

Southeastern Algebraic Geometry Symposium VIII

June 9–13, 2025 *

Southern University of Science and Technology (SUSTech), Shenzhen, China

Overview

The **Southeastern Algebraic Geometry Symposium VIII** will take place from **Monday, June 9 to Friday, June 13, 2025** at the **Southern University of Science and Technology (SUSTech)**, Shenzhen.

This handbook contains important details about the schedule, venue, registration, accommodation, and transportation. It will be updated periodically and finalized before the conference date.

Organizers

- Zhan Li (SUSTech), lizhan@sustech.edu.cn

Venue

- **June 9–11:** Science Building, Room M1001
- **June 12–13:** Taizhou Building (International Center for Mathematics) ICM Lecture Hall 240 A

Important Timeline

- **Banquet:** Tuesday evening (June 10)
Leaving at 5:20pm from the campus, walking to the Baoneng Mall (Restaurant name: Zhong Fa Yuan)
- **Free afternoon:** Thursday (June 12)
- **Free discussion:** Friday (June 13)
(One can use Science Building, Room M3009, 9:00-17:00).

Registration

The deadline for registration is **May 20th, 2025**.

Note: Invited speakers do *not* need to fill in the registration form. Accommodation has been reserved for speakers from **June 8 (check-in)** to **June 14 (check-out)**. If your travel plans differ, please contact the organizer as soon as possible.

*Last Updated: June 6th, 2025

Hotel Information

Vienna Best Sleep International Hotel (Shenzhen Tanglang Metro Station)

Google map: <https://maps.app.goo.gl/kKvkie1qp4Dw1bFQA>

Baidu map: <https://j.map.baidu.com/bd/74>

(The hotel is not next to the street, you need to go inside approximately 10 meter, and there will be a gate for guests.)

(i) It takes approximately 50 minutes and costs around 70 RMB to get from Shenzhen Bao'an Airport to the hotel. I recommend taking a taxi from outside Gate 13 of the airport. The taxis there use meters, so you can rest assured that you will be charged a fair rate. Please show the following message to the taxi driver:

“Please take me to the Vienna Best Sleep International Hotel (Shenzhen Tanglang Metro Station).”

请送我去：维也纳好眠国际酒店(塘朗地铁站店)

(ii) At check-in, please let the front desk know that you are attending the conference, or present the following information in Chinese:

我参加东南代数几何会议，预定人李展

(iii) Graduate students will be accommodated in double rooms (2 persons per room). The remaining attendees will be accommodated in single rooms. All rooms include breakfast.

Payment and SIM card

You can make payments using cash or by scanning a QR code. We recommend using the app **Alipay**, where you can link your credit card for convenient e-payment. If you're using a SIM card from your home country, you should still be able to access apps from home, such as Gmail and Google Maps.

Enter the Campus

There will be a shuttle service to take participants from the hotel to the campus each day (leave at 8:30am from the parking lot of the hotel). For registered participants, you can also go to the campus on your own (we have provided your name to the campus guards).

SOUTHEASTERN ALGEBRAIC GEOMETRY SYMPOSIUM VIII

9 JUNE – 13 JUNE 2025

LOCATION: SCIENCE BUILDING M1001 (JUNE 9–11);
TAIZHOU BUILDING (INTERNATIONAL CENTER FOR MATHEMATICS) ICM LECTURE
HALL 240 A (JUNE 12)

Monday, 9 June

Morning Session

Chair: Zhan Li

- 09:00–10:00** Speaker: Chuyu Zhou
Title: Non-linear wall crossing for K-stability
- 10:00–10:30** Tea Break
- 10:30–11:30** Speaker: Zheng Hua
Title: Symplectic foliations of grassmannian

Afternoon Session

Chair: Bingyi Chen

- 13:00–14:00** Speaker: Zheng Zhang
Title: On the K-moduli of cubic hypersurface pairs
- 14:00–14:30** Tea Break
- 14:30–15:30** Speaker: Jihao Liu
Title: Abundance conjecture when $\nu \leq 1$
- 15:30–16:00** Tea Break
- 16:00–17:00** Speaker: Zhixin Xie
Title: On the relative cone conjecture for families of hyperkähler manifolds

Tuesday, 10 June

Morning Session

Chair: Changzheng Li

- 09:00–10:00** Speaker: Florin Ambro
Title: Classification of toric surface singularities
- 10:00–10:30** Tea Break and Group Photo
- 10:30–11:30** Speaker: Vladimir Lazić
Title: On the Cone conjecture beyond the trivial canonical class

Afternoon Session

Chair: Cong Ding

- 13:00–14:00** Speaker: Chengxi Wang
Title: K-moduli spaces of certain families of weighted projective hypersurfaces and the structure of wall-crossing
- 14:00–14:30** Tea Break
- 14:30–15:30** Speaker: Chen Jiang
Title: Stability of syzygy bundles on varieties of Picard number one
- 15:30–16:00** Tea Break
- 16:00–17:00** Speaker: Hao Sun
Title: Existence of Higgs-de Rham flow for principal G -bundles

Wednesday, 11 June

Morning Session

Chair: Xiaowen Hu

09:00–10:00 Speaker: Yuri Prokhorov
Title: Conic bundle structures on singular Fano 3-folds

10:00–10:30 Tea Break

10:30–11:30 Speaker: Lei Song
Title: Syzygies of ample line bundles on abelian surfaces

Afternoon Session

Chair: Renjie Lv

13:00–14:00 Speaker: Kenta Hashizume
Title: On minimal model program for log canonical pairs in complex analytic setting

14:00–14:30 Tea Break

14:30–15:30 Speaker: Zhengyu Hu
Title: Zariski decompositions and MMP for generalized pairs

15:30–16:00 Tea Break

16:00–17:00 Speaker: Lu Qi
Title: Stable degeneration of Fano fibration germs

Thursday, 12 June (change location to Taizhou Building (International Center for Mathematics) ICM Lecture Hall 240 A)

Morning Session

Chair: Wenfei Liu

09:00–10:00 Speaker: Sung Rak Choi
Title: A valuative approach to the $-K$ -MMP

10:00–10:15 Tea Break

10:15–11:15 Speaker: Yusuke Nakamura
Title: A counterexample to the PIA conjecture

11:15–11:30 Tea Break

11:30–12:30 Speaker: Zhiyu Tian
Title: A simple remark on a conjecture of Suslin

Friday, 13 June

Free discussions (Science Building, Room M3009, 9:00-17:00).

Titles and Abstracts

Title: Non-linear wall crossing for K-stability

Speaker: Chuyu Zhou

Abstract: In this talk, I will present the abstract theory of wall crossing phenomenon for K-moduli, with an emphasize on non-linear setting. In particular, we will produce a semi-algebraic chamber decomposition to control the variation of K-stability and K-moduli. In the process, the K-moduli theory with real coefficients is needed to complete the picture. Joint with Yuchen Liu.

Title: Symplectic foliations of grassmannian

Speaker: Zheng Hua

Abstract: We will construct a class of Poisson structures on grassmannian by realizing grassmannian as a certain moduli space of coherent systems on a degeneration of elliptic curve. Such a moduli space is equipped with a natural Poisson structure whose symplectic leaves are indexed by certain vector bundles on the curve. This generalizes the well known Richardson stratification on grassmannians.

Title: On the K-moduli of cubic hypersurface pairs

Speaker: Zheng Zhang

Abstract: A cubic hypersurface pair consists of a cubic hypersurface and a hyperplane section. In this talk, I will explain the following results. (1) Martinez-Garcia, Papazachariou and Zhao have shown that the K-moduli of cubic surface pairs (S, cE) is isomorphic to a GIT compactification. We give a uniformization of a certain K-moduli as the Baily-Borel compactification of a ball quotient. (2) We also show that the K-moduli of cubic threefold pairs (X, cD) is isomorphic to a GIT compactification. This is joint work in preparation with Fei Si.

Title: Abundance conjecture when $\nu \leq 1$

Speaker: Jihao Liu

Abstract. In a recent joint work with Zheng Xu, we show that the non-vanishing conjecture implies the abundance conjecture when $\nu \leq 1$. We also prove the abundance conjecture in dimension ≤ 5 when $\kappa \geq 0$ and $\nu \leq 1$ unconditionally. I will discuss this work in my talk.

Title: On the relative cone conjecture for families of hyperkähler manifolds

Speaker: Zhixin Xie

Abstract: The Kawamata-Morrison cone conjecture predicts the geometry of the nef cone and the movable cone of a variety with trivial canonical class. In this talk, we will discuss families of varieties with trivial canonical class and vanishing irregularity. We will study the relative nef cone and the relative movable cone of such families, using machinery from the Minimal Model Program. As application, we will show the relative cone conjecture for families whose very general fibre is a projective hyperkähler manifold of one of the known deformation types. This is joint work with Andreas Höring and Gianluca Pacienza.

Title: Classification of toric surface singularities

Speaker: Florin Ambro

Abstract: In the search of minimal models, singularities appear inevitably. Explicit classification of these singularities is possible in small dimension, with important global applications. In higher dimension, explicit classification is considered hopeless, expecting instead qualitative results on invariants of singularities, such as the minimal log discrepancy, or the index of complements. I will survey the above in the first half of the talk. In the latter half, I will discuss a new qualitative classification of toric surface singularities.

Title: On the Cone conjecture beyond the trivial canonical class

Speaker: Vladimir Lazić

Abstract: In this talk I will discuss a possible extension of the Cone conjecture beyond the case of klt Calabi-Yau pairs. This is joint work in progress with Isabel Stenger and Zhixin Xie.

Title: K-moduli spaces of certain families of weighted projective hypersurfaces and the structure of wall-crossing

Speaker: Chengxi Wang

Abstract: In the talk, we will consider the K-moduli spaces of hypersurfaces of degree $2(n+3)$ in weighted projective spaces $\mathbf{P}(1, 2, n+2, n+3)$. We give an explicit description of the wall crossing for K-moduli spaces M_w of certain log Fano pairs with coefficient w whose double cover gives the weighted hypersurface. By this description, we show that the K-polystable limits of these weighted hypersurfaces are also weighted hypersurfaces of the same degree in the same weighted projective space. Furthermore, we obtain that the wall crossing of M_w coincides with variation of GIT except at the last K-moduli wall which gives a divisorial contraction. Our K-moduli spaces provide new birational models for some natural loci in the moduli space of marked hyperelliptic curves. This is based on my work with In-Kyun Kim and Yuchen Liu.

Title: Stability of syzygy bundles on varieties of Picard number one

Speaker: Chen Jiang

Abstract: We give a criterion for slope-stability of the syzygy bundle of a globally generated ample line bundle on a smooth projective variety of Picard number 1 in terms of Hilbert polynomial. As applications, we prove the stability of syzygy bundles on many varieties, such as smooth Fano or Calabi-Yau complete intersections and hyperkähler varieties.

Title: Existence of Higgs-de Rham flow for principal G -bundles

Speaker: Hao Sun

Abstract: The theory of Higgs-de Rham flow is established and developed by Lan-Sheng-Zuo, which is based on the nonabelian Hodge correspondence in positive characteristic given by Ogus-Vologodsky and iterated destabilizing modifications given by Simpson. In this talk, I will discuss how to construct Higgs-de Rham flow for principal G -bundles. This is joint work with Mao Sheng and Jianping Wang.

Title: Conic bundle structures on singular Fano 3-folds

Speaker: Yuri Prokhorov

Abstract: We discuss certain sufficient conditions of the existence of birational conic bundle structures on Fano 3-folds with terminal singularities. As an application we prove non-rationality of some such Fano 3-folds, which are very close to rational ones.

Title: Syzygies of ample line bundles on abelian surfaces

Speaker: Lei Song

Abstract: Cohomological rank functions on polarized abelian varieties were introduced by Jiang and Pareschi. In particular, the first cohomological rank function of the ideal sheaf of a point is closely related to the syzygies of ample line bundles. Using Bridgeland stability conditions, Lahoz and Rojas defined Chern degree functions on polarized surfaces and showed these coincide with the cohomological rank functions for abelian surfaces. Employing this perspective, we sharpen results of Ito and of Rojas concerning the syzygies of ample line bundles on abelian surfaces, and affirmatively answer a question of Gross and Popescu. This is joint work in progress with Chunyi Li and Xiao Wang.

Title: On minimal model program for log canonical pairs in complex analytic setting

Speaker: Kenta Hashizume

Abstract: Remarkable progress has been made in recent years in the field of the minimal model theory for complex algebraic varieties. The first breakthrough was brought by Birkar, Cascini, Hacon and McKernan. In 2022, Fujino generalized their results to projective morphisms between complex analytic spaces. This is the first step of the minimal model theory in the complex analytic setting. In this talk, I will introduce recent progress of the minimal model theory for log canonical pairs in complex analytic setting. This talk contains joint works with Makoto Enokizono.

Title: Zariski decompositions and MMP for generalized pairs

Speaker: Zhengyu Hu

Abstract: I will discuss the study of Zariski decompositions for klt generalized pairs (if exists). To generalize the study to generalized dlt pairs, I will introduce a type of MMP which preserves the Zariski decomposition, as well as a finiteness theorem. As an application I will talk some of my recent progresses.

Title: Stable degeneration of Fano fibration germs

Speaker: Lu Qi

Abstract: Fano fibrations can be viewed as an interpolation between Fano varieties and klt singularities, for which MMP-type contractions provide more examples. In this talk, we will report some progress on the stable degeneration for Fano fibration germs, recently conjectured by Sun-Zhang. If time permits, we will also discuss some boundedness results for Fano fibrations together with potential applications in the minimal model program. Based on a series of ongoing work joint with Jingjun Han, Jiyuan Han, Minghao Miao, Linsheng Wang, Tong Zhang and Ziquan Zhuang.

Title: A valuative approach to the $-K$ -MMP

Speaker: Sung Rak Choi

Abstract: We study the geometry of the triples which consist of a usual pair and a pseudo-effective divisor. We prove that there exists a quasi-monomial valuation which computes the log canonical threshold of the triple if the triple is potentially klt. As a by-product, we show that in such a case, we can run the $-K$ -MMP. This is based on the joint work with S.Jang, D.Kim, and D.Lee.

Title: A counterexample to the PIA conjecture

Speaker: Yusuke Nakamura

Abstract: In this talk, I will give a counterexample to the PIA (precise inversion of adjunction) conjecture for MLD's (minimal log discrepancy). The usual inversion of adjunction is a type of claim "the information of the singularity of a pair (X, D) can be recovered from the information of the singularity of D ". The precise version (PIA conjecture) states that this is correct at the level of MLD (minimal log discrepancy), the invariant of the singularity. The PIA conjecture is known to be true in dimension 3. In this talk, I will give a counterexample in dimension 5. This talk is based on joint work with Kohsuke Shibata.

Title: A simple remark on a conjecture of Suslin

Speaker: Zhiyu Tian

Abstract: Suslin made a conjecture on Lawson homology, which is an integral analogue of the conjecture of Bloch-Kato and Milnor (theorem of Voevodsky). I will discuss the first open case of the conjecture for one-cycles on threefolds.