Conference on Recent Progress in Algebraic Geometry

East China Normal University, Shanghai

2025.10.15 – 2025.10.19

華東師範大學 | 数学科学学院

School of Mathematical Sciences,East China Normal University

Speakers

Izzet Coskun	*University of Illinois Chicago*
Laura Costa	*Universitat de Barcelona*
Yong Hu	*Shanghai Jiao Tong University*
Sukmoon Huh	*Sungkyunkwan University*
Chen Jiang	*Fudan University*
Haidong Liu	*Sun Yat-sen University*
Yujie Luo	*National University of Singapore*
Ngaiming Mok	*Hong Kong University*
Gianluca Occhetta	*University of Trento*
Yury Prokhorov	*HSE University*
Lu Qi	*East China Normal University*
Konstantin Shramov	*HSE University*
Xiaotao Sun	*Tianjin University*
Long Wang	*SIMIS*
Guolei Zhong	*IBS- CCG*
Kang Zuo	*Wuhan University*

Organizing Committee

Rong Du, Jun Lu, Xin Lü, Sheng Meng, Lu Qi, Shengli Tan, Tong Zhang

Contact

Sheng Meng (smeng@math.ecnu.edu.cn)

Schedule

Oct 14th : Registration

Oct 15th Wed

Time	Title	Chair
8:20	Bus pick-up, from Powerlong Artels+ Hotel to department	
8:55-9:00	Opening	
9:00-10:00	Ngaiming Mok: Recognition problems on uniruled projective manifolds and an application to semi-rigidity in several complex variables	Bo Liu
10:00-10:30	Tea break & Group photo	
10:30-11:30	Kang Zuo: p-adic Simpson correspondence and Grothendieck anabelian geometry	Bo Liu
11:45	Bus pick-up, from Math Building to Powerlong Artels+ Hotel	
11:45-13:30	Lunch Break	
13:30	Bus pick-up, from Powerlong Artels+ Hotel to department	
14:00-15:00	Lu Qi: Boundedness in general type MMP and K-stability	Ngaiming Mok
15:00-15:30	Tea break	
15:30-16:30	Guolei Zhong: Holomorphic symplectic geometry of elliptic surfaces	Ngaiming Mok
17:00	Bus pick-up, from Math Building to Powerlong Artels+ Hotel	
17:30-19:00	Dinner	

Oct 16th Thu

Time	Title	Chair
8:20	Bus pick-up, from Powerlong Artels+ Hotel to department	
9:00-10:00	Yury Prokhorov: Birational transformations of Q-conic bundles	Tong Zhang
10:00-10:30	Tea break	

10:30-11:30	Sukmoon Huh: Resolving a rational map on the space of plane cubics	Tong Zhang
11:45	Bus pick-up, from Math Building to Powerlong Artels+ Hotel	
11:45-13:30	Lunch Break	
13:30	Bus pick-up, from Powerlong Artels+ Hotel to department	
14:00-15:00	Konstantin Shramov: Pluricanonical fibrations of compact complex manifolds	Yun Gao
15:00-15:30	Tea break	
15:30-16:30	Long Wang:Approaches to the Kawaguchi-Silverman conjecture	Yun Gao
17:00	Bus pick-up, from Math Building to Faculty hotel	
17:30-19:00	Dinner	
19:00	Bus pick-up, from Faculty hotel to Powerlong Artels+ Hotel	

Oct 17th Fri

Time	Title	Chair
8:20	Bus pick-up, from Powerlong Artels+ Hotel to department	
9:00-10:00	Izzet Coskun: Brill-Noether Theory for moduli spaces of sheaves on surfaces	Rong Du
10:00-10:30	Tea break	
10:30-11:30	Haidong Liu: Degrees of canonical Fano threefolds	Rong Du
11:45	Bus pick-up, from Math Building to Powerlong Artels+ Hotel	
11:45-13:30	Lunch Break	
13:30	Bus pick-up, from Powerlong Artels+ Hotel to Zhujiajiao	
14:00-17:30	Free discussion & Zhujiajiao Ancient Town 朱家角 https://www.zhujiajiao.com/en/	
17:30-19:00	Dinner	

Oct 18th Sat

Time	Title	Chair
8:20	Bus pick-up, from Powerlong Artels+ Hotel to department	
9:00-10:00	Xiaotao Sun: Globally F-regularity of moduli spaces of parabolic bundles	Xin Lü
10:00-10:30	Tea break	
10:30-11:30	Laura Costa: Brill-Noether theory of stable bundles on ruled varieties	Xin Lü
11:45	Bus pick-up, from Math Building to Powerlong Artels+ Hotel	
11:45-13:30	Lunch Break	
13:30	Bus pick-up, from Powerlong Artels+ Hotel to department	
14:00-15:00	Yong Hu: Moduli spaces of threefolds on the Noether line	Fei Hu
15:00-15:30	Tea break	
15:30-16:30	Yujie Luo: Morphisms from a very general hypersurface	Fei Hu
17:00	Bus pick-up, from Math Building to Powerlong Artels+ Hotel	
17:30-19:00	Dinner	

Oct 19th Sun

Time	Title	Chair
8:20	Bus pick-up, from Powerlong Artels+ Hotel to department	
9:00-10:00	Chen Jiang: Fano indices of canonical Fano 3-folds	Sheng Meng
10:00-10:30	Tea break	
10:30-11:30	Gianluca Occhetta:The secret birational life of flags	Sheng Meng
11:45	Bus pick-up, from Math Building to Powerlong Artels+ Hotel	
11:45-13:30	Lunch Break	
	END	

Abstracts

Brill-Noether Theory for moduli spaces of sheaves on surfaces

Izzet Coskun

University of Illinois Chicago

In this talk, I will survey aspects of Brill-Noether theory for moduli spaces of sheaves on surfaces. I will first discuss the cohomology of the general stable sheaf on surfaces such as Hirzebruch, K3 and abelian surfaces. I will then describe some recent results on the cohomology jumping loci. This talk is based on joint work with Jack Huizenga, Howard Nuer, Neelarnab Raha and Kota Yoshioka.

Brill-Noether theory of stable bundles on ruled varieties

Laura Costa

Universitat de Barcelona

Let X be a smooth projective variety of dimension n over an algebraically closed field K of characteristic 0 and H an ample divisor on X. Consider $M_H = M\{X, H\}(r; c_1, \ldots, c_s)$ the moduli space of H-stable rank-r vector bundles on X with fixed Chern classes $c_i(E) := c_i$ for $i = 1, \ldots, s := \min\{r, n\}$. One way to study the geometry of the moduli space M_H is by considering its subvarieties. In particular, one can consider the subvarieties called Brill-Noether loci, whose points are the stable vector bundles having at least k independent sections. In this talk, we will focus the attention on the non-emptiness of Brill-Noether locus in the case when X is a ruled surface and a ruled 3-fold.

Moduli spaces of threefolds on the Noether line

Yong Hu

Shanghai Jiao Tong University

In this talk, we will introduce the 3-dimensional Noether inequality and completely classify the canonical threefolds on the Noether line with $p_g \geq 5$ by studying their moduli spaces. For every such moduli space, we establish an explicit stratification, estimate the number of its irreducible components and prove the dimension formula. A new and unexpected phenomenon is that the number of irreducible components grows linearly

with the geometric genus, while the moduli space of canonical surfaces on the Noether line with any prescribed geometric genus has at most two irreducible components of the same dimension. This is a joint work with S.Coughlan, R.Pignatelli and T.Zhang.

Resolving a rational map on the space of plane cubics

Sukmoon Huh

Sungkyunkwan University

The family of plane cubic curves is parametrized by the projective space of dimension nine. The assignment to a plane cubic curve its Hessian cubic is a $3-1$ map. The Hessian cubic comes with a non-trivial 2-torsion divisor class, and it allows one to represent the Hessian as the symmetric determinant of a net of cubics. This defines a birational map from the projective space to the Grassmannian $G(3,6)$. We use the notion of net logarithmic sheaves to describe this picture and resolve the birational map. This is a joint work with Simone Marchesi and Joan Pons-Llopis.

Fano indices of canonical Fano 3-folds

Chen Jiang

Fudan University

We show that the Q-Fano index of a canonical weak Fano 3-fold is at most 66. This upper bound is optimal and gives an affirmative answer to a conjecture of Chengxi Wang in dimension 3. During the proof, we establish a new Riemann--Roch formula for canonical 3-folds and provide a detailed study of non-isolated singularities on canonical Fano 3-folds, concerning both their local and global properties. Our proof also involves a Kawamata--Miyaoka type inequality and geometry of foliations of rank 2 on canonical Fano 3-folds. This is a joint work with Haidong Liu.

Degrees of canonical Fano threefolds

Haidong Liu

Sun Yat-sen University

Some invariants such as Picard numbers, degrees, Fano indices, play important roles in the classification of Fano threefolds with mild singularities. In this talk, I will show that the optimal upper bound of degrees of canonical Fano threefolds with Picard number 1 is 72. This is a joint work with Chen Jiang and Jie Liu.

Morphisms from a very general hypersurface

Yujie Luo

National University of Singapore

Let X be a very general hypersurface of degree d in the projective $(n+1)$-space with $n \geq 3$, and $f: X \to Y$ a non-birational surjective morphism to a normal projective variety Y. We first prove that Y is rationally connected. Next, we prove that Y is a Fano variety provided that either Y has only canonical singularities or $\deg f \geq C$ for some constant $C = C(n,d)$ depending only on n and d. Furthermore, we show that if the degree of f is prime and large then Y is isomorphic to the projective n-space. This is joint work with Yongnam Lee and De-Qi Zhang.

Recognition problems on uniruled projective manifolds and an application to semi-rigidity in several complex variables

Ngaiming Mok

Hong Kong University

The geometric theory of uniruled projective manifolds introduced by Hwang-Mok revolves around the notion of the variety of minimal rational tangents (VMRT), i.e., the collection at a general point of tangents to *minimal rational curves*. With an aim to schematize the proof of rigidity under Kähler deformation, I formulated the *recognition problem* on rational homogeneous manifolds X of Picard number 1 in VMRTs, viz., the question of recognizing a rational homogeneous manifold $X = G/P$ of Picard number 1 by its VMRT at a *general* point. In works with J. Hong on mappings and Y. Zhang on geometric substructures I formulated a relative version of the recognition problem for *admissible* pairs (X_0, X) consisting of rational homogeneous manifolds $X_0 \subset X$ of Picard number 1, including those defined by marked Dynkin subdiagrams. The pair (X_0, X) is said to be rigid whenever the inclusion $\mathcal{C}_0(X_0) \subset \mathcal{C}_0(X) \subset \mathbb{P}T_0X$ at a *general* point determines the pair. This problem has at its origin the problem of Schur rigidity in relation to Schubert differential systems first studied by Walters and Bryant in the Hermitian symmetric case.

It turns out that, for applications to several complex variables, it is necessary to study the rigidity problem for certain admissible pairs (X_0, X) of non-subdiagram type. With this background I will introduce the semi-rigidity theorem of Kim-Mok-Seo (2025) characterizing proper holomorphic maps $f: \Omega \to \Omega'$ between certain classical symmetric domains Ω and Ω' of rank r resp. r' satisfying $r \geq 2$ and $r' < 2r - 1$, proving a well-known conjecture confirming *semi-rigidity* of such maps in these cases. Our proof exploits a combination of techniques from several complex variables (Mok-Tsai), CR-geometry (Kim, Kim-Zaitsev) and the geometric theory of uniruled projective manifolds. I will focus on the most difficult case of proper holomorphic maps from a type-III domain (i.e., biholomorphically the Siegel upper half-plane) to a type-I domain, which necessitates the solution of Hwang-Li (2021) of the recognition problem for *symplectic Grassmannians* and a technique of proving rigidity of admissible pairs of *non-subdiagram* type using the theory of sub-VMRT structures, especially the *thickening lemma* applied to the transport of geometric substructures along minimal rational curves.

The secret birational life of flags

Gianluca Occhetta

University of Trento

I will show how to construct the Chow quotient of the complete flag variety of linear subspaces of the three dimensional complex projective space by its maximal torus, proving that it is smooth and a Mori Dream Space, and describing in detail its rich birational geometry. This is a joint work with Lorenzo Barban and Luis Eduardo Solá Conde.

Birational transformations of Q-conic bundles

Yury Prokhorov

HSE University

A Q-conic bundle is a contraction $f: X \to Z$ of a threefold with only terminal singularities to a surface such that the anticanonical divisor $-K_X$ is f-ample and the relative Picard number $\rho(X/Z)$ equals 1. In my talk I introduce several important classes of elementary birational transformations that improve the singularities of the underlying variety X, as well as, the singularities of linear systems on X. These transformations are naturally appear as steps of the Sarkisov program.

Boundedness in general type MMP and K-stability

Lu Qi

East China Normal University

In this talk, I will discuss how to apply the local theory of K-stability to obtain some boundedeness results in the Minimal Model Program for general type varieties. Based on joint work with Jingjun Han and Ziquan Zhuang.

Pluricanonical fibrations of compact complex manifolds

Konstantin Shramov

HSE University

A pluricanonical fibration of a compact complex manifold is a meromorphic map defined by a sufficiently large and divisible multiple of its canonical class. For a projective variety, a theorem due to P. Deligne and K. Ueno asserts that the image of the automorphism group of the variety in the automorphism group of the base of its pluricanonical fibration is finite. I will tell about an analog of this result for compact complex manifolds of dimension N and Kodaira dimension $N-1$. The talk is based on a joint work with K.Loginov.

Globally F-regularity of moduli spaces of parabolic bundles

Xiaotao Sun

Tianjin University

I will report a preprint joint with Mingshuo Zhou, in which we prove that moduli space of parabolic bundles with a fixed determinant on a generic curve is globally F-regular.

Approaches to the Kawaguchi-Silverman conjecture

Long Wang

SIMIS

Kawaguchi and Silverman proposed a conjecture about arithmetic and dynamical degrees of dominant rational self-maps defined over number fields. There are several approaches to this conjecture. We will give an overview, based on the joint works with Yohsuke Matsuzawa, and with Sheng Meng and Tianle Yang.

Holomorphic symplectic geometry of elliptic surfaces

Guolei Zhong

IBS-CCG

Let X be a complex surface admitting a nowhere vanishing holomorphic 2-form; such a form induces a holomorphic symplectic structure on X. In this talk, we consider the case when X is an elliptic surface and study how the symplectic geometry is related to the underlying complex geometry of the elliptic fibration. In particular, when the elliptic fibration is non-isotrivial, we introduce a symplecto-functional invariant which determines its symplectic geometry. Applications will be addressed to isogenies of elliptic K3 surfaces. This is based on a joint work with Jun-Muk Hwang.

p-adic Simpson correspondence and Grothendieck anabelian geometry

Kang Zuo

Wuhan University

Classical Teichmüller space plays a central role in geometry, connecting Riemann surfaces, hyperbolic geometry, and complex analysis. Hitchin gave a modern perspective on this space using the non-abelian Hodge correspondence, which provides a striking interaction between complex geometry and topology via differential equations. In the p-adic setting, we propose a parallel program that can be developed through the p-adic Simpson correspondence. In this talk, I will describe an approach to constructing a p-adic analogue of Teichmüller space by applying this correspondence to certain special Higgs bundles. This p-adic Teichmüller space is expected to reveal deep connections with anabelian geometry, a field that studies how algebraic fundamental groups encode arithmetic information. The talk will draw on joint work with Mao Sheng and Jinbang Yang, as well as ongoing collaborations with Xiaotao Sun and Jinbang Yang.

Accommodation

Hotel: Powerlong Artels+ Hotel (Shanghai, Minhang District, Wujing, Zizhu High-Tech Park; near East China Normal University & Shanghai Jiao Tong University)

酒店：宝龙艺悦酒店（上海，闵行区，吴泾，紫竹，华东师范大学&上海交通大学）

Conference Venue

Rm.102, Mathematics Building, East China Normal University, 5005 South Lianhua Road, Minhang District, Shanghai

华东师范大学数学楼 102 室, 上海市闵行区吴泾镇莲花南路 5005 号

Direction

From Pudong Airport (PVG)

Taxi: takes about 45 mins and costs around 170 RMB.

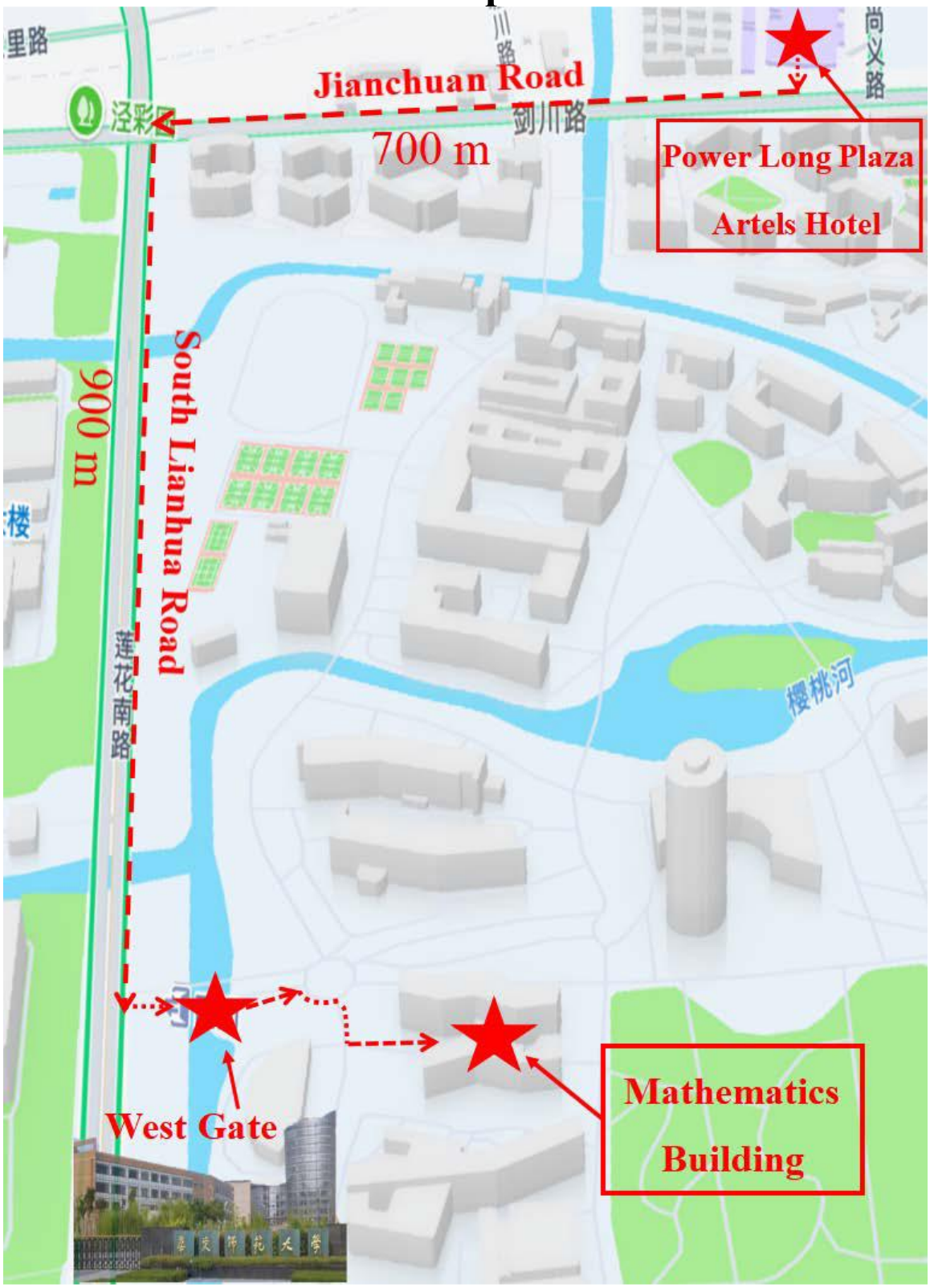
Subway: Take Airport Bus Line 7 to Shanghai South Railway Station, then transfer to Metro Line 15 to Yongde Road Station. The hotel is within walking distance from the station.

From Hongqiao Airport (SHA) / Hongqiao Railway Station

Taxi: takes about 35 mins and costs around 100 RMB.

Subway: take Line 2 to Loushanguan Road Station, then take Line 15 to Yongde Road Station, finally walk to the hotel.

Map


Jianchuan Road
700 m
Power Long Plaza
Artels Hotel
South Lianhua Road
900 m
West Gate
Mathematics
Building
樱桃河
泾彩
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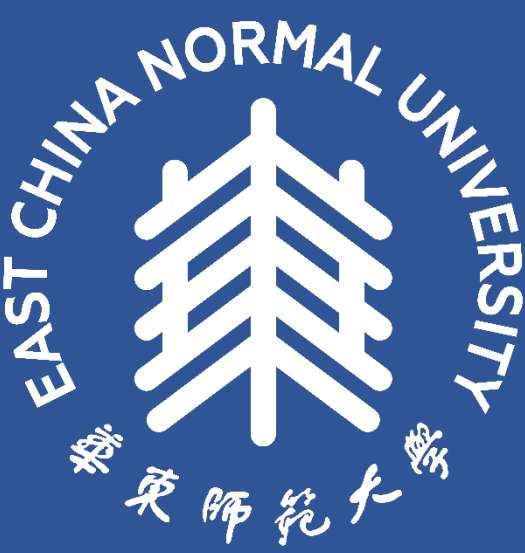
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