

Davide Castelnovo

Ph. D.

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Citizenship: Italian

Employment

- Sep. 2024 - present **Postdoctoral researcher**, University of Pisa, Italy
Jun. 2023 - Jun. 2024 **Postdoctoral researcher**, University of Padova, Italy
Jan. - May 2022 **Visiting student at Tallinn Institute of Technology**, Estonia, Collaborating with Dr. Fosco Loregian

Education

- Nov. 2019 - Oct. 2023 **Ph. D. in Computer Science, Mathematics and Physics**, University of Udine, Italy
○ Thesis: *"Fuzzy algebraic theories and \mathcal{M}, \mathcal{N} -adhesive categories"*
○ Supervisor: Prof. Marino Miculan
Oct. 2016 - Dec. 2018 **Master in Mathematics**, University of Milano, Italy
○ Master thesis *"A conservative embedding of intuitionistic logic in a topos of sheaves"*
- Supervisors: Prof. S. Mantovani (Univ. of Milano) & Prof. M. E. Maietti (Univ. of Padova).
○ GPA: 110/110 summa cum laude.
Oct. 2012 - Jul. 2016 **Bachelor in Mathematics**, University of Milano, Italy
○ GPA: 99/110

Research Interests

- Formal Methods Algebraic Graph Transformations, Models for Concurrency, Rewriting Systems
General Mathematics Category Theory, Algebraic Topology, Mathematical Logic

Experiences

- Algebraic Theories I established a syntactic framework for the study of algebraic structures on fuzzy sets and proved a monadicity results for the associated categories of models.
Adhesive Categories and Algebraic Graph Transformations I identified criteria to establish adhesivity properties for a wide range of categories employed in the Double Pushout (DPO) approach to graph rewriting.
I obtained results concerning the relationship between various forms of adhesivity and the categorical properties of the underlying category. Building on these results, I proved an embedding result into toposes.
Concurrency I proved various results regarding sequential independence in left-linear rewriting systems, where rules are allowed to "merge" parts of the input. These are steps toward resolving the open problem of characterizing the causality of derivations within such systems, with the ultimate goal of developing a concurrent semantics.
Programming Languages Python, Haskell and Bash.

List of Publications

Journals

- 2025 Davide Castelnovo, Marino Miculan, *On The Axioms Of \mathcal{M}, \mathcal{N} -Adhesive Categories*, Logical Methods in Computer Science, 21
- 2024 Davide Castelnovo, Fabio Gadducci, Marino Miculan, *A simple criterion for \mathcal{M}, \mathcal{N} -adhesivity*, Theoretical Computer Science 982:114280

Proceedings of Conferences

- 2025 Roberto Biondo, Davide Castelnovo, Fabio Gadducci, *EGGs are adhesive!*, arXiv preprint arXiv:2503.13678, Proceedings of the 9th International Conference on Algebra and Coalgebra in Computer Science
- 2024 Paolo Baldan, Davide Castelnovo, Andrea Corradini, Fabio Gadducci, *Left-Linear Rewriting in Adhesive Categories*, Proceedings of the 35th International Conference on Concurrency Theory
- 2022 Davide Castelnovo, Fabio Gadducci, Marino Miculan, *A new criterion for \mathcal{M}, \mathcal{N} -adhesivity, with an application to hierarchical graphs*, Proceedings of the 25th International Conference on Foundations of Software Science and Computation Structures
- 2022 Davide Castelnovo, Marino Miculan, *Fuzzy Algebraic Theories*, Proceedings of the 30th EACSL Annual Conference on Computer Science Logic
- 2021 Davide Castelnovo, Marino Miculan, *Closure Hyperdoctrines*, Proceedings of the 9th Conference on Algebra and Coalgebra in Computer Science

Seminars, Colloquia, Talks

- Sep. 2024 **Talk at 35th International Conference on Concurrency Theory, “Left-Linear Rewriting in Adhesive Categories”**, University of Calgary, Calgary, Canada
- Mar. 2024 **Talk at Workshop on Process Theory for Security Protocols and Cryptography “On the axioms of \mathcal{M}, \mathcal{N} -adhesive categories”**, Tallinn Institute of Technology, Tallinn, Estonia
- Feb. 2024 **Talk at 35th Estonian and the 9th Joint Estonian-Latvian Theory Days “On the axioms of \mathcal{M}, \mathcal{N} -adhesive categories”**, Randivälja, Estonia
- Feb. 2024 **Talk at TallCat - Compositional Systems and Methods group at Tal-Tech, “On the axioms of \mathcal{M}, \mathcal{N} -adhesive categories”**, Tallinn Institute of Technology, Tallinn, Estonia
- Jul. 2023 **Talk at PRIN 2017 “IT-MATTERS” Final Workshop “ \mathcal{M}, \mathcal{N} -adhesivity: results and examples”**, Scuola IMT Alti Studi, Lucca, Italy
- Dec. 2022 **3rd ItaCa Workshop**, University of Pisa, Pisa, Italy
- Sep. 2022 **9th Symposium on Compositional Structures**, University of Como, Como, Italy
- Apr. 2022 **Talk at 25th International Conference on Foundations of Software Science and Computation Structures, “A new criterion for \mathcal{M}, \mathcal{N} -adhesivity, with an application to hierarchical graphs”**, Technische Universität München, München, Germany

- Feb. 2022 **Talk at 30th EACSL Annual Conference on Computer Science in Logic 2022, “Fuzzy Algebraic theories”**, *University of Göttingen*, Göttingen (online), Germany
- Mar. 2021 **Talk at 22nd Graduate Student Conference in Logic “Closure Hyperdoctrines”**, *University of Illinois*, Urbana-Champaign (online), United States of America
- Sep. 2021 **International Conference on Algebra, Topology and Their Interactions**, *Udine (online)*, Italy
- Sep. 2021 **Talk at 9th Conference on Algebra and Coalgebra in Computer Science, “Closure Hyperdoctrines”**, *University of Salzburg*, Salzburg, Austria
- Apr. 2021 **Midlands Graduate School in the Foundations of Computing Science**, *University of Sheffield*, Sheffield (online), United Kingdom
- Oct. 2020 **Talk at TallCat - Compositional Systems and Methods group at TalTech, “Equational theories in an enriched context”**, *Tallinn Institute of Technology*, Tallinn (online), Estonia
- Mar. 2020 **Talk at 25th Estonian Winter School in Computer Science, “Preclosure Hyperdoctrines, Completeness of (Higher Order) Spatial Logic for Closure Spaces”**, *Tallinn Institute of Technology*, Tallinn, Estonia
- Dec. 2019 **1st ItaCa Workshop**, *University of Milano*, Milano, Italy

Teaching and Outreach Activities

- 2020, 2021 (winter term) **Undergraduate students tutoring**, Tutoring the *Algebra 1* class for the first year of the Math undergraduate program, University of Udine
- 2021, 2023 (winter term) **Undergraduate students tutoring**, Tutoring the *Linear Algebra* for the first year of the Mechanical Engineering undergraduate program, University of Udine

Other Professional Activities

- Sep. 7-8, 2021 **Member of the Organizing Committee of the International Conference on Algebra, Topology and Their Interactions**, *Udine (online)*, Italy
- 2020 - 2023 **Students’ representative at Mathematics, Computer Science and Physics Departmental Council**, *Univ. of Udine*, Italy
- 2021 - 2023 **Students’ representative at Mathematics, Computer Science and Physics Ph. D. School Council**, *University of Udine*, Italy

Reviewer Activities

- Conferences International Conference on Algebra and Coalgebra in Computer Science (CALCO), Symposium on Logic in Computer Science (LICS), International Colloquium on Automata, Languages, and Programming (ICALP), Italian Conference on Theoretical Computer Science (ICTCS), International Conference on Graph Transformation (ICGT), Graph Computation Models (GCM)
- Journals Logical Methods in Computer Science

Languages

- Italian Mother tongue
- English Fluent, speaking and writing