# BOOK OF ABSTRACTS

## SS37 - Automata, Dynamics and Topology on Cantor spaces

## 2nd Joint Meeting Brazil-Italy in Mathematics

September 8, 2026

Messina, Italy

## Organizers:

Altair Santos de Oliveira Tosti, Northern State University of Paraná
Davide Perego, University of Geneva
Francesco Matucci, University of Milan-Bicocca

2nd Joint Meeting Brazil-Italy
in Mathematics
Messina, 7–11 September 2026

**SS37**

# On Jones's representations of Thompson groups: the subgroups and the knot construction

*Valeriano Aiello* [1]
Department of Mathematics "G. Castelnuovo", University of Rome "La Sapienza"

In his work on Thompson groups, Vaughan Jones developed a method to construct unitary representations of these groups, often using Planar Algebras and C*-algebras. Several interesting subgroups arise as stabilizers of vectors in these representations, including both classical and newly discovered examples. Some of these representations also realized a connection with knot theory: the Thompson groups turned out to be knot constructors as good as the braid groups, and the matrix coefficients of suitable representations can be interpreted as (renormallized) quantum knot invariants, such as the Jones and HOMFLY polynomials. In this talk, I will review both old and recent developments in this line of research.

**References**

[1] V. Aiello, *An introduction to Thompson knot theory and to Jones subgroups*, J. of Knot Theory and its Ramifications 34 (03) (2025), 2340002, doi: 10.1142/S0218216523400023 preprint arXiv:2211.15461

[2] Brothier, Arnaud and Vaughan FR Jones. *Pythagorean representations of Thompson's groups*, Journal of Functional Analysis 277.7 (2019): 2442-2469.

[3] Jones, Vaughan FR. *Some unitary representations of Thompson's groups F and T*, J. Comb. Algebra 1.1 (2017): 1-44.

[1]The author is partially supported by Sapienza Università di Roma (Progetto di Ateneo Dipartimentale 2024 "New research trends in Mathematics at Castelnuovo") and by INdAM-GNAMPA through Project "Simmetrie distribuzionali per processi stocastici quantistici" CUP E53C25002010001.

E–mail: address@server.it.

2nd Joint Meeting Brazil-Italy
in Mathematics
Messina, 7–11 September 2026

**SS37**

# Generalized torsion elements in infinite groups

*Raimundo de Araújo Bastos Júnior* [1]
Department of Mathematics, University of Brasília

In this talk, we present some properties of generalized torsion elements in groups. We describe the set of generalized torsion elements in finitely generated abelian-by-finite groups. This presentation is mainly based on the papers [1, 2]. In this class of groups, the set of generalized torsion elements forms a subgroup; however, this is not true in general. This is a joint work with L. Mendonça.

## References

[1] R. Bastos and L. Mendonça, *Generalized torsion elements in infinite groups*, *Proc. Amer. Math. Soc.*, vol. 153 (2025), pp. 5171–5181.

[2] R. Bastos, C. Schneider and D. Silveira, *Generalized torsion elements in groups*, Arch. Math. (Basel), **122**, 121–131, 2024.

[1] Aknowledgements...
E–mail: address@server.it.

2nd Joint Meeting Brazil-Italy
in Mathematics
Messina, 7–11 September 2026

**SS37**

# Generalised Bieri-Stallings groups

*Ilaria Castellano*
Department of Mathematics and Applications, University of Milan-Bicocca
*Bianca Marchionna*
Research Institute in Mathematics and Physics, Universiyé catholique de Louvain
*Brita E. A. Nucinkis*
Department of Mathematics, Royal Holloway University of London
*Yuri Santos Rego*
School of Mathematics and Physics, University of Lincoln

While the theory of finiteness properties for discrete groups is firmly established, its counterpart for (non-compact, non-discrete) totally disconnected locally compact groups is at a relatively early stage, despite a rapid and ongoing development.

In the discrete setting, an extensive body of literature focuses on separating groups according to their finiteness properties. Among the first (and most famous) families of discrete groups separated by finiteness properties are Bieri–Stallings groups $SB_n$, $n \geq 1$ [2,4] and Bestvina–Brady groups $BB_n$, $n \geq 1$ [1].

In this talk, I will discuss the methodology introduced in [3] to extend the Bieri–Stallings construction. The goal is to produce totally disconnected locally compact groups that satisfy property $\mathtt{FP}_n$ but fail to satisfy $\mathtt{FP}_{n+1}$. This approach relies on the notion of generalised presentations.

## References

[1] Mladen Bestvina and Noel Brady. *Morse theory and finiteness properties of groups.* In: Invent. Math. 129.3 (1997), pp. 445– 470. doi: 10.1007/s002220050168.

[2] Robert Bieri. *Homological dimension of discrete groups.* 2nd ed. Queen Mary College Mathematical Notes. Queen Mary College, Department of Pure Mathematics, London, 1981, pp. iv+198. isbn: 0902480111

[3] Ilaria Castellano, Bianca Marchionna, Brita E.A. Nucinkis, Yuri Santos Rego. *Generalisable presentations and compactness properties of locally compact right-angles Artin groups.* arXiv preprint (2026)

[4] John Stallings. *A finitely presented group whose 3-dimensional integral homology is not finitely generated.* In: Amer. J. Math. 85.4 (1963), pp. 541–543. doi: 10.2307/2373106

E–mail: ilaria.castellano@unimib.it.

2nd Joint Meeting Brazil-Italy
in Mathematics
Messina, 7–11 September 2026

**SS37**

# Transition groups of context-free graphs and Lehnert's conjecture

*Daniele D'Angeli* [1]
Department of Engineering, University Niccolò Cusano Roma

*Corentin Bodart*
Department of Mathematics, University of Oxford

*Francesco Matucci*
Department of Mathematics, University of Milano Bicocca

*Davide Perego*
Department of Mathematics, University of Geneva

*Emanuele Rodaro*
Department of Mathematics, Politecnico of Milano

This talk introduces a new perspective on the Lehnert's conjecture (stating that a group is co-context-free if and only if it is a subgroup of Thompson's group $V$), focusing on the definition of a new class of groups, termed *transition groups*, which act via permutations on digraphs. Specifically, we provide a language-theoretic characterization of finitely generated subgroups of Thompson's group $V$: a finitely generated group embeds into $V$ if and only if it admits a faithful context-free action, or equivalently, if it belongs to the class of transition groups of context-free graphs.

## References

[1] C. Bodart, D. D'Angeli, D. Perego and E. Rodaro, *A language-theoretic characterisation of subgroups of Thompson's group V*, submitted.

[2] D. D'Angeli, F. Matucci, D. Perego and E. Rodaro, *Context-free graphs and their transition groups*, to appear in Transactions of the London Mathematical Society.

[1]Partially supported by GNSAGA
E–mail: daniele.dangeli@unicusano.it.

2nd Joint Meeting Brazil-Italy
in Mathematics
Messina, 7–11 September 2026

**SS37**

# On wreath product occurring as subgroup of automata group

*Alex Carrazedo Dantas*
Department of Mathemathics, University de Brasília
*Junio R. Oliveira*
*Tulio M. G. Santos*
Department of Mathemathics, Federal University of Rio de Janeiro

A finitely generated group is said to be automata group provided it admits a faithful self-similar finite-state representation on some regular $m$-tree. In this presentation we show that if $G$ is a subgroup of an automata group, then for each finitely generated abelian group A the wreath product $A \wr G$ is a subgroup of an automata group. We obtain, for example, that the group $\mathbb{Z} \wr (\mathbb{Z} \wr \mathbb{Z})$ is a subgroup of an automata group; this solves Problem 15.19- (b) of the Kourovka Notebook proposed by A. M. Brunner and S. Sidki in 2000. This is joint work with Junio R. Oliveira and Tulio M. G. Santos [1].

## References

[1] A. C. Dantas, J. R. Oliveira, T. Santos, *On wreath product occurring as subgroup of automata group.* J. Algebra. **689** (2026), 219–243.

E–mail: alexcdan@gmail.com.

2nd Joint Meeting Brazil-Italy
in Mathematics
Messina, 7–11 September 2026

**SS37**

# Divergence in groups with micro-supported actions

*Tatiana Nagnibeda, Letizia Issini* [1]
Université de Genève

*Dominik Francoeur*
Universidad Autónoma de Madrid

Divergence of groups is a quasi-isometry invariant that measures how difficult it is to connect two points while avoiding a large ball around the identity. It is easy to see that divergence is linear for direct products. I will discuss how the presence of direct products as subgroups can be used to show that certain groups have linear divergence. This applies to some groups that admit a micro-supported action on a Hausdorff topological space, i.e., groups containing elements with arbitrarily small support.

[1]The speaker was supported by the Swiss Government Excellence Scholarship No. 2022.0011 during this project and thanks the ICMAT in Madrid for support and hospitality during a stay in which some of this work was developed. The visit in Madrid was made possible thanks to Subside Tremplin, awarded by the University of Geneva. Further travel support was granted by the Swiss Mathematical Society and the Swiss National Science Foundation.

E–mail: letizia.issini@unige.ch.

2nd Joint Meeting Brazil-Italy
in Mathematics
Messina, 7–11 September 2026

**SS37**

# Geometry and finiteness properties of locally compact RAAGs

*Ilaria Castellano*
Department of Mathematics and Applications, University of Milano-Bicocca

*Bianca Marchionna*[1]
Research Institute in Mathematics and Physics, Université catholique de Louvain

*Brita E. A. Nucinkis*
Department of Mathematics, Royal Holloway University of London

*Yuri Santos Rego*
School of Mathematics and Physics, University of Lincoln

Right-angled Artin groups (RAAGs) are a prominent family of finitely presented groups in geometric and computation group theory. They are defined via an explicit presentation as follows: given a finite undirected graph $\Gamma = (V, E)$, the *RAAG* $A_\Gamma$ *of type* $\Gamma$ is the group given by the presentation:

$$\langle V \mid [v, w] = 1, \forall \{v, w\} \in E\rangle.$$

Notice that RAAGs interpolate between finitely generated free groups (when $\Gamma$ is totally disconnected) and finitely generated free abelian groups (when $\Gamma$ is complete). For a nice introduction, see for instance [1]. Building on the Cayley graph of $(A_\Gamma, V)$, one constructs a CAT(0) cube complex $S_\Gamma$ — called the *universal Salvetti complex* of $A_\Gamma$ – on which $A_\Gamma$ acts cellularly and geometrically. This turns out to be extremely convenient to describe the large scale geometry, the cohomology and the finiteness properties of $A_\Gamma$.

In this talk, we introduce a generalisation of RAAGs to locally compact groups based on the notion of generalised presentations [2]. Remarkably, locally compact RAAGs of type $\Gamma$ have a cellular action on a thicker version of $S_\Gamma$ with controlled cell stabilisers. The favourable geometry of this complex allows us to deduce several cohomological and finiteness properties for locally compact RAAGs. The outcomes are, however, not always the same as in the standard RAAG case; on the way, we will discuss new geometric and cohomological behaviours that emerge in this more general setting.

## References

[1] R. Charney, *An introduction to right-angled Artin groups*, Geom. Dedicata, 125 (2007), 41—158

[2] I. Castellano, B. Marchionna, B. E. A. Nucinkis and Y. Santos Rego, *Generalisable presentations and compactness properties of locally compact right-angled Artin groups*, arXiv preprint (2026)

[1]FNRS Chargée de Recherche.
E–mail: bianca.marchionna@uclouvain.be.

2nd Joint Meeting Brazil-Italy
in Mathematics
Messina, 7–11 September 2026

**SS37**

# Decompositions of groups of pure symmetric automorphisms of RAAGs

*Luis Mendonça*[1]
Instituto de Ciências Exatas, Universidade Federal de Minas Gerais

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).

## References

[1] C. Martínez-Pérez and L. Mendonça *Pure symmetric automorphisms, extensions of RAAGs, and Koszulness*, arXiv:2510.13038, 2025.

[1]supported by FAPEMIG grant APQ- 02750-24
E–mail: luismendonca@mat.ufmg.br.

2nd Joint Meeting Brazil-Italy
in Mathematics
Messina, 7–11 September 2026

**SS37**

# Equations in groups acting on regular rooted trees

*Marialaura Noce*
University of Salerno

For most algebraic systems, deciding whether a system of equations has a solution is hard, since many natural decision problems (among them the word and conjugacy problems) reduce to it. Equations are well understood in two classical settings: finitely generated abelian groups, where they reduce to linear Diophantine systems over $\mathbb{Z}$, and non-abelian free groups. Most other tractable classes show either "free-like" behavior (e.g. Gromov hyperbolic groups) or "abelian-like" behavior (e.g. nilpotent groups). Self-similar and branch groups acting on regular rooted trees, such as the Grigorchuk group, belong to neither type, and equations in them remain largely unexplored.

In this talk, we survey the Diophantine problem and the structure of solution sets of equations in groups acting on regular rooted trees. We give particular attention to quadratic equations, those in which every variable occurs exactly twice. We show some useful techniques, present the current state of the art, new results, and open problems.

E–mail: mnoce@unisa.it.

2nd Joint Meeting Brazil-Italy
in Mathematics
Messina, 7–11 September 2026

**SS37**

# Conjugacy in Röver-Nekrashevych groups

*Matteo Tarocchi*
Laboratoire de mathématiques d'Orsay, Université Paris-Saclay

Röver-Nekrashevych Groups $V(G)$ are groups of almost automorphisms of regular rooted trees, and thus homeomorphisms of Cantor spaces, that are generated by a copy of Thompson's group $V$ together with some self-similar group $G$.

In this talk, I will describe techniques to tackle their conjugacy problem (the decision problem of, given any two elements of a group, determining whether they are conjugate in such group). This is based on a work-in-progress project with Julio Aroca, Jim Belk and Francesco Matucci, where we show that the conjugacy problem for a Röver-Nekrashevych Group $V(G)$ is solvable as soon as $G$ is a finitely generated, torsion, contracting self-similar group (e.g., when $G$ is the Grigorchuk group).

E–mail: matteo.tarocchi.math@gmail.com.

2nd Joint Meeting Brazil-Italy
in Mathematics
Messina, 7–11 September 2026

**SS37**

# Braided Version of Thompson's Group $F$: Reidemeister numbers and fixed points

*Altair Santos de Oliveira Tosti* [1]
Department of Mathemathics, Universidade Estadual do Norte do Paraná

*Paula Macedo Lins de Araújo*
Department of Mathemathics, Universiy of Lincoln

*Yuri Santos Rego*
Department of Mathemathics, Universiy of Lincoln

The braided Thompson group, denoted by $F_{br}$ and introduced by Brady–Burillo–Cleary–Stein in [1], is a natural generalization of Thompson's group $F$ that incorporates braid group structures. While elements of the standard group $F$ are geometrically represented by pairs of finite rooted binary trees with a trivial, order-preserving matching between their leaves, elements of $F_{br}$ replace this trivial matching with a topological braid.

In this talk, we will discuss results from [2] concerning fixed-point properties and subsets stabilized by automorphisms of $F_{br}$.

## References

[1] T. Brady, J. Burillo, S. Cleary, M. Stein, *Pure braid subgroups of braided Thompson's groups.* Publ. Mat. **52** (2008), no. 1, 57–89.

[2] P. M. Lins de Araujo, A. S. de Oliveira-Tosti, Y. S. Rego, *Thompson-like groups, Reidemeister numbers, and fixed points.* Geom. Dedicata **217** (2023), no. 3, Paper No. 54.

[1] Aknowledgements to Fundação Araucária do Paraná for the finantial support.
E–mail: altair@uenp.edu.br.