Geometric Group Theory
Abstracts

Saturday 10:15 – 12:15
Karen Vogtmann, Cornell University
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Moon Duchin, Tufts University
Delaram Kahrobaei, City University of New York, Graduate Center and City Tech

Saturday 3:15 – 5:15
Ruth Charney, Brandeis University
Johanna Mangahas, Brown University
Geneive Walsh, Tufts University
Linda Keen, Graduate Center and Lehman College CUNY

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Saturday 10:15 – 12:15

**Hairy graphs and the cohomology of Out(F_n)**
Karen Vogtmann, Cornell University

Kontsevich showed that the homology of Out(F_n) can be identified with the cohomology of a certain Lie algebra A. Morita constructed cocycles from elements of the abelianization of A. We will show that the abelianization of A is strictly larger than Morita conjectured, then use the new information to construct new cocycles out of "hairy graphs". These include a heretofore mysterious unstable homology class in Aut(F_5) which was found in 2002 by F. Gerlits. (This is joint work with Jim Conant and Martin Kassabov.)

**Instability in groups**
Moon Duchin, Tufts University

In hyperbolic spaces, geodesics between the same endpoints must stay uniformly close together; this means that in hyperbolic groups, different geodesic spellings of the same word can't be too far apart in the Cayley graph. In free abelian groups, on the other hand, typical words can have geodesic spellings quite far apart from one another because of the many ways to rearrange letters, even though the model spaces are Euclidean and geodesics there are unique. We might describe this by staying that hyperbolic groups are geodesically stable while free abelian groups are geodesically unstable. I'll focus this talk on an intermediate situation arising in the nilpotent case, where the groups break into a stable part and an unstable part.

**Growth rate of an endomorphism of a group**
Delaram Kahrobaei, City University of New York, Graduate Center and City Tech

Bowen defined the growth rate of an endomorphism of a finitely generated group and related it to the entropy of a map $f:M \mapsto M$ on a compact manifold. In this note we study the purely group theoretic aspects of the growth rate of an endomorphism of a finitely generated group. We show that it is finite and bounded by the maximum length of the image of a generator. An equivalent formulation is given that ties the growth rate of an endomorphism to an increasing chain of subgroups. We then consider the relationship between growth rate of an endomorphism on a whole group and the growth rate restricted to a subgroup or considered on a quotient.We use these results to compute the growth rates on direct and semidirect products. We then calculate the growth rate of endomorphisms on several different classes of groups including abelian and nilpotent. This is a joint work with Kenneth Falconer and Benjamin Fine.

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Saturday 3:15 – 5:15

**Length functions of right-angled Artin groups**

Ruth Charney, Brandeis University

Morgan and Culler proved that a minimal action of a free group on a tree is determined by its length function. This theorem has played an important role in the study of automorphism groups of free groups. Right-angled Artin groups may be viewed as higher dimensional analogues of free groups. Motivated by an interest in their automorphism groups, we prove a 2-dimensional analogue of Culler and Morgan''s theorem for right-angled Artin groups acting on CAT(0) rectangle complexes. (Joint work with Max Margolis)

**The geometry of right-angled Artin subgroups of mapping class groups**

Johanna Mangahas, Brown University

I'll describe joint work with Matt Clay and Chris Leininger. We give sufficient conditions for a finite set of mapping classes to generate a right-angled Artin group quasi-isometrically embedded in the mapping class group. Moreover, under these conditions, the orbit map to Teichmueller space is a quasi-isometric embedding for both of the standard metrics. As a consequence, we produce infinitely many genus h surfaces (h at least 2) in the moduli space of genus g surfaces (g at least 3) for which the universal covers are quasi-isometrically embedded in the Teichmueller space.

**Spaces of CAT(0) structures on 2- and 3- manifolds**

Geneive Walsh, Tufts University

Consider a right-angled Coxeter group whose defining graph is the 1-skeleton of triangulation of $S^1$ or S^2$. Associated to such a group is a reflection orbifold, which is finitely covered by a manifold. When the triangulation is acute,

the reflection orbifold has a moduli space of singular "cubed" structures, which are made out of "hyperbolic cubes". These arise directly from the triangulation of $S^1$ or $S^2$. When the right-angled Coxeter group is a group of reflections in the faces of a right-angled hyperbolic 3-dimensional polyhedron, this moduli space of the reflection orbifold contains the (unique) hyperbolic structure. We also give applications to triangulations of $S^2$. This is joint work with Sam Kim.

**Generalized Riley Slices of Parameter Spaces of Kleinian Groups**

Linda Keen, Graduate Center and Lehman College CUNY

Abstract: In this talk we will discuss how to extend the theory of pleating rays for those Kleinian groups in the Riley Slice to groups representing orbifolds. We will show how the dynamics of the boundary of this space can be described by continued fractions. We will also talk about discrete subgroups outside the Riley slice that represent finite volume groups and show how they also correspond to boundary points.