

Title and abstracts

1 Jinpeng An (Peking U)

Title: Bounded orbits of homogeneous dynamics

Abstract: Homogeneous dynamics is a special kind of dynamical systems given by Lie groups. For certain important cases, the systems are ergodic and hence the points with bounded orbits form a set of measure zero if the space is noncompact. However, the behavior of bounded orbits reveals the complexity of the system and is related to problems in Diophantine approximation. In this talk, we will discuss some recent progresses of investigations in bounded orbits of homogeneous dynamics and their relations with Diophantine problems.

2 Minicourse by Aaron Brown (University of Chicago)

Title: Around the Zimmer Program

Abstract: The Zimmer Program concerns a number of questions and conjectures about smooth (sometimes volume-preserving) actions of lattice in higher-rank Lie groups (such as $SL(n, \mathbb{Z})$ when $n \geq 3$) on manifolds. I will give an overview of the program, motivation for various conjectures, and outline some recent results due to myself and coauthors. A tentative outline is the following:

1. Lattices in Lie groups, examples of standard actions, non-standard actions
2. Superrigidity and conjectures in the Zimmer program: existence, local rigidity, and global rigidity of actions
3. Zimmer's conjecture part 1
4. Smooth ergodic theory for abelian actions
5. Zimmer's conjecture part 2
6. global rigidity of actions on tori

3 Dou Dou (Nanjing U)

Title: Variational principles for amenable metric mean dimensions

Abstract: Mean dimension is a meaningful quantity to measure infinite entropy. In this talk, for countable discrete amenable group actions, we show that there exist variational principles between metric mean dimension and rate distortion function in information theory. This extends recent results by Lindenstrauss and Tsukamoto.

4 Huichi Huang (Chongqing U)

Title: Problems related to Furstenberg's $\times p, \times q$ conjecture

Abstract: We discuss several problems related to Furstenberg's $\times p, \times q$ conjecture, namely, irreducible representations of a semi-direct product group, Fourier coefficients of Borel probability measures on the unit circle, equidistributions of a double sequence in the unit circle and a semigroup action on the Banach space $C[0, 1]$.

5 Wen Huang (USTC)

Title: Measure complexity and Mobius disjointness

Abstract: We will review some progress about Sarnak's Mobius disjointness conjecture by the measure complexity. Some examples including (Quasi)-discrete spectrum systems and skew product maps on torus over a rotation of the circle will be discussed.

6 Enhui Shi (Suda)

Title: Topological transitivity and wandering intervals for group actions on the line \mathbb{R}

Abstract: For every group G , we show that either G has a topologically transitive action on the line \mathbb{R} by orientation-preserving homeomorphisms, or every orientation-preserving action of G on \mathbb{R} has a wandering interval. According to this result, all groups are divided into two types: transitive type and wandering type, and the types of several groups are determined. We also show that every finitely generated orderable group of wandering type is indicable. As a corollary, we show that if a higher rank lattice Γ is orderable, then Γ is of transitive type. This is a slight progress of the 1-dimensional Zimmer's rigidity conjecture.

7 Ronggang Shi (Fudan U)

Title: Multiple ergodic theorem on homogeneous spaces

Abstract: We prove a multiple ergodic theorem for one parameter diagonal group actions on homogeneous spaces. The convergence rate is also obtained. The proof uses effective k -step correlations. These effective results are based on the existence of the spectral gap and quantitative nonescape of mass estimates.

8 Yi Shi (Peking U)

Title: C^r -Closing lemma for conservative partially hyperbolic diffeomorphisms on 3-manifolds

Abstract. The C^r closing lemma is one well-known problem in the theory of dynamical systems. The problem is to perturb the original dynamical system so as to obtain a C^r -close system that has a periodic orbit passing through a given point. Smale listed this problem as one of the mathematical problems in this century. In this talk, we will prove the C^r ($r=1,2,3,\dots,\infty$) closing lemma for conservative partially hyperbolic diffeomorphisms on 3-manifolds. This shows that C^r -generic conservative partially hyperbolic diffeomorphisms on 3-manifolds have dense periodic points. If time permits, we will also discuss this problem for partially hyperbolic diffeomorphisms with one-dimensional center. This is a joint work with Shaobo Gan.

9 Lei Yang (Sichuan U)

Title: badly approximable points on manifolds and unipotent orbits in homogeneous spaces

Abstract: We will study n -dimensional badly approximable points on manifolds. Given a smooth non-degenerate submanifold in R^n , we will show that any countable intersection of the sets of weighted badly approximable points on the manifold has full Hausdorff dimension. This strengthens a previous result of Beresnevich by removing the condition on weights and weakening the analytic condition on manifolds to smooth condition. Compared with the work of Beresnevich, we study the problem through homogeneous dynamics. It turns out that the problem is closely related to the study of distribution of long pieces of unipotent orbits in homogeneous spaces.

10 Shengkui Ye (Xi'an Jiaotong Liverpool)

Title: Topological Zimmer's conjecture and Euler characteristics

Abstract: Let M be an orientable (may not be compact) manifold. When the Euler characteristic of M is not divisible by 6, any group action of $SL(n, \mathbb{Z})$ ($n > \dim M + 1$) on M by homeomorphisms is trivial. This proves a topological version of the Zimmer's conjecture for these manifolds.

11 Guohua Zhang (Fudan U)

Title: Comparison property for group actions

Abstract: Let a countable amenable group G act on a zero-dimensional compact metric space X . We say that the action admits comparison if for any clopen sets A and B , the condition, that for every G -invariant measure m on X we have the sharp inequality $m(A) < m(B)$, implies that A is subequivalent to B , that is, there exists a finite clopen partition A_1, \dots, A_k for A , and elements g_1, \dots, g_k in G such that $g_1(A_1), \dots, g_k(A_k)$ are disjoint clopen subsets of B . We prove this property for actions of groups whose every finitely generated subgroup has subexponential growth. This is a joint work with Professor Tomasz Downarowicz.

12 Yun Zhao (Suda)

Title: Measure Theoretic Pressure for Amenable Group Actions

Abstract: In this talk, we will define measure theoretic pressure for an amenable group action by using the spanning sets, and shows that the measure theoretic pressure of ergodic measures can be described in terms of metric entropy and an integral of the observable associated with the ergodic measure. Using the theory of Caratheodory structure, we give an equivalent definition of measure theoretic pressure for amenable group actions, and obtain an inverse variational principle, i.e., the topological pressure on a certain set is exactly the measure theoretic pressure of an ergodic measure.