

# Floris van Doorn

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(last updated on June 24, 2024)

## Education and Employment

- 2023 – present    W2 professor, Mathematical Institute, University of Bonn.
- 2021 – 2023      Postdoctoral Associate, Mathematics Department, University of Paris-Saclay.
- Feb-Mar 2021    Tutor, Center of Mathematical Sciences and Applications, Harvard University.
- 2018 – 2021      Postdoctoral Associate, Mathematics Department, University of Pittsburgh.
- 2013 – 2018      Ph.D. in Pure and Applied Logic, Carnegie Mellon University.
- Dissertation: *On the Formalization of Higher Inductive Types and Synthetic Homotopy Theory*.
- Advisors: Jeremy Avigad, Steve Awodey.
- 2011 – 2013      M.Sc. (cum laude), Mathematical Sciences, Utrecht University.
- Thesis: *Explicit convertibility proofs in Pure Type Systems*.
- Advisor: Freek Wiedijk.
- 2008 – 2011      B.Sc. (cum laude), Mathematics, Utrecht University.
- 2008 – 2011      B.Sc. (cum laude), Physics and Astronomy, Utrecht University.

## Publications

- 2024 *Integrals Within Integrals: A Formalization of the Gagliardo-Nirenberg-Sobolev Inequality*, Floris van Doorn, Heather Macbeth. To appear at ITP 2024.
- 2023 *Formalising the h-principle and sphere eversion*, Patrick Massot, Floris van Doorn, Oliver Nash. Certified Programs and Proofs (CPP) 2023.
- 2021 *Progress on a Perimeter Surveillance Problem*, Jeremy Avigad, Floris van Doorn. Thirty-Fifth Annual International Conference on Autonomous Systems (ICAS).
- 2021 *Formalized Haar Measure*, Floris van Doorn. Interactive Theorem Proving (ITP).
- 2020 *Maintaining a Library of Formal Mathematics*, Floris van Doorn, Gabriel Ebner, and Robert Y. Lewis. 13th Conference on Intelligent Computer Mathematics (CICM).
- 2020 *Sequential Colimits in Homotopy Type Theory*, Kristina Sojakova, Floris van Doorn, Egbert Rijke. Thirty-Fifth Annual ACM/IEEE Symposium on Logic in Computer Science (LICS).
- 2020 *A Formal Proof of the Independence of the Continuum Hypothesis*, Jesse Michael Han and Floris van Doorn. Certified Programs and Proofs (CPP).
- 2020 *The Lean Mathematical Library*, the mathlib community.<sup>1</sup> Certified Programs and Proofs (CPP).
- 2019 *A Formalization of Forcing and the Unprovability of the Continuum Hypothesis*, Jesse Michael Han and Floris van Doorn. Interactive Theorem Proving (ITP).
- 2018 *Higher Groups in Homotopy Type Theory*, Ulrik Buchholtz, Floris van Doorn, Egbert Rijke. Logic in Computer Science (LICS).
- 2017 *Homotopy Type Theory in Lean*, Floris van Doorn, Jakob von Raumer, Ulrik Buchholtz. 8th International Conference on Interactive Theorem Proving (ITP).

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<sup>1</sup>This was a paper written collectively by the contributors to `mathlib`. I wrote part of the paper.

- 2016 *Constructing the Propositional Truncation using Non-recursive HITs*, Floris van Doorn. The 5th ACM SIGPLAN Conference on Certified Programs and Proofs (CPP).
- 2015 *The Lean Theorem Prover (System Description)*, Leonardo de Moura, Soonho Kong, Jeremy Avigad, Floris van Doorn, Jakob von Raumer. The 25th jubilee edition of the International Conference on Automated Deduction (CADE).
- 2014 *The Structural Theory of Pure Type Systems*, Cody Roux and Floris van Doorn. LNCS Advanced Research in Computing and Software Science.
- 2013 *Explicit Convertibility Proofs in Pure Type Systems*, Floris van Doorn, Herman Geuvers, Freek Wiedijk. Workshop on Logical Frameworks and Meta-languages: Theory and Practice (LFMTP).

## Teaching

- 2024 Instructor for Collaborative Formalization Project in Analysis (Bonn).
- 2023 Instructor for Formalized Mathematics in Lean (Bonn).
- 2021 Instructor for Abstract Algebra (Pitt).
- 2020 Instructor for Topics in Geometry (Pitt).
- 2019 Instructor for Calculus I (Pitt).
- 2016 TA for Differential and Integral Calculus with Russell C. Walker (CMU).
- 2015 TA for Logic and Mathematical Inquiry with Jeremy Avigad (CMU).
- 2015 TA for Game Theory with Adam Bjorndahl (CMU).
- 2014 TA for Formal Logic with Steve Awodey (CMU).
- 2012 TA for Discrete Mathematics with Han Hoogeveen (Utrecht).
- 2011 TA for Foundations of Mathematics with Jaap van Oosten (Utrecht).

## Grants, Awards and Competitions

- 2021 Labex Mathématiques Hadamard 2-year Postdoctoral Fellowship in the area Mathematics for Artificial Intelligence.
- 2012 First prize at the International Mathematics Competition for University Students.
- 2011 Second prize at the International Mathematics Competition for University Students.
- 2010 Second prize at the International Mathematics Competition for University Students.
- 2009 Royal Holland Society of Sciences and Humanities “Young Talent Incentive Price” for mathematics.
- 2008 Silver medal at the International Mathematical Olympiad.

## Unpublished Work

- 2022 *Designing a general library for convolutions*, Floris van Doorn. Preprint.
- 2016 *Logic and Proof*, Jeremy Avigad, Robert Y. Lewis, Floris van Doorn. Online textbook for an introductory course to logic and proof assistants.
- 2014 *Propositional Calculus in Coq*, Floris van Doorn. Short article.
- 2013 *Explicit Convertibility Proofs in Pure Type Systems*, Floris van Doorn. Master thesis. Advisor: Freek Wiedijk.

## Service

- 2019 – present    Maintainer for Lean’s mathematical library [mathlib](#).
- 2024 – present    Program Committee for Interactive Theorem Proving (ITP) 2024.
- 2024                Scientific organizer for the Workshop Computer-verified proofs: 48 hours in Rome.
- 2020 – 2022       Program Committee for Certified Programs and Proofs (CPP) 2020-2022.
- 2021                Program Committee for the Workshop on Homotopy Type Theory / Univalent Foundations (HoTT/UF) 2021.
- 2021                Problem Committee for the Proof Ground 2021 Interactive Proving Contest.

I have also reviewed manuscripts as external reviewer for TYPES, Journal of Automated Reasoning, Mathematical Structures in Computer Science, CICM, Transactions on Computational Logic, Foundations of Software Science and Computation Structures (FOSSACS), ITP, Logical Methods in Computer Science and Experimental Mathematics.

## Extracurricular Service

- 2009 – 2013       Trainer of the Dutch Mathematical Olympiad.
- 2008 – 2013       Volunteer for the “Vierkant voor Wiskunde” mathematics summer camps.
- 2012 – 2013       Chairman of the Benelux Mathematical Olympiad 2013.
- 2011 – 2012       Treasurer of the Dutch University Mathematical Olympiad 2012.
- 2009 – 2011       IT committee member for the International Mathematical Olympiad 2011.
- 2009 – 2010       Head awards ceremony of the Benelux Mathematical Olympiad 2010.
- 2008 – 2009       Secretary of the Benelux Mathematical Olympiad 2009.

## Selected Talks

- 2024    *Towards a formalized proof of Carleson’s theorem*, Hausdorff trimester.
- 2024    *Primes, Proofs and Computers*, Dies Academicus talk.
- 2024    *The Sobolev inequality in Lean*, Informal Formalization Seminar.
- 2023    *Formalizing sphere eversion using Lean’s mathematical library*, CALCO 2023 & MFPS XXXIX, Bloomington, Indiana.
- 2023    *Tutorial on interactive theorem proving in Lean*, Logic Colloquium, Milan.
- 2023    *What can we learn from formalizations in homotopy type theory?*, Formalization of Cohomology Theories, Banff International Research Station.
- 2023    *Formalizing sphere eversion in Lean*, INRIA, Nantes.
- 2022    *Lessons Learned from Formalizing Local Convex Integration*, Lean in Lyon.
- 2018    *Towards Spectral Sequences for Homology*, Homotopy Type Theory Electronic Seminar Talks (HoTTEST), online.
- 2018    *Spectral Sequences in Homotopy Type Theory*, Workshop: Types, Homotopy Type theory, and Verification, Hausdorff Research Institute for Mathematics.
- 2017    *Homotopy Type Theory in Lean*, Computer-aided mathematical proof, Cambridge.
- 2017    *Eilenberg-MacLane Spaces in Homotopy Type Theory*, ASL North American annual meeting, Boise.

## Languages

Dutch (native), English (fluent), French (intermediate), German (basic).

Computer languages: Fluent in Lean,  $\text{\LaTeX}$ , Mathematica, Coq.

Experience with Python, C, Standard ML.