Gregorio Baldi:

Title: Complex Hyperbolic Lattices and Hodge Theory

Abstract: I will discuss how Hodge theory provides a powerful framework for studying non-arithmetic lattices in PU(1, n). This approach leads to the analysis of variations of Hodge structures on the associated complex ball quotients and their connection to totally geodesic submanifolds. The talk is based on joint work with E. Ullmo, as well as N. Miller, M. Stover, and E. Ullmo, and is ultimately linked to the Zilber-Pink philosophy, which has its origins in number theory.

Mladen Bestvina:

Title: Automatic continuity of big groups

Abstract: A Polish group satisfies automatic continuity (AC) if every homomorphism to a separable group is continuous. In a recent preprint with George Domat and Kasra Rafi we classified those stable surfaces (of infinite type) whose mapping class groups satisfy AC. In the talk I will try to outline a proof of the simpler result (also in the paper) that the homeomorphism group of every stable Stone space (e.g. the endspace of a stable surface) is AC. Our work builds on the previous work of Rosendal, Rosendal-Solecki, K. Mann and others.

Emmanuel Breuillard:

Title: Character varieties of random groups.

Abstract: We study the moduli space of representations from a "typical" finitely presented group to SL(2,C), or more generally any complex semisimple Lie group. We establish a dimension formula and show irreducibility of the character variety. Typical is understood in the sense of Gromov's random groups. The proof is conditional on GRH for Dedekind zeta functions of number fields and makes use of recent advances on uniform spectral gaps and expanders for finite simple groups of Lie type. This is joint work with Oren Becker and Peter Varju.

Serge Cantat:

Title : The asymptotic growth of the Cremona group.

Abstract : The Cremona group is the group of all birational transformations of the complex projective plane.
For each degree d, the subset of birational transformations defined by formulas of degree d is an algebraic variety.
Let N(d) be the number of irreducible components of this variety.
I will discuss the following question: How does N(d) grow as d goes to infinity?
(This is based on a joint work with A. Calabri, A. Massarenti, F. Maucourant, and M. Mella.)

Thomas Delzant:

Title: Group rings and hyperbolic geometry.

We study group rings using hyperbolic geometry. This has algebraic, geometric and topological consequences. For example, we obtain a lower bound on the number of critical points of a Morse function on a compact hyperbolic manbifold in terms of its injectivity radius. (work with G. Avramidi)

Damien Gaboriau

Title: Measure Equivalence of Baumslag-Solitar Groups

Abstract: In 2001, K. Whyte proved that all Baumslag–Solitar groups BS(r,s), with |r|,|s|≠1 and |r|≠|s|, are quasi-isometric, thereby completing the quasi-isometry classification of Baumslag–Solitar groups initiated by B. Farb and L. Mosher. Since then, the question as to their measure equivalence has remained an intriguing open problem. Together with A. Poulin, A. Tserunyan, R. Tucker-Drob, and K. Wrobel, we solve this problem, establishing the measure equivalence counterpart to Whyte's theorem.
Consequently, each BS(r,s) belongs to one of three measure equivalence classes according to whether it is amenable (|r|=1 or |s|=1), virtually isomorphic to F_n\times Z (2\leq |r|=|s|), or non-amenable and non-unimodular (2\leq |r|<s).
Although measure equivalence concerns measure-preserving actions, we reduce it to a measured graph-theoretic problem in the non-measure-preserving (type III) setting.

Pierre Godfard:

Title: Hodge structures on conformal blocks

Abstract: Modular functors are collections of vector bundles with flat connection on (twisted) moduli spaces of curves, with strong compatibility conditions with respect to some natural maps between the moduli spaces. Such structures arise naturally in the representation theories of affine Lie algebras and of quantum groups. In this talk, we will discuss Hodge structures on such flat bundles. If these flat bundles where rigid, a result of Simpson in non-Abelian Hodge theory would imply that they support Hodge structures. However, that is not the case in general. We will explain how a different kind of rigidity for modular functors can be used to prove an existence and uniqueness result for such Hodge structures. Finally, we will discuss the computation of Hodge numbers for sl2 modular functors (of odd level) and how these numbers are part of a cohomological field theory (CohFT). Motivicity of certain families of modular functors in genus 0 will also be reviewed.

Thomas Koberda

Title: Using logic to investigate homeomorphism groups

Abstract: It is a difficult and deep problem to understand countable groups that can act by homeomorphisms on compact manifolds, especially in dimension two or more. I will discuss some new ways of investigating groups acting on manifolds through ideas from mathematical logic. This talk will include work that is joint with Sang-hyun Kim, J. De la Nuez Gonzalez, and Yash Lodha.

Claudio Llosa-Isenrich

Title: Integrable measure equivalence of nilpotent groups

Abstract: A famous open problem in geometric group theory is the quasi-isometry classification of nilpotent groups. Conjecturally, two simply connected nilpotent Lie groups are quasi-isometric if and only if they are isomorphic. In the 1980s, Pansu reduced this conjecture to nilpotent groups with isomorphic associated Carnot graded group. I will explain how measured group theory can offer a route towards making progress on this conjecture. In

particular, I will present a converse to a theorem of Austin, proving that two finitely generated or simply connected nilpotent groups have isomorphic associated Carnot graded groups if and only if they are integrably measure equivalent. This is joint work with Thiebout Delabie and Romain Tessera.

Julien Marché

Title: Signatures of conformal blocks

Abstract: Conformal blocks are families of local systems over compactified moduli spaces of curves enjoying compatibility relations. Moreover, their monodromy is defined over a cyclotomic field: once embedded into complex numbers, they were recently shown to support variations of Hodge structures. In this talk, I will explain that the formula for their signature (analogous to Verlinde formula) unexpectedly involves the geometry of two-bridge knots.

Gabriele Mondello:

Title: Largest compact subvarieties of A_g

Abstract.
The moduli space A_g of principally polarized Abelian varieties of dimension g is a central object in algebraic geometry.
Over the complex numbers its coarse space has a natural structure of non-compact quasi-projective variety.

I will explain how to show that a compact holomorphic subvariety passing through a very general point of A_g has dimension at most g-1.
Time permitting I will discuss how to determine the maximal dimension of a compact holomorphic subvariety contained in A_g.

This is joint work with Samuel Grushevsky, Riccardo Salvati Manni, Jacob Tsimerman.

Andrew Putman:

Title: The homology of the mapping class group

Abstract:I will give a survey about what is known about the homology of the mapping class group and its subgroups.

Pierre Py:

Title: Profinite rigidity of Kähler groups: some examples

Abstract: A kähler group is a group that can be realized as the fundamental group of a closed kähler manifold. We prove that certain kähler groups are profinitely rigid among the class of residually finite kähler groups. This includes surface groups, their direct products as well as certain groups with exotic finiteness properties built by Dimca, Papadima and Suciu. To establish these results, we first prove that the profinite completion of a kähler group detects fibrations onto hyperbolic Riemann surfaces. This is based on a joint work with Hughes, Llosa Isenrich, Stover and Vidussi.

Jean Raimbault

Title: Invariant random subgroups in Coxeter groups

Abstract: I will describe some properties of reflexive invariant random subgroups
in hyperbolic Coxeter groups, and give some applications.

Nick Salter

Title: The fundamental group of the principal stratum

Abstract: After decades of work, we now know an amazing amount about the dynamics of the SL_2(R) action on the space of translation surfaces, and our understanding of the associated algebraic geometry is growing steadily. Sadly, the same cannot be said about topological aspects of these moduli spaces. I will report on some recent modest progress in this direction. The main result will give simple, explicit and intuitive generators for the

fundamental group of the principal stratum (abelian differentials with simple zeroes) consisting of shears and half-twists about saddle connections. We will also highlight some related and hopefully tantalizing problems at the interface of geometric group theory and the algebraic geometry of curves.

Alex Suciu

Title: Sigma-invariants and twisted jump loci

Abstract: The Bieri-Neumann-Strebel-Renz invariants $\Sigma^q(X,\mathbb{Z})$ of a finite-type CW-complex X keep track of the finiteness properties of its abelian covering spaces. In previous work, I showed how to bound these Sigma-invariants in terms of the tropical varieties associated with the cohomology jump loci $V^{\le q}(X,\mathbb{C})$. In this talk, I will sketch several ways in which these bounds can be sharpened, by considering cohomology jump loci with coefficients twisted by local systems over fields of arbitrary characteristic. Based on work in progress with Yongqiang Liu.

Slobodan Tanushevski

Title: Retracts of free groups and related subgroups

Abstract: Let G be a group. A subgroup R of G is called a retract of G if there exists a homomorphism $r:G \to R$
that restricts to the identity on R. I will discuss several recently discovered properties of retracts of free groups:
special combinatorial features of their Stallings graphs, strong absorption properties, covering properties, etc.

Philippe Eyssidieux

Title: Algebrogeometric subgroups of the mapping class group

Abstract: Joint work with Louis Funar. We introduce a method to provide constraints for algebrogeometric subgroups of mapping class groups, i.e.: images of fundamental groups of curves under complex algebraic maps to the moduli space of smooth curves, which consists in studying the

Shafarevich morphisms attached to the orbifold compactifications constructed in our previous work (arXiv:2112.06726). This imply for instance that these algebrogeometric subgroups have infinite image under quantum representations except in a few well-understood cases.

Tsachick Gelander

Title:Mixed identities in linear groups and effective versions

Abstract: A mixed identity in group G is an equation W(x)=1 where W is a non-trivial word in the free product $G*\langle x\rangle$. which is satisfied for all $x\in G$. Mixed Identity Free (MIF) means that no such identity holds on G. When G has no mixed identities, one wishes to find such x effectively (w.r.t the word metric). Set $f(n)=\min\{|g|: g\in G, W(g)\neq 1 \text{ for all } W\in B(n)\}$
where B(n) is the n-th ball in $G*\langle x\rangle$. If f is sub-exponential there are interesting applications for the reduced C*-algebra of the group, especially when the group also has rapid decay.

Recently, Elayavalli and Schafhauser gave a negative answer for the C*-algebraic Tarski problem by studying this property for free groups. More recently, Itamar Vigdorovich extended their work to uniform lattices in SL(n,R). What we proved is:

Theorem 1. For a f.g. linear group \Gamma with MIF, the function f is linear (i.e. f(n)<Cn).

If the Zariski closure G is a classical group, then \Gamma is MIF, provided G is PSL(n), or G=SP_{2r} and \Gamma has no elements of order 2, or G=SO(n) and \Gamma has no elements g for which g+g^{-1} is a scalar. Along the way, we proved a new variant of the supper approximation theorem, which is of independent interest.

This is a joint work with Nir Avni

Sam Mellick

Title: Fixed price one for H^2 x H^2 via the ideal Poisson Voronoi tessellation

Abstract:
Cost is a fundamental invariant in measured group theory. It is the analogue of the minimum size of a generating set of a group, but for probability measure preserving (pmp) actions. A group is said to have fixed price if all of its essentially free pmp actions have the same cost.

In recent work with Fraczyk and Wilkens, we showed that higher rank semisimple Lie groups have fixed price one. As a corollary, this implies that the minimum size of a generating set for torsion-free lattices in such groups grows sublinearly in the covolume, resolving a conjecture of Abert, Gelander, and Nikolov.

The argument makes use of the strange properties of a natural but new stochastic geometric object: the limit of the Voronoi tessellation on the Poisson point process of the associated symmetric space as the intensity tends to zero.

In this talk, I will explain the ideas of the proof by discussing the specific example of SL(2,R) x SL(2,R). No prior knowledge of cost or the Poisson point process is assumed.