

Marc BOURDON

Title: Rank one rigidity

Abstract: The aim of these lectures is to present and prove some of the classical rigidity theorems that rely on the quasi-conformal geometry of boundaries of hyperbolic spaces. This includes Mostow's rigidity in rank one and Pansu's quasi-isometry rigidity theorem.

Yosuke MORITA

Title: The existence problem of compact Clifford-Klein forms

Abstract: Let G/H be a homogeneous space. A discrete subgroup of G is called a discontinuous group for G/H if it acts properly and freely on G/H . A manifold obtained as the quotient of G/H by a discontinuous group is called a Clifford-Klein form. We focus on the non-Riemannian case (i.e. the case when H is noncompact). The study of discontinuous groups in this case is much harder than the Riemannian case because not every discrete subgroup of G acts properly on G/H .

One of the major objectives in this area is to determine every homogeneous space that admits compact Clifford-Klein forms. In this series of talks, we review some basic results and recent finding on this problem. In the first half of the talks, we explain the "Lie-theoretic" approach; it is based on the Benoist-Kobayashi criterion, which says that properness of the action is rephrased in the language of the Cartan projection of reductive groups. In the second half, we explain the "cohomological" approach based on the comparison of relative Lie algebra cohomology and de Rham cohomology of Clifford-Klein forms.

Yoshifumi MATSUDA

Title: Isolated circular orders of groups and rigidity of actions on the circle

Abstract: A circular order of a group is a certain integral 2-cocycle, which corresponds to a faithful action on the circle by orientation-preserving homeomorphisms if the group is countable. The set of circular orders on a group is endowed with a natural topology. With respect to this topology, isolated circular orders on a countable group correspond to actions on the circle which are rigid in a certain sense.

In this talk, we discuss isolated circular orders on various countable groups, mainly free products of finite cyclic groups, such as the modular group. If time permits, we discuss correspondence between isolated circular orders on a countable group and isolated left orders on a certain central extension of the group by the infinite cyclic group.

Motoko KATO

Title: Generalizations of Higman-Thompson groups which are not locally orientation preserving

Abstract: Higman-Thompson groups are groups of piecewise linear homeomorphisms of the unit interval, which are locally orientation preserving. They are typical examples of finitely presented infinite simple groups. Generalizing these groups, Funar and Neretin defined signed Higman-Thompson groups. Signed Higman-Thompson groups are groups of piecewise linear homeomorphisms of the unit interval, which are locally orientation preserving or orientation reversing. In this talk, we describe some basic properties of signed Higman-Thompson groups, including virtual simplicity and topological finiteness properties. We also give a necessary and sufficient condition for a signed Higman-Thompson group to be isomorphic to one of Higman-Thompson groups. This is a joint work with Julio Aroca (Autonomous University of Madrid).

Mao OKADA

Title: Local rigidity of certain actions of nilpotent-by-cyclic groups on the sphere

Abstract: Asaoka proved local rigidity of certain conformal actions of a solvable group on the n -dimensional sphere, where the group is a semidirect product of the infinite cyclic group and the free abelian group of rank n . Every conformal action on the sphere is the boundary extension of an isometric action on the real hyperbolic space. In this talk, we give another example of locally rigid actions on the $(2n+1)$ -dimensional sphere, which may be considered as a complex hyperbolic analogue of the above result of Asaoka. In our case, the group is a semidirect product of the infinite cyclic group and a lattice of the $(2n+1)$ -dimensional Heisenberg group.

Ryokichi TANAKA

Title: Rough isometries and measures at infinity for word hyperbolic groups

Abstract: We discuss the following question: given a word hyperbolic group, when two hyperbolic metrics on it are roughly isometric. There are several hyperbolic metrics other than word metrics, although they are quasi-isometric to word metrics but not roughly isometric to them. We study concrete examples of those metrics.

Tetsuya ITO

Title: Construction and prospects for isolated left orderings

Abstract: A left ordering of a group G is called an isolated ordering if it is an isolated point in the space of all left orderings. A left ordering can be understood as an algebraic object that encodes a faithful action on the real line, and an isolated ordering can be seen as a kind of "very rigid" action.

In this talk we discuss basics of isolated orderings, and review various constructions of isolated orderings. Some of these constructions are algebraic so it is quite interesting to understand them in a point of view of dynamics.

Yuichi KABAYA

Title: Kazhdan constants and semidefinite programming

Abstract: Narutaka Ozawa found a new necessary and sufficient criterion for Kazhdan's property (T) for finitely generated groups, which gives an explicit lower bound of the spectral gap, and the Kazhdan constant. Using his criterion, Netzer and Thom improved previously known lower bounds of the Kazhdan constant for $SL_3(\mathbb{Z})$ (with respect to some standard generators). In this talk, I will give more evidence that this is actually a powerful method from many examples: $SL_n(\mathbb{Z})$, \mathbb{A}_2 groups, Steinberg groups, and some finite groups. This is a joint work with Koji Fujiwara.

Junichi MUKUNO

Title: On the fundamental group of semi-Riemannian manifolds with positive curvature operator

Abstract: We consider analogy of Myers theorem in the setting of semi-Riemannian submersion from a semi-Riemannian manifold (E, g) onto (B, g_B) with the fiber closed Riemannian, where (B, g_B) is a complete Riemannian manifold. Assume that the entire space (E, g) satisfies the curvature condition $R \geq k > 0$ of Andersson--Howard. Then we prove that the fundamental group of the fibers is finite if the horizontal distribution is integrable. This is a generalization of my previous result, which is Lorentzian case.