SCHEDULE

1. Time and Location

Time: Nov. 13 - 15, 2020

Location: Wisdom Valley (Hui Yuan) Building 3, Room 415

https://j.map.baidu.com/d5/wjQ

2. Schedule

Nov. 13

4:30-5:30 pm, There is a department colloquium given by Ruochuan Liu which may be interested to some attendants https://math.sustech.edu.cn/colloquium/11904.html

7:00-10:00 pm, Free discussion.

Nov. 14.

8:30 - 9:30 am, Positivity in foliation theory (Jie Liu & Wenhao Ou)

9:45 -10:45 am, Positivity in foliation theory (Jie Liu & Wenhao Ou)

11:00 - 12:00 am, Positivity in foliation theory (Jie Liu & Wenhao Ou)

1:30-2:30 pm, Positivity in foliation theory (Jie Liu & Wenhao Ou)

2:45 - 3: 45 pm, Positivity in foliation theory (Jie Liu & Wenhao Ou)

4:00 - 5: 00 pm, Blowing up varieties with projective bundle structures (Duo Li)

5:15 - 6:00 pm, Problem Section

Nov 15.

8:30-9:30 am, Semistable Vector Bundles on Rational Homogeneous spaces (Rong Du)

9:45-10:45 am, Some results on the foliations with small Chern numbers (Jun Lu)

11:00- 12:00 am, Counterexamples to Fujita's conjecture on surfaces in positive characteristic (Yongming Zhang)

1:30-2:30 pm, Generic inner projection and Castelnuovo-Mumford regularity of structure sheaves (Lei Song)

3. Abstracts of talks

1. **Title**: Positivity in foliation theory

Speaker: Jie Liu & Wenhao Ou

Abstract: In the last decades, there has been increasing interaction between foliation theory and algebraic geometry, and it has been proved that foliation is a very powerful tool in algebraic geometry. For instance, they play an important role in the proof of the Beauville-Bogomolov decomposition theorem for singular spaces and of the Campana-Paun's uniruledness criterion. In this lecture series, we will give a brief and elementary introduction to the foliation theory in algebraic geometry. In particular, we will focus on the interactions of foliations with stability and positivity.

2. **Title**: Generic inner projection and Castelnuovo-Mumford regularity of structure sheaves

Speaker: Lei Song

Abstract: A. Noma established a sharp bound for Castelnuovo-Mumford regularity of structure sheaves of smooth projective varieties of arbitrary dimension. An essential tool is his classification of projective varieties via generic inner projection. In this talk, I will explain Noma's classification, and show how blending it with the theory of multiplier ideals leads to the same bound for normal projective varieties with at worst isolated, $\mathbb{Q}$-Gorenstein singularities. By contrast, such a bound fails for varieties with arbitrary singularities. This is based on a joint work with J. Moraga and J. Park.

3. **Title**: Blowing up varieties with projective bundle structures

Speaker: Duo Li

Abstract: we study a blowing up of a smooth projective variety X along a smooth center B which is equipped with a projective bundle structure. When the center is a point, then X must be a projective space. When the center is a curve, we can classify the pair (X, B) with $\dim X < 5$. If X is a projective space and B is a curve, we show that B must be a line in X.

4. **Title**: Semistable Vector Bundles on Rational Homogeneous spaces

Speaker: Rong Du

Abstract: We will introduce the background and related problems of semistable vector bundles on projective spaces. In particular, the Grauert-Mulich-Barth theorem on projective spaces will be recalled. Furthermore, we will talk about the generalized Grauert-Mulich-Barth theorem on rational homogeneous spaces. This is a joint work with Xinyi Fang and Yun Gao.

5. **Title**: Counterexamples to Fujita's conjecture on surfaces in positive characteristic

Speaker: Yongming Zhang

Abstract:

We present counterexamples to Fujita's conjecture in positive characteristic. Precisely, we show that over any algebraically closed field k of characteristic $p > 0$ and for any positive integer m, there exists a smooth projective

surface S with an ample Cartier divisor A such that the adjoint linear system $|K_S + mA|$ is not free of base point.

6. **Title**: Some results on the foliations with small Chern numbers

Speaker: Jun Lu

Abstract:

In this talk, we'll give some results on the foliations with small Chern numbers on an algebraic surface. The report will be divided by 3 parts.

(1) The geography of non-algebraic double Riccati foliations (resps., Lotka-Voterra foliations). We will give their Chern numbers and get the slope inequalities. It's a joint work with Jie Hongand Sheng-Li Tan (resp., Weili Shao).

(2) Poincaré problem on Riccati foliations. We claim that a Riccati foliation on a rational surface is algebraic iff it is a pulling-back of some Riccati foliation with Kodaira dimension $-\infty$. Thus we can classify all algebraic Riccati foliation. It's a joint work with Cheng Gong and Sheng-Li Tan. As an interesting application, we will construct a counterexample to Gurjar-Zhang's conjecture. This is a joint work with Xiaohang Wu.

(3) Adjoint canonical divisor of a foliation. We will compute the Zariski's decomposition of adjoint canonical divisor of a foliation and find a new invariance. It's a joint work with Xiaohang Wu and Xiaolei Liu.