The Bulletin of Symbolic Logic
Volume 23, Number 2, June 2017

2016 EUROPEAN SUMMER MEETING OF THE ASSOCIATION FOR SYMBOLIC LOGIC

LOGIC COLLOQUIUM '16

Leeds, UK

July 31–August 6, 2016

Logic Colloquium '16, the annual European Summer Meeting of the Association of Symbolic Logic, was hosted by the University of Leeds, the third time Leeds has hosted this event. The meeting took place from July 31 to August 6, 2016, at the campus of the university. The plenary lectures were held in the Business School Western Lecture Theatre and the other lectures in various rooms in the Maurice Keyword Building.

Major funding for the conference was provided by the Association for Symbolic Logic (ASL), the US National Science Foundation, Cambridge University Press, the School of Mathematics of the University of Leeds, and the British Logic Colloquium.

The success of the meeting was due largely to the excellent work of the Local Organizing Committee under the leadership of its Chair, Nicola Gambino (University of Leeds). The other members were Olaf Beyersdorff, Andrew Brooke-Taylor, Barry Cooper (deceased), Immi Halupczok, H. Dugald Macpherson, Vincenzo Mantova, Michael Rathjen, John Truss, and Stan Wainer.

The Program Committee consisted of Manuel Bodirsky (Technical University Dresden), Sam Buss (University of California, San Diego), Nicola Gambino (University of Leeds), Rosalie Iemhoff (Utrecht University, chair), Hannes Leitgeb (Munich Center for Mathematical Philosophy), Steffen Lempp (University of Wisconsin), Maryanthe Malliaris (University of Chicago), Ralf Schindler (University of Münster), and Yde Venema (University of Amsterdam).

The main topics of the conference were: Algebraic Logic, Computability Theory, Model Theory, Proof Theory, Philosophical Logic, and Set Theory. The program included two tutorial courses, twelve invited lectures, among which were the Twenty-seventh Annual Gödel Lecture and the British Logic Colloquium Lecture, twenty-four invited lectures in six special sessions, and 125 contributed talks. There were 238 participants, and ASL travel grants were awarded to thirty-five students and recent Ph.D's.

The following tutorial courses were given:

Thierry Coquand (University of Gothenburg), *Univalent type theory*.

Uri Andrews (University of Wisconsin), *Computable model theory*.

The following invited plenary lectures were presented:

Stevo Todorcevic (University of Toronto and CNRS Paris), (the Gödel Lecture), *Basis problems in set theory*.

Laurent Bienvenu (CNRS et Université Paris Diderot), (the British Logic Colloquium Lecture), *Randomized algorithms in computability theory*.

Richard Garner (Macquarie University), *Non-standard arities*.

Rob Goldblatt (Victoria University of Wellington), *Spatial logic of tangled closure and derivative operators*.

Itay Kaplan (The Hebrew University of Jerusalem), *Developments in unstable theories focusing on NIP and* NTP_2.

1079-8986/17/2302-0006
DOI:10.1017/bsl.2017.16

includes the important classes of precomplete ceers and uniformly finitely precomplete (u.f.p.) ceers but not e-complete.

In [1], it was shown that there are infinitely many computable isomorphism types of universal weakly precomplete (in fact u.f.p.) ceers; and there are infinitely many computable isomorphism types of nonuniversal weakly precomplete ceers.

We consider ceers relatively to the following well known reduction: a ceer R is said to be reducible to a ceer S, if there is a computable function f such that, for all x and y, $xRy \iff f(x)Sf(y)$. We construct an infinite ω-chain of nonequivalent weakly precomplete ceers under this reduction.

[1] S. Badaev and A. Sorbi, *Weakly precomplete computably enumerable equivalence relations*. ***Mathematical Logic Quarterly***, vol. 62 (2016), no. 1, pp. 111–127.

▸ FARSHAD BADIE AND HANS GÖTZSCHE, *Towards logical analysis of occurrence values in truth-functional independent occurrence logic*.
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The human beings never really understood how truth could be recognised as the centrepiece of philosophy. The idea of truth vs. falsity is based on the assumption that the truth-value of statements about things beyond actual settings can, indisputably, be determined (false statements about settings are just counterfactuals).

In this discussion, we will rely on our alternative kind of logic: *Occurrence Logic* (Occ Log), which is not based on truth functionality, see [1]. The Occ Log $z \,^\circ\!\!> y$ expression denotes the fact that y occurs in case and only in case z occurs. Note that '$z \,^\circ\!\!> y$' does not by itself express any kind of truth-value semantics. We will see that the *Occurrences* as the main building blocks of our approach are independent from truth-values, but they are strongly dependent on the occurrence values. The fact that 'y would only occur [and would only have an occurrence value] in case z occurs [and has an occurrence value]', has been represented by Occ Log expression $z \,^\circ\!\!> y$. We shall stress that what is in logic often called states of affairs (including events) of the real world could be called *Local Universes* that are made of Entities and Properties. Focusing on the events z and y we can justifiably say that in case, and only in case, the local universe of z differs from the local universe of y regarding at least one but not all Entities and Properties, one of them can, potentially, be said to be a change of the other.

[1] Hans Götzsche, ***Deviational Syntactic Structures***, Bloomsbury Academic, London/ New Delhi/New York/Sydney, 2013.

▸ BEKTUR BAIZHANOV, OLZHAS UMBETBAYEV, AND TATYANA ZAMBARNAYA, *The properties of linear orders defined on the classes of convex equivalence of 1-formulas*.
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In the report we consider small countable theories with an $\emptyset$-definable binary relation of linear order. Let A be a finite subset of a countable saturated model N, and $H(x)$ and $\Theta(x)$ be A-definable 1-formulas such that $H(N) \subset \Theta(N)$.

Define $E_{H,\Theta}(x, y) := H(x) \wedge H(y) \wedge (x < y \to \forall z((x < z < y \wedge \Theta(z)) \to H(z))) \wedge (y < x \to \forall z((y < z < x \wedge \Theta(z)) \to H(z))$.

$E_{H,\Theta}(x, y)$ is an A-definable relation of equivalence on $H(N)$ such that any $E_{H,\Theta}$-class is convex in $\Theta(N)$.

We say that an ordered theory T has the *property of finiteness of discrete chains of convex equivalences* (*FDCCE*) if for every two one-formulas $H(x)$ and $\Theta(x)$ such that $H(N) \subset \Theta(N)$, for any k $(1 < k < \omega)$ every discrete chain of convex $E_{H,\Theta}$-classes is finite.

We say that the set of A-definable one-formulas $C \subset F_1(A)$ is a $BH - algebra$ if it is closed under the following logical operations: $\wedge$, $\neg$, $\vee$, $\lhd_k^i$ $(0 < i < k, 1 < k < \omega)$.

Theorem 1. *Let T be a small ordered theory with FDCCE, A be a finite subset of a countable saturated model N of the theory T. Then for every finite set of A-definable one-formulas $\{\phi_1(x), \dots, \phi_n(x)\}$, $n < \omega$ the BH-algebra generated by this set is finite.*

An ordered theory T is a theory of a *pure order* if it is in a language $L = \{=, <\}$.

Theorem 2. *Let T be a small theory of a pure order. Then T is ω-categorical if and only if it has FDCCE.*

Corollary 3. *Let T be a non-ω-categorical small theory of a pure order. Then there is $\emptyset$-definable 1-formula $\phi(x)$ such that for some elements $\alpha, \beta \in \phi(N)$ $(\alpha < \beta)$, $(\alpha, \beta) \cap \phi(N)$ is an infinite discrete chain.*

Corollary 4. *Let T be a countable complete ordered theory in a language L and $T_0 \subset T$ be a complete theory in a language $L_0 := \{=, <\} \subset L$. If T_0 is non-ω-categorical then $I(T, \omega) = 2^{\omega}$.*

[1] M. Rubin, *Theories of linear order*. ***Israel Journal of Mathematics***, vol. 17 (1974), pp. 392–443.

[2] S. Shelah, *End extensions and numbers of countable models*. ***The Journal of Symbolic Logic***, vol. 43 (1978), pp. 550–562.

► DANA BARTOŠOVÁ, *Combinatorics of ultrafilters on automorphism groups*.
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For a topological group G, an ambit is a compact pointed space (X, x_0) with a (jointly) continuous action of G on X with the orbit $Gx_0 = \{gx_0 : g \in G\}$ dense in X. The greatest ambit of G, denoted by $S(G)$, is an ambit that has every ambit as its quotient preserving the distringuished points. We will study $S(G)$ for G an automorphism group of a countable first order structure as a space of ultrafilters, describe how the multiplication in G extends to $S(G)$ and show a couple of results about combinatorics and algebra in $S(G)$.

This is partially a joint work with Andrew Zucker (CMU).

► MARTIN BAYS AND JONATHAN KIRBY, *Exponential-algebraic closedness and quasi-minimality*.
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It is well-known that the complex field $\mathbb{C}$, considered as a structure in the ring language, is strongly minimal: every definable subset of $\mathbb{C}$ itself is finite or co-finite. Zilber conjectured that the complex exponential field $\mathbb{C}_{\exp}$ is quasiminimal, that is, every subset of $\mathbb{C}$ definable in this structure is countable or co-countable.

He later showed that if Schanuel's conjecture of transcendental number theory is true and $\mathbb{C}_{\exp}$ is *strongly exponentially-algebraically closed* then his conjecture holds [1]. Schanuel's conjecture is considered out of reach, and proving strong-exponential algebraic closedness involves finding solutions of certain systems of equations and then showing they are generic, the latter step usually done using Schanuel's conjecture.

We show that if $\mathbb{C}_{\exp}$ is *exponentially-algebraically closed* then it is quasiminimal. Thus Schanuel's conjecture can be dropped as an assumption, and strong exponential-algebraic closedness can be weakened to exponential-algebraic closedness which requires certain systems of equations to have solutions, but says nothing about their genericity.

[1] B. Zilber, *Pseudo-exponentiation on algebraically closed fields of characteristic zero*. ***Annals of Pure and Applied Logic***, vol. 132 (2005), no. 1, pp. 67–95.