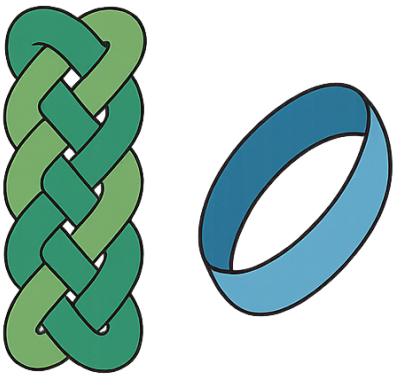

II Group Theory, Braid Theory and Related Aspects

Book of Abstracts

Organizers of the book of abstracts

Camila Dantas – UnB
Igor Lima – UnB
Oscar Ocampo – UFBA

Apoio:

II Group Theory, Braid Theory and Related Aspects

Universidade de Brasília (UnB - Brazil)
December 01-06, 2025

Program and abstracts

Scientific Committee

Conchita Martínez Pérez (Universidad de Zaragoza)
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II GTBT - Preliminary Program

CIC/EST Building Auditorium – University of Brasília – Campus Darcy Ribeiro

Monday

- 08:00 – 08:30: Registration
- 08:30 – 09:00: Opening Ceremony (30 min)
- 09:00 – 10:00: Talk – Pavel Zalesski (UnB) (50+5+5 min)
- 10:00 – 10:25: Coffee-break (25 min)
- 10:25 – 10:55: Talk (30 min) – Wagner Sgobbi (UFES)
- 10:55 – 11:00: Break (5 min)
- 11:00 – 12:00: Talk – Agustin Moreno Cañadas (Universidad Nacional de Colômbia/Colômbia) (50+5+5 min)
- 12:00 – 14:00: Lunch
- 14:00 – 15:00: Talk – Paolo Bellingeri (Université de Caen Normandie/France) (50+5+5 min)
- 15:00 – 15:30: Talk (30 min) – Danilo Silveira (UFOP)
- 15:30 – 15:55: Coffee-break (25 min)
- 15:55 – 16:25: Talk (30 min) – Fabiola Manjarrez Gutierrez (Universidad Nacional Autónoma de México/México)
- 16:25 – 16:30: Break (5 min)
- 16:30 – 17:00: Talk (30 min) – Vinícius Laass (UFBA)
- 17:00 – 17:05: Break (5 min)
- 17:05 – 18:05: Minicourse – Carolina Miranda e Pereiro (UFES) (1 hour)
- 18:05: Opening Cocktail Reception

Tuesday

- 08:00 – 08:30: Registration
- 08:30 – 09:30: Minicourse – Gisele Teixeira Paula (UFPR) (1 hour)
- 09:30 – 10:00: Talk (30 min) – Altair Tosti (UENP)
- 10:00 – 10:30: Coffee-break (30 min)

- 10:30 – 11:30: Talk – Jesús Juyumaya (Universidad de Valparaíso/Chile) (50+5+5 min)
- 11:30 – 12:10: Talk (40 min) – Yuri Santos Rego (University of Lincoln)
- 12:10 – 14:00: Lunch
- 14:00 – 16:00: PhD Defense of Ênio Leite (UFBA) (2 hours)
- 16:00 – 16:30: Coffee-break (30 min)
- 16:30 – 17:30: Minicourse – Carolina Miranda e Pereiro (UFES) (1 hour)

Wednesday

- 08:00 – 08:30: Registration
- 08:30 – 09:30: Minicourse – Gisele Teixeira Paula (UFPR) (1 hour)
- 09:30 – 10:00: Talk (30 min) – Mohsen Amiri (UFU)
- 10:00 – 10:30: Coffee-break (30 min)
- 10:30 – 11:30: Talk – Daniel Vendrúsculo (UFSCar) (50+5+5 min)
- 11:30 – 12:10: Talk (40 min) – José Gregório Rodríguez-Nieto (Universidad Nacional de Colômbia/Colômbia)
- 12:10 – 14:00: OFFICIAL PHOTO and Lunch
- Afternoon: Free
- 19:00: Conference Dinner

Thursday

- 08:00 – 08:30: Registration
- 08:30 – 09:30: Minicourse – Gisele Teixeira Paula (UFPR) (1 hour)
- 09:30 – 10:00: Talk (30 min) – Yerko Rojas (UEM)
- 10:00 – 10:30: Coffee-break (30 min)
- 10:30 – 11:30: Talk – Federica Gavazzi (Heriot-Watt University, Edinburgh) (50+5+5 min)
- 11:30 – 12:00: Talk (30 min) – Kisnney Almeida (UEFS)
- 12:00 – 14:00: Lunch
- 14:00 – 15:00: Talk – Daniel Juan-Pineda (Universidad Nacional Autónoma de México/México) (50+5+5 min)

- 15:00 – 15:30: Talk (30 min) – Paulo César Santos Jr (UESB)
- 15:30 – 16:30: Coffee-break + Poster Session (1 hour)
- 16:30 – 17:00: Talk (30 min) – Luís Mendonça (UFMG)
- 17:00 – 17:05: Break (5 min)
- 17:05 – 18:05: Minicourse – Carolina Miranda e Pereiro (UFES) (1 hour)

Friday

- 08:00 – 08:30: Registration
- 08:30 – 09:30: Minicourse – Gisele Teixeira Paula (UFPR) (1 hour)
- 09:30 – 10:00: Talk (30 min) – Renato Diniz (UFRB)
- 10:00 – 10:25: Coffee-break (25 min)
- 10:25 – 11:25: Talk – Carmine Monetta (University of Salerno/Italy) (50+5+5 min)
- 11:25 – 12:05: Talk (40 min) – Marco Boggi (UFF)
- 12:05 – 14:00: Lunch
- 14:00 – 14:40: Talk (40 min) – Olga Salazar-Díaz (Universidad Nacional de Colômbia/Colômbia)
- 14:40 – 15:10: Coffee-break (30 min)
- 15:10 – 16:10: Minicourse – Carolina Miranda e Pereiro (UFES) (1 hour)

Saturday

- 09:00 – 09:40: Talk (40 min) – Bruno Cisneros de la Cruz (Universidad Nacional Autónoma de México/México)
- 09:40 – 10:05: Coffee-break (25 min)
- 10:00 – 11:00: Talk – Oscar Ocampo (UFBA) (50+5+5 min)
- 11:00 – 12:00: Talk – Maria Cumplido Cabello (Universidad de Sevilla) (50+5+5 min)
- 12:00 – 12:05: Closing Remarks (5 min)

Contents

Talks

On the Conjugacy and Centralizers in Monod's Group H

Altair Santos de Oliveira Tosti

Abstract

In this talk, we discuss results from [**?**] on the study of conjugacy and centralizers in Monod's group $HH(\mathbb{R})$ which adapts techniques developed in [**?**, **?**]. This group and its subgroups $H(A)$, where A is a subring of $\mathbb{R}$, were introduced in [**?**] by N. Monod and provides another counterexample to the von Neumann-Day conjecture.
The group H is the set of piecewise projective, orientation-preserving homeomorphisms of the extended real line $\mathbb{R} \cup \{\infty\}$ that stabilize infinity. Alternatively, the group H can be defined as acting on $\mathbb{R}$ itself, where an element $f \in H$ is characterized by the existence of finitely many breakpoints $t_1, t_2, \ldots, t_n \in \mathbb{R}$ such that:

- On each interval $[t_i, t_{i+1}]$, the function f acts as a fractional linear transformation:

$$f(t) = \frac{a_i t + b_i}{c_i t + d_i}, \quad \text{where } a_i d_i - c_i b_i = 1,$$

  for suitable real numbers $a_i, b_i, c_i, d_i \in \mathbb{R}$.
- On the unbounded intervals $(-\infty, t_1]$ and $[t_n, +\infty)$, the function f acts as linear transformations:

$$f(t) = \frac{a_0 t + b_0}{d_0} \quad \text{on } (-\infty, t_1], \qquad f(t) = \frac{a_n t + b_n}{d_n} \quad \text{on } [t_n, +\infty).$$

For any subring A of $\mathbb{R}$, a subgroup $H(A) \leq H$ consists of all elements of H that are piecewise in ${}_2(A)$, with breakpoints confined to the set P_A, where P_A denotes the set of fixed points of hyperbolic elements of ${}_2(A)$.

References

[1] J. Burillo, F. Matucci, E. Ventura, *The conjugacy problem in extensions of Thompson's group F*. Israel J. Math. **216** (2016), no. 1, 15–59.

[2] M. Kassabov, F. Matucci, *The simultaneous conjugacy problem in groups of piecewise linear functions*. Groups Geom. Dyn. **6** (2012), no. 2, 279–315.

[3] F. Matucci, A. S. de Oliveira-Tosti, *Conjugacy and centralizers in groups of piecewise projective homeomorphisms*. Groups Geom. Dyn. **16** (2022), no. 1, 1–28.

[4] N. Monod, *Groups of piecewise projective homeomorphisms*. Proc. Natl. Acad. Sci. USA **110** (2013), no. 12, 4524–4527.

(Altair Santos de Oliveira Tosti) UENP

Brauer Configuration Algebras Induced by the Braid Group and Its Burau Representations

Agustín Moreno Cañadas

Abstract

Brauer Data Analysis (BDA) or simply Brauer analysis is a novel tool for data analysis. It arose from investigations of the so-called Brauer configuration algebras, which were introduced by Green and Schroll to study algebras of tame and wild representation type.

BDA allows for finding connections between the representation theory of algebras, integer partitions, graph energy, and the Yang-Baxter equation theory with practical applications in, Cryptography, manufacturing textile and freight industries, Cybersecurity or music composition.

This talk introduces Brauer configuration algebras induced by automorphisms as elements of the braid group adding their growth rates as a new element for Brauer data analysis. Furthermore, words associated with some Brauer configurations and their induced Brauer configuration algebras are realized as products of suitable specializations of Burau representations.

References

[1] Green, E. L. and Schroll, S. Brauer Configuration Algebras: A Generalization of Brauer Graph Algebras. *Bulletin des Sciences Mathématiques*, 141(6), 2017.

[2] Cañadas, A. M., Rodríguez-Nieto, J. G., and Salazar-Díaz, O. P. Brauer Configuration Algebras Induced by Integer Partitions and Their Applications in the Theory of Branched Coverings. *Mathematics*, 12, 3626, 2024.

(Agustín Moreno Cañadas) Universidad Nacional de Colombia/Colômbia

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Left-Invariant Orderings on Artin Groups of Type B

Bruno Aarón Cisneros de la Cruz

Abstract

It is well known that braid groups admit left-invariant orderings, and a wide variety of constructions of such orders have been developed. However, with the exception of geometric constructions (via the mapping class group), these approaches have not been successfully generalized to the broader class of Artin groups.

In this talk, I will present a construction of a left-invariant ordering for Artin groups of type B (braid groups of type B). This construction is based on the development of rotating normal forms (à la Fromentin) for the dual presentation of Artin groups of type B.

(Bruno Aarón Cisneros de la Cruz) Unidad Oaxaca del Instituto de Matemáticas de la UNAM - SECIHTI

Groups with restrictions on conjugacy classes

Carmine Monetta

Abstract

The aim of this talk is to discuss groups whose structure is constrained by the behaviour of their conjugacy classes. In the first part, I will present recent results obtained in collaboration with Costantino Delizia, Primož Moravec and Chiara Nicotera on groups in which every element is conjugate to its inverse. Structural properties and certain classes of these groups will be described. In the second part, I will consider finite groups whose conjugacy classes satisfy restrictions on their orders. This work, developed with Víctor Sotomayor, shows how such constraints affect the overall structure of the group.

(Carmine Monetta) University of Salerno/Itália

The parametrized braid groups

Daciberg Lima Gonçalves, Vinicius Casteluber Laass and Weslem Liberato Silva

Abstract

In this talk we define the parametrized braid groups of a given fiber bundle. We will show presentations in the cases of torus-bundle. Also, as an applications, we will show some results in order to determine the homotopy classes of fiber-preserving self maps over S^1 that satisfy the Borsuk-Ulam property.

References

[1] Gonçalves, D. L., Laass, V. C., and Silva, W. L. The Borsuk-Ulam property for homotopy classes on bundles, parametrized braid groups and applications for surface bundles. *Topology and Its Applications*, 359 (2025), 109081.

(Vinicius Casteluber Laass) UFBA

Finiteness conditions and generalized torsion elements in groups

Danilo Sansão da Silveira

Abstract

An element of a group is called a generalized torsion element if some finite product of its conjugates is equal to the identity. In this talk, we will discuss some problems concerning finiteness conditions and generalized torsion in some classes of groups. We will prove that in a locally graded Bell group (or a just infinite soluble group), the generalized torsion elements form a characteristic subgroup. We show that locally graded (or just infinite) Bell groups of finite generalized exponent must have finite exponent. Furthermore, we study the relationship between finite generalized exponent and finite exponent in some class of groups. This is a joint work with Raimundo Bastos (UnB).

(Danilo Sansão da Silveira) UFOP

Surface braid groups, fixed points, coincidences, and Borsuk-Ulam-type theorems.

Daniel Vendrúscolo

Abstract

We will present how surface braid groups appear in the study of fixed points, coincidences, and more recently in Borsuk-Ulam type problems. Nielsen's fixed point theory (and its generalizations) describes a minimality invariant for sets of fixed points (coincidences and roots) in homotopy classes of continuous maps. This invariant, known as the Nielsen number, is optimal in dimension greater than or equal to 3. For surfaces, optimal results are only achieved using the braid group of the surfaces involved.

(Daniel Vendrúscolo) UFSCar

Circular Heegaard splittings for sutured manifolds

Fabiola Manjarrez Gutierrez

Abstract

In this talk we will generalized the classic notion of Heegaard splittings for compact 3-manifolds to the analogous notion for sutured 3-manifolds. We will discuss some invariants that arise from this notion as well as a special application to knots exteriors.

(Fabiola Manjarrez Gutierrez) Universidad Nacional Autónoma de México/México

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Virtual Braids, Virtual Artin Groups, and Their Classifying Spaces

Federica Gavazzi

Abstract

As classical braid groups are examples of Artin groups, virtual braid groups are examples of virtual Artin groups, a structure recently introduced by Bellingeri, Paris, and Thiel. This talk examines the topology of these groups through two remarkable normal subgroups, focusing on candidate CW complexes that serve as their classifying spaces. Generalizing a previous construction (the BEER complex) for pure virtual braids, we construct a cell complex whose fundamental group is the pure virtual Artin group PVA. We show that is aspherical when the associated Coxeter graph is of spherical or affine type, making it a classifying space for PVA in these cases. As a consequence, we obtain a classifying space for the pure virtual braid group on n strands.

References

[1] Bartholdi, L., Enriquez, B., Etingof, P., and Rains, E. Groups and Lie algebras corresponding to the Yang–Baxter equations. *Journal of Algebra*, 305(2):742–764, 2006.

[2] Bellingeri, P., Paris, L., and Thiel, A.-L. Virtual Artin groups. *Proceedings of the London Mathematical Society*, 126(1):192–215, 2023.

[3] Gavazzi, F. Spaces Related to Virtual Artin Groups. 2024, p. 49. `arXiv:2410.08640 [math.GR]`. Available at: https://arxiv.org/abs/2410.08640.

(Federica Gavazzi) Heriot-Watt University/Edinburgh

Knots and tied structures

Jesús Juyumaya

Abstract

I will show the origin of certain tied structures and their applications in knot theory.

(Jesús Juyumaya) Universidad de Valparaíso/Chile

On the Whitehead group of the braid group of non-orientable compact surfaces

John Guaschi and Daniel Juan Pineda

Abstract

Let G be an infnite discrete group. The Whitehead group, Wh(G), is a geometric invariant that encodes surgery obstrcutions. We show how one can compute Wh(G) when G is the braid group of a non-orientable surface such as the projective plane.

(Daniel Juan Pineda) Universidad Nacional Autónoma de México/México

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On GL(V) x End(V)-representation of g-digroups.

José Gregorio Rodríguez-Nieto

Abstract

In this talk, we construct a g-digroup structure on the Cartesian product GL(V)×End(V), where GL(V) and End(V) denote the group of automorphisms and the monoid of endomorphisms of a vector space V, respectively, and show that this structure admits a natural notion of g-digroup representation. The proposed definition is compatible with the concept of g-digroup action, introduced in [1]. Furthermore, we establish several connections between these representations and the classical theory of group representations.

References

[1] Marin-Gavirio, I. D., Rodríguez-Nieto, J. G., Salazar-Díaz, O. P., and Velásquez, R. Actions and representations of g-digroups. *Semigroup Forum*, 110(1):190–215, 2025.

[2] Rodríguez-Nieto, J. G., Salazar-Díaz, O. P., and Velásquez, R. The structure of g-digroup actions and representation theory. *Algebra and Discrete Mathematics*, 32(1):103–126, 2021.

[3] Salazar-Díaz, O. P., Velásquez, R., and Wills-Toro, L. A. Generalized digroups. *Communications in Algebra*, 44:2760–2785, 2016.

(José Gregorio Rodríguez-Nieto) Universidad Nacional de Colombia/Colômbia

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On the finiteness properties of fixed subgroups of automorphisms

Kisnney Emiliano de Almeida

Abstract

Under some conditions, we use sigma-invariants to study the finiteness properties of the fixed subgroups of group automorphisms, answering a question made by Lei, Ma and Zhang. This is a joint work with L. Mendonça.

(Kisnney Emiliano de Almeida) UEFS

Decomposition of groups of pure symmetric automorphisms of RAAGs

Luis Mendonça

Abstract

We will discuss decompositions of the group of pure symmetric automorphisms of a RAAG into iterated extensions of free groups or RAAGs. In particular, we will explain how this relates to the notion of Koszulness for the associated Lie algebra coming from their lower central series. Joint work with Conchita Martínez-Pérez (Zaragoza).

(Luis Mendonça) UFMG

Uniform canonical root stacks of genus 0 stable curves

Marco Boggi

Abstract

Canonical root stacks of stable curves are (non-representable) ramified coverings of moduli stacks of stable curves of a given genus. They have the remarkable property that their fundamental group is isomorphic to the quotient of the mapping class group of the corresponding surface by the subgroup generated by certain powers of Dehn twists. We will show that for genus 0, when all ramification indices equal a fixed $m \geq 1$, these stacks satisfy a list of desirable properties which closely relate their geometry with group theoretic properties of mapping class groups in genus 0 (talk based on a joint work in progress with Louis Funar and Philippe Eyssidieux).

(Marco Boggi) UFF

Canonical Reduction Systems in Spherical Artin–Tits Groups

María Cumplido Cabello

Abstract

One can view braid groups as mapping class groups of punctured disks, and from this perspective braids admit a Nielsen–Thurston classification and a canonical reduction system (CRS), consisting of the essential curves preserved by a reducible braid. Spherical-type Artin–Tits groups are the natural algebraic generalization of braid groups, equipped with a rich Garside structure but lacking an underlying surface. In this work, we introduce an algebraic analogue of the canonical reduction system for any element of a spherical Artin–Tits group, replacing curves by irreducible parabolic subgroups. This provides a purely algebraic notion of CRS that recovers the classical one for braids and builds a bridge between topological and algebraic viewpoints. We also develop an algorithm to compute this algebraic CRS, combining tools from low-dimensional topology and Garside theory. In particular, we use the periodicity of centralizers of powers of an element to obtain an effective computational procedure. In the case of braid groups, we obtain an improved and more efficient version of the algorithm. This is a joint work with Juan González-Meneses and Davide Perego

(María Cumplido Cabello) Universidad de Sevilla/Espanha

On the Sum of Element Orders in Finite Abelian Groups

Mohsen Amiri

Abstract

Let $\psi(G) = \sum_{g\in G} o(g)$ denote the sum of element orders of a finite group G. It is known that among groups of order n, the cyclic group C_n maximizes ψ. Tărnăuceanu proved that two finite abelian p-groups of the same order are isomorphic if and only if they have the same sum of element orders, and conjectured this for arbitrary finite abelian groups. In this talk, we confirm the conjecture by proving a stronger result: for finite LCM-groups G and H of the same order, $\psi(G) = \psi(H)$ if and only if G and H are the same order type.

(Mohsen Amiri) UFU

Braces and g-digroups as solutions of the Yang -Baxter Equation

Olga Patricia Salazar-Díaz and José Gregorio Rodríguez-Nieto

Abstract

We review the basics about braces and g-digroups and show that they are solutions of the Yang-Baxter Equation.

(Olga Patricia Salazar-Díaz) Universidad Nacional de Colombia/Colômbia

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Universal virtual braid groups

Oscar Ocampo

Abstract

In this talk we introduce the concept of *universal virtual braid group with n strands and c types of crossings*, denoted by $UV_n(c)$. This group has a right-angled Artin group as a finite index subgroup and has as quotients, among others, the virtual braid group, the welded braid group, the unrestricted virtual braid group, the virtual twin group and the virtual singular braid group. We study structural aspects of $UV_n(c)$, we show that it is linear, residually finite, Hopfian but no co-Hopfian.

(Oscar Ocampo) UFBA

Combinatorics and Generalizations

Paolo Bellingeri

Abstract

Cactus groups were introduced by Devadoss as "quasibraids" in 1998 and subsequently by Henriques and Kamitzer as an analogue of braids in coboundary categories. In this talk, we will present some combinatorial properties of these groups, which are actually closer to right-angle Coxeter groups and admit combinatorially and geometrically interesting generalizations. This talk is based on two articles with Chemin & Lebed and Godelle & Paris.

(Paolo Bellingeri) Université de Caen Normandie/França

Conjugacy classes and finite order elements in abelian-by-finite groups

Paulo César dos Santos Júnior

Abstract

Consider the following short exact sequence

$$1 \longrightarrow A \longrightarrow G \xrightarrow{\pi} S_n \longrightarrow 1,$$

where A is an abelian group and S_n acts on A with an injective permutation representation. In our study, we focus on the group G. We study the conjugacy classes of elements in the group G and we characterize its elements of finite order. Special attention is given to cases where G arises in connection with braid groups on surfaces. The results presented are part of a collaborative work with Oscar Ocampo and Ênio Leite, currently in progress.

(Paulo César dos Santos Júnior) UESB

Profinite properties and profinite genus of residually finite groups

Pavel Zalesski

Abstract

I shall define profinite property for residually finite groups and give examples of profinite properties for groups of geometric nature. Then I shall define the notion of genus and give some results on genus for free constructions.

(Pavel Zalesski) UnB

Goldberg-type short exact sequences

Renato dos Santos Diniz

Abstract

Let $M_{g,p}$ be a closed surface (orientable or not) of genus $g \geq 0$ with $p \geq 1$ boundary components. Let N denote the normal subgroup of $P_n(M_{g,p})$ generated by the image of the Artin pure braids via the inclusion of the disk D into $M_{g,p}$, $i\colon D \hookrightarrow M_{g,p}$. Then

$$1 \to \ N \to P_n(M_{g,p}) \to \Pi_1^n(\pi_1(M_{g,p})) \to 1 \tag{1}$$

is a short exact sequence. It is known as the *Goldberg's short exact sequence*. It was proved for closed surfaces different from $\mathbb{S}^2$ and $\mathbb{R}P^2$ by Goldberg in 1973 (solving a conjecture of Birman), for $S = \mathbb{R}P^2$ by Gonçalves and Guaschi in 2017 and for any finitely punctured surface by Dekimpe, Gonçalves and Ocampo in 2025. The aim of this work is to consider the case of the full surface braid group and to prove that

$$1 \to \ N \to B_n(M_{g,p}) \to (\Pi_1^n(\pi_1(M_{g,p}))) \rtimes S_n \to 1 \tag{2}$$

is a short exact sequence. We also prove that if K denote the normal subgroup of $B_n(M_{g,p})$ generated by the image of the Artin braid group B_n then we obtain the following short exact sequence

$$1 \to \ K \to B_n(M_{g,p}) \to \pi_1(M_{g,p}) \to 1. \tag{3}$$

This work was done in collaboration with Oscar Ocampo and Paulo Cesar Santos Junior.

References

[Bi1] J. S. Birman, On braid groups, *Comm. Pure Appl. Math.* **22** (1969), 41–72.

[G] C. H. Goldberg, An exact sequence of braid groups, *Math. Scand.* **33** (1973), 69–82.

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[KGO] K. Dekimpe, D. L. Gonçalves and O. Ocampo, The R_∞-property for braid groups over orientable surfaces, Monatshefte für Mathematik 208 (2025), 1-18.

(Renato dos Santos Diniz) UFRB

A geometric approach to the Reidemeister-Schreier algorithm

Wagner Carvalho Sgobbi

Abstract

Finding a presentation for a subgroup H of a group G in terms of a presentation of G is not an easy task in general. The first results in this direction were obtained by Schreier (1927) and Reidemeister (1932) and are known today as the "Reidemeister-Schreier" Theorem (or algorithm) (see, for example, [**?**]). At first sight, it may be seen as a quite abstract or artificial theorem, especially for topologists. In this talk, we intend to give intuitions for this theorem by showing a way to visualize its geometry, based on a result in [**?**]. We also give some examples where one can effectively see the algorithm happening inside the trees and Cayley graphs.

References

[1] Lyndon, R.C., Schupp, P.E. *Combinatorial Group Theory*, Springer-Verlag, 1977.

[2] Serre, J-P. *Trees*, Springer-Verlag, Berlin-Heidelberg-New York, **1980**.

[3] Sgobbi, W. C. *Geometric invariants of groups and property* R_∞, PhD thesis, **2022**. Available at https://repositorio.ufscar.br/handle/ufscar/15958.

(Wagner Carvalho Sgobbi) UFES

Element Orders and p-Nilpotence in Verbal Subgroups

Yerko Contreras Rojas

Abstract

The concept of p-nilpotence has traditionally been studied through properties of p-local subgroups, where p is a prime number. More recently, attention has shifted toward the behavior of elements of coprime orders in group-theoretic contexts. In this work, we investigate the p-nilpotence of a verbal subgroup $w(G)$, focusing on conditions derived from the orders of its generators—specifically, the w-values. We establish criteria based on the product of a w-value that is a p'-element and another w-value of nontrivial order divisible by p. These conditions are closely tied to arithmetic properties of element orders, particularly in the case where the verbal subgroup corresponds to a commutator word. Our results contribute to a deeper understanding of how order-based constraints influence the structural properties of verbal subgroups.

(Yerko Contreras Rojas) UEM

Topological versions of Artin groups

Yuri Santos Rego

Abstract

Emil Artin's braid groups, along with their generalisations, are amongst the most important families of infinite discrete groups. In this talk we shall discuss a way of constructing topological Artin-like groups. These can be built out of suitable topological "base groups" and your preferred Artin presentation. We then discuss general properties that these groups (might) have, such as being compactly presented — an appropriate version of "finitely presented". Going deeper, we can use this machinery to construct novel examples of totally disconnected locally compact (tdlc) groups with interesting cohomological and geometric properties, such as: a new family of (discrete) Thompson-like groups containing, for every n, groups of homological type FP_n $but not of type FP_{n+1}$; $and a family of tdlc right-angled Artin groups (RAAGs) that act geometrically on contractible cube d complexes$, $some of which are CAT(0)$, $and some of which cha$

The talk is based on joint work with Ilaria Castellano, Bianca Marchionna, and Brita Nucinkis.

(Yuri Santos Rego) University of Lincoln/Inglaterra

Mini Course

Braid Groups and Generalizations

Carolina de Miranda e Pereiro

Abstract

In this mini course, we will study the Artin braid groups and an important generalization known as surface braid groups. These groups will be presented with a primary focus on their topological and algebraic properties, through the lens of fundamental groups and configuration spaces. This approach provides a short exact sequence (due to Fadell-Neuwirth), which is fundamental in the theory. We will discuss this sequence in detail, as it enables us to prove significant results in braid theory, including extension problems, the existence or absence of torsion elements, computation of the center of these groups, among others. Furthermore, braid groups appear in various mathematical contexts, and we will explore some of their applications.

(Carolina de Miranda e Pereiro) UFES

An Introduction to Geometric Group Theory

Gisele Teixeira Paula

Abstract

The aim of this minicourse, intended for advanced undergraduate and graduate students, is to introduce key ideas in geometric group theory. We begin with essential tools for understanding groups as metric spaces, such as Cayley graphs, before moving on to coarse geometry, quasi-isometries, and the Milnor–Schwarz theorem. We then discuss the concept of ends of groups and its connection to large-scale geometric and topological invariants. The course concludes with an exploration of Gromov-hyperbolic groups, emphasizing their distinctive algebraic and geometric properties.

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PhD Thesis Defense

Framed Braid Groups and Their Generalizations

Ênio Carlos Leite and Oscar Ocampo

Abstract

Let $n \geq 2$ and let B_n denote the Artin braid group, also known as the braid group of the disk. We denote by FB_n the framed braid group. In this thesis, we study framed braid groups and their generalizations. Initially, we develop a structural analysis of the group FB_n , investigating several algebraic properties. In particular, we determine its center, lower central series, commutator subgroup, as well as certain Coxeter-type quotients and associated congruence subgroups. Next, we extend our study to the context of surfaces, considering the framed braid groups $FB_n(M)$, where M may be an orientable or non-orientable surface, possibly with a finite number of punctures. Subsequently, we introduce and analyze two generalizations of the framed braid group: the framed virtual braid group FVB_n and the framed singular braid group FSG_n. For both cases, we present descriptions by generators and relations, and investigate structural properties analogous to those of FB_n. Finally, we construct an invariant for singular knots, based on the virtual Temperley–Lieb algebra and the Markov trace, thus establishing a connection between the algebraic theory of braids and the theory of singular knots.

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Posters

Homology of $\mathbb{RP}^n$ via the Universal Coefficient Theorem

Ana Carolina Moura Teixeira

Abstract

Algebraic Topology is a branch of Mathematics of great interest, with applications in several areas such as Differential Geometry, Applied Mathematics, and Knot Theory. One of the useful and well-known tools in this field is homology theory, as it provides a powerful invariant that associates to a given topological space the so-called homology groups of the space, in such a way that homeomorphic topological spaces have isomorphic homology groups.

In this work, we present the computation of the homology groups of real projective spaces $\mathbb{RP}^n$ with coefficients in the groups $\mathbb{Z}_m$ and $\mathbb{Q}$. To this end, we use the Universal Coefficient Theorem, a fundamental result that establishes a relationship between homology with integer coefficients and homology with coefficients in other abelian groups or fields. This theorem allows one to systematically determine the homology groups with different coefficients from the homology groups with integer coefficients, thereby simplifying and generalizing the computation process.

(Ana Carolina Moura Teixeira) UFBA

On the generalized torsion of nilpotent-by-finite groups

Douglas Vilela de Paiva Silva

Abstract

An element $g \in G$ of a group G is said to have generalized torsion if a finite product $g^{x_1} \cdots g^{x_n}$ of its conjugates is trivial. This property appears as a well-known obstruction to the biorderability of groups, analogous to the fact that the existence of torsion in the group exhibits an obstruction to one-sided orderability.

In general, these concepts are not identical, and examples of groups without generalized torsion but not orderable are known, as are left-orderable groups that are not biorderable. Thus, in this work, we explore nontrivial connections between such properties in virtually-abelian groups in the class of nilpotent-by-finite groups. This is a joint work with Luís Mendonça (UFMG).

(Douglas Vilela de Paiva Silva) UFMG

The Specht Problem for T-Ideals of Lie algebras over fields of positive characteristic

Edgardo Bladimir Aguirre Rodriguez

Abstract

Given an algebra, one may ask whether the T-ideal of its polynomial identities is finitely generated. This problem, formulated in 1950, is known as the Specht Problem, and it already has an answer, for example, in the case of associative algebras. For Lie algebras, the problem remains open when the field has characteristic 0, and a first counterexample was given by Vaughan-Lee when the characteristic is 2. In this poster we present a construction of a T-ideal of Lie algebras over a field of positive characteristic that is not finitely generated, thereby providing a negative solution to the Specht problem in this setting.

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Automorphisms of the Two Dimensional Crystallographic Groups

Felipe Quaresma Pires

Abstract

Two-dimensional crystallographic groups, also known as wallpaper groups, are classic topics at the intersection of Algebra, Geometry, and Topology. In this sense, an interesting aspect is to understand their automorphism groups Aut(G) and outer automorphism groups Out(G), since these allow us to grasp the nature of the symmetries of these groups and how they relate to other geometric and topological structures. Thus, according to [**?**], this work provides an explicit determination of Aut(G) and Out(G) for some of the 17 possible two-dimensional crystallographic groups. This work is part of the author's master's research, supervised by Marcel Vinhas Bertolini (UFPA) and Juliana Silva Canella (UFPA), and all the results presented here are part of the article [2].

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Computing exemples in the non-abelian tensor square of groups

João Henrique Oliveira Sager

Abstract

The non-abelian tensor product and the non-abelian tensor square of groups was introduced by Brown and Loday in [1], while studying homotopy groups. Later in [2], Brown calculated the tensor square of some groups whose order is less or equal than to 30. In [3], given an finite solvable group G, Rocco founded a presentation of $\nu(G)$ given by mean of a convenient set of generators for the subgroup $[G, G^{\phi}]$, so that the computation of those invariantes of G is much easier to perform inside $\nu(G)$. Our main goal here is to evaluate, using computational tools given in [4], the non-abelian tensor square of groups whose order is between 31 and 40.

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Evidence of Asymptotic Normality for Standardized Sample Means of J(Dn) in Dihedral Groups

João Victor Monteiros de Andrade

Abstract

We study a function J defined on finite groups, focusing on dihedral groups Dn of order 2n. For Dn, J(Dn) is computed from elementary arithmetic quantities associated with n. We conjecture that the standardized sample means of J(Dn), obtained by resampling with replacement from the values of J(Dn) for n N, converge in distribution to the standard Normal as the sample size increases, in line with the Central Limit Theorem. To assess this hypothesis, we conduct a large-scale simulation varying both sample size (from 30 up to the order of millions) and the cutoff N. Goodness-of-fit is evaluated using histograms overlaid with the Normal curve, Q–Q plots, and the Kolmogorov–Smirnov test. We observe strong agreement with normality (p-values mostly > 0.05) and systematically improving diagnostics as sample size grows, providing robust empirical support for the conjecture. We discuss implications for functions related to J and potential connections to a "degree of normality" within families of groups, highlighting future directions and the computational cost of the experiment.

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Some Characterization and Results About Crystallographic Groups

Júlio Gama Ramalho de Oliveira

Abstract

In this work, we present a structured summary of classical results about crystallographic groups, emphasizing the role of fundamental polyhedron, Dirichlet regions, and side-pairing transformations in obtaining group presentations. Using these tools, we describe the structure of the Hantzsche–Wendt group and derive its standard presentation via Poincaré's fundamental polyhedron theorem. We then review the Bieberbach theorems, which classify crystallographic groups up to affine conjugacy and characterize their holonomy. Finally, we discuss primitive holonomy groups and provide algebraic criteria for primitivity, including applications to families generalizing the Hantzsche–Wendt group.

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A note on connecting multiplicative functions defined on finite groups

Leonardo Santos da Cruz

Abstract

In the present work we explore relationships between multiplicative functions defined in [2], [3]. To do so, we use other important quotients, thus establishing deeper connections that were previously little or not evaluated in some group families. Furthermore, we extract new characterizations and asymptotic patterns for some classes of groups.

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