

2nd International Meeting on Geometric Group Theory and Low Dimensional Topology

December, 17 and 18, 2020

Talks and Abstracts

Jonathan Barmak

Generalized Euclidean rings and the Andrews-Curtis conjecture

We will use an example by Evans of a matrix $M \in \mathrm{GL}_2(\mathbb{Z}[X^{\pm 1}, Y^{\pm 1}])$ which is not a product of elementary and diagonal matrices to construct presentations \mathcal{P}, \mathcal{Q} which are not \mathbb{Q}^* -equivalent, though they are simple homotopy equivalent. In fact they are \mathbb{Q}^{**} -equivalent as proved by Fernández.

Martin Blufstein

A generalized metric small cancellation condition and Artin groups

We present a metric condition T' which generalizes classical metric small cancellation conditions and also applies to other known classes of groups such as Artin groups. Moreover, an Artin group is T' if and only if it is two-dimensional. This condition implies diagrammatic reducibility and, under some additional conditions, T' presentations have quadratic Dehn functions and solvable conjugacy problem. We also introduce a strict version of this condition which implies hyperbolicity. The contents of this talk are based on joint work with Gabriel Minian and Iván Sadofschí Costa.

Bill Bogley and Kirk McDermott

Cyclic spines and Brieskorn 3-manifolds

We describe a family of cyclic 3-manifold spines that generalize the Sieradski manifolds and which are in many cases commensurable with the Brieskorn-Pham manifolds as studied by Milnor in 1975. These arise from a family of non-aspherical relative presentations for centrally extended triangle groups. We identify those that are spherical through our solution to the finiteness problem for the fundamental groups and exhibit examples with Nil and $SL_2(\mathbb{R})$ geometries.

Jens Harlander

LOTs of Coxeter type

All (prime) LOT groups want to be 1-relator groups, but are not. Prime knots groups that require more than 2 generators were known to Crowell and Fox in the 1950's. A word labeled oriented tree (wLOT) is of Coxeter type if, after adding relations $a^2 = 1$ for every vertex a , we obtain an amalgamated product of dihedral groups. The rank of Coxeter groups is well understood and we can show that for every n there exists a wLOT of Coxeter type whose group has rank n . We also investigate asphericity for wLOTs of Coxeter type. We show that the asphericity questions boils down to interesting questions concerning 1-relator groups of dihedral type.

Wolfgang Metzler

On the general Andrews-Curtis Conjecture

The general Andrews-Curtis Conjecture asks, whether two finite two-dimensional PLCW-complexes of the same simple-homotopy type can be three-deformed into each other. In this generality, unlike in higher dimensions, the conjecture was open up to now.

In higher dimensions one can even add the requirements, that a fixed sub-complex between the first and the second complex can be kept fixed during the deformation, or that the final map is homotopic to the one given originally (C.T.C. Wall). These additional requirements don't hold in dimension 2, a fact which can be shown following A. Sieradski and almost unnoticedly passed attention. Technically it is based on two different ways of calculating the **bias** of appropriate 2-complexes, once via diagonal maps of fundamental groups, once via Q-transformations.

By suitably enlarging the Sieradski-examples, we hope to get rid of the unwanted requirements, thus ending with a negative answer for the general Andrews-Curtis Conjecture without additional restrictions.

(A note on History: Since several decades I have expected a negative outcome of the Conjecture. But two years ago I committed the sin of turning my mind. Friends and colleagues turned it back again. I am very grateful to them.)

Gabriel Minian

Relative I-test, asphericity and equations over groups

I will discuss a relative version of the I-test, and applications to asphericity and equations over groups. The (absolute) I-test is a method that we introduced some years ago to study asphericity and diagrammatic reducibility. In contrast to classical weight tests, it is not based on curvature. This is a joint work with Jonathan Barmak.

Stephan Rosebrock

Combinatorial Relative Asphericity

For a 2-complex L and a subcomplex $K \subset L$ we ask the following questions: *Under which assumptions does $\pi_1(K)$ embed into $\pi_1(L)$?* and: *If K is aspherical under which assumptions is L aspherical?*

This leads to two different combinatorial notions of relative asphericity. We define directed diagrammatic reducibility and relative vertex asphericity and present some results which can be obtained with these notions. Among these are versions of the Freiheitssatz and asphericity results.

This is joint work with Jens Harlander.

Iván Sadofski Costa

Actions of A_5 on contractible 2-complexes

There is a complete classification (due to Oliver and Segev) of the finite groups G which act without fixed points on an acyclic 2-complex. However, it is not known if every action of a finite group G on a finite and contractible 2-complex X has a fixed point. The topic of this talk is the following recent result: every action of A_5 on a finite and contractible 2-complex has a fixed point.

Gerald Williams and Ihechukwu Chinyere

Hyperbolicity of cyclically presented groups

Cyclically presented groups are groups defined by presentations that admit a cyclic symmetry. Prominent examples include the Higman group and the Fibonacci groups. I will discuss recent results that classify the $T(6)$ (small cancellation) cyclically presented groups that are hyperbolic and present results concerning hyperbolicity of groups of Fibonacci type.