2023 SCMS Geometric Group Theory Workshop Schedule

@Gu Lecture Hall SCMS (2nd floor)

	8.07 Monday	8.08 Tuesday	8.09 Wednesday	8.10 Thursday	8.11 Friday
8:30-9:00	***Registration***① **and opening Remarks**				
9:00-10:00 Chair	**Jingyin Huang** Hongyu Wang	**Yi Liu** Yue Gao	**Jingyin Huang** Hao Liang	**Beibei Liu** Li Cai	**Xuezhi Zhao** Zhiyun Cheng
	Conference photo				
10:30-11:30 Chair	**Beibei Liu** Josiah Oh	**Yanqing Zou** Zixi Wang	**Shengkui Ye** Ye Liu	**Tianyi Zheng** Tian Yang	**Shicheng Wang** Ruifeng Qiu
14:30-15:30 Chair	**Wenyuan Yang** Qing Liu	**Beibei Liu** Ying Zhang	**Zhe Sun** Binbin Xu	**Jingyin Huang** Zhi Lü	
16:00-17：00 chair	**Qiang Zhang** Jianchun Wu	**Robert Tang** Enxin Wu	**Yi Huang** Suzhen Han	**Problem Session** 15:40-17:40	
17:30-19:30	**Dinner**	**Dinner**	**Dinner**	**Banquet** 18:30-21:00	

Wifi network: eduroam

username: 2023scmsg@guest password: Scmsguest

Zoom ID: 638 0620 1510 password: 623848

① You can register either on Aug. 6th from 1pm to 6pm at the SCMS Guest House or on Monday at the workshop.

Titles and abstracts

Jingyin Huang, The Ohio State University
Title: Groups quasi-isometric to RAAGs
Abstract: We will start this minicourse with a gentle introduction to the question of quasi-isometric classification and rigidity of finitely generated groups, which is a fundamental problem in geometric group theory. We will also give a brief survey of known results in this direction for groups with features of non-positive curvature. Then we will focus on understanding the quasi-isometric geometry of right-angled Artin groups (RAAGs), and describing the collection of finitely generated groups quasi-isometric to a large class of right-angled Artin groups. We will emphasize the close connection between the study of groups quasi-isometric to RAAGs and the following topics: cubulation, special cube complexes, buildings, exotic lattices, and minimal surfaces in metric spaces. Part of the lecture is based on joint work with B. Kleiner.

Yi Huang, Tsinghua University
Title: The idiot's guide to shearing surfaces
Abstract: we (try to) give a friendly guide for shearing between hyperbolic surfaces in as ``efficient'' a manner as possible. On the way, we'll see Teichmueller spaces, Thurston's earthquake theorem, and a novel metric on Teichmueller space called the earthquake metric which has surprising connections to both the Thurston metric and the Weil-Petersson metric. This is work in collaboration with K. Ohshika, H. Pan and A. Papadopoulos.

Beibei Liu, Massachusetts Institute of Technology
Title: Hyperbolic Geometry--An Introduction
Abstract: The aim of this minicourse is to introduce fundamental concepts and properties in hyperbolic geometry. Part I of the minicourse is to present fundamental concepts, such as limit sets, geometric finiteness, critical exponent, and so on. Part II is to introduce the dynamics properties of hyperbolic geometry, including the Patterson-Sullivan measures. Part III of the minicourse gives an overview of various rigidity results about hyperbolic geometry and higher-rank symmetric spaces.

Yi Liu, Peking University
Title: On profinite properties about 3-manifold groups
Abstract: In this talk, I will discuss recent progress in studying properties of 3-manifold groups that are determined (or not determined) by their profinite completions. I will be particularly interested in finite volume hyperbolic 3-manifolds, and discuss whether some classical geometric properties are profinitely invariant.

Zhe Sun, University of Science and Technology of China

Title: Asymmetric intersection number and Fock-Goncharov duality
Abstract: Fock and Goncharov introduced a pair of mirror moduli spaces associated to G and G^L which generalized the Teichmüller space and the decorated Teichmüller space, and they proposed a duality: the canonical basis of the regular function ring of one space X is parameterized by the tropical integral points of its mirror X^V. In this talk, I will explain my joint work with Linhui Shen and Daping Weng for SL3 (in progress for SLn), where we introduce the topological asymmetric intersection numbers between webs on the surfaces to provide the duality pairings and the map from webs to tropical points. We prove that the map is the same as the previous one obtained by Douglas and myself. We relate the cluster algebra and skein algebra by this intersection number and prove the mutation equivariance, where the flip equivariance is a consequence.

Robert Tang, Xi'an Jiaotong-liverpool University
Title: Large-scale geometry of the Rips filtration
Abstract: Given a metric space X and a scale parameter $\sigma \geq 0$, the Rips graph $Rips^\sigma X$ has X as its vertex set, with two vertices declared adjacent whenever their distance is at most σ. A classical fact is that X is a quasigeodesic space precisely if it is quasi-isometric to its Rips graph at sufficiently large scale.
By considering all possible scales, we obtain a directed system of graphs known as the Rips filtration. How does the large-scale geometry of $Rips^\sigma X$ evolve as $\sigma \to \infty$? Is there a meaningful notion of limit and, if so, does it satisfy any nice properties? In this talk, I will discuss some work in progress inspired by these questions.

Shicheng Wang, Peking University

Title: 拓扑和数论间的一些联系

Abstract: 我们将讨论由研究流形的映射度和手性而引发的拓扑和数论之间的一些问题和相互

作用。If time allowed, we may talk some connections with profiniteness.

Wenyuan Yang, Peking University
Title: Limit sets for branching random walks on relatively hyperbolic groups
Abstract: Branching random walks (BRW) on groups consist of two independent processes on the Cayley graphs: branching and movement. Start with a particle on a favorite location of the graph. According to a given offspring distribution, the particles at the time n split into a random set of particles with mean $r \ge 1$, each of which then moves independently with a fixed step distribution to the next locations. It is well-known that if the offspring mean r is less than the inverse of the spectral radius of the underlying random walk, then BRW is transient: the particles are eventually free on any finite set of locations. The particles trace a random subgraph which accumulates to a random subset called limit set in a boundary of the graph. In this talk, we consider BRW on relatively hyperbolic groups and study the limit set of the trace at the Bowditch and Floyd boundaries. In particular, the Hausdorff dimension of the

limit set will be computed. This is based on a joint work with Mathieu Dussaule and Longmin Wang.

Shengkui Ye, New York University Shanghai

Title: Splitting and polyfreeness of triangle Artin groups

Abstract: A triangle Artin group is an Artin group generated by three elements. We show that some of them are virtually polyfree, partially confirming a question of Bestvina. Meanwhile, some of them are not splitting as graph of free groups, answering negatively two questions of Jankiewicz. This is a joint work with Xiaolei Wu.

Qiang Zhang, Xi'an Jiaotong University
Title: Some new progress on fixed subgroups
Abstract: Fixed subgroups of group endomorphisms have been considered since the 1970s. One of the most important result is due to Bestvina and Handel in 1990: the fixed subgroup of a free group automorphism $\phi: F(X)\to F(X)$ has rank at most $|X|$. After Bestvina and Handel's announcement, their result was extended to various directions. In this talk, we will introduce some new progress on the fixed subgroups.

Xuezhi Zhao, Capital Normal University
Title: Geometric intersection numbers of loops on surfaces
Abstract: Given two loops on a compact surface, the geometric intersection number is defined to be the minimal intersection number of two loops in the general position which are respectively in the homotopy classes of the two loops. The determination of geometric intersection numbers is a problem with a long history, which can be traced back to M. Dehn. In this talk, we shall explain an algorithmic treatment of such a problem. Our integration has two parts: Nielsen fixed point theory and Gröbner-Shirsov basis. Moreover, some applications in geometric topology will be illustrated. This talk contains a joint work with Gu, Ying.

Tianyi Zheng, University of California,San Diego
Title: Liouville property for random walks on iterated monodromy groups and conformal dimension
Abstract: Conformal dimension was introduced in the late 1980s by P. Pansu; it is a natural invariant in the study of the geometry of hyperbolic spaces and their boundaries. In this talk we will discuss how conformal geometry can be used to prove the Liouville property (that is, all bounded harmonic functions are constant) for random walks on iterated monodromy groups, when the limit set has Ahlfors-regular conformal dimension strictly less than 2. This is joint work with N. Matte Bon and V. Nekrashevych.

Yanqing Zou, East China Normal University
Title: Some results of 3-manifolds
Abstract: It is known that every compact orientable 3-manifold admits a Heegaard splitting. Then we can study 3-manifolds through Heegaard splittings. We will introduce some results on geometries, mapping class groups of 3-manifolds from Heegaard splitting.