

# THE BULLETIN OF SYMBOLIC LOGIC

## Edited by

James Cummings, *Managing Editor*  
Guram Bezhanishvili    Salma Kuhlmann  
Katalin Bimbó            Øystein Linnebo  
Peter Dybjer              Anca Muscholl  
Ali Enayat                 Arno Pauly

## Reviews Editors

Graham Leach-Krouse, *Managing Editor for Reviews*  
Albert Atserias            Antonio Montalbán  
Mark van Atten            Valeria de Paiva  
Clinton Conley            Christian Retoré  
Johanna Franklin         Marion Scheepers  
Dugald Macpherson      Nam Trang

## Thesis Abstracts Editor

Sandra Müller

VOLUME 29 • NUMBER 2 • JUNE 2023 • ISSN 1079-8986

Copyright © 2023 by the Association for Symbolic Logic. All rights reserved.  
Reproduction by photostat, photo-print, microfilm, or like process by permission only.



PUBLISHED BY CAMBRIDGE UNIVERSITY PRESS & ASSESSMENT FOR  
AND ON BEHALF OF THE ASSOCIATION OF SYMBOLIC LOGIC.

The BULLETIN, the JOURNAL and the REVIEW OF SYMBOLIC LOGIC are the official organs of the Association for Symbolic Logic, an international organization for furthering research in logic and the exchange of ideas among mathematicians, computer scientists, linguists, and others interested in this field. The BULLETIN encourages submissions of *Articles* and *Communications* in all areas of logic, including mathematical or philosophical logic, logic in computer science or linguistics, the history or philosophy of logic, and applications of logic to other fields. It also encourages the submissions of abstracts for doctoral level theses in logic. The BULLETIN also publishes reviews of publications in logic.

### Editors

James Cummings (Managing Editor), Department of Mathematical Sciences, Carnegie Mellon University, Wean Hall 6113, Pittsburgh, PA 15213, USA

[jcumming@andrew.cmu.edu](mailto:jcumming@andrew.cmu.edu)

Guram Bezhanishvili, New Mexico State University, New Mexico, USA

[guram@nmsu.edu](mailto:guram@nmsu.edu)

Katalin Bimbó, University of Alberta, Alberta, Canada

[bimbo@ualberta.ca](mailto:bimbo@ualberta.ca)

Peter Dybjer, Department of Computer Science and Engineering, Chalmers University of Technology, SE 412 96 Göteborg, Sweden

[peterd@chalmers.se](mailto:peterd@chalmers.se)

Ali Enayat, Department of Philosophy, Linguistics, and Theory of Science, University of Gothenburg, Box 200, SE 405 30, Gothenburg, Sweden

[ali.enayat@gu.se](mailto:ali.enayat@gu.se)

Salma Kuhlmann, Fachbereich Mathematik und Statistik, Universität Konstanz, Konstanz 78457, Germany

[salma.kuhlmann@uni-konstanz.de](mailto:salma.kuhlmann@uni-konstanz.de)

Øystein Linnebo, Department of Philosophy, IFIKK, 0315 Oslo, Norway

[oystein.linnebo@ifikk.uio.no](mailto:oystein.linnebo@ifikk.uio.no)

Anca Muscholl, LaBRI, Université Bordeaux, 351 cours de la Libération, F-33405 Talence cedex, France

[anca@labri.fr](mailto:anca@labri.fr)

Arno Pauly, Swansea University, Wales

[arno.m.pauly@gmail.com](mailto:arno.m.pauly@gmail.com)

### Reviews editors

Graham Leach-Krouse (Managing Editor), Kansas State University, Kansas, USA, [gleadchr@ksu.edu](mailto:gleadchr@ksu.edu)

Albert Atserias [atserias@cs.upc.edu](mailto:atserias@cs.upc.edu),

Mark van Atten [mark.vanatten@univ-paris1.fr](mailto:mark.vanatten@univ-paris1.fr),

Clinton Conley [clintonc@andrew.cmu.edu](mailto:clintonc@andrew.cmu.edu),

Johanna Franklin [johanna.n.franklin@hofstra.edu](mailto:johanna.n.franklin@hofstra.edu),

Dugald Macpherson [pmthdm@maths.leeds.ac.uk](mailto:pmthdm@maths.leeds.ac.uk),

Antonio Montalbán [antonio@math.berkeley.edu](mailto:antonio@math.berkeley.edu),

Valeria de Paiva [valeria.depaiva@gmail.com](mailto:valeria.depaiva@gmail.com),

Christian Retoré [christian.retore@lirmm.fr](mailto:christian.retore@lirmm.fr),

Marion Scheepers [mscheepe@boisestate.edu](mailto:mscheepe@boisestate.edu), and

Nam Trang [namtrang35@gmail.com](mailto:namtrang35@gmail.com).

### Thesis abstracts editor

Sandra Müller [sandra.mueller@tuwien.ac.at](mailto:sandra.mueller@tuwien.ac.at)

*Articles* present topics of broad interest in a way that is accessible to a large audience. They can be purely expository, survey, or historical articles or they may contain, in addition, new ideas or results or new approaches to old ones.

*Communications* should be announcements of important new results and ideas in any aspect of logic; they may be short papers in their final form or preliminary announcements (extended abstracts, position papers) of longer, full papers that will be published elsewhere. In any case, they should include, in addition to a description of the new results or ideas, enough history, background, and explanation to make the significance of the work apparent to a wide audience. *Communications* will be quickly refereed and published within six months of the submission of final version.

To submit *Articles* or *Communications* please follow the procedure described at <https://aslonline.org/journals/the-bulletin-of-symbolic-logic/the-bulletin-of-symbolic-logic-submission-guidelines>.

To submit *Thesis Abstracts* please follow the procedure described at <https://aslonline.org/journals/the-bulletin-of-symbolic-logic/logic-thesis-abstracts-in-the-bulletin-of-symbolic-logic>.

Books for review in the BULLETIN should be sent to **ASL, Department of Mathematics, University of Connecticut, 341 Mansfield Road, U-1009, Storrs, CT 06269-1009, USA.**

## TABLE OF CONTENTS

### ARTICLES

Incompatibility of generic hugeness principles by MONROE ESKEW .....	157
Saturated models for the working model theorist by YATIR HALEVI AND ITAY KAPLAN.....	163
Computably compact metric spaces by RODNEY G. DOWNEY AND ALEXANDER G. MELNIKOV .....	170
Under lock and key: a proof system for amultimodal logic by G. A. KAVVOS AND DANIEL GRATZER.....	264

### REVIEWS

K. Steele and H. Orri Stefánsson, <i>Beyond Uncertainty: Reasoning with Unknown Possibilities</i> Reviewed by MAGDALEN ELMITT .....	294
J. Krajíček, <i>Proof Complexity</i> Reviewed by MORITZ MÜLLER .....	296

### THESIS ABSTRACTS

Dodamgodage Gihanee M. Senadheera, <i>Effective Concept Classes of PAC and PACi Incomparable Degrees, Joins and Embedding of Degrees</i> , School of Mathematical and Statistical Sciences, Southern Illinois University, Carbondale, IL, USA, 2022. Supervised by Wesley Calvert.....	298
Miguel Antonio Cardona-Montoya, <i>Forcing theory and combinatorics of the real line</i> , Vienna University of Technology, Vienna, Austria, 2022. Supervised by Jakob Kellner and Diego A. Mejía .....	299
Francesco Paolo Gallinaro, <i>Around Exponential-Algebraic Closedness</i> , University of Leeds, UK, 2022. Supervised by Vincenzo Mantova .....	300
Rahman Mohammadpour, <i>New methods in forcing iteration and applications</i> , Institut de Mathématiques de Jussieu-Paris Rive Gauche, Université de Paris, Paris, France, 2020. Supervised by Boban Veličković .....	300
Notices.....	303