Title/Abstract

October 10

Bo-Hae IM (KAIST)

Waring's problem for rational functions in one variable

Abstract: Let $f \in \mathbb{Q}(x)$ be a non-constant rational function. We consider "Waring's Problem for $f(x)$," i.e., whether every element of $\mathbb{Q}$ can be written as a bounded sum of elements of $\{f(a) \mid a \in \mathbb{Q}\}$. For rational functions of degree 2, we give necessary and sufficient conditions. For higher degrees, we prove that every polynomial of odd degree and every odd Laurent polynomial satisfies Waring's Problem. We also consider the "Easier Waring's Problem": whether every element of $\mathbb{Q}$ can be represented as a bounded sum of elements of $\{\pm f(a) \mid a \in \mathbb{Q}\}$. This is a joint work with Michael Larsen.

Zhiyuan LI (SCMS, Fudan Univ.)

Compactification of the moduli space of polarized K3 surfaces via GIT and arithmetic

Abstract: I will talk about the compactification of moduli space of certain polarized K3 surfaces. So far, there exists several compactifications in the moduli theory of K3 surface. The study of connections between them via binational geometry is so called Hassett-Keel-Looijenga program. I will survey the recent progress and talk about an ongoing work in the study of moduli space polarized K3 surfaces of degree 6. The ongoing project is joint with Geer, Laza, Si and Tian.

Wansu KIM (KAIST)

Geometry of Newton Stratification

Abstract: In this talk, Id like to motivate and explain the geometry of the Newton strata in Hodge-type Shimura varieties obtain by me and Paul Hamacher. Well focus on a few motivating examples of the moduli of polarised abelian varieties or K3 surfaces.

Chen JIANG (SCMS, Fudan Univ.)

Birational boundedness of non-canonical Calabi–Yau 3-folds

Abstract: Calabi–Yau varieties and Fano varieties are building blocks of varieties in the sense of birational geometry. They are expected to satisfying certain finiteness. Recent progress on BAB Conjecture shows that certain Fano varieties form a bounded family. We are looking for the analogue for Calabi–Yau varieties. Here we consider very singular Calabi–Yau varieties, that is, Calabi–Yau varieties with non-canonical klt singularities, which are those Calabi–Yau varieties behaving most like Fano. I will show the birational boundedness result for non-canoncal klt Calabi–Yau 3-folds. It is related to Shokurov's conjecture

on minimal log discrepancies of non-canonical singularities. A part of this talk is a joint work with W. Chen, G. Di Cerbo, J. Han, and R. Svaldi.

Jinhyun PARK (KAIST)

K-theory of schemes via formal schemes

Abstract: In this talk, I will present a new way to understand algebraic K-theory of k-schemes via some formal schemes. This description is particularly useful when the schemes admit singularities. I will discuss its connection to a classical problem in algebraic geometry on vector bundles, and explain how this is related to the studies of motivic cohomology of schemes. This talk is based on a joint work with Pablo Pelaez of Universidad Nacional Autonoma de Mexico.

Zhi JIANG (SCMS, Fudan Univ.)

On pluricanonical systems of irregular varieties

Abstract: We will discuss some recent progress on the explicit birationality of pluricanonical maps of some irregular varieties. Part of the talk is based on a joint work with J.A. Chen, J.J. Chen, and M. Chen.

October 11

Quanshui WU (Fudan Univ.)

Filtered Quantization, Skew Calabi-Yau algebras and Poisson algebras

Abstract: Suppose that A is a filtered algebra such that the associated graded algebra gr(A) is commutative Calabi-Yau. Then gr(A) has a canonical Poisson structure with a modular derivation and A is skew Calabi-Yau. We describe a connection between the Nakayama automorphism of A and the modular derivation of gr(A) by using homological determinants. As an application, we prove that the rings of differential operators over smooth affine algebraic varieties are Calabi-Yau. This talk is based on a joint work with Ruipeng Zhu.

Sanghoon BAEK (KAIST)

Noether's problem and unramified cohomology

Abstract: A generalized version of Noether's problem asks whether the classifying space BG of an algebraic group is stably rational and this problem still open for a connected group G over an algebraically closed field. A natural way of attacking the non-rationality is to provide a nontrivial unramified cohomology group. In particular, the unramified cohomology of degree 2, called the unramified Brauer group, has extensively been used for finite groups G. But the cohomology group of degree 2 vanishes for a reductive group G, thus it is essential to understanding the unramified cohomology of degree bigger than 2. In this talk we shall discuss the group of degree 3 unramified cohomology of BG.

October 12

Hyungryul BAIK (KAIST)

Flows and foliations in 3-manifolds and laminar groups

Abstract: Thurston developed the theory of universal circles which connects the theory of codimension-one foliations in 3-manifold and 3-manifolds group actions on the circle. This motivated work of many authors including Calegari, Dunfield, Fenley, Gabai, Kazez, Roberts. We will review the outline of the construction of universal circle when 3-manifold admits a nice foliation or flow, and motivates the theory of laminar groups from the perspective of the universal circle. We will also mention some of the recent developments in this direction.

Zhi LYU (Fudan Univ.)

On orbit braids

Abstract: Let M be a connected topological manifold of dimension at least 2 with an effective action of a finite group G. Associating with the orbit configuration space $F_G(M,n), n \geq 2$ of the G-manifold M, we try to upbuild the theoretical framework of orbit braids in $M \times I$ where the action of G on I is trivial, which contains the following contents: We introduce the orbit braid group $\mathcal{B}_n^{orb}(M,G)$, and show that it is isomorphic to a group with an additional endowed operation (called the extended fundamental group), formed by the homotopy classes of some paths (not necessarily closed paths) in $F_G(M,n)$, which is an essential extension for fundamental groups. The orbit braid group $\mathcal{B}_n^{orb}(M,G)$ is large enough to contain the fundamental group of $F_G(M,n)$ and other various braid groups as its subgroups. Around the central position of $\mathcal{B}_n^{orb}(M,G)$, we obtain five short exact sequences weaved in a commutative diagram. We also analyze the essential relations among various braid groups associated to those configuration spaces $F_G(M,n), F(M,n)$, and $F(M/G,n)$. We finally consider how to give the presentations of orbit braid groups in terms of orbit braids as generators. We carry out our work by choosing $M = \mathbb{C} \approx \mathbb{R}^2$ with typical actions of $\mathbb{Z}_p$ and $(\mathbb{Z}_2)^2$. We obtain the presentations of the corresponding orbit braid groups, from which we see that the generalized braid group $Br(B_n)$ (introduced by Brieskorn) actually agrees with the orbit braid group $\mathcal{B}_n^{orb}(\mathbb{C}\setminus\{0\},\mathbb{Z}_2)$ and $Br(D_n)$ is a subgroup of the orbit braid group $\mathcal{B}_n^{orb}(\mathbb{C},\mathbb{Z}_2)$. This talk is based upon a joint work with Hao Li and Fengling Li.