgebra Seminar
ILLC/Online (April 2020 - December 2021)

ITACA WORKSHOP 2019, Italian Categorists Workshop
University of Milan (December 19 - 20, 2019)

CSW 2019, Computer Science Workshop
DIBRIS – University of Genoa (June 11, 2019)

LOGIC AND PHILOSOPHY OF SCIENCE SEMINAR SERIES
University of Florence (October 2013 - March 2020)

Seminars & talks

- *Tracking knowledge in security protocols: verification via action models*
SySMA+VRain/ELP Workshop
Universitat Politècnica de València (March 7, 2025), slides [↗](#)
- *Machine translation, problem solving and pattern recognition: Early criticisms revisited* (presented by Stefania Centrone)
Munich Centre for Mathematical Philosophy, Logic Seminar
Munich (December 5, 2024), slides for the conclusive part [↗](#)
- *Connectionism and focus mechanisms in neural network architectures*
Philosophy of Artificial Intelligence Seminar
Technical University of Munich (May 18, 2024)
- *Machine translation, problem solving, and pattern recognition: A historical-phenomenological analysis* (with Stefania Centrone)
Friedrich-Alexander-Universität Erlangen-Nürnberg (May 8, 2024), slides [↗](#)
- *Computerised Reasoning. The “dark side” of AI*
Science Communication Flash Talk @ IMT Lucca
SISSA Masterclass (Nov. 15 - 16, 2023), slides [↗](#)
- *GL within HOL Light*
Flash Talk, Proof and Computation Autumn School
Herrsching (Sept. 2023), slides [↗](#)
- *Investigations of Proof Theory and Automated Reasoning for Non-classical Logics*
PhD Viva, DiMa – University of Genoa (July 12, 2022), slides [↗](#)
- *An introduction to normal modal logics: V. Analytic Proof Systems for Provability Logic*
Working Seminar on Modal Logic, University of Genoa (Sept. 29, 2020), slides [↗](#)
- *Modalities in HoTT*
Categorical Logic and Elements of Topos Theory
DiMa – University of Genoa (Sept. 20, 2019), slides [↗](#)
- *A Curry-Howard Correspondence for Intuitionistic Belief*
Poster Session at The Proof Society Summer School,
Computational Foundry – Swansea University (Sept. 10, 2019)
- *An introduction to normal modal logics: IV. Labelled Sequent Calculi*
Working Seminar on Modal Logic, University of Genoa (Sept. 5, 2019)
- *An introduction to normal modal logics: III. Bits of Structural Proof Theory*
Working Seminar on Modal Logic, University of Genoa (August 28, 2019)
- *An introduction to normal modal logics: II. Logics for Arithmetical Provability*
Working Seminar on Modal Logic, University of Genoa (June 3, 2019)

- *An introduction to normal modal logics: Ib. Relational Semantics*
Working Seminar on Modal Logic, University of Genoa (June 3, 2019)
- *An introduction to normal modal logics: Ia. Axiomatic Calculi for Normal Modal Logics*
Working Seminar on Modal Logic, University of Genoa (May 29, 2019)
- *Categorical Semantics for Intuitionistic Belief*
Logic and Philosophy of Science Seminar, University of Florence (May 24, 2019), slides [↗](#)

Schools

- Sept. 2023 INTERNATIONAL SUMMER SCHOOL ON INTERACTIONS OF PROOF ASSISTANTS AND MATHEMATICS 2023
organised by University of Regensburg, September 18 - 29, 2023
- Sept. 2023 PROOF AND COMPUTATION AUTUMN SCHOOL 2023
organised by Ludwig Maximilian University of Munich, September 10 - 16, 2023
- Dec. 2022 MATHCOMP WINTER SCHOOL
organised by INRIA Sophia Antipolis, December 5 - 9, 2022
- Nov. 2022 THE PROOF SOCIETY AUTUMN SCHOOL
hosted by the University of Utrecht, November 7 - 10, 2022
- April 2021 MIDLANDS GRADUATE SCHOOL 2021 IN THE FOUNDATIONS OF COMPUTING SCIENCE
organised by the Universities of Birmingham, Leicester, Nottingham and Sheffield, April 12 - 16, 2021 (online)
- October 2020 HILBERT-BERNAYS SUMMER SCHOOL ON LOGIC AND COMPUTATION 2020
organised by the University of Göttingen, October 12 - 16, 2020 (online)
- Sept. 2019 2ND SUMMER SCHOOL OF THE PROOF SOCIETY
hosted by the Computational Foundry of Swansea University, September 8 - 11, 2019
- August 2016 AILA LOGIC SUMMER SCHOOL 2016
organised by AILA [↗](#) , SILFS [↗](#) , and University of Milan, August 21 - 27, 2016

Student supervision

- 2025 CO-ADVISOR
Antonella Bilotta's dissertation
"Growing a Modular Framework for Modal Systems- HOLMS: A HOL Light Library"
Master's degree in Logic, Philosophy and History of Science, University of Florence, April 2025
- 2024 – CO-ADVISOR
Yilian Huang's PhD project
"Privacy policies with controlled natural languages for clarity and verification"
National PhD Program in Cybersecurity 2024 Cycle
- 2024 – CO-ADVISOR
Hira Zaheer's PhD project
"Formally verifying zero-knowledge protocols"
National PhD Program in Cybersecurity 2024 Cycle

2024 CO-ADVISOR
Leonardo Quartini's dissertation
"A Proof of the Completeness Theorem of Modal Logic K in HOL Light"
Master's degree in Mathematics, University of Florence, April 2024

Reviewing activities

2024 CONTRIBUTIONS REVIEWER
LICS 2024 [↗](#)
hosted by TALTech Tallin

CONTRIBUTIONS REVIEWER
SEFM 2024 [↗](#)
hosted by the University of Aveiro

CONTRIBUTIONS REVIEWER
ISoLA 2024 [↗](#)
hosted in Crete

CONTRIBUTIONS REVIEWER
ITASEC 2024 [↗](#)
hosted in Salerno

2023 PROGRAM COMMITTEE MEMBER
The Proof Society School and Workshop 2023 [↗](#)
hosted by the University of Barcelona

CONTRIBUTIONS REVIEWER
Tableaux 2023 [↗](#)
hosted by the Czech Technical University

2022 CONTRIBUTIONS REVIEWER
TYPES 2022 [↗](#)
hosted by INRIA Nantes

POST-PROCEEDINGS REVIEWER
Post-TYPES 2021 [↗](#), Online conference

Software skills

Languages: \LaTeX , HTML/CSS, (basics of) Java, OCaml, Prolog

Proof Assistants: HOL Light, ROCQ, LEAN, AGDA

Operating systems: GNU/Linux, MS Windows

Languages

Italian	Mother tongue
English	Advanced, C1
French	Intermediate, A2
Catalan	Basic, A1
Spanish	Basic, A1

Memberships

since Oct. 2019	Member of The Proof Society ↗
2021 - 2024	Member of INdAM - GNSAGA Italian National Institute for Higher Mathematics, National Group on Algebraic and Geometric Structures, and their Applications ↗
since Oct. 2022	Member of EuroProofNet ↗
since April 2023	Member of the IMT Extended MInD Group ↗
since May 2023	Member of Computability in Europe ↗
since July 2024	Member of GRIN - The Italian Society for Informatics ↗
since August 2024	Member of the European Association for Theoretical Computer Science, Italian Chapter ↗
since January 2025	Member of the International Research Network <i>Logic and Interaction</i> ↗