華東師範大學 | 数学科学学院
School of Mathematical Sciences,East China Normal University

2024 年 ECNU 代数几何与复几何研讨会（11.13）
程序册

华东师范大学闵行校区, 上海

2024.11.13 - 2024.11.15

会议报告人（按姓氏拼音排序）

桂耀挺　（北京大学）
江孝炜　（清华大学）
缪明昊　（南京大学）
王淋生　（复旦大学）
吴磊　（浙江大学）
张磊　（中山大学）

组织委员会（按姓氏拼音排序）

杜荣 吕鑫 陆俊 孟晟 戚鲁 谈胜利 张通

日程安排

11 月 13 日：抵会及自由讨论

11 月 14 日

地点：华东师范大学（闵行）数学科学学院数学楼 102

时间	会议内容	主持人
10:00 - 11:00	王淋生: A valuative criterion of K-polystability	戚鲁
11:00 - 13:00	午餐	
13:00 - 14:00	缪明昊: Weighted Volume of Toric Fano Fibrations	戚鲁
14:00 - 14:30	茶歇	
14:30 - 15:30	江孝炜: Boundedness of Fano Type Fibrations	戚鲁

11 月 15 日

地点：华东师范大学（闵行）数学科学学院数学楼 102

时间	会议内容	主持人
10:30 - 11:30	桂耀挺: Two different type curvature flows in asymptotic flat space	吕鑫
11:30 - 13:00	午餐	
13:00 - 14:00	吴磊: Logarithmic cotangent bundles, Chern classes, and applications	吕鑫
14:00 - 14:15	茶歇	
14:15 - 15:15	张磊: The Pro-étale Fundamental Group à la Bhatt-Scholze	吕鑫
15:15 - 15:45	茶歇	
15:45 - 16:45	缪明昊: Optimal Degenerations of K-unstable Fano Threefolds	吕鑫
18:00	晚宴	

报告摘要

Title: A valuative criterion of K-polystability

Linsheng Wang

Abstract: If the delta invariant of a Fano manifold is greater than one, then the Fano manifold is K-stable and admits a KE metric. In this case, it admits no nontrivial holomorphic vector field. For a Fano manifold with nontrivial holomorphic vector fields, we will introduce another "delta" invariant characterizing its K-polystability. Moreover, the g-weighted version of this invariant can be used to characterizing the existence of g-solitons on a Fano manifold. As an application, we will give a family of Fano threefolds admitting g-solitons for any weight function g.

Title: Weighted Volume of Toric Fano Fibrations

Minghao Miao

Abstract: In the preprint by Sun-Zhang, an invariant called the weighted volume is introduced. This invariant combines two well-studied invariants: the normalized volume and the H-invariant, both prominent in the literature on K-stability. In this talk, we will discuss the weighted volume in the context of toric Fano fibrations. It is intrinsically linked to a convex optimization problem on an unbounded polyhedron.

Title: Boundedness of Fano Type Fibrations

Xiaowei Jiang

Abstract: Fano type fibrations include many central ingredients of birational geometry, such as Fano varieties, Mori fiber spaces, flipping and divisorial contractions, crepant models, and germs of singularities. In this talk, we will first review some background on Fano type fibrations, and then outline some ideas in Birkar's proof of the boundedness of Fano type fibrations, which can be viewed as a relative version of the well-known BAB conjecture.

Title: Two different type curvature flows in asymptotic flat space

Yaoting Gui

Abstract: We present two type curvature flows related to mean curvature and harmonic mean curvature in asymptotic flat space. As a consequence, we construct a different kind of foliation and define a geometric center of mass. This is a joint work with Prof. Yuqiao Li and Prof. Jun Sun.

Title: The Pro-étale Fundamental Group à la Bhatt-Scholze

Lei Zhang

Abstract: B. Bhatt and P. Scholze introduced the notion of the pro-étale fundamental group for a topologically Noetherian scheme X in their celebrated work "The pro-étale cohomology for schemes". This is a topological group that classifies the geometric covers of X. Under the Yoneda embedding, the geometric covers are identified with sheaves of sets which are locally constant sheaves for the pro-étale topology. In particular, the finite étale covers are geometric. Therefore, the pro-étale fundamental group refines Grothendieck's étale fundamental group which classifies only finite étale covers. There is a natural morphism from the pro-étale fundamental group to the étale fundamental group which realizes the étale fundamental group as the profinite completion of the pro-étale fundamental group. However, there has been no direct comparison between the topological and pro-étale fundamental groups. In this talk, we are going to present this comparison. We'll also introduce some comparison theorems in the p-adic setting.

Title: Logarithmic cotangent bundles, Chern classes, and applications

Lei Wu

Abstract: Using MacPherson's Euler obstruction function, one can identify the abelian group of constructible functions with the group of algebraic cycles on a smooth complex algebraic variety. Kashiwara's local index formula gives an alternative approach to this identification by using characteristic cycles for holonomic D-modules (they are Lagrangian cycles in the cotangent bundle). This identification then enables us to define Chern classes of algebraic cycles by using characteristic cycles. In this talk, I will first explain how to obtain Chern classes of the pushforward of Lagrangian cycles under an open embedding with normal crossing complement by using logarithmic cotangent bundles motivated by D-module theory. Then I will discuss applications of such Chern classes in understanding Chern-Mather classes of very affine varieties and in proving the Involution Conjecture of Huh and Sturmfels in likelihood geometry. This work is joint with Maxim, Rodriguez, and Wang.

Title: Optimal Degenerations of K-unstable Fano Threefolds

Minghao Miao

Abstract: In this talk, we will propose a question of how to explicitly determine the optimal degenerations of the K-unstable Fano manifolds as predicted by the Hamilton-Tian conjecture. We answer this question for a family of K-unstable Fano threefolds (No 2.23 in Mori-Mukai's list), which has discrete automorphism groups and the normalized Kahler-Ricci flow develops Type II singularity. Our approach is based on a new method to check weighted K-stability, which

generalizes Abban-Zhuang's theory to give an estimate of the weighted delta invariant by dimension induction. Some speculative relations between the delta invariant and the H invariant will also be discussed. This is based on a joint work with Linsheng Wang.