Floris van Doorn

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Education and Employment

2023 – present W2 professor, Mathematical Institute, University of Bonn.
2021 – 2023 Postdoctoral Associate, Mathematics Department, University of Paris-Saclay.
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: Prof. Jeremy Avigad, Prof. Steve Awodey.
2011 – 2013 M.Sc. (cum laude), Mathematical Sciences, Utrecht University.
Thesis: *Explicit convertibility proofs in Pure Type Systems.*
Advisor: Prof. Freek Wiedijk.
2008 – 2011 B.Sc. (cum laude), Mathematics, Utrecht University.
2008 – 2011 B.Sc. (cum laude), Physics and Astronomy, Utrecht University.

Grants and Awards

2025 Skolem award for the paper *The Lean Theorem Prover (System Description).*
2025 Principal Investigator for the renewal of the DFG Excellence Strategy – EXC-2047/1 – 390685813.
2024 Application partner of NFDI 29/1 MaRDI (Mathematische Forschungsdateninitiative).
2021 Labex Mathématiques Hadamard 2-year Postdoctoral Fellowship in the area Mathematics for Artificial Intelligence.
2009 Royal Holland Society of Sciences and Humanities "Young Talent Award" in mathematics.

Publications

2024 *Integrals Within Integrals: A Formalization of the Gagliardo-Nirenberg-Sobolev Inequality*, Floris van Doorn, Heather Macbeth. Interactive Theorem Proving (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.[1] 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).

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). This paper won the Skolem Award in 2025.

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).

Preprints and Unpublished Work

2025 *Carleson operators on doubling metric measure spaces*, Lars Becker, Floris van Doorn, Asgar Jamneshan, Rajula Srivastava, Christoph Thiele. Preprint.

2024 *A blueprint for the formalization of Carleson's theorem on convergence of Fourier series*, Lars Becker, María Inés de Frutos-Fernández, Leo Diedering, Floris van Doorn, Sébastien Gouëzel, Asgar Jamneshan, Evgenia Karunus, Edward van de Meent, Pietro Monticone, Jasper Mulder-Sohn, Jim Portegies, Joris Roos, Michael Rothgang, Rajula Srivastava, James Sundstrom, Jeremy Tan, Christoph Thiele. Blueprint for a formalization project.

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 on arXiv.

Invited Talks

2025 *Lean: Collaboration using Formalization*, MaRDI Annual Meeting 2025, Munich.

[1] This was a paper written collectively by the contributors to `mathlib`. I wrote part of the paper.

2025 *The Carleson project: a collaborative formalization* (joint with María Inés de Frutos Fernández). MATRIX-MFO Tandem Workshop: Machine Learning and AI for Mathematics, Oberwolfach.

2025 *The Carleson Project: Formalization and Collaboration.* Big proof: formalizing mathematics at scale, Isaac Newton Institute, Cambridge.

2025 *Progress report on the Carleson Project*, Lean together, online.

2025 *Formalizing modern mathematics in Lean*, LEAN meets MaRDI and OSCAR, Berlin.

2024 *Formalizing a proof of Carleson's theorem*, Homotopy Type Theory Electronic Seminar Talks (HoTTEST), online.

2024 *Carleson operators on doubling metric measure spaces* (joint with Christoph Thiele). Special Topic School: Maximal Operators and Applications, Bonn.

2024 *Towards a formalized proof of Carleson's theorem*, Hausdorff trimester.

2024 *The Sobolev inequality in Lean*, Informal Formalization Seminar.

2024 *The internals of Lean*, 48 hours in Rome.

2023 *Mathematics in Lean*, Hausdorff School, Bonn.

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.

2020 *Tactics in Lean*, HCM Workshop: Mathematical Language and Practical Type Theory, Bonn.

2019 *A Formal Abstract of the Classification of Finite Simple Groups*, Vietnam – USA Joint Mathematical meeting.

2018 *Towards Spectral Sequences for Homology*, Homotopy Type Theory Electronic Seminar Talks (HoTTEST), online.

2018 *Spectral Sequences in Homotopy Type Theory*, Types, Homotopy Type theory, and Verification, Hausdorff Research Institute for Mathematics, Bonn.

2017 *Homotopy Type Theory in Lean*, Computer-aided mathematical proof, Cambridge.

2017 *The Lean HoTT Library*, Big Proof, Isaac Newton Institute, Cambridge.

2017 *Eilenberg–MacLane Spaces in Homotopy Type Theory*, ASL North American annual meeting, Boise.

2016 *Homotopy Type Theory in Lean*, Univalent Foundations and Proof Assistants, International Congress on Mathematical Software (ICMS), Berlin.

2016 *Homotopy Type Theory in Lean*, Workshop on Homotopy Type Theory / Univalent Foundations, Porto.

2016 *Reducing Higher Inductive Types to Quotients*, Workshop on Homotopy Type Theory and Univalent Foundations of Mathematics (HoTT/UF), Fields Institute Toronto.

2016 *The Lean Theorem Prover and Homotopy Type Theory*, joint with Jeremy Avigad. Workshop on Homotopy Type Theory and Univalent Foundations of Mathematics (HoTT/UF), Fields Institute Toronto.

Teaching

2025 Instructor for Formalized Mathematics in Lean (Lecture course, Bonn).
2025 Instructor for The Logic of Proof Assistants (Lecture course, Bonn).
2024 Instructor for Formalized Mathematics in Lean (Practical training course, Bonn).
2024 Instructor for Collaborative Formalization Project in Analysis (Graduate Seminar, Bonn).
2023 Instructor for Formalized Mathematics in Lean (Practical training course, 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).

Supervision

I am currently mentoring two postdoctoral researchers, María Inés de Frutos Fernández and Michael Rothgang (both Oct 2024–present) and one PhD student, Arend Mellendijk (Oct 2024–present).

Including ongoing projects, I have supervised 2 Master thesis projects and co-supervised 5 more (all in Bonn). I have also supervised 6 Bachelor thesis projects (5 in Bonn, 1 in Orsay). I am mentoring 3 student research assistants.

In Summer 2024, Winter 24/25 and Summer 2025 I also led and organized the seminar for the Formalized Mathematics group in Bonn. This seminar features student presentations from their Bachelor or Master projects and presentations by members of the group or invited guests.

More details and the research output of my group can be found on the webpage `https://florisvandoorn.com/formalized-mathematics`.

I was examiner for the PhD thesis defense of Fred Lin, and I have provided one anonymous external PhD thesis evaluation.

Service

2023 – present	Leader for the interdisciplinary research unit (IRU) on Formalized Mathematics in Bonn.
2019 – present	Maintainer for Lean's mathematical library `Mathlib`.[2]
2025	Organizer for Simons Institute for the Theory of Computing and SLMath Joint Workshop: AI for Mathematics and Theoretical Computer Science.
2024	Program Committee for Interactive Theorem Proving (ITP).

[2] I am one of the 27 maintainers of Lean's mathematical library, which involves making high-level decisions about the organization and direction of the library, reviewing and approving new contributions to the library, representing the Lean community, helping new Lean users, giving tutorials at "Lean for the Curious Mathematician" meetings and coordinating activities (e.g. workshops) related to Lean.

2024	Scientific organizer for the Workshop Computer-verified proofs: 48 hours in Rome.
2020 – 2022	Program Committee for Certified Programs and Proofs (CPP).
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.

Besides PC memberships, I have also reviewed 13 manuscripts as external reviewer for the following conferences and journals:
Conference on Intelligent Computer Mathematics (CICM), Experimental Mathematics Foundations of Software Science and Computation Structures (FOSSACS), Interactive Theorem Proving (ITP), Journal of Automated Reasoning, Logical Methods in Computer Science (LMCS), Mathematical Structures in Computer Science, Transactions on Computational Logic, Types Conference and Workshop on Homotopy Type Theory / Univalent Foundations (HoTT/UF).
Furthermore, I have been an anonymous reviewer for 12 grant applications.

Outreach / Extracurricular Service

2024 – present	Organizer of a weekly 2-hour "Lean hacking session" extracurricular meeting for students in Bonn. During this meeting students work on Lean projects, can discuss Lean topics and ask questions. Typical attendance is 5–10 students.
2025	Interviewee for the article *Was passiert, wenn niemand mehr die Mathematik versteht?*, Spektrum der Wissenschaft 33/2025.
2025	Public lecture *Primes, Proofs and Computers*, Bonn Math Night.
2020	Interviewee for the podcast *De fascinatievolger deel 16* (Dutch *The fascination follower part 16*).
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.

I have written the following articles in mathematics magazines.

2012	*Roosters Kleuren* (Dutch, *coloring grids*), Floris van Doorn. Vakidioot 11/12(5):20-21
2011	*Op weg naar IMO 2011. IMO 2008, Opgave 5* (Dutch, *Towards IMO 2011. IMO 2008, Problem 5*), Floris van Doorn. Euclides 86(4):142-143 (Feb 2011)
2008	*Wiskunde in Vietnam* (Dutch, *Mathematics in Vietnam*), Floris van Doorn. Pythagoras 47(3):20 (jan. 2008).
2008	*De eerste ronde van de Nederlandse Wiskunde Olympiade 2006 – 2008. Een bundel met opgaven en uitgebreide uitwerkingen* (Dutch, *The first round of the Dutch Mathematical Olympiad 2006 – 2008. A booklet with problems and extensive solutions*), Floris van Doorn, Alexander van Hoorn, Maarten Roelofsma. Unpublished booklet.

International Mathematics Competitions

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.
2008 Silver medal at the International Mathematical Olympiad.

Languages

Dutch (native), English (fluent), German (advanced), French (intermediate).
Computer languages: Fluent in Lean, LaTeX, Mathematica, Coq.
Experience with Python, C, Standard ML.