10th Conference on Algebra and Coalgebra in Computer Science

CALCO 2023, June 19–21, 2023, Indiana University Bloomington, IN, USA

Edited by

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ACM Classification 2012
Theory of computation → Models of computation; Theory of computation → Modal and temporal logics; Theory of computation → Categorical semantics; Theory of computation → Algebraic semantics; Theory of computation → Quantum computation theory; Software and its engineering → Context specific languages

ISBN 978-3-95977-287-7

Published online and open access by
Schloss Dagstuhl – Leibniz-Zentrum für Informatik GmbH, Dagstuhl Publishing, Saarbrücken/Wadern, Germany. Online available at https://www.dagstuhl.de/dagpub/978-3-95977-287-7.

Publication date
September, 2023

Bibliographic information published by the Deutsche Nationalbibliothek
The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data are available in the Internet at https://portal.dnb.de.

Digital Object Identifier: 10.4230/LIPIcs.CALCO.2023.0

ISBN 978-3-95977-287-7 **ISSN 1868-8969** **https://www.dagstuhl.de/lipics**

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ISSN 1868-8969

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(Co)algebraic pearls

Early Ideas

Preface

This volume contains the proceedings of the 10th Conference on Algebra and Coalgebra in Computer Science (CALCO), held at Indiana University, from June 19th to June 21st, 2023, under the auspices of IFIP WG 1.3 "Foundations of System Specification". Previous CALCO editions took place in Salzburg (Austria, 2021), London (UK, 2019), Ljubljana (Slovenia, 2017), Nijmegen (the Netherlands, 2015), Warsaw (Poland, 2013), Winchester (UK, 2011), Udine (Italy, 2009), Bergen (Norway, 2007), Swansea (Wales, 2005).

CALCO is a high-level, bi-annual conference formed by joining CMCS (the International Workshop on Coalgebraic Methods in Computer Science) and WADT (the Workshop on Recent Trends in Algebraic Development Techniques). It provides a forum to present and discuss results of theoretical nature on the mathematics of algebras and coalgebras, the way these results can support methods and techniques for software development, as well as experience reports concerning the transfer of the resulting technologies into industrial practice. Typical topics of interest include:

- models and logics
- algebraic and coalgebraic semantics methodologies in software and systems engineering
- specialised models and calculi
- system specification and verification
- tools supporting algebraic and coalgebraic methods
- string diagrams and network theory
- quantum computing.

Following on the tradition started in 2015, also this year's edition was co-located with the conference Mathematical Foundations of Programming Semantics (MFPS).

The conference featured invited talks by Roberto Bruni, Jeremy Siek and Elaine Pimentel and a Special Session on "*Category theory in Machine Learning*", organised by Brendan Fong, Brandon Shapiro and Fabio Zanasi, with talks by Jean-Simon Pacaud Lemay on "*Differential Categories and Machine Learning*", Brandon Shapiro on "*A dynamic monoidal category for deep learning*" and Prakash Panangaden on "*Is there a place for semantics in machine learning?*". Moreover, Assia Mahboubi and Bob Harper were joint invited speakers for CALCO and MFPS, and there was a joint special session on "*Machine-checked Mathematics*" organised by Assia Mahboubi, with talks by Floris Van Doorn on "*Formalizing sphere eversion using Lean's mathematical library*", Yannick Forster on "*Synthetic Computability in Constructive Type Theory*" and Andrei Popescu on "*On the exquisite pleasure of doing coinduction and corecursion in Isabelle*".

In addition, there were 19 contributed talks, of which 15 were regular papers, 2 (co)algebraic pearls, and 3 early ideas papers. This volume collects the abstracts of the five invited talks, as well as the peer-reviewed papers. We are grateful to the Program Committee members for their hard work in reviewing and selecting the papers.

The Program Committee has also chosen the Best Paper of the conference. The selection process led to the assignment of an ex-aequo award to two papers, namely "*Aczel-Mendler Bisimulations in a Regular Category*" by Jérémy Dubut, and "*Fractals from Regular Behaviours*" by Todd Schmid, Victoria Noquez, Lawrence S. Moss. It was instead the duty of the audience to select the Best Talk. This has been awarded to Dario Stein for his presentation of the paper "*A Category for Unifying Gaussian Probability and Nondeterminism*", coauthored with Richard Samuelson. Our warmest congratulations to the authors!

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We would also like to extend our warm thanks to the local organiser, Larry Moss, for his tireless support throughout all phases of the organization, despite the challenges of managing a hybrid conference. We are grateful to Thorsten Wißmann, who served as the publicity chair, as well as Stefan Milius and Alexandra Silva, the former and current chairs of the CALCO steering committee. Additionally, we greatly benefited from the expertise and guidance of Fabio Gadducci and Alexandra Silva, chairs of the previous CALCO edition. Our last acknowledgement goes to Michael Wagner and the LIPIcs team, who provided continuous, accurate and friendly support in the production of these proceedings.

Paolo Baldan and Valeria de Paiva

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