

Program in Aug 19 - 23

	Aug 19	Aug 20	Aug 21	Aug 22	Aug 23
14:00-15:00	Laza	Laza	Laza		Free Discussion
15:00-15:30	Coffee break	Coffee break	Coffee break		
15:30-16:30	Zhang	Zhang	Zhang	Cho	
16:45-17:45	Jiang	Jiang	Shin	Laza	

Invited Speakers:

Yonghwa Cho (KIAS)

Zhi Jiang (SCMS, Fudan U.)

Radu Laza (Stony Brook U.)

Yongjoo Shin (KIAS)

Tong Zhang (East China Normal U.)

----- Title and Abstract -----

Radu Laza

Title: Moduli and periods for Hyperkaehler manifolds

Abstract: The Hyperkaehler (HK) manifolds are one of the building blocks in Algebraic Geometry. They are particularly interesting as there is a rich interplay between their geometry and their periods (or more precisely, the Hodge structure on the second cohomology group). In these lectures, I will review some of the basic results on moduli and periods of HK manifolds, and raise a number of questions.

The plan of the lecture is as follows:

- (1) I will start by reviewing the role of HK manifolds, and I will introduce the main actors the period map, period domains, Global Torelli theorem, etc.
- (2) I will focus on what is known in the two dimensional case (aka K3 surfaces). Specifically, I will discuss the problem of compactifying the moduli of K3 surfaces.
- (3) I will then return to the general case, and discuss some results on the degenerations of HK manifolds.
- (4) I will close with an even more basic question: How does one recover a HK from its second cohomology, or even easier how does the second cohomology recovers the cohomology of HK manifolds. As we will see this discussion has consequences on the question of degenerations discussed previously, and even more importantly it might lead to bounding the deformation types of HK manifolds.

Tong Zhang

Title: Geography of complex irregular 3-folds of general type

Abstract: In the series of lectures, I will start from a brief survey of the geography of complex irregular surfaces of general type. Then I will focus on a similar problem in dimension three and introduce the full Severi type inequality for complex irregular 3-folds of general type. The method of the proof will also be discussed.

Zhi Jiang

Title: On pluricanonical systems of irregular varieties

Abstract: I will report some recent progress on pluricanonical systems and adjoint system on irregular varieties and some related . This talk is based on a joint work with J.A. Chen, M. Chen and J.Chen.

YongJoo Shin

Title: A characterization of Inoue surfaces with $p_g=0$ and $K^2=7$

Abstract: Inoue constructed the first examples of smooth minimal complex surfaces of general type with $p_g=0$ and $K^2=7$. These surfaces are finite Galois covers of the 4-nodal cubic surface with the Galois group, the Klein group $\mathbb{Z}_2 \times \mathbb{Z}_2$. For such a surface S , the bicanonical map of S has degree 2 and it is composed with exactly one involution in the Galois group. The divisorial part of the fixed locus of this involution consists of two irreducible components: one is a genus 3 curve with self-intersection number 0 and the other is a genus 2 curve with self-intersection number -1.

In this talk, we conversely assume that S is a smooth minimal complex surface of general type with $p_g=0$, $K^2=7$ and having an involution σ . And we show that, if the divisorial part of the fixed locus of σ consists of two irreducible components R_1 and R_2 , with $g(R_1)=3$, $R_1^2=0$, $g(R_2)=2$ and $R_2^2=-1$, then the Klein group $\mathbb{Z}_2 \times \mathbb{Z}_2$ acts faithfully on S and S is indeed an Inoue surface. This is joint work with Yifan Chen.

Yonghwa Cho

Title: Toric systems, mutations and MMP

Abstract: Let S be a del Pezzo surface. We consider two different subjects related to S . One is the toric degenerations of S , and the other is the derived category of S . In this talk, we investigate the relations between these subjects by comparing total spaces of degenerations and full exceptional collections in the derived category. More specifically, we discuss a parallelism established via relative MMP (on degeneration side) and mutations (on derived category side).