

RICCARDO BORSETTO

PhD Student in Computer Science — Type Theory, Constructive Mathematics, Formalization

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RESEARCH INTERESTS

Type theory, category theory, proof theory, constructive mathematics, computable real analysis, strong negation and apartness, proof assistants, minimal logic, modal logic, separation logic.

EDUCATION

PhD in Computer Science — University of Verona, Logic Group Oct 2024 – present

Advisors: Margherita Zorzi and Isabella Mastroeni.

- Thesis topic: proof theory for modal logic, formalised in (Cubical) Agda.

MSc in Computer Science — University of Padua & Radboud University Apr 2023

110/110 summa cum laude. Erasmus+ at Radboud University, Nijmegen (6 months).

- Thesis: *A canonical normal-form theorem for the type theory of regular categories.*

MSc in Mathematics — University of Padua Apr 2019

110/110.

- Thesis: *Hedberg's Theorem in the Minimalist Foundation.*

PUBLICATIONS AND ACCEPTED PAPERS

- **Glivenko's Theorem Underneath Structure.** With G. Fellin, T. Uustalu, C.-S. Wan. *Computability in Europe (CiE) 2026*, Trier. Accepted; Springer LNCS.
- **NAMOR: a New Agda Library for Modal Extended Sequents.** With M. Zorzi. *OVERLAY 2025*, Bologna. CEUR Workshop Proceedings.
- **An Agda Implementation of the Modal Logic S4.2: First Investigations.** With M. Zorzi. *ICTCS 2025*, Pescara. CEUR Workshop Proceedings.

UNDER REVIEW

- **Metamathematics of the Modal Logic S4.2 in the Agda Proof Assistant.** With M. Zorzi. Submitted to the *Journal of Logic and Computation*, 2026.
- **NAMOR: a New Agda Library for Modal Extended Sequents.** With M. Zorzi. Submitted to the *Journal of Automated Reasoning*, 2026.
- **A canonical normal-form theorem for the type theory of regular categories.** With M. E. Maietti. Submitted to *Mathematical Structures in Computer Science*, 2026.

TALKS AND CONTRIBUTED PRESENTATIONS

- **A Cubical Path from Algebra to Analysis.** With L. Molena and M. J. Turek-Grzybowski. *TYPES 2026*, Gothenburg.
- **Kraus's Magic Trick for Computing with Constructive Reals.** Joint work with L. Molena and M. J. Turek-Grzybowski. *PACMAN 2026*.
- **Where does AC_ω hide in constructive reals?** *Dagstuhl Seminar 26121 — Proof Systems in Actual Practice*, 2026.
- **A canonical normal-form theorem for the type theory of regular categories.** *SSTT 2026*.

FORMALIZATION AND SOFTWARE

- **Bilateral strong-negation type theory** (Cubical Agda, very much work in progress) — observational equality with a dual positive apartness, Köpp–Petrakis strong negation as a computed operator. With I. Petrakis.

- **Constructive and computable real analysis** (Cubical Agda, ongoing) — signed-digit representations, premetric completion of the rationals, and the countable-choice barrier for constructive reals. With L. Molena and M. J. Turek-Grzybowski; the signed-digit and coinductive reals build on work with T. Altenkirch.
- **arrow-algebras** (Cubical Agda) — arrow algebras and their nuclei, partial combinatory algebras, and the induced triposes; based on work by B. van den Berg.
- **NAMOR** (Cubical Agda) — cut elimination for position-based modal sequent calculi, uniformly capturing eight normal modal logics from K to S5.
- **s4dot2-cut-elimination** (Cubical Agda) — cut elimination and finite model property for the modal logic S4.2.
- **nuclear** (Cubical Agda) — conservation theorems for nuclei over substructural entailment relations (Full Lambek logic). With T. Altenkirch.
- **regcat-normal-form** (Agda) — the canonical normal-form theorem for the type theory of regular categories.
- **hyperhoare** (Cubical Agda) — Cousot–Wang’s calculational design of hyperlogics by abstract interpretation.
- **Minimal logic library** (Agda) — natural deduction, Beth semantics, and completeness for Johanson’s minimal propositional logic.
- **lean-archimedean** (Lean 4 / Mathlib) — constructive Archimedean typeclass, proved equivalent to Mathlib’s `Archimedean`, with instances for $\mathbb{Z}$, $\mathbb{Q}$, $\mathbb{R}$.
- **Agda compiler patch** — eliminates `UnsupportedIndexedMatch` under `-cubical-compatible`.
- Repositories at github.com/eapiova; most are private, and most are work in progress.

TEACHING

- Teaching Assistant, University of Verona (2024–2025): Foundations of Mathematics; Mathematical Logic.
- Teaching Assistant, University of Padua (2021–2023): Logic and Computability.
- Mathematics and Physics teacher, Liceo (Veneto), 2019–2020.

SERVICE AND ACADEMIC ACTIVITIES

- Editorial collector, *Dagstuhl Reports* vol. 16 (Seminar 26121).
- Schools and meetings: Dagstuhl 26121; TYPES 2026; CSL 2026; HoTT/UF 2025; EuroProofNet WG6; “Proof and Computation” Autumn School 2025; LFPSI School 2025.

SKILLS AND LANGUAGES

- **Proof assistants:** Cubical Agda, Agda, Lean 4, Coq/Rocq.
- **Programming:** Haskell, PureScript, F#, OCaml, Python, SQL. **Tools:** Git, $\text{\LaTeX}$, Typst, Nix.
- **Languages:** Italian (native), English (C1, IELTS 7.0), very basic reading and listening knowledge of Japanese (N5/N4) and Korean.