# 21st International Conference on Types for Proofs and Programs

**TYPES 2015, May 18–21, 2015, Tallinn, Estonia**

Edited by

Tarmo Uustalu


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# Preface

This volume is the post-proceedings of the 21st International Conference on Types for Proofs and Programs, TYPES 2015, which was held in Tallinn, Estonia, 18–21 May 2015.

The TYPES meetings are a forum to present new and on-going work in all aspects of type theory and its applications, especially in formalized and computer assisted reasoning and computer programming. The meetings from 1990 to 2008 were annual workshops of a sequence of five EU funded networking projects. Since 2009, TYPES has been run as an independent conference series. Prior to the 2015 meeting in Tallinn, TYPES meetings had taken place in Antibes (1990), Edinburgh (1991), Båstad (1992), Nijmegen (1993), Båstad (1994), Torino (1995), Aussois (1996), Kloster Irsee (1998), Lökeberg (1999), Durham (2000), Berg en Dal near Nijmegen (2002), Torino (2003), Jouy-en-Josas near Paris (2004), Nottingham (2006), Cividale del Friuli (2007), Torino (2008), Aussois (2009), Warsaw (2010), Bergen (2011), Toulouse (2013), Paris (2014), with post-proceedings published in various outlets and since the Bergen 2011 meeting in LIPIcs.

The TYPES areas of interest include, but are not limited to: foundations of type theory and constructive mathematics; applications of type theory; dependently typed programming; industrial uses of type theory technology; meta-theoretic studies of type systems; proof assistants and proof technology; automation in computer-assisted reasoning; links between type theory and functional programming; formalizing mathematics using type theory.

The TYPES conferences are traditionally of open and informal character. Selection of talks for presentation at the conference is based on short abstracts; reporting work in progress and work presented or published elsewhere is welcome. A formal post-proceedings volume is prepared after the conference. Papers submitted to that must represent unpublished work and are subjected to a full review process; the call for papers is open and not restricted to the authors and presentations of the conference.

The programme of TYPES 2015 included three invited talks by Gilles Barthe (IMDEA Software Institute), Andrej Bauer (University of Ljubljana) and Peter Selinger (Dalhousie University) as well as two tutorials by Joachim Kock (Autonomous University of Barcelona) and Peter LeFanu Lumsdaine (Stockholm University). The contributed part of the programme consisted of 35 talks.

TYPES 2015 was sponsored by the European Regional Development Fund through the CoE project EXCS and the ICT R&D project Coinduction.

The call for contributions to the post-proceedings of TYPES 2015 led to the present volume of nine papers documenting conference presentations at TYPES 2015 and other new work by members of the community. Four of the papers concern homotopy type theory while the rest are on a variety of topics: probabilistic reasoning, reversible programming, hardware description, patterns and dynamic rebinding. I thank both the authors and the reviewers for their hard work.

Tarmo Uustalu
Tallinn, June 2017

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