This analysis will show that a large variety of purely set-theoretic paradoxes—including the various Russell paradoxes as well as all the familiar implementations of the paradoxes of Mirimanoff and Burali-Forti for instance—are all instances of a single limitative phenomenon.

[1] THOMAS FORSTER AND THIERRY LIBERT, *An Order-Theoretic Account of Some Set-Theoretic Paradoxes*, ***Notre Dame Journal of Formal Logic***, vol. 52 (2011), no. 1, pp. 1-19.

▸ JIAMOU LIU, *The Isomorphism Problem on Automatic Linear Orders and Trees*.
School of Computing and Mathematical Sciences, Auckland University of Technology, New Zealand.
E-mail: jiamou.liu@aut.ac.nz.

Automatic structures are finitely presented structures where the universe and all relations can be recognized by finite automata. Such structures form a subclass of computable (or recursive) structures and every automatic structure has a decidable first-order theory[2, 1]. A well-studied problem in the study of algorithmic/recursive model theory is the isomorphism problem, which asks whether two given finitely presented structures (over the same signature) are isomorphic. It is known that the isomorphism problem for automatic structures is complete for the first level of the analytical hierarchy Σ^1_1[3]. It follows that Σ^1_1-completeness also holds for the class of automatic successor trees and automatic partial orders[6]. In [4, 5], it is shown that (1) the isomorphism problem for automatic trees of height at most $n \geq 2$ is complete for the level of Π^0_{2n-3} of the arithmetic hierarchy, (2) the isomorphism problem for automatic trees of finite height is recursively equivalent to true arithmetic. In this talk, we will discuss two recent results along this line of research:

(i) The isomorphism problem for automatic order trees is Σ^1_1-complete.

(ii) The isomorphism problem for automatic linear orders is Σ^1_1-complete.

We will also discuss the isomorphism problem for a class of linear orders presented by context-free languages. The work is joint with Dietrich Kuske and Markus Lohrey.

[1] A. BLUMENSATH AND E. GRÄDEL, *Automatic Structures*, In ***Proceedings of LICS'00***, pages 51–62, IEEE Computer Society Press, 2000.

[2] B. KHOUSSAINOV AND A. NERODE, *Automatic presentations of structures*, In ***Proceedings of LCC'95***, LNCS 960, 367–392, Springer, 1995.

[3] B. KHOUSSAINOV, A. NIES, S. RUBIN, AND F. STEPHAN, *Automatic structures: richness and limitations*, ***Logical Methods in Computer Science***, 3(2):2:2, 18 pp. (electronic), 2007.

[4] D. KUSKE, J. LIU, AND M. LOHREY, *The isomorphism problem on classes of automatic structures*, In ***Proceedings of LICS'10***, pp. 160–169. IEEE Computer Society Press, 2010.

[5] J. LIU, ***From finite to automatic structures and beyond***, PhD Thesis. University of Auckland, 2010.

[6] A. NIES, *Describing groups*, ***Bulletin of Symbolic Logic***, 13(3): 305–339, 2007.

▸ ROBERT LUBARSKY, HANNES DIENER, *Principles Weaker than BD-N*.
Dept. of Mathematical Sciences, Florida Atlantic University, 777 Glades Rd., Boca Raton FL 33431, USA.
E-mail: Lubarsky.Robert@comcast.net.
FB 6: Mathematik, Emmy-Noether-Campus, Walter-Flex-Str. 3, Universität zu Siegen, 57068 Siegen, Germany.
E-mail: diener@math.uni-siegen.de.

BD-N is a very weak foundational principle, first identified in [3] through its being equivalent (under Countable Choice) to sequentially continuous functions being continuous. BD-N holds in all major schools of mathematics (Brouwer's intuitionism, Russian computable or recursive constructivism, and classical mathematics), and it has been shown to be equivalent with many other properties. Thus it is of central importance in reverse (constructive) mathematics. There were other interesting theorems it was seen to imply, but the reverse implication had not been proven to be true. These are a version Riemann's well-known theorem that a conditionally not absolutely convergent sequence can be rearranged to have any limit [1], and the closure of the anti-Specker spaces, a kind of compactness, under products [2]. We show that these statements are strictly weaker than BD-N, while still not being provable in constructive set theory alone. (That the closure of the anti-Specker spaces is weaker than BD-N was shown in [4].)

[1] JOSEF BERGER, DOUGLAS BRIDGES, HANNES DIENER, *A Version of Riemann's permutation theorem ...*, notes

Sponsors:

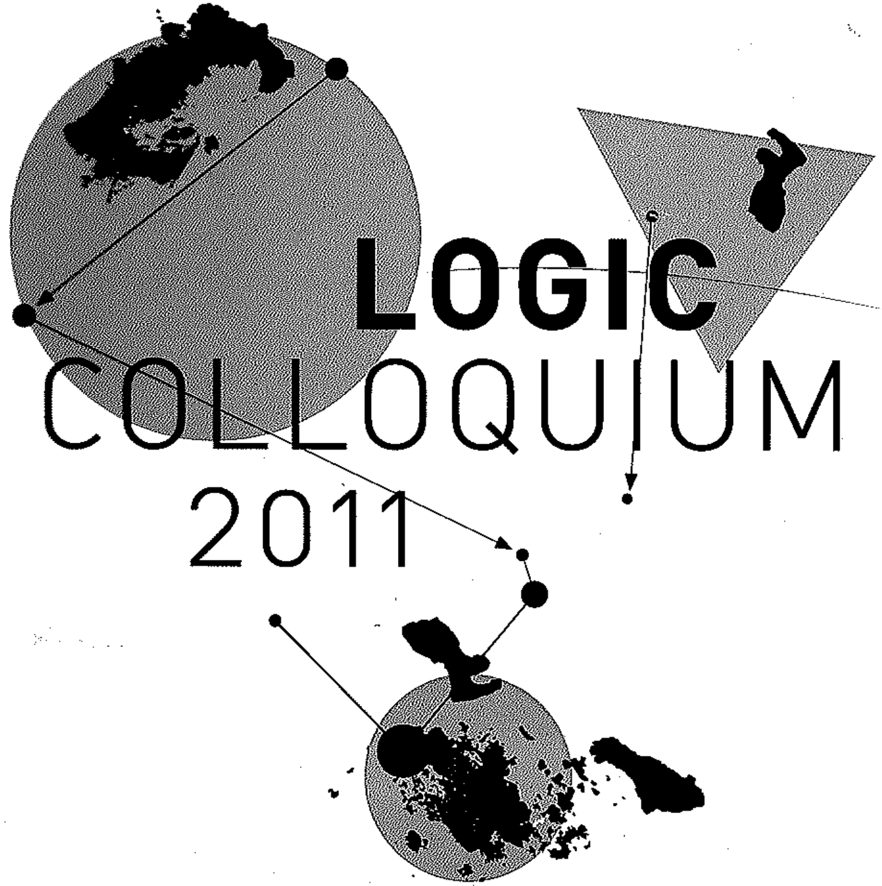
Association for Symbolic Logic

Universitat de Barcelona

IMUB Institut de Matemàtica

Generalitat de Catalunya
Government
of Catalonia

i-math ingenio mathematica



LOGIC COLLOQUIUM 2011

Abstracts

Barcelona
Catalonia,
Spain
July 11-16