

Floris van Doorn

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Research Interests

I'm interested in mathematical logic, more specifically Type Theory and interactive theorem proving. I'm especially interested in Homotopy Type theory. I'm currently working on the formalization of Homotopy Type Theory in the proof assistant Lean and studying Higher Inductive Types. I also like other branches of mathematical logic such as Set Theory and Model Theory.

Publications

- “Constructing the Propositional Truncation using Non-recursive HITs.” *Certified Proofs and Programs (CPP)*, 2016.
- “The Lean Theorem Prover (system description),” with Leonardo de Moura (first author), Soonho Kong, Jeremy Avigad and Jakob von Raumer. CADE-25.
- “The Structural Theory of Pure Type Systems,” with Cody Roux (first author). *LNCS Advanced Research in Computing and Software Science 2014*.
- “Explicit convertibility proofs in Pure Type Systems,” with Herman Geuvers and Freek Wiedijk. *Proceedings of the Workshop on Logical Frameworks and Meta-languages: Theory and Practice (LFMTP), 25-36, 2013*.

Other talks

- “Homotopy Type Theory in Lean,” talk together with Jeremy Avigad. *Workshop on Homotopy Type Theory and Univalent Foundations of Mathematics*, Fields Institute Toronto, 2016.
- “Reducing HITs to quotients,” *Workshop on Homotopy Type Theory and Univalent Foundations of Mathematics*, Fields Institute Toronto, 2016.
- “Homotopy Type Theory in Lean,” *Workshop on Homotopy Type Theory / Univalent Foundations*, colocated with FSCD 2016.
- “The Lean HoTT library,” *Univalent Foundations and Proof Assistants, ICMS*, 2016.

Other written work

- “The Lean Theorem Prover,” Floris van Doorn. Homotopy Type Theory blog, 2 December 2015. <http://homotopytypetheory.org/2015/12/02/the-proof-assistant-lean/>
- “Constructing the Propositional Truncation using Nonrecursive HITs,” Floris van Doorn. Homotopy Type Theory blog, 28 July 2015. <http://homotopytypetheory.org/2015/07/28/constructing-the-propositional-truncation-using-nonrecursive-hits/>
- “Propositional Calculus in Coq,” Floris van Doorn. arXiv:1503.08744, 9 May 2014.
- “Roosters Kleuren” (Dutch, “coloring grids”), Floris van Doorn. *Vakidoot* 11/12(5):20-21
- “Op weg naar IMO2011 - IMO2008 opgave 5” (Dutch, “Towards IMO2011 - IMO2008 problem 5”), Floris van Doorn. *Euclides* 86(4):142-143
- “Wiskunde in Vietnam” (Dutch, “Mathematics in Vietnam”), Floris van Doorn. *Pythagoras* 47(3):20 (jan. 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.

Education

2013-present	Ph.D. student in Pure and Applied Logic in the Philosophy department of Carnegie Mellon University
2011-2013	M.Sc. (cum laude), Mathematical Sciences, Utrecht University; Average grade: 9.3 (out of 10). Total ECTS: 156 (120 needed). Thesis: ‘Explicit convertibility proofs in Pure Type Systems’ about a variant of PTSs where there are explicit proofs of beta conversion which are added to the term in the conversion rule. The complete proof was formalised in Coq.
2008-2011	B.Sc. (cum laude), Mathematics, Utrecht University; B.Sc. (cum laude), Physics and Astronomy, Utrecht University; Average grade: 9.1 (out of 10) ; total ECTS: 304.25 (180 needed). Thesis (with Jasper Mulder): ‘Lattices and Topological Systems’
2002-2008	High school at Comenius College Hilversum

Languages: Dutch (mother tongue), English (fluent), German (basic), French (basic).
Programming: \LaTeX (fluent), Lean (fluent), Mathematica (good), Coq (intermediate), C (basic).

Teaching

Fall 2015	TA for Logic and Mathematical Inquiry with Jeremy Avigad (CMU)
Spring 2015	TA for Game Theory with Adam Bjorndahl (CMU)
Fall 2014	TA for Formal Logic with Steve Awodey (CMU)
Spring 2012	TA for Discrete Mathematics with Han Hoogeveen (UU)
Fall 2011	TA for Foundations of Mathematics with Jaap van Oosten (UU)

Volunteering

2009-2013	Trainer of the Dutch Mathematical Olympiad. Every year the top 30 high school students are selected for this training which prepares them for international contests, most notably the International Mathematics Olympiad. As a trainer one has to create problem sets, give training sessions, give feedback on homework exercises, invigilate during exams and grade exam problems.
2009-2013	Volunteer for ‘Vierkant voor Wiskunde’ mathematics summer camps. This is a camp for children between 10 and 18. It entails preparing mathematical problem booklets, watching over the participants during the camp, and helping them with mathematical problems.
2012-2013	Organizing the Benelux Mathematical Olympiad (BxMO) 2013 as chairman.
2011-2012	Organizing the Dutch University Mathematical Olympiad (LIMO in Dutch) 2012 as treasurer. This is a teamed mathematics competition for university students in the Netherlands and Belgium.
2010-2011	Member of the IT committee for the IMO 2011.
2009-2010	Organizing the BxMO 2010 as head awards ceremony.
2008-2009	Organizing the BxMO 2009 as secretary.

Achievements

I have participated three times in the IMC (International Mathematics Competitions), and once in the IMO (International Mathematical Olympiad).

IMC 2012	first prize	(placed 7th out of 315 contestants)
IMC 2011	second prize	(placed 61st out of 305 contestants)
IMC 2010	second prize	(placed 121st out of 328 contestants)
IMO 2008	silver medal	(placed 127th out of 535 contestants)

I also participated in various national mathematics contests in the Benelux, including several editions of the LIMO (a teamed mathematics contest for university students in the Netherlands and Belgium), PUMA (an individual mathematics contest in Ghent, Belgium), MOAWOA (an individual mathematics contest held in Utrecht), reaching the top 5 in each contest.

I also received the KHMW “Jong Talent Aanmoedigingsprijs” (lit. “Young Talent Incentive Price”) for mathematics in 2009, for having high grades after the first year of college. The KHMW is the “Royal Holland Society of Sciences and Humanities.”