

# Abstracts

**Adrien le Boudec** (CNRS, ENS de Lyon)

**Title:** Covolumes of lattices in products of simple groups

**Abstract:** Given a locally compact group  $G$ , consider the following questions: if  $\Gamma$  is a lattice in  $G$ , are there only finitely many discrete subgroups of  $G$  that contain  $\Gamma$ ? Is the set of covolumes of lattices in  $G$  bounded away from zero? When  $G$  is a connected semi-simple Lie group, both answers are positive by results of Wang and Kazhdan-Margulis.

In the talk we will discuss these problems for irreducible lattices in products of totally disconnected simple locally compact groups. This is joint work with Pierre-Emmanuel Caprace.

**Bruno Duchesne** (Université de Lorraine)

**Title:** Homeomorphism groups of Ważewski dendrites.

**Abstract:** Dendrites are topological spaces that can be thought as "compact real trees". The Ważewski dendrite is universal in the sense that it contains any other dendrite. We will be interested in rigidity properties of groups acting on dendrites and topological properties of the homeomorphism groups of the universal Ważewski dendrite. For example, one can describe explicitly the Furstenberg boundary of this group.

**Tullia Dymarz** (University of Wisconsin)

**Title:** Quasi-isometries of Baumslag-Gersten groups

**Abstract:** The classic Baumslag-Gersten group is a popular one relator group whose interesting features include an extremely fast growing Dehn function. This group can also be viewed as an HNN extension of a solvable Baumslag-Solitar group amalgamated along two cyclic subgroups. We study quasi-isometries of this and related graphs of groups. This is joint work with Kevin Whyte and Jennifer Taback.

**Cornelia Druţu** (University of Oxford)

**Title:** Fixed point properties and conformal dimension of the boundary for hyperbolic groups

**Abstract:** Evidence from random group theory points out to the fact that for generic Gromov hyperbolic groups there is a connection between the conformal dimension of their boundary and fixed point properties for affine

actions by isometries on uniformly curved Banach spaces. In this talk I shall explain that nevertheless there exist examples of exotic hyperbolic groups for which no such connection can be established. This is joint work with Ashot Minasyan.

**David Fisher** (Indiana University)

**Title:** Arithmeticity, Superrigidity and Totally Geodesic Submanifolds

**Abstract:** We prove that hyperbolic manifolds with “many” closed totally geodesic submanifolds of dimension at least 2 have arithmetic fundamental group. The proof involves a superrigidity theorem and some key inputs come from homogeneous dynamics.

**Mikołaj Frączyk** (Alfréd Rényi Institute)

**Title:** Growth of mod- $p$  homology and torsion.

**Abstract:** I will talk about new methods for bounding torsion growth and mod- $p$  homology growth in sequences of subgroups of sufficiently nice groups p.ex. higher rank lattices or mapping class groups of surfaces of genus at least 2. Part of the talk will be based on a joint project with Miklos Abert, Nicolas Bergeron and Damien Gaboriau.

**Thomas Haettel** (Université de Montpellier)

**Title:** Hyperbolic rigidity of higher rank lattices

**Abstract:** We will show that any action of a higher rank lattice on a Gromov-hyperbolic space is elementary. One notable consequence is another proof of the Farb-Kaimanovich-Masur result that any morphism from a higher rank lattice to a mapping class group has finite image. We will also discuss rigidity properties of the “universal lattices”  $SL(n, \mathbb{Z}[X_1, \dots, X_d])$  (joint work with Masato Mimura).

**Yair Hartman** (Ben-Gurion University)

**Title:** Which groups have bounded harmonic functions?

**Abstract:** Bounded harmonic functions on groups are closely related to random walks on groups. It has long been known that all abelian groups, and more generally, virtually nilpotent groups are “Choquet-Deny” that is, cannot support non-trivial bounded harmonic functions. Equivalently, every random walk on such groups has a trivial Furstenberg-Poisson boundary. I will present a recent result where we complete the classification of discrete

countable Choquet-Deny groups, proving a conjuncture of Kaimanovich-Vershik. We show that any finitely generated group which is not virtually nilpotent, is not Choquet-Deny. Surprisingly, the key here is not the growth rate, but rather the algebraic infinite conjugacy class property (ICC).

This is joint work with Joshua Frisch, Omer Tamuz and Pooya Vahidi Ferdowsi.

**Mehrdad Kalantar** (University of Houston)

**Title:** TBA

**Abstract:** TBA

**Marek Kaluba** (Technische Universität Berlin )

**Title:**  $\text{Aut}(F_n)$  has property  $(T)$

**Abstract:** Abstract: I will sketch the recent proof of (arXiv:1812.03456) that the group of automorphisms of free group on  $n \geq 6$  generators has Kazhdan's property  $(T)$ . The proof follows by estimating the spectral gap of  $\Delta_n$ , the group Laplace operator via sum of squares decomposition in real group algebra. We use the action of "Weyl" group to simplify the combinatorics of computing  $\Delta_n^2$  and reduce the problem of finding a sum of squares decompositions (for all  $n \geq 6$ ) to a single computation for  $n = 5$ . The final computation is just small enough to be performed using computer software.

As a side-result we produce strong lower estimates on Kazhdan constants for both  $\text{SAut}(F_n)$  and  $\text{SL}_n(\mathbb{Z})$ . In the latter case these considerably narrow the gap between the upper and lower bounds.

**Jean Lécureux** (Université Paris-Sud )

**Title:** Maximal representations into infinite-dimensional symmetric spaces.

**Abstract:** Let  $\Gamma$  be a complex hyperbolic lattice, and  $G$  be a Hermitian Lie group. One can define a class of representations of  $\Gamma$  into  $G$ , which are called *maximal representations*. These representations satisfy nice geometrical properties, and in suitable cases are even superrigid. I will explain how to generalize some of these results in the case when  $G$  is infinite-dimensional. This is a joint work with B. Duchesne and B. Pozzetti.

**Masato Mimura** (Tohoku University)

**Title:** An extreme counterexample to the Lubotzky–Weiss conjecture

**Abstract:** Around 1992-3, Lubotzky and Weiss conjectured that it would be impossible for an infinite compact group to accommodate two finitely generated dense subgroups, one amenable and the other with Kazhdan’s property (T). This conjecture was resolved in the negative around 2010, independently, by Ershov and Jaikin, and by Kassabov. In this talk, I discuss further development, more precisely, an ‘extreme’ counterexample to this conjecture.

**Mahan Mj** (Tata Institute of Fundamental Research)

**Title:** Commensurators of thin groups

**Abstract:** A celebrated theorem of Margulis characterizes arithmetic lattices in terms of density of their commensurators. A question going back to Shalom asks the analogous question for thin subgroups. We shall report on work during the last decade or so and conclude with a recent development. In ongoing work with Thomas Koberda, we were able to show that for a large class of normal subgroups of rank one arithmetic lattices, the commensurator is discrete.

**Izhar Oppenheim** (Ben Gurion University)

**Title:** Vanishing of cohomology for groups acting on buildings

**Abstract:** In his seminal paper from 1973, Garland introduced a machinery for proving vanishing of group cohomology for groups acting on Bruhat-Tits buildings. This machinery, known today as “Garland’s method”, had several applications as a tool for proving rigidity results (e.g., proving Kazhdan property (T) or, more recently, group stability results). In my talk, I will discuss various generalizations of Garland’s method. Part of this talk is based on a joint work with Z. Grinbaum-Reizis.

**Damian Osajda** (Uniwersytet Wrocławski, McGill University)

**Title:** Quasi-isometric rigidity for two-dimensional Artin groups

**Abstract:** The talk is based on a joint work with Jingyin Huang. I will present several results concerning quasi-isometries of two-dimensional Artin groups. I will describe quasi-flats and provide useful quasi-isometry invariants for such groups. Those results are based on a notion of non-positive curvature for two-dimensional Artin groups introduced by Huang and me

recently. Our quasi-isometric invariants allow to conclude various quasi-isometric rigidity results. In particular, I will present a large class of strongly rigid (self quasi-isometries are close to automorphisms) Artin groups. In contrast, none of the right-angled Artin groups are strongly rigid.

**Holger Reich** (Freie Universität Berlin)

**Title:** TBA

**Abstract:** TBA

**Mikael de la Salle** (CNRS, ENS de Lyon)

**Title:** Strong property (T) for  $SL(3, \mathbb{Z})$

**Abstract:** Property (T) is a rigidity property for unitary representations for a group. Vincent Lafforgue's strong property (T) (as its Banach-space variants) is a strengthening of property (T) where one allows to work with representations which are not uniformly bounded. It has been known for a couple of years that higher rank Lie/algebraic groups, as well as their co-compact lattices, have strong (T). The aim of my talk, which is motivated by recent applications of strong (T) to the study of group actions on manifolds, will be to generalize these results to cover non-uniform lattices as well. I will explain why this is difficult, and how these difficulties can be overcome. This involves a form of induction of representations which leaves to world of representations, and a (to me) surprisingly strong form of property (T) for higher rank algebraic groups which allows to deal with these objects.

**Damian Sawicki** (MPI Bonn)

**Title:** On new counterexamples to the coarse Baum-Connes conjecture

**Abstract:** Cayley graph is a geometric object associated to a finitely generated group and encoding some of its properties. The analogous invariant of a group action on a compact space is a warped cone. Our focus will be the fact conjectured by Druţu and Nowak that the coarse assembly map is not surjective for warped cones over actions with a spectral gap.

**Yehuda Shalom** (Tel Aviv University)

**Title:** Conjugation invariant norms on groups

**Abstract:** A conjugation invariant norm on a group induces a bi-invariant metric on it. Two natural, yet quite extremal sources of such metrics are the discrete one, on any (discrete) group, and a compact one, coming from

a (embedding into a) compact metric group. In the talk we shall discuss some rigidity phenomena related to these norms. In particular, we shall be interested in examples where every other norm on a discrete/compact group arises from the opposite source. Our basic examples come from arithmetic-like groups, and we shall see how they are intimately related to deep results such as Margulis' normal subgroup theorem and Nikolov-Segal work on finitely generated profinite groups. Based on joint work with Leonid Polterovich and Zvi Shem-Tov

**Mark Shusterman** (University of Wisconsin)

**Title:** Balanced presentations for fundamental groups of curves over finite fields

**Abstract:** We show that the algebraic fundamental group of a smooth projective curve over a finite field admits a finite topological presentation where the number of relations does not exceed the number of generators.