# International Conference "Groups and Their Actions 2019"

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Programme & abstracts

# Invited Talks

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## Equations in acylindrically hyperbolic groups. Algebraic, verbal, and existential closedness of subgroups of groups.

Oleg Bogopolski
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After explaining basic notions in this area, we present new results from [1, 2] and give main ideas of their proofs. (For brevity, a group $H$ is called *clean* if it does not contain nontrivial finite normal subgroups.)

**Theorem 1.** If $H$ is a clean acylindrically hyperbolic group, then any finite system of equations with constants in $H$ has the same set of solutions in $H$ as a single equation. Moreover, this set is a projection, up to conjugacy, of the set of solutions of a single splitted equation. (An equation over $H$ is called *splitted* if it has the form $w(x_1, \dots, x_n) = h$, where $h \in H$.)

In particular, if $H$ is a clean non-elementary hyperbolic group, then every (possibly infinite) system of equations with constants in $H$ and finitely many variables is equivalent to a single equation with coefficients in $H$, i.e., they have the same set of solutions in $H$.

**Theorem 2.** For any clean acylindrically hyperbolic group $H$ and any overgroup $G$ of $H$ the notions of verbal and algebraic closedness of $H$ in $G$ are equivalent.

**Corollary 1.** If $H$ is a finitely generated clean acylindrically hyperbolic group and $G$ is a finitely presented overgroup of $H$, then the notions of verbal and algebraic closedness of $H$ in $G$ are both equivalent to the assertion that $H$ is a retract in $G$.

The same conclusion holds if $H$ is an equationally noetherian clean acylindrically hyperbolic group and $G$ is an overgroup which is finitely generated over $H$.

**Corollary 2.** (solution to Problem 5.2 from [4]) Verbally closed subgroups of clean hyperbolic groups are retracts.

Moreover:

a) We describe solutions of the equation $x^n y^m = a^n b^m$ in acylindrically hyperbolic groups (AH-groups), where $a, b$ are non-commensurable loxodromic elements and $n, m$ are integers with sufficiently large common divisor.

b) We construct certain test words in AH-groups and give their applications to endomorphisms of AH-groups.

c) We describe homomorphisms for which the codomain is acylindrically hyperbolic and the domain is either the Hawaiian earring group, or a topological group which is completely metrizable or locally compact Hausdorff, see [3].

d) We show that the notions of discrimination and separation of a group $G$ by its subgroup $H$ are equivalent if $G$ is a clean AH-group. In the case where $G$ is a clean hyperbolic group these notions are both equivalent to the existential closedness of $H$ in $G$.

# References


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## Non-realizability of piecewise isometric actions on the circle

Yves de Cornulier
CNRS

I will show that the group of piecewise isometric self-transformations of the circle (where each transformation is defined modulo indeterminacy at breakpoints) cannot be realized as a genuine group acting on the circle. The proof involves involves some general rigidity results for near actions of one-ended groups.

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## Engel elements in groups of automorphisms of rooted trees

Gustavo Fernández-Alcober
University of Basque Country

The Grigorchuk group is an example of a group where the set of left Engel elements is not a subgroup. In this talk we survey recent results about the sets of (bounded) left or right Engel elements in some general families of groups of automorphisms of rooted trees. This is joint work with A. Garreta, M. Noce, and G. Tracey.

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## Groups with proximal action are uniformly simple.

Światosław Gal
University of Wroclaw

A group is called $N$?uniformly simple if for every nontrivial conjugacy class $C$, $(C^{\pm})^{\leq N}$ covers the whole group. Every uniformly simple group is simple. It is known that many group with geometric or dynamical origin are simple. In the talk we prove that, in fact, many of them are uniformly simple. The results are due to the speaker, Kuba Gismatullin, and Nir Lazarovich.

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## Some Groups from Wild Topology

Wolfgang Herfort
TU Vienna

A space is *wild* if it has a point whose fundamental system of open neighbourhoods does not have a base made up by simply connected sets. The simplest example is the *Hawaiian Earring*, a bouquet of shrinking circles. Since the early 1990's work from G. Higman, H. B. Griffiths investigating the fundamental group of the Hawaiian Earring, the Hawaiian Earring Group (HEG), has been taken up. S. Shelah, K. Eda, A. Zastrow, J. Cannon & G. Conner, and others. The HEG and its generalizations (fundamental groups of 1-dimensional Peano continua) were studied and K. Eda & K. Kawamura determined the precise structure of the abelianization of HEG (and thus of the first homology group of the Hawaiian Earring). W. Hojka and the speaker contributed to the understanding of an important factor group of HEG, the fundamental group of an Archipelago space. In my talk I will try to give an insight into some of the present developments and results.

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## The size of solution sets to equations in groups

Anton Klyachko
Moscow State University

Solomon's theorem (1969) says that, in any group, the number of solutions to a system of coefficient-free equations is divisible by the order of the group provided the number of equations is less than the number of unknowns.

The main subject of the talk is recently discovered connections between this fact and other classical results. If time permits, I shall discuss algebraic-group analogues of these theorems.

This lecture is based on joint works with Elena Brusyanskaya, Anna Mkrtchyan, Maria Ryabtseva, and Andrey Vasil'ev.

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## Centralizers in profinite groups

Pavel Shumyatsky
University of Brasilia
Brazil

I will survey some recent results on centralizers in profinite groups. In particular, I will describe the theorem that if $G$ is a profinite group in which all centralizers are abelian, then $G$ is either virtually abelian or virtually pro-$p$. This is a joint result with Pavel Zalesski and Theo Zapata.

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## Powerfully nilpotent groups

Gunnar Traustason
(joint work with James Williams)
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In this talk we will introduce a special subclass of powerful $p$-groups that we call *powerfully nilpotent groups* and are $p$-groups that possess a central series of a special kind. We will describe some structure theory and discuss 'classification' in terms of an ancestry tree and powerful coclass.

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## The model theory of finite groups

John Wilson
Oxford / Leipzig University

How much of finite group theory is still possible if one is only allowed to make statements in the first-order language of group theory? Single groups present no problems (because of their multiplication tables), but interesting questions arise if one tries to characterize properties of arbitrary finite groups or to recover standard easy results about finite groups. After giving the necessary definitions and background, I will discuss some results and open questions.

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## Contributed Talks

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### On a question of Malinowska on sizes of finite nonabelian simple groups in relation to involution sizes

Chimere Stanley Anabanti
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Let $I_n(G)$ denote the number of elements of order $n$ in a finite group $G$. In 1979, Herzog conjectured that two finite simple groups containing the same number of involutions have the same size. Zarrin, in 2018, disproved Herzog's conjecture with a counterexample. Then he conjectured that "if $S$ is a non-abelian simple group and $G$ a group such that $I_2(G) = I_2(S)$ and $I_p(G) = I_p(S)$ for some odd prime divisor $p$, then $|G| = |S|$". Zarrin's conjecture was disproved by the recent author in a 2019 paper, where more counterexamples to Herzog's conjecture were also given. In an attempt to reformulate the mentioned conjecture of Zarrin, Malinowska asked: "what is the smallest positive integer $k$ such that whenever there exist two nonabelian finite simple groups $S$ and $G$ with prime divisors $p_1, \cdots, p_k$ of $|G|$ and $|S|$ satisfying $2 = p_1 < \cdots < p_k$ and $I_{p_i}(G) = I_{p_i}(S)$ for all $i \in \{1, \cdots, k\}$, we have that $|G| = |S|$?". In this talk, we resolve Malinowska's question.

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### Rings with Lie nilpotent proper subrings

Orest D. Artemovych
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The possible structures of finite-dimensional Lie algebras all of those proper subalgebras are nilpotent have been studied by E.L. Stitzinger, A.G. Gein, D. Towers and other. An associative ring $R$ is said to be *Lie nilpotent* if its associated Lie ring $R^L$ (with the Lie multiplication defined by $[x, y] = xy - yx$ for $x, y \in R$) is nilpotent.

In my talk I will discuss some results on Lie rings with nilpotent proper subrings, associative (in particular, Jacobson radical) rings with Lie nilpotent proper subrings and their connexion with groups.

## On the generic family of Cayley graphs of a finite group

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Let $G$ be a finite group and let $m$ be an integer, $m > 1$. We define *the generic graph* $\mathcal{G}_m(G)$ as a graph whose set of vertices is equal $G^m = \underbrace{G \times \cdots \times G}_{m}$. If $\mathbf{g} = (g_1, \ldots, g_m)$, $\mathbf{h} = (h_1, \ldots, h_m)$ are two vertices of $\mathcal{G}_m(G)$, then

$$\mathbf{g} \sim \mathbf{h} \quad \text{iff} \quad \mathbf{h} = \mathbf{x}_{[k,l)} \cdot \mathbf{g},$$

where $\mathbf{x}_{[k,l)} = (\underbrace{e, e, \ldots, e}_{k-1 \ \text{times}}, \underbrace{x, x, \ldots, x}_{l-k \ \text{times}}, e, e, \ldots, e)$ with $x \in G^{\times} = G \setminus \{e\}$ and $1 \leqslant k < l \leqslant m+1$.

By $G_{[k,l)}$ we denote the set of all elements $\mathbf{x}_{[k,l)}$, where $x \in G^{\times}$ and call it *an interval.* The symmetric set $\mathcal{S}$ is the union of all intervals:

$$\mathcal{S} = \bigcup_{1 \leqslant k < l \leqslant m+1} G_{[k,l)}.$$

Thus the graph $\mathcal{G}_m(G)$ is the Cayley graph $Cay(G^m, \mathcal{S})$. It is easy to see that the graph $\mathcal{G}_m(G)$ has $|G|^m$ vertices and obviously is $d$-regular, where $d = \binom{m+1}{2}(|G| - 1)$.

It is shown that for each $m > 1$ the graph $\mathcal{G}_m(G)$ determines the group $G$ up to isomorphism. The groups of automorphisms $\mathbf{Aut}(\mathcal{G}_m(G))$ are described. Relations between combinatorial properties of the graph $\mathcal{G}_m(G)$ and algebraic properties of the group $G$ are discussed.

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## Some anti-geometric groups

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A group $G$ is strongly bounded if any abstract action of $G$ on a metric space has bounded orbits. There exist infinite examples of such groups due to Shelah, Bergman, Droste and Göbel, de Cornulier and others. I will present the main ideas of a general construction which allows one to embed a group into a strongly bounded group which is only slightly larger in cardinality. This allows one, for example, to embed any countable group into a strongly bounded group of cardinality $\aleph_1$.

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## Branch structures of some GGS-groups

Elena Di Domenico
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Groups acting on regular rooted trees provide an answer to many problems in group theory. For example the Grigorchuk group and Gupta-Sidki $p$-groups are counterexamples to the General Burnside Problem.

The Grigorchuk-Gupta-Sidki groups, also known as GGS-groups, are a family of groups of automorphisms of regular rooted trees generalizing the second Grigorchuk group and the Gupta-Sidki p-groups. In this talk we will focus on the GGS-groups over $p^n$-adic trees and we will see in which cases these groups have a particular structure that defines them as branch groups.

This is a joint work with Gustavo A. Fernández Alcober and Norberto Gavioli.

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## Amenability and Computability, 2

Karol Duda
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This is the second talk concerning the joint work together with Aleksander Iwanow on amenability and computability in groups. I am going to present results concerning the condition opposite to amenability, i.e. paradoxical decomposition.

A paradoxical decomposition of a group $G$ is a triple $(K, (A_k)_{k\in K}, (B_k)_{k\in K})$ consisting families $\mathcal{A}$ and $\mathcal{B}$ of subsets of $G$ indexed by elements of a finite set $K \subset G$ such that:

$$G = \Big(\bigsqcup_{k\in K} kA_k\Big) \bigsqcup \Big(\bigsqcup_{k\in K} kB_k\Big) = \Big(\bigsqcup_{k\in K} A_k\Big) = \Big(\bigsqcup_{k\in K} B_k\Big).$$

If additionally families $\mathcal{A}$ and $\mathcal{B}$ consist of computable sets, then such paradoxical decomposition is called *effective* paradoxical decomposition.

The main result which I am going to present is formulated as the following theorem:

**Theorem 1.** *Let $G$ be a computable group. Given $K \subset G$ such that for some natural $n$ there is no $n$-Følner set with respect to $K$, there exists an effective paradoxical decomposition of $G$.*

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## Simplicity and amenability of ultraproducts of normed groups

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During my talk I will explain metric ultraproduct construction of groups, equipped with invariant metric. Its importance to group theory became apparent recently and they are intensively studied. I will concentrate, in this context, on simplicity and amenability. I will explain (non)uniform metric amenability and uniform metric simplicity. Examples are: some classes of linear groups over infinite fields which are uniformly metrically simple and Higman-Thompson groups, which are not-uniformly metric amenable and IET group. These generalize, respectively, the previously studied notions of uniform amenability and uniform simplicity (join work with Krzysztof Majcher and Martin Ziegler).

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## Simple groups as the automorphism groups of Boolean functions.

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It is a known fact that each finite group is isomorphic (as an abstract group) with a symmetry group of some graph. This implies a similar fact for Boolean functions and equivalently for hypergraphs and unordered relations.

However, this statement says nothing about the action of this group. In most applications, however, this action is more important than the abstract group. That is why the more important question seems to be:

Which permutation groups are automorphism groups of Boolean functions?

(At this point we are not talking about isomorphism but about equality.)

We will now deal with permutation groups, which are simple groups. We will give a full solution to this problem here. We will show here that in except of a certain family of permutation groups (isomorphic with alternating groups) and two other groups, they are automorphism groups of Boolean functions.

This is done by combining results based on the classification of finite simple groups with the description of intransitive actions of simple groups.

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## Normal subgroups in the the group of column-finite infinite matrices

Waldemar Hołubowski
(joint work with Martyna Maciaszczyk and Sebastian Żurek)
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The classical result due to Jordan, Burnside, Dickson, says that every normal subgroup of $GL(n,K)$ ($K$ - a field, $n \geq 3$) which is not contained in the center, contains $SL(n,K)$. A. Rosenberg gave description of normal subgroups of $GL(V)$, where $V$ is a vector space of any infinite cardinality dimension. However, in countable case his result is incomplete. We fill this gap giving description of the lattice of normal subgroups of the group of infinite column-finite matrices indexed by positive integers over any field.

# Finite quandle rings and matrices

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Quandle theory is a relatively new subject in abstract algebra which has origins in knot theory. Quandles are generally non-associative algebraic structures. They were introduced independently in 1982 by Joyce [1] *(quandles)* and Matveev [2] *(distributive groupoids)* with the purpose of constructing invariants of knots.

A *quandle* is a set $Q$ with a binary operation $\triangleright\colon Q \times Q \to Q$ satisfying the three axioms

(i) for every $a \in Q$, we have $a \triangleright a = a$, *(idempotence)*

(ii) for every pair $a, b \in Q$ there is a unique $c \in Q$ such that $a = c \triangleright b$, *(right-invertibility)* and

(iii) for every $a, b, c \in Q$, we have $(a \triangleright b) \triangleright c = (a \triangleright c) \triangleright (b \triangleright c)$. *(self-distributivity)*

The uniqueness in axiom (ii) implies that the map $f_b : Q \to Q$ defined by $f_b(a) = a \triangleright b$ is a bijection; the inverse map $f_b^{-1}$ then defines the dual operation $a \triangleleft b = f_b^{-1}(a)$. The set $Q$ then forms a quandle $Q^* = (Q, \triangleleft)$ under $\triangleleft$, called the dual of $(Q, \triangleright)$. If the dual quandle operation is the same as original quandle operation, i.e., $a \triangleleft b = a \triangleright b$ or $(a \triangleright b) \triangleright b = a$ for all $a, b \in Q$, then such quandles are called *involutory* (since all the maps $f_b : Q \to Q$ are involutions). We will call a quandle $Q$ *self-dual* if $Q \cong Q^*$.

Let $Q = \{q_1, q_2, \ldots, q_n\}$ be a finite quandle with $n$ elements. We define the matrix of $Q$, denoted $M_Q$, to be the matrix whose entry in row $i$ and column $j$ is $q_i \triangleright q_j$. The matrix $M_Q$ is really just the quandle operation table considered as a matrix, with the columns acting on the rows. In particular, if the elements of the quandle are the numbers $Q = \{1, 2, \ldots, n\}$ with $M_Q = [\alpha_{ij}]$, where $\alpha_{ij} = i \triangleright j$, then $M_Q$ is an *integral quandle matrix.*

Using techniques from [3] and applying packages [4],[5] we compute matrices of finite involutory, self-dual quandles and make the corresponding classification of quandles of low order.

Let $(Q, \triangleright)$ be a quandle and $(R, +, \cdot)$ be an associative ring with identity. Following [6],[7] we can consider a ring $R[Q]$ (non-associative in general) as the set of all formal finite $R$-linear combinations of elements of quandle $Q$, that is, $R[Q] = \left\{ \sum_{q \in Q} r_q q \mid r_q \in R \text{ and } r_q = 0 \text{ for almost all } q \in Q \right\}$

with the natural addition and the multiplication given by the following $\left(\sum_{x\in Q} r_x x\right)\left(\sum_{y\in Q} r_y y\right) = \sum_{x,y\in Q} r_x r_y (x \triangleright y)$, where $x, y \in Q$, $r_x, r_y \in R$.

Analogous to group rings, we can rewrite the product of two elements $a = \sum_{i=1}^{n} \alpha_i q_i$ and $b = \sum_{i=1}^{n} \beta_i q_i$ of a quandle ring $R[Q]$, where $Q = \{q_1, q_2, \dots, q_n\}$ is a finite quandle, in the following way

$$ab = \sum_{1\leq i,j\leq n} \alpha_i\beta_j(q_i \triangleright q_j) = \sum_{i=1}^{n} \left( \sum_{1\leq j\leq n,\ q_i=q_k\triangleright q_j} \alpha_k\beta_j \right) q_i.$$

Since for any $i, j \in \{1, 2, \dots, n\}$ the quandle equation $q_i = q_k \triangleright q_j$ has unique solution, that is $q_k = q_i \triangleleft q_j$, we can associate the matrix $A = [a_{i,j}]_{1\leq i,j\leq n}$ over ring $R$ to the element $a \in R[G]$, where $a_{i,j} = \alpha_k$. Thus, the computation of product of elements $a, b \in R[Q]$ is a simple matrix multiplication of the matrix $A$ by the column $(\beta_1, \beta_2, \dots, \beta_n)$. The correlations between properties of elements $a \in R[G]$ and their associated matrices $A \in M_n(R)$ are studied.

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## Amenability and Computability, 1

Aleksander Iwanow (Ivanov)
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This is the first talk concerning the joint work together with Karol Duda on amenability and computability in groups. The basic notions and facts in this area will be introduced. The main result which I am going to present states existence of a computable group with undecidable problem of recognition when a finite set generates an amenable subgroup.

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## Ideals in the ring $T(\infty, \mathbb{F})$

Martyna Maciaszczyk
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In this talk I give description of the ideals in the ring $T(\infty, \mathbb{F})$ infinite $\mathbb{N} \times \mathbb{N}$ uppertriangular matrices over the field $\mathbb{F}$. In the description I use the concept of zero pattern.

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## Free actions on metric lines

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A group $G$ admits a free, rigid, order-preserving action on a linearly ordered set $X$ if and only if $G$ is (two-sided) orderable – here, an action is rigid if for all $g \neq 1$ one has either $gx > x$ for all $x$, or $gx < x$ for all $x$. Examples of linearly ordered sets include ordered abelian groups $\Lambda$; such a $\Lambda$ can also be viewed as a $\Lambda$-metric space. We will call linearly ordered sets of this sort 'metric lines'. An affine automorphism $g$ of a $\Lambda$-metric space is a permutation satisfying $d(gx, gy) = \alpha_g d(x, y)$ for all $x, y$ where $\alpha_g$ is an order-preserving automorphism of $\Lambda$.

We will describe some classes of groups admitting free affine actions on metric lines and discuss the problem of equivariantly embedding a linearly ordered set equipped with a rigid action in a metric line equipped with an affine action.

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## On weak Sierpiński subsets in groups and free subgroups

Piotr Słanina (joint work with A. Bier and Y. Cornulier)
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$E$ is a Sierpiński set in a metric space (or group) if for any $a \in E$, $E$ is congruent to $E \setminus \{a\}$. In a group $G$, a weak Sierpiński subset is a subset $E$ such that for some $g, h \in G$ and $a \neq b \in E$, we have $gE = E \smallsetminus \{a\}$ and $hE = E \smallsetminus \{b\}$. Mycielski and Tomkowicz [2] studied existence of such sets and asked: does weak Sierpiński set in a group follow an existence of nonabelian subgroup?

We study the subgroup generated by $g$ and $h$, give positive answer to this question and more, show that a group with weak Sierpiński set has either presentation $G_k = \langle g, h \mid (h^{-1}g)^k \rangle$ or it is free over $(g, h)$. In addition, in such groups $G_k$, we characterize all weak Sierpiński subsets.

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## Finite 2-nilpotent groups acting on compact manifolds

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A group $G$ is Jordan if there exists an integer $J$ such that the index of the maximal abelian subgroup in every finite subgroup of $G$ is at most $J$, intuitively, every finite subgroup of $G$ is 'almost' abelian. Ghys conjectured that the diffeomorphism group of every compact manifold is Jordan. This was verified in many cases, but eventually turned out to be false. The first counterexample is due to Csikós–Pyber –Szabó (2014) who embedded certain 3-dimensional finite Heisenberg groups to the diffeomorphism group of $S^2 \times T^2$. Based on this, Mundet i Riera found many other counterexamples by embedding higher dimensional Heisenberg groups satisfying some conditions.

These results raised the question of how much a diffeomorphism group can fail to be Jordan. More concretely, given a family of finite groups in which the index of the maximal abelian subgroup is not bounded, is there a compact manifold whose diffeomorphism group contains every member of the family? A result from January 2019 (arXiv:1412.6964) answers this affirmatively for the families: (1) fixed (but arbitrary) dimensional Heisenberg groups over arbitrary finite cyclic rings; (2) every special $p$-groups of order $p^r$ for every prime $p$ ($r$ fixed, but arbitrary). In the talk, these results are presented as well as a possible extension to arbitrary finite 2-nilpotent groups.

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## The congruence subgroup property for multi-EGS groups

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It was proved by G. A. Fernández-Alcober, A. Garrido and J. Uria-Albizuri that the branch Grigorchuk-Gupta-Sidki (GGS) groups possess the congruence subgroup property. This result was extended to all branch multi-GGS groups by A. Garrido and J. Uria-Albizuri. The first examples of finitely generated branch groups without the congruence subgroup property, the extended Gupta-Sidki (EGS) groups, were constructed by Pervova. In this talk, we consider a natural generalisation of multi-GGS and EGS groups, and demonstrate their unexpected behaviour concerning the congruence subgroup property. This is joint work with J. Uria-Albizuri.

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## On the laws of the form $ab \equiv ba$

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N.D.Gupta has proved that groups which satisfy the laws $[x, y] \equiv [x,_n y]$ for $n = 2, 3$ are abelian.Every law $[x, y] \equiv [x,_n y]$ can be written in the form $ab \equiv ba$ where $a, b$ belong to a free group $F_2$ of rank two, and the normal closure of $a, b$ coincides with $F_2$. In my talk I will discuss the question: for which words $a$, $b \in F_2$,every group satisfying the law $ab \equiv ba$ is abelian?

### References

[1] W. Tomaszewski, On laws of the form $ab \equiv ba$ equivalent to the abelian law, Rend. Semin. Mat. Univ. Padova, Volume 136, 2016, pp. 19-34; DOI: 10.4171/RSMUP/136-3

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## On commensurability of Baumslag-Solitar groups

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Two groups are called commensurable if they have isomorphic subgroups of finite index. In particular, finitely generated commensurable groups are quasi-isometric. Baumslag-Solitar groups form an interesting and important class of one-relator groups with unusual properties. While the quasi-isometry classification for them was known previously, due to Whyte, Farb and Mosher, the commensurability classification was not. In joint work with Montse Casals-Ruiz and Ilya Kazachkov we fill this gap by providing a complete commensurability classification of Baumslag-Solitar groups.

## Some observations on Archipelago-Groups

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The two prototype-examples of topological spaces, that in modern language are called "not homotopically Hausdorff" are Griffiths' Space from the fifties, and the Harmonic Archipelago as constructed by Bogley and Sieradski in 1998. Both spaces have their reputation as well-known counter-examples. The fundamental group of the latter space has been investigated, been shown to be the universal countable locally free group [2], and given rise to the definition of Archipelago Groups [1]. At the beginning of this year K. Eda initiated a discussion, whether the results of [1] could be correct. In this talk I want to present the conclusions to which I came, having meditated about the assertions in the paper and of K. Eda.

Roughly speaking my conclusions were, that I could agree the K. Eda's assertion that with the methods of the paper only much weaker universality properties of Archipelago Groups could be proven as asserted there. Contrary to what is asserted in the paper it is nor clear that the isomorphism type of an Archipelago group is already determined by vague cardinality data (no. of elements and of elements of order two) of the generating group, but the coincidence of these data only suffices to construct a surjective homomorphism between two Archipelago groups, also if generated by non-isomorphic groups with matching data.

In addition, when that way meditating about the paper, I also came to the conclusion that Thm. 5 of the paper, which asserts that Archipelago Groups are the fundamental groups of topological spaces that are constructed as a certain mapping cone, can only be correct, if one requires additional conditions that according to [1] are not required for those spaces that are used in the construction of the corresponding mapping cone. If time suffices I will outline a corresponding complexity-argument that shows that otherwise Thm.5 cannot be correct.

[1] G.R. Conner, W. Hojka & M. Meilstrup: "Archipelago groups", Proc. Amer. Math. Soc. 143 (2015), no. 11, 4973–4988.

[2] Hojka, Wolfram: "The harmonic archipelago as a universal locally free group", J. Algebra 437 (2015), 44–51.

## INVITED SPEAKERS

Oleg Bogopolski
Yves de Cornulier
Gustavo Fernández-Alcober
Światosław Gal
Wolfgang Herfort
Anton Klyachko
Pavel Shumyatsky
Gunnar Traustason
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Nadia Gubareni
Anastasia Hadjievangelou
Waldemar Hołubowski
Yuriy Ishchuk
Aleksander Iwanow
Olga Macedońska-Nosalska
Martyna Maciaszczyk
Ayan Mahalanobis
Shane O'Rourke
Bartłomiej Pawlik
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