

Title and Abstract

November 8 (Thursday)

9:00-10:00 **Xiaoli Chao**

Title: Harmonic Forms on Submanifolds and Related Problems

Abstract: In this talk, we deal with harmonic forms on complete submanifolds with weighted Poincaré inequality. By supposing submanifold is stable or has sufficiently small total curvature or finite index, we establish some vanishing and finiteness theorems for L^p harmonic q -forms, which are some extension of the results of Kim-Yun, Sang-Thanh, Cavalcante-Mirandola-Vitorio, Lin, Dung-Seo, and Choi-Seo. Moreover, we will summarize some problems related harmonic forms, e.g. index of minimal hypersurfaces.

10:30-11:30 **Song Dai**

Title: Dominations in Higher Teichmüller Theory

Abstract: In this talk, we will survey some domination results in higher Teichmüller theory. Higher Teichmüller theory, initiated by Hitchin, studies the moduli space of the representations from a surface group to a semisimple Lie group, which is a generalization of classical Teichmüller theory. By the non-Abelian Hodge theory, the moduli space of the representations corresponds to the moduli space of the Higgs bundles via the equivariant harmonic maps from the universal cover of the Riemann surface to the symmetric space of the Lie group. We focus on the geometric quantities of the harmonic map, for instance the metric and the curvature. Under the background of the Hitchin fibration, we describe a conjectural picture for the behavior of these quantities and show some developments in recent years.

14:00-15:00 **Yingying Zhang**

Title: Harmonic Maps into CAT(1) Spaces

Abstract: We will talk about the regularity of energy minimizing maps from a Riemannian polyhedra into a CAT(1) space. As applications, we will first discuss a Liouville-type theorem, we will also mention a generalization of Sacks-Uhlenbeck theorem from a compact Riemann surface into a compact locally CAT(1) space.

15:30-16:30 **Bin Zhou**

Title: On the Complex Monge-Ampère Equation with L^p Right-Hand Side

Abstract: In this talk, we discuss the complex Monge-Ampère equation with right-hand side in L^p , $p > 1$. We show that not only the uniform estimate, but also the stability and Hölder continuity of the solution can be proved by a PDE approach. These results were studied using capacity theory by Kolodziej, Guedj-Kolodziej-Zeriahi, etc.

We also discuss the equation in the case the right-hand side has pole singularity as well as some integral estimates for the solution when the right-hand side is in the Lorenz-Zygmund spaces.

November 9 (Friday)

9:00-10:00 **Wenjiao Yan**

Title: Isoparametric Hypersurface and Chern's Conjecture

Abstract: In this talk, I will briefly introduce the progress on Chern's conjecture and its relation with isoparametric hypersurface.

Then introduce our recent job joint with Professor Zizhou Tang and Professor Dongyi Wei, which gives a sufficient condition for a hypersurface to be isoparametric.

10:30-11:30 **Zuoqin Wang**

Title: Eigenfunctions on Riemannian Manifolds - A Survey

Abstract: This will be a survey talk on various (semiclassical) behaviors of eigenfunctions on compact Riemannian manifolds, including nodal sets, quantum ergodicity etc.

14:00-15:00 **Zhenlei Zhang**

TBA

15:30-16:30 **Peng Wu**

Title: The Weitzenböck Formula and Rigidity of Some Canonical Metrics on Four-Manifolds

Abstract: First we will talk about the rigidity of Einstein metrics with positive sectional curvature on four-manifolds. Currently the main tool is the Weitzenböck formula derived by Derdzinski. Then we will talk about an alternative proof of the Weitzenböck formula, and extend it to "Einstein metrics" on four-dimensional smooth metric measure spaces, including gradient Ricci solitons, quasi-Einstein metrics, etc. At last we will talk about the rigidity of gradient shrinking Ricci solitons with half harmonic Weyl curvature.

November 10 (Saturday)

9:00-10:00 **Yang Huang**

Title: Morse Theory in Contact Topology

Abstract: Contact structure is the odd-dimensional sibling of symplectic structure. The modern study of contact structures is built upon fundamental work of Gromov, Eliashberg, Bennequin etc. A central dichotomy in this subject is flexibility versus rigidity. I will first explain old and new work in the attempt to understand this dichotomy. Then I will describe a plan, joint with Ko Honda, to probe this question using Morse theory.

10:30-11:30 **Yi Liu**

Title: On Constructions of Subsurfaces in Hyperbolic 3-Manifolds

Abstract: For closed hyperbolic 3-manifolds, Kahn and Markovic constructed immersed quasi-Fuchsian surface subgroups. Their construction provided a fundamental step in

Agol's resolution of the virtual Haken conjecture. In this mostly surveying talk, I will review some development of their method over the past few years, and mention some more recent progress due to various people.

14:00-15:00 Binbin Xu

Title: Bending Lamination Conjecture for Quasi-Fuchsian Manifolds

Abstract: A quasi-Fuchsian manifold is a geometrically finite 3 dimensional complete hyperbolic manifold, which topologically can be identified with a real line bundle over an oriented surface with negative Euler characteristic. Its convex core is the minimal convex subset on which the manifold retracts. The boundary of the convex core consists of two hyperbolic surfaces pleated along two measured laminations respectively which we call the bending laminations. Thurston conjectured that the geometry of a quasi-Fuchsian manifold can be determined by its bending laminations together with the corresponding bending angles. This conjecture was proved to be true for the case where the bending laminations are simple closed geodesics and the case where the surface is once-punctured torus. For other cases, the conjecture is still open. In this talk, we will review this conjecture, and discuss an idea which could be helpful for solving it.

15:30-16:30 Wenyuan Yang

Title: Harmonic and Quasi-Conformal Measures on Boundaries

Abstract: In this talk, I will introduce two classes of natural measures on boundaries of non-positively curved groups. Harmonic measures on Martin boundary can be integrated to represent positive harmonic functions, while quasi-conformal measures on visual boundary underlie the construction of Bowen-Margulis measures on geodesic flow. The talk will discuss their relationship and some related open problems.

November 11 (Sunday)

9:00-10:00 Chao Xia

Title: Isoperimetric Type Problems in an Euclidean Ball

Abstract: The classical isoperimetric problem asks to find the domain with least boundary area among all bounded domains with fixed volume. The infinitesimal solution is the CMC surface.

In this talk, we first review several isoperimetric type problems involving the area, the first eigenvalue, the torsional rigidity, as well as the quermassintegrals for bounded domains in the Euclidean space and study their global and infinitesimal solutions.

Next we introduce the relative isoperimetric problem involving the area in an Euclidean ball, whose infinitesimal solution is the CMC surface with free boundary. Finally, we propose to study relative isoperimetric type problems involving suitable generalizations of the first eigenvalue, the torsional rigidity, as well as the quermassintegrals in an Euclidean ball. Several open problems will be presented.

10:30-11:30 Gang Li

Title: Uniqueness of Conformally Compact Einstein Metrics with Prescribed Homogeneous Conformal Infinity

Abstract: We take the Berger metric for example to explain the uniqueness of CCE metric that fills in for homogeneous conformal infinity that is closed to the round metric.

14:00-15:00 Xiaoyang Chen

Title: The Topology of Quasiregular Elliptic Manifolds

Abstract: Quasiregular elliptic manifolds share some topological properties with nonnegatively curved manifolds. We will give a survey about these properties.

15:30-16:30 Guoyi Xu

Title: Gradient Estimate of Harmonic Function and Eigenfunctions

Abstract: Since Cheng-Yau proved the gradient estimate of harmonic functions in 1975, their method played important role in geometric analysis. Its philosophy was generalized to prove the lower bound of eigenvalues and parabolic Harnack estimate by Li-Yau, later to establish the Harnack estimate in Ricci flow by Hamilton, the fundamental gap theorem by Andrews and Clutterbuck. In this talk, we will firstly review the history of gradient estimate and its important application, then present our recent results in this direction. Some open questions will be posed in 'accessible disguise', basic PDE and Riemannian geometry is enough to understand most part of the talk.