

Welcome to

Tianyuan Workshop: Algebraic Geometry

September 1st – 5th, 2025

Invited Speakers

JIANG, Chen (江辰), Fudan University

LIN, Hsueh-Yung (林學庸), National Taiwan University

MA, Linqun (马临全), Purdue University

OU, Wenhao (欧文浩), AMSS

YOBUKO, Fuetaro, (呼子笛太郎), Tokyo University of Science

Organizers

LI, Zhiyuan (李志远), SCMS

FU, Baohua (付保华), AMSS

Schedule

	9.1 (Mon.)	9.2 (Tue.)	9.3 (Wed.)	9.4 (Thu.)	9.5 (Fri.)
9:30-10:30	W. Ou	W. Ou	L. Ma*	L. Ma*	L. Ma*
11:00-12:00	F. Yobuko	F. Yobuko	W. Ou	F. Yobuko	
12:00-14:00	Lunch Break				
14:00-15:00	Z. Jiang	C. Jiang		H. Zou	
15:30-16:30	L. Zhang	H. Lin*		H. Lin*	
17:00-18:00	Free Discussion				

*: Online talks

Lin:

<https://uni-bielefeld.zoom-x.de/j/64648326615?pwd=obkvbrAatHCowpmO4k8rNUU8xgYUa6.1>

Ma:

<https://uni-bielefeld.zoom-x.de/j/64533078023?pwd=Gb8W6ldLjWG51h1OvaZXd9gRfc2vD8.1>

Notes:

1. Wednesday afternoon will be free. We plan to organize some activities, such as hiking, if the weather permits.
2. All talks will conclude after the Friday morning sessions, so you may travel home on Friday afternoon. Of course, discussion sessions can continue that afternoon as you want.

Abstract(s)

JIANG, Chen

Title: *Positivity in hyperkähler manifolds via Rozansky—Witten theory*

Abstract: For a hyperkähler manifold X of dimension $2n$, Huybrechts showed that there are constants a_0, a_2, \dots, a_{2n} such that

$$\chi(L) = \sum_{i=0}^n \frac{a_{2i}}{(2i)!} q_X(c_1(L))^i$$

for any line bundle L on X , where q_X is the Beauville-Bogomolov-Fujiki quadratic form of X . Here the polynomial $\sum_{i=0}^n \frac{a_{2i}}{(2i)!} q^i$ is called the Riemann--Roch polynomial of X .

In this talk, I will discuss recent progress on the positivity of coefficients of the Riemann--Roch polynomial and also positivity of Todd classes. Such positivity results follow from a Lefschetz-type decomposition of the root of Todd genus via the Rozansky—Witten theory.

LIN, Hsueh-Yung

Title: *The MRC-dimension of motivic invariants of birational automorphisms*

Abstract: Let k be a field of characteristic zero. For any geometrically integral k -variety B of positive dimension, we construct a series of birational automorphisms of $X = \mathbb{P}^3 \times B$ such that the MRC-bases of their motivic invariants have maximal dimension (equal to $\dim X - 2$). Using this, we prove the unboundedness of motivic invariants of the Cremona group $\text{Bir}(\mathbb{P}^n)$ for $n \geq 4$. We also show that de Jonquière maps do not generate $\text{Bir}(\mathbb{P}^n)$, reproving a

result of Blanc-Lamy-Zimmermann for $n \geq 4$. (Joint work in progress with E. Shinder.)

MA, Linqun

Title: *Singularities in mixed characteristic birational geometry*

Abstract: We give an overview on recent development of singularity theory in mixed characteristic. We first review the singularities in equal characteristic (MMP singularities and F-singularities). We then give their mixed characteristic counterparts and show their relationships with the equal characteristic definition. Finally, we include some applications.

OU, Wenhao

Title: *Foliations on compact Kaehler manifolds*

Abstract: In these lectures, we will study criteria for foliations on compact Kaehler manifolds which are induced by meromorphic maps.

In the first one, we will recall some basic notions, such as analytic graphs of foliations, cycle spaces of Kaehler manifolds, and so on.

In the second one, we will review some notions in complex analytic geometry, and compare them with their counterpart in algebraic geometry

In the third one, we will prove a criterion for foliations induced by meromorphic maps, and show its application on characterizations of uniruled Kaehler manifolds.

YOBUKO, Fuetaro

Title: *Quasi-F-splitting*

Abstract: In this talk, I will introduce the notion of quasi-F-splitting, which is an extension of F-splitting. I will then explain its relation to the Artin–Mazur height of Calabi–Yau varieties, liftability to mod p^2 and Kodaira-type vanishing results.

Title: *Quasi-F-splitting and singularities*

Abstract: I will explain the relationship between quasi-F-splitting of singularities and klt singularities, especially in dimensions two and three. This is joint work with Kawakami, Takamatsu, Tanaka, Witaszek, and Yoshikawa.

Title: *Iterated quasi-F-splitting and quasi-F-regularity*

Abstract: I will introduce the notion of quasi-F-regularity, which is an extension of F-regularity. I will also explain the notion of the quasi-test ideal of singularities. This is joint work with Kawakami, Takamatsu, Tanaka, Witaszek, and Yoshikawa.

JIANG, Zhi and ZHANG, Lei

Title: *Generic vanishing in positive characteristic*

Abstract: Generic vanishing theory over the field of complex numbers was established by Green and Lazarsfeld thirty years ago and has since become a powerful tool in the study of irregular varieties. In positive characteristic, Hacon and Patafalvi also proved a generic vanishing theorem. Recently, J. Baudin refined this result and provided a conceptual generalization. In this report, we present Baudin’s recent work and discuss its potential further applications.

ZOU, Haitao

Title: *Galois representations arising from hyper-Kähler varieties*

Abstract: Hyper-Kähler varieties, closely related to abelian varieties and K3 surfaces, have attracted increasing attention in both algebraic and arithmetic geometry in recent years. In this talk, I will survey some notable features of the Galois representations associated with hyper-Kähler varieties. I will also present an arithmetic analogue of Nagai's conjecture for hyper-Kähler varieties, based on joint work with Kazuhiro Ito, Tetsushi Ito, Teruhisa Koshikawa, and Teppei Takamatsu.