2022 年几何群论研究生暑期学校

会议日程

	8.15 周一	8.16 周二	8.17 周三	8.18 周四	8.19 周五
8:50-9:00	**开幕式与合影**				
9:00-10:00 主持人	**孙洪宾** 高红铸	**孙洪宾** 邹燕清	**孙洪宾** 张强	**黄靖尹** 刘勍	**陈蕾** 王骁
10:15-11:15 主持人	**刘毅** 王宏玉	**陈绿洲** 程志云	**刘毅** 杨志青	**刘毅** 杜晓明	**杨文元** 陈海苗
11:30-12:30 主持人			杨文元 吴建春		
14:30-15:30 主持人	**杨文元** 赵学志	**谷世杰** 赵旭安		**李琼玲** 钟立楠	**梁灏** 王彦英
15:45-16：45 主持人	**吴云辉** 包志强	**黄意** 刘烨		**汪浸** 蔡力	**张影** 王家军
21:00-22:00	答疑与自由讨论	答疑与自由讨论	答疑与自由讨论	公开问题讨论	

报告题目及摘要

陈蕾

题目: Nielsen realization problem for 3-manifolds

摘要: In this talk, I will describe a joint work with Bena Tshishiku on Nielsen Realization problem for 3-manifolds, in particular, about the twist subgroup. The twist subgroup is a normal finite abelian subgroup of the mapping class group of 3-manifold, generated by the sphere twist. The proof mainly uses the geometric sphere theorem/torus theorem and geometrization.

陈绿洲

题目: The Kervaire conjecture and the minimal complexity of surfaces

摘要: We use topological methods to solve special cases of a fundamental problem in group theory, the Kervaire conjecture, which has connection to various problems in topology. The conjecture asserts that, for any nontrivial group G and any element w in the free product G*Z, the quotient (G*Z)/<<w>> is still nontrivial. We interpret this as a problem of estimating the minimal complexity (in terms of Euler characteristic) of surface maps to certain spaces. This gives a conceptually simple proof of Klyachko's theorem that confirms the Kervaire conjecture for any G torsion-free. We also obtain new results concerning injectivity of the map G->(G*Z)/<<w>> when w is a proper power.

谷世杰

题目: Compactifications of manifolds

摘要: In 1966, Larry Siebenmann once mused that his work (PhD thesis) was initiated at a time "when 'respectable' geometric topology was necessarily compact". That attitude has long since faded; today's topological landscape is filled with research in which noncompact spaces are primary objects. However, major successes in understanding and compactifying manifolds included here are fundamental to manifold topology and geometric group theory: Stalling's characterization of Euclidean spaces, Siebenmann's collaring theorem and our recent Gu-Guilbault's manifold completion theorem. In the first part, I will provide a quick access to some of those results by weaving them together with common interpretations. In the second part, I will introduce several long-standing open questions on this topic. In particular, the implications between pseudo-collarability and Z-compactifiability, two main extensions on the manifold completion theorem, are not clear. Using the interaction of hypoabelian groups and knot theory, I will construct counterexamples to the statement that Z-compactifiability implies pseudo-collarability. If time permits, I'll briefly discuss my progress on the reverse implication, which relies on 4D topology and commutator length.

黄靖尹

题目: Measure equivalence superrigidity for some generalized Higman groups

摘要: In the 1950s, Higman introduced the first class of examples of infinite finitely presented groups without any non-trivial finite quotient. We study Higman groups from the viewpoint of measure equivalence - a notion introduced by Gromov as a measurable counterpart to quasi-isometry. For most Higman groups and some generalizations, we prove a strong measure equivalence rigidity theorem. In this talk, I'll sketch the proof, discuss some of the consequences,

and compare to some other measure equivalence rigidity/flexibility results in the literature. This is joint work with Camille Horbez.

黄意

题目: The Lipschitz problem for bordered hyperbolic surfaces

摘要: we give elementary constructions for optimal (i.e.: least) Lipschitz constant homeomorphisms for geodesic bordered hyperbolic surfaces as well as for funnelled hyperbolic surfaces, and employ this to generalise Thurston's Lipschitz theoretic approach to Teichmueller theory.

李琼玲

题目: Non-Abelian Hodge correspondence and certain Hitchin fibers

摘要: Let X=(S,J) be a closed Riemann surface with genus at least 2. The non-abelian Hodge theory provides a correspondence between the representation variety of the fundamental group of S into a Lie group G with the moduli space of G-Higgs bundles over the Riemann surface X. There is a natural fibration, defined by Hitchin, from the moduli space of Higgs bundles to the complex vector space formed by holomorphic differentials of various ranks. The Fuchsian Higgs bundles of rank 2 are embedded into the moduli space of rank n Higgs bundles and we call their Hitchin fibers the n-Fuchsian fibers. We show Higgs bundles in such n-Fuchsian fibers give rise to representations which are dominated by the n-Fuchsian representations. This work is joint with Song Dai (Tianjin University).

梁灏

题目：Boundary rigidity of gromov hyperbolic spaces

摘要: We introduce the concept of boundary rigidity for Gromov hyperbolic spaces. We show that a proper geodesic Gromov hyperbolic space with a pole is boundary rigid if and only if its Gromov boundary is uniformly perfect. I will explain some of its applicatioins and explain the idea of the proof. This is joint work with Qingshan Zhou.

刘毅

题目: Special cube complexes and 3-manifold groups

摘要: In this mini course, I will give an introduction to the theory of special cube complexes and explain how they get involved in the study of 3-manifold groups, such as the resolution of the virtual Haken conjecture and the virtual fibering conjecture.

孙洪宾

题目：Subgroup separability and profinite completions of 3-manifold groups

摘要：This lecture series will cover subgroup separability and profinite completions of groups, and their connection on 3-manifolds groups. In the first lecture, we will talk about subgroup separability of groups, prove free and surface groups are subgroup separable. In the second lecture, we will talk about profinite completions of groups, induced homomorphisms, and the Grothendieck rigidity of groups. In the third lecture, I will briefly sketch how to use known subgroup separability results to prove all 3-manifolds groups are Grothendick rigid.

汪湜

题目: Kleinian groups with small critical exponent must be convex cocompact
摘要: Let G be a finitely generated discrete subgroup of Isom(H^n). The critical exponent of G characterizes the exponential growth rate of the G-orbits. In joint work with Beibei Liu, we prove that if the critical exponent is small enough, then G must be convex cocompact, that is, the orbit map of G is a quasi-isometric embedding. This partly answers a conjecture of Kapovich.

吴云辉

题目: Recent progress on first eigenvalues of hyperbolic surfaces for large genus
摘要: In this talk we will discuss several recent results on first eigenvalues of closed hyperbolic surfaces for large genus. For example, we show that a random hyperbolic surface of large genus has first eigenvalue greater than $\frac{3}{16}-\epsilon$, extending Mirzakhani's lower bound 0.0024. This talk is based on several joint works with Yuhao Xue.

杨文元

题目: Hyperbolic boundaries of groups
摘要: The mini-course is an introduction to various hyperbolic boundaries of groups and their applications. I will start by introducing the ends boundary and Floyd boundary for any locally finite graphs, then proceed to discuss their relation with Gromov boundary of hyperbolic spaces, Bowditch boundary of relatively hyperbolic groups and etc. Along the course, I will talk about topological/metric/measure theoretic results on those boundaries.

张影

题目: Closed geodesics on the most symmetric tori: monotonicity, positivity, and log-concavity of the shifted trace polynomials
摘要: We study all closed geodesics on the most symmetric tori, and define shifted trace polynomials for these geodesics.We obtain partial monotonicity and positivity for the shifted trace polynomials. We make the log-concavity conjecture for these and other polynomials and confirm it for those geodesics represented by positive words.
This is joint work with Xiangfei Li.