

2026 Shanghai Geometric Group Theory workshop Schedule

@Gu Lecture Hall SCMS (2nd floor)

	7.6 Monday	7.7 Tuesday	7.8 Wednesday	7.9 Thursday	7.10 Friday
8:50-9:00	Opening				
9:00-10:00	Jaikin-Zapirain	Miller	Martelli	Huang	Miller
10:20-11:20	Lee	Martelli	Stover	Jaikin-Zapirain	Martelli
11:30 – 12:30			Bin Sun		Liu
Lunch break					
14:00-15:00	Nucinkis	Jaikin-Zapirain	Free afternoon	Miller	Free afternoon
15:20-16: 20	Dey	Hongbin Sun		Problem Session	
16:30 – 17:30	Xie	Mutanguha			
				Banquet 18:30-21:00	

Wifi network: eduroam

Username: 2026shjhql@guest password: Scmsguest

See [How to set this up](#)

Registration will be on the first floor of SCMS from 8am on Monday July 6th .

Titles and abstracts

Subhadip Dey, Tata Institute of Fundamental Research

Title: Irreducible groups and ergodicity in the boundary

Abstract: Let G be a noncompact semisimple real Lie group, and let Γ be a discrete subgroup of $G \times G$, which is irreducible, meaning that projections of Γ to both factors are dense. Such groups arise naturally in geometry and dynamics, yet their structure remains poorly understood. In this talk, I will discuss some questions concerning these groups and explain how ergodic properties of their actions on boundary spaces can be useful to address them. In particular, I will present some recent results, based on joint work with Sebastian Hurtado, showing that certain irreducible groups cannot decompose as free products and must satisfy strong algebraic constraints.

Jingyin Huang, The Ohio State University

Title: $K(\pi,1)$ -conjecture for Artin groups

Abstract: I will outline an approach to the $K(\pi,1)$ -conjecture for Artin group, by constructing actions of certain Artin groups on complexes that satisfy suitable notion of combinatorial non-positive curvature. In particular, I will discuss how this would imply the $K(\pi,1)$ -conjecture for all 3-dimensional Artin groups and some higher dimensional ones. This is based on joint work with Piotr Przytycki and joint work with Nima Hoda.

Andrei Jaikin-Zapirain, Institute of Mathematical Sciences

Title: Embeddings of Group Algebras into Division Rings and Artinian Rings, and Applications

Abstract: Let K be a field and G a group. In the first part of the course, I will discuss several approaches to embedding the group algebra KG into division rings and Artinian rings. In the second part, I will present several applications.

Gye-Seon Lee, Seoul National University

Title: Convex cocompact groups with three-dimensional limit sets

Abstract: One natural problem is to understand which Gromov hyperbolic groups can be realized as discrete subgroups of the isometry group of real hyperbolic space, and which compact metrizable spaces can arise as limit sets of such groups. In this talk, we describe a general construction of convex cocompact hyperbolic reflection groups with three-dimensional limit sets. As an application, we answer a question of M. Kapovich in the affirmative by constructing a convex cocompact group acting on real hyperbolic space whose limit set is a Čech cohomology sphere other than the standard sphere. Joint work with Sami Douba, Ludovic Marquis, and Lorenzo Ruffoni.

Yi Liu, Peking University

Title: Entropy versus volume via Heegaard diagrams

Abstract: We introduce a notion called the Heegaard presentation length for closed orientable 3-manifolds. Using this as a bridge, we compare the entropy of a surface mapping class and the volume

of its mapping torus, obtaining inequalities improving former results of Kojima.

Bruno Martelli, University of Pisa

Title: Pseudo-Anosov homeomorphisms

Abstract: A pseudo-Anosov homeomorphism is a particularly beautiful kind of self-homeomorphism of a surface, introduced by Thurston. It is connected with hyperbolic geometry (in particular to hyperbolic surfaces and 3-manifolds), geometric group theory, and dynamics. We introduce a generalised version of these objects that work in every even dimension, and finally focus on a 4-dimensional example that produces a fibering hyperbolic 5-manifold.

Nick Miller, Villanova University

Title: Arithmeticity in hyperbolic geometry

Abstract: Arithmetic manifolds are hyperbolic manifolds constructed from number theoretic data. By their very definition, they exhibit a strong connection between algebraic invariants, such as trace fields, and geometric quantities like lengths of closed geodesics. Despite this, the geometry of these manifolds remains surprisingly mysterious. Nevertheless, a guiding philosophy is that arithmetic manifolds should be among the most symmetric hyperbolic manifolds and therefore exhibit geometric phenomena that are rare or absent in generic hyperbolic manifolds. In this minicourse, I will survey arithmetic hyperbolic manifolds in both low and high dimensions, and discuss several manifestations of this philosophy, both known and conjectural. I will also discuss some of my own work in this direction, including joint work with Cheetham-West and Lee, and with Bader, Fisher, and Stover.

Jean Pierre Mutanguha, McGill University

Title: Canonical decompositions of free-by-cyclic groups

Abstract: Free-by-cyclic groups can be defined as mapping tori of free group automorphisms. I will discuss a dynamical decomposition of automorphisms that produces a canonical decomposition of the corresponding free-by-cyclic groups. This will involve the partial order on attracting laminations for an automorphism. The decomposition of free-by-cyclic groups can be considered an extension of the JSJ decomposition of 3-manifolds. This talk is on joint work with Spencer Dowdall, Yassine Geurch, Radhika Gupta, and Caglar Uyanik.

Brita Nucinkis, Royal Holloway, University of London

Title: On generalised presentations over topological groups

Abstract: I will present a procedure that turns certain abstract presentations, such as those for surface groups, Thompson groups, and Artin groups, into topological groups with a prescribed open subgroup. These all share some topological properties depending on the chosen open subgroup. For studying cohomological finiteness conditions, we concentrate on totally disconnected locally compact RAAGs and present a generalisation of the Salvetti complex for these groups. This is joint work with Ilaria Castellano, Bianca Marchionna and Yuri Santos Rego.

Matthew Stover, Temple University

Title: Modular embeddings of Fuchsian groups

Abstract: A Fuchsian group Γ has a modular embedding if its adjoint trace field is a totally

real number field and every unbounded Galois conjugate Γ^σ comes equipped with a holomorphic (or conjugate holomorphic) map $\phi^\sigma : \mathbb{B}^1 \rightarrow \mathbb{B}^1$ intertwining the actions of Γ and Γ^σ on the Poincaré disk $\mathbb{B}^1$. I will describe why these should be rare and special, the previously-known examples (coming from triangle groups and Teichmüller curves), and my recent construction of the first cocompact nonarithmetic Fuchsian groups with a modular embedding that are not commensurable with a triangle group.

Bin Sun, Michigan State University

Title: L^2 -Betti numbers of Dehn filling

Abstract: I will talk about joint work with Nansen Petrosyan about L^2 -Betti numbers of groups. Although L^2 -Betti numbers in general don't interact well with taking quotients of groups, we prove that, for virtually compact special hyperbolic groups, group-theoretic Dehn filling preserves L^2 -Betti numbers.

Hongbin Sun, Rutgers University

Title: Two aspects of graph 3-manifold groups

Abstract: We prove that the fundamental groups of graph 3-manifolds are virtually poly-free and lie in the family Lex. As a consequence, all finitely generated 3-manifold groups also have these two properties. The first property is a purely group-theoretical concept, and the second is related to the left-exactness property of bounded cohomology of groups. Both properties are proved by constructing sequences of covers of graph 3-manifolds.

Xiangdong Xie, Bowling Green State University

Title: Pattern rigidity in nilpotent Lie groups

Abstract: A pattern in a group consists of the left cosets of a collection of subgroups. A quasi-isometry between two groups with patterns is pattern-preserving if it coarsely permutes the left cosets in the patterns.

There are two natural questions concerning PPQIs (pattern-preserving quasi-isometries). The first is to determine when there is a PPQI between two groups with patterns. The second is whether PPQIs exhibit rigidity properties. We will discuss the second question in the setting of nilpotent Lie groups. We show that every self PPQI is at finite distance from an automorphism if the subgroups intersect the center trivially and generate the whole group and one of the following holds:

(1) G is a 2-step simply connected nilpotent Lie group, (2) G is a free nilpotent Lie group.

This is ongoing joint work with Mitra Alizadeh, Hao Liang and Qingshan Zhou.