Abstracts for GiG 2024 lightning talks

1   Shaked Bader

TITLE: Subgroups of word hyperbolic groups in dimension 2 over arbitrary rings

ABSTRACT: In 1996 Gersten proved that if G is a word hyperbolic group of cohomological dimension 2 and H is a subgroup of type FP_2, then H is hyperbolic as well. In this talk, I will present a project with Robert Kropholler and Vlad Vankov generalising this result to show that the same is true if G is only assumed to have cohomological dimension 2 over some ring R and H is of type $FP_2(R)$.

2   Arka Banerjee

TITLE: On the girth of cubulated groups

ABSTRACT: The girth of a finitely generated group G is the supremum of the girth of Cayley graphs for G over all finite generating sets. We show that lattices in automorphism group of certain cube complexes satisfy a Girth alternative: the group is either virtually abelian or the girth of the group is infinite (joint work with Gulbrandsen, Mishra, and Parija).

3   Megha Bhat

TITLE: Orientation-preserving homeomorphisms of the real line are commutators

ABSTRACT: A uniformly perfect group has commutator width p if every element can be expressed as a product of p commutators. Questions about commutator width have been asked and answered for various groups such as the alternating group, symmetric group and various isometry and homeomorphism groups. I will talk about this question for the homeomorphism group of $\mathbb{R}$, and show that it has commutator width one.

4   Indranil Bhattacharya

TITLE: Hyperbolic metric bundles over $[0, \infty]$

ABSTRACT: Hyperbolic metric bundles arise naturally when a hyperbolic group sits inside another hyperbolic group as normal subgroup. Nir Lazarovich, Alex Margolis, and Mahan Mj proved that rigid groups can't arise as fibers of those metric bundles. Our goal is to classify the one ended hyperbolic groups that arise as fibers of such metric bundles.

5 Sushil Bhunia

TITLE: Twisted Conjugacy in Torelli Groups

ABSTRACT: Let ϕ be an automorphism of a group G, two elements x and y of G are said to be ϕ-twisted conjugate if $gx = y\phi(g)$ for some g in G. This is an equivalence relation on G, the equivalence classes are called ϕ-twisted conjugacy classes. A group G has the $R\infty$-property if the number of its ϕ-twisted conjugacy classes is infinite for every automorphism ϕ of G. In this talk, we will study the $R\infty$-property of the Torelli group $I(\Sigma_g)$ of the closed surface Σ_g.

6 Ritwik Chakraborty

TITLE: Gibbs measures for the Ising model on Hyperbolic groups

ABSTRACT: A Gibbs measure is a probability measure that describes a physical system with finitely many interacting components in equilibrium at a given temperature and is the starting point of Classical Statistical Mechanics. In the '60s, Dobrushin, Lanford, and Ruelle gave the first robust definition of Gibbs measures on infinite graphs. In probabilistic terms, these are probability measures that satisfy a certain spatial Markov property. When the underlying graph is a Cayley graph of a one-ended hyperbolic group, I will talk about how Gibbs measures for the Ising model "look like" at low temperatures.

7 Anindya Chanda

TITLE: Quasigeodesic Anosov Flows and Sphere-filling Curves

ABSTRACT: In their seminal paper 'Group Invariant Peanno Curves', Cannon and Thurston gave an example of a sphere-filling curve on the Gromov boundary of a closed hyperbolic manifold which is a surface bundle over circle. In this talk, we will generalize this example using quasigeodesic flows. This examples are great instances where the dynamics of the flows interact with the large scale geometry of the underlying manifolds.

8 Kajal Das

TITLE: Invariance of non-vanishing of first l^p-cohomology under L^q-Measure Equivalence

ABSTRACT: L^q-Measure Equivalence (ME) preserves many geometric properties of finitely generated groups like quasi-isometry. It has been proved by P. Pansu that if two finitely generated groups are quasi-isometric, the first l^p-cohomologies are isomorphic as a topological vector space. In this talk, we will discuss that non-vanishing of first l^p cohomology is preserved under L^q-ME for finitely generated non-amenable groups with $q \geq p$.

9 Shubhabrata Das

TITLE: On stability of the Haagerup property for groups

ABSTRACT: I will talk about the Haagerup property (or Gromov's a-T-menability) for groups and how it remains stable under taking graph products. (Based on a joint work with Partha Sarathi Ghosh.)

10   Sumanta Das

TITLE: The Goldman bracket characterizes homeomorphisms between non-compact surfaces

ABSTRACT: We show that a homotopy equivalence between two non-compact orientable surfaces without boundary is homotopic to a homeomorphism if and only if it preserves the Goldman bracket, provided our surfaces are neither the plane nor the punctured plane.

11   Rajesh Dey

TITLE: An icosahedral subgroup of $\text{Mod}(S_{19})$

ABSTRACT: Any finite subgroup of $\text{Mod}(S_g)$ induces a branched covering on S_g. For such a cover, Birman-Hilden theory asserts that the liftable mapping class group is isomorphic to the quotient of the symmetric mapping class group by the group of deck transformations. In this lightning talk, I will try to motivate the liftability problem for alternating covers by using the example of an icosahedral subgroup of $\text{Mod}(S_{19})$.

12   Neeraj Kumar Dhanwani

TITLE: Dehn quandles arising from surfaces

ABSTRACT: Quandles are algebraic systems with a binary operation that encodes the three Reidemeister moves of planar diagrams of links in the 3-space. In this talk, we discuss the construction of Dehn quandles of surfaces. We shall end the talk by discussing the explicit finite presentations for Dehn quandles of surfaces.

13   Yonathan Fruchter

TITLE: Orbits of words in a free group

ABSTRACT: It is an old question whether automorphism orbits of words in a non-abelian free group are closed in the profinite topology. In this short talk I will give a brief overview of this problem and report on some recent progress.

14   Siddhartha Gadgil

TITLE: Formalization and beyond

ABSTRACT: Formalization is writing mathematical proofs in a manner that can be understood and checked by a computer, with automation helping this process. This is rapidly entering the mainstream of mathematics. I will briefly discuss formalization, examples of successful formalization, and the relation of formalization with mathematics research, teaching and AI.

15 Antoine Goldsborough

TITLE: Random Artin groups

ABSTRACT: What does a typical Artin group look like? I will briefly mention a model for random Artin groups as well as some recent results that relate to this question.

16 Rakesh Halder

TITLE: On the Existence of Cannon-Thurston (CT) Maps for Amalgamations

ABSTRACT: In this lightning talk, we will see a result on existence of Cannon-Thurston (CT) maps for amalgamations. More precisely, suppose G is an amalgamation of two hyperbolic groups, say G_1 and G_2, over a common quasiconvex subgroup, say H, such that G is hyperbolic. Let K_i be a hyperbolic subgroup of G_i containing H such that the inclusion K_i to G_i admits the CT map, $i = 1, 2$. Then the result says that the amalgamation, say K, of K_1 and K_2 over H is hyperbolic and the inclusion K to G admits the CT map. This is joint work Pranab Sardar.

17 Megan Howarth

TITLE: Cone types of hyperbolic triangle groups

ABSTRACT: Cone types constitute a valuable combinatorial tool for the study of infinite groups. Notably, hyperbolic triangle groups have finitely many cone types. We describe their structure and use it to estimate the spectral radius of the simple random walk on their Cayley graphs.

18 Letizia Issini

TITLE: On linear divergence in finitely generated groups

ABSTRACT: Divergence is a quasi-isometry invariant of groups that measures how difficult it is to connect points avoiding a big ball around the identity. We will talk about some groups that have linear divergence.

19　Pankaj Kapadi

TITLE: Generating the liftable mapping class group of a finite sheeted unbranched regular cyclic cover of genus two surface

ABSTRACT: For a finite-sheeted unbranched regular cyclic covering of a closed hyperbolic surface, a generating set for the liftable mapping class group associated to this cover can be obtained by combining generators for the Torelli group and lifting generators of the image in the symplectic representation. Since Torelli group of the surface of genus at least three is finitely generated, this method produces a finite generating set for the liftable mapping class group for covers associated to surface of genus at least three. As the Torelli group of surface of genus two is not finitely generated, in this talk, we will see how to obtain a finite generating set for the liftable mapping class group in the genus two case.

20　Chris Kaprinski

TITLE: Decent actions on restricted products

ABSTRACT: An action of a group on a metric space is "decent" if every subgroup with a bounded orbit fixes a point and every finitely generated subgroup each of whose elements fix a point has a global fixed point. We study conditions on when actions on restricted products of CAT(0) spaces are decent.

21　Swathi Krishna

TITLE: Relative hyperbolicity of endomorphisms of free products

ABSTRACT: Let G be a free product with a given free factor system and let ϕ be an injective endomorphism that is strictly type preserving with respect to this free factor system. We will look at the conditions under which the ascending HNN extension of G and ϕ is relatively hyperbolic. This is a work in preparation.

22　Lokenath Kundu

TITLE: The Dehn function for Palindromic Sub-Group of $Aut(F_n)$.

ABSTRACT: In this talk, we prove that the Dehn function of the palindromic automorphism group $\Pi A(F_n)$ is exponential.

23　Tejbir Lohan

TITLE: Reversibility of Affine Transformations

ABSTRACT: Reversible elements in a group are those elements that are conjugate to their own inverses. They are closely related to strongly reversible elements, which can be expressed as a product of two involutions. In this talk, we will classify the reversible and

strongly reversible elements in the group of affine transformations. This is joint work with K. Gongopadhyay and C. Maity.

24   Lawk Mineh

TITLE: Tiling in groups

ABSTRACT: A subset T of a group G is called a tile of G if G can be covered by a collection of disjoint translates of T. We proved that in an acylindrically hyperbolic group, every finite subset is contained in a finite tile.

25   Sayantika Mondal

TITLE: Filling curves: Same or different?

ABSTRACT: In this talk, I'll look at filling curves on hyperbolic surfaces and consider its length infima in the moduli space of the surface as a type invariant. Then explore the relations between this geometric invariant and a topological namely the self-intersection number of a curve. In particular, for all finite type surface, construct infinite families of filling curves that cannot be distinguished by self-intersection number but via length infimum.

26   Zachary Munro

TITLE: Strict C(6) complexes

ABSTRACT: We define a small-cancellation condition intermediate to C(6) and C(7) which implies toral relative hyperbolicity.

27   Amartya Muthal

TITLE: Train tracks and dynamics of outer automorphisms

ABSTRACT: Each outer automorphism of F_n can be represented topologically by a homotopy equivalence of a graph G whose fundamental group is F_n. Analogous to the notion of Thurston normal form for elements of the mapping class group, we have the notion of relative train tracks for outer automorphisms of F_n. In this talk I will describe how relative train tracks can be used to study dynamics of outer automorphisms on the space of certain trees with F_n action, and the space bi-infinite paths in G.

28   Abhijit Pal

TITLE: Quasi-Möbius maps between boundaries

ABSTRACT: F. Paulin proved that if a homeomorphism between Gromov boundaries of two

hyperbolic groups is a quasi-Möbius equivalence then the homeomorphism induces a quasi-isometry between the groups. We aim to generalize Paulin's result to relatively hyperbolic groups.

29   Sreekrishna Palaparthi

TITLE: Reducing spheres and the Goeritz Group

ABSTRACT: The Goeritz Group of genus g is the isotopy classes of diffeomorphisms of the three sphere which preserve a genus-g Heegaard surface. It is still unknown if these groups are finitely generated for n greater than 3. In this talk we give a brief outline of the interplay between reducing sphere complex and the Goeritz Groups.

30   Aditya Prabhu

TITLE: Finite generation of $\mathrm{Aut}(F_n)$

ABSTRACT: In this talk, we shall get an idea of the proof of Nielsen's theorem giving an explicit generating set for the automorphism group of finitely generated free groups.

31   Bhola Nath Saha

TITLE: Filling systems on surfaces

ABSTRACT: A finite set of homotopically distinct simple closed curves on a surface, pairwise in minimal position, is called a filling system if their complement is a disjoint union of topological discs. The mapping class group acts on the set of filling systems in a natural way. In this short talk, we discuss topology, geometry and combinatorics of filling systems.

32   Sagar Saha

TITLE: A class of non-contracting branch groups of exponential growth

ABSTRACT: The exploration of (weakly) branch groups has gained significant importance since the pioneering work of Grigorchuk in the 1980s. We provide a class of non-contracting groups containing an infinite family of branch groups and show that these groups are of exponential growth. It seems this is the first example of a class of non-contracting branch groups constructed explicitly.

33   Ritvik Saharan

TITLE: Representation varieties of 3-Manifold Groups

ABSTRACT: We intend to cover representation varieties of the fundamental groups of 3-manifolds.

34 Apeksha Sanghi

TITLE: Infinite metacyclic subgroups of mapping class group

ABSTRACT: In this talk, we will discuss the necessary and sufficient conditions for a pair of elements in mapping class group of genus g surface to generate an infinite metacyclic subgroup. We will see some explicit construction of infinite metacyclic subgroup.

35 Shrinit Singh

TITLE: Relations among words having same image on every finite group

ABSTRACT: The talk addresses the question of whether two words that have the same image on every finite group as word maps are endomorphically equivalent.

36 Gangotryi Sorcar

TITLE: High dimensional hyperbolic RACG that fiber

ABSTRACT: Many group theoretic properties of right angled Coxeter groups (RACGs) can be read off from their defining graph, for example, hyperbolicity, (virtual cohomological) dimension, fibering, etc. We will present some of what this can achieve and ask if there is more.

37 Chaitanya Tappu

TITLE: A Moduli Space of Marked Hyperbolic Structures for Big Surfaces

ABSTRACT: In this talk, I will introduce the moduli space of marked, complete, Nielsen-convex hyperbolic structures on any surface of negative (but not necessarily finite) Euler characteristic, with emphasis on infinite type surfaces. The natural action of the mapping class group of the surface on this marked moduli space is continuous. I will talk about the question of whether this space admits a mapping class group invariant metric.

38 Soumyadip Thandar

TITLE: Groups with Property Rapid Decay

ABSTRACT: Property Rapid Decay was first established for free groups by Haagerup and introduced and studied by many, such as, Jolissaint, who established it for groups of polynomial growth, and for classical hyperbolic groups. In this talk, I will discuss necessary geometric conditions in the direction developed by Chatterji, Ruane and Sapir for groups having this property with a class of examples.

39   Ravi Tomar

TITLE: Coned-off spaces and Cannon-Thurston maps

ABSTRACT: Suppose $K < H < G$ are hyperbolic groups such that K is quasiconvex in G. Let $\hat{G}$ and $\hat{H}$ denote the coned-off Cayley graphs of G and H with respect to K, respectively. We provide conditions for the existence of the Cannon–Thurston map for H in G in terms of the Cannon–Thurston map for $\hat{H}$ in $\hat{G}$. This is a joint work with Pranab Sardar.

40   Nicolas Vaskou

TITLE: Rigidity results for Artin groups

ABSTRACT: To large-type Artin groups can be associated a graph that plays the role of the curve graph for mapping class groups. Studying this graph and its relation with others complexes reveals several strong rigidity and classification results for Artin groups.