

BICMR-TOKYO ALGEBRAIC GEOMETRY WORKSHOP

Sho Ejiri

Title: Iitaka's conjecture for 3-folds in positive characteristic

Abstract: Iitaka's conjecture is one of the most important conjectures on algebraic fiber spaces. In this talk, we prove this conjecture in the case when total spaces are 3-folds and characteristics are larger than 5. Our proof uses the weak positivity of (some subbundles of) direct image sheaves of powers of relative canonical bundles. This is a joint work with Lei Zhang.

Baohua Fu

Title: In Search of Isolated Symplectic Singularities

Abstract: An isolated symplectic singularity is either an ADE surface singularity or a normal isolated singularity of dimension at least four whose smooth part carries a symplectic form. Previous known examples are nite quotient of \mathbb{C}^{2n} or minimal nipotent orbit closures in simple Lie algebras. These singularities have strong relationship with for example the LeBrun-Salomon conjecture on Fano contact manifolds. I'll report on our attempts (joint with D. Juteau, P. Levy and E. Sommers) in search of new isolated symplectic singularities.

Yoshinori Gongyo

Title: On log Calabi–Yau structure of varieties admitting polarized endomorphism

Abstract: I will discuss the log Calabi–Yau structure of varieties admitting polarized endomorphism. This is motivated in local theory for isolated singularities. I will talk from more global side. This talk is based on a joint work with Amael Broustet.

Chen Jiang

Title: On alpha-invariants of Fano varieties

Abstract: Alpha-invariants was introduced by Tian in order to investigate the existence of Kähler-Einstein metrics on Fano manifolds. I will discuss recent progress on alpha-invariants and their relation with K-stability and boundedness of Fano varieties.

Yujiro Kawamata

Title: Birational geometry and derived categories

Abstract I will talk about the recent progress on the DK conjecture connecting birational geometry and the derived categories, and related conjectures such as DL conjecture, etc. I will also discuss two kinds of factorizations of birational maps; those into flips, flops and divisorial contractions according to the minimal model program, and more traditional factorizations into blow-ups and blow-downs with smooth centers.

Zhan Li

Title: A construction of non-commutative mirror symmetry and derived equivalences

Abstract: I will explain a construction of non-commutative Calabi-Yau varieties. The motivations for such construction are twofold: first, it generalizes the classical Batyrev-Borisov mirror symmetry construction to non-commutative setting; second, it unifies many sporadic examples of derived equivalent non-commutative varieties. This construction is conjectured to give mirror pairs. As a first test, we show their derived equivalences. This work is partially joint with Lev Borisov.

Wenfei Liu

Title: The minimal volume of stable log surfaces with positive geometric genus

Abstract: Originally introduced to compactify the moduli spaces of surfaces of general type, stable surfaces form now an important class of objects in surface theory. The volumes of stable surfaces, being positive rational numbers, satisfy the descending chain condition by a deep result of Alexeev. In particular, there is a minimum for any subset of volumes of stable surfaces. It is thus an

interesting question to find out the minimum of volumes for naturally appearing families of stable surfaces.

This talk is about stable surfaces with a (possibly empty) reduced boundary, called stable log surfaces. I will report on my recent work about the minimal volume of stable log surfaces with positive geometric genus, which extends Tsunoda–Zhang’s Noether type inequality for normal stable log surfaces.

Yusuke Nakamura

Title: A rational points formula on singular Fano threefolds over a finite field.

Abstract: Esnault proved that smooth Fano varieties defined over a finite field have a rational point. In this talk, I will discuss some generalization on singular Fano threefolds. This is joint work with Yoshinori Gongyo and Hiromu Tanaka.

Qizheng Yin

Title: Cycles on K3 surfaces and hyper-khler varieties via Gromov-Witten theory

Abstract: Using virtual class techniques in Gromov-Witten theory, we obtain a decomposition of the small diagonal for the universal family of K3 surfaces, thus generalizing a theorem of Beauville and Voisin for a fixed K3 surface. The universal decomposition plays a key role in the proof of the Marian-Oprea-Pandharipande conjecture on the tautological ring of the moduli of K3 surfaces. This is joint work with Rahul Pandharipande.

If time permits, I will also speculate possible uses of Gromov-Witten virtual classes in studying cycles on hyper-Kähler varieties.

Lei Zhang

Title: Birational characterization of Abelian varieties in positive characteristic

Abstract: A smooth projective variety X with maximal Albanese dimension and Kodaira dimension zero is expected to be birationally equivalent to an abelian variety, which plays a fundamental role in studying irregular variety. This was proved by Kawamata and Viehweg about 40 years ago in characteristic zero. Recently joint with Hacon and Patakfalvi, we can prove this result in characteristic $p > 0$. In this talk, we will explain the idea of the proof in an elementary language. In particular we will discuss a property of a sheaf on an abelian variety slightly weaker than generic vanishing, which unfolds the generic vanishing result proposed by Hacon and Patakfalvi.