Shanks Workshop: Geometric Methods in Group Theory

Schedule

All talks will be at Buttrick Hall 101.

Saturday, April 23:

9:00 - 9:30	Coffee
9:30 - 10:30	**Mladen Bestvina**: *On the Farrell-Jones conjecture for mapping class groups.*
10:30 - 11:00	Coffee
11:00 - 12:00	**Ashot Minasyan**: *An exotic group action on an R-tree.*
12:00 - 14:00	Lunch
14:00 - 15:00	**Michael Hull**: *Homomorphisms to acylindrically hyperbolic groups.*
15:00 - 15:30	Coffee
15:30 - 16:30	**Sergei Ivanov**: *The bounded WP and the precise WP for presentations of groups*
16:30 - 18:30	Free time
18:30 -	Conference Dinner at Blackstone Brewery

Sunday, April 24:

9:00 - 9:30	Coffee
9:30 - 10:30	**Piotr Przytycki**: *Rips complex for relatively hyperbolic groups*
10:30 - 11:00	Coffee
11:00 - 12:00	**Olga Kharlampovich**: *Tarski-type questions for group rings.*

Abstracts of talks

Mladen Bestvina (Utah)
On the Farrell-Jones conjecture for mapping class groups.

Abstract. I will try to describe what the Farrell-Jones conjecture is about, and how one goes about proving it. Then I will try to outline a proof of FJC for mapping class groups, which is work in progress, joint with Arthur Bartels.

Michael Hull (UIC)
Homomorphisms to acylindrically hyperbolic groups.

Abstract. We will discuss the study of homomorphisms to an acylindrically hyperbolic group, or equivalently the study of systems of equations in an acylindrically hyperbolic group. In particular, we will give

a criteria for an acylindrically hyperbolic group G to be equationally noetherian, which means that G satisfies a group-theoretic version of the Hilbert basis theorem. As an application, we will show that a group which is hyperbolic relative to equationally noetherian subgroups is equationally noetherian. We will also discuss some potential future applications to 3-manifold groups.

Sergei V. Ivanov (UIUC)
The bounded word problem and the precise word problem for presentations of groups.

Abstract. We discuss the bounded word problem and the precise word problem for groups given by generators and defining relations. For example, for every finitely presented group, the bounded word problem is in NP and the precise word problem is in PSPACE. It is proved that, for certain finite presentations of groups, which include Baumslag-Solitar one-relator groups and free products of cyclic groups, the bounded word problem and the precise word problem can be solved in polylogarithmic space. As consequences of developed techniques that can be described as calculus of brackets, we obtain polylogarithmic space bounds for the computational complexity for the diagram problem for free groups, for the width problem for elements of free groups, and for computation of the area defined by polygonal singular closed curves in the plane. Since a polylogarithmic space bound automatically implies a quasipolynomial time bound, we also obtain quasipolynomial time bounds for these problems.

Olga Kharlampovich (CUNY)
Tarski-type questions for group rings.

Abstract. We consider some fundamental model-theoretic questions that can be asked about a given algebraic structure (a group, a ring, etc.), or a class of structures, to understand its principal algebraic and logical properties. These Tarski type questions include: elementary classification and decidability of the first-order theory.

We describe solutions to Tarski's problems in the class of group algebras of free groups. We will show that unlike free groups, two groups algebras of free groups over infinite fields are elementarily equivalent if and only if the groups are isomorphic and the fields are equivalent in the weak second order logic. We will also show that for any field, the theory of a group algebra of a torsion free hyperbolic group is undecidable and for a field of zero characteristic even the diophantine problem is undecidable. (These are joint results with A. Miasnikov)

Ashot Minasyan (Southampton)
An exotic group action on an R-tree.

Abstract. I will discuss a construction of a finitely generated group L and an R-tree T such that 1) L acts on T non-trivially and with finite arc stabilizers; 2) L has Serre's property (FA), i.e., any action of L on a simplicial tree has a global fixed vertex.

To construct the group L we employ small cancellation theory over hyperbolic groups, developed by Ol'shanskii. The tree T is obtained as a strong limit (in the sense of Gillet and Shalen) of simplicial Bass-Serre trees corresponding to certain amalgamated free products.

Piotr Przytycki (McGill)
Rips complex for relatively hyperbolic groups.

Abstract. We will describe a Rips complex, a thickening of the Cayley graph of a relatively hyperbolic group G, with a graph-theoretic property called dismantlability. This guarantees fixed-point properties and implies that the Rips complex is a classifying space for G (with respect to appropriate family). This is joint work with Eduardo Martinez-Pedroza.