

Seminar week on Moduli, Birational Geometry, and related topics

May 27 – May 29, 2026
B236-1, IBS, Daejeon, Republic of Korea

Speaker: **Shigeyuki Kondo** (Nagoya University)

Title: Desmic quartic surfaces and a Fano 3-fold of degree 6 with 34 nodes

Abstract: A desmic quartic surface associated with Desmic tetrahedra is a birational model of the Kummer surface of the self-product of an elliptic curve. We recall the classical geometry of these surfaces and study their analogs in arbitrary characteristic. Moreover, we discuss the cubic line complex \mathfrak{C} associated with Desmic tetrahedra which is a complete intersection of a quadric and a cubic in \mathbb{P}^5 . We prove that \mathfrak{C} is rational and has 34 nodes, and the number 34 is the maximum number of nodes on a complete intersection of a quadric and a cubic. This is a joint work with Igor Dolgachev.

Speaker: **JongHae Keum** (KIAS)

Title: Automorphisms of K3 surfaces

Abstract: A generic K3 surface has trivial automorphism group. Some special K3 surfaces have infinite automorphism groups. It is a nontrivial problem to compute the group of automorphisms of a given K3 surface. I will review known methods, such as Vinberg and Borchers–Kondo, and then work out the case of generic Hessian quartic surfaces. A joint work with Dolgachev.

Speaker: **Fei Si** (Xi'an Jiaotong University)

Title: Birational geometry of moduli spaces of del Pezzo pairs from various aspects

Abstract: Let P_d be the moduli space of pairs (X, C) where X is a smooth del Pezzo surface of degree d and $C \sim -2K_X$ is a smooth curve. In this talk we will introduce the compactifications for the moduli space P_d from three perspectives: GIT, Hodge theory and K-stability. The precise relationships among these compactifications will be discussed for degree $d = 8$.

Speaker: **Kyoung-Seog Lee** (POSTECH)

Title: Geometry and derived categories of Inoue surfaces with $p_g = 0$ and $K^2 = 7$

Abstract: Inoue surfaces with $p_g = 0$ and $K^2 = 7$ are classical examples of surfaces of general type and they have been intensively studied by many experts. In the first part of this talk, I will review some of the known results for these surfaces. Then, I will discuss the geometry and derived categories of coherent sheaves of these surfaces. The last part of the talk is based on a joint work in progress with Do Geun Kim.

Speaker: **Sang-Bum Yoo** (Gongju National University of Education)

Title: A chain of \mathbb{C}^* -flips of the moduli spaces of \mathcal{O} -twisted rank 2 constrained framed Hitchin pairs on a smooth curve

Abstract: In 1999, Ch. Okonek, A. Schmitt and A. Teleman constructed a chain of \mathbb{C}^* -flips connecting to the moduli space of torsion free coherent sheaves on a smooth projective scheme via a variation of moduli of framed modules. In 2000, A. Schmitt constructed a chain of \mathbb{C}^* -flips connecting to the moduli space of Hitchin pairs on a smooth projective scheme via a variation of moduli of framed Hitchin pairs. Let X be a smooth complex projective curve. In this work, we show that there exists a surjective commutative forgetful diagram from the chain of \mathbb{C}^* -flips of the moduli spaces of \mathcal{O}_X -twisted rank 2 framed Hitchin pairs on X with Higgs fields compatible with framings to the chain of \mathbb{C}^* -flips of the moduli spaces of rank 2 framed modules on X . This is a joint work with YongJoo Shin.

Speaker: **Junchao Shentu** (USTC)

Title: Hyperbolicity of admissible stratum of the moduli of stable minimal models

Abstract: Hyperbolicity represents a fundamental global geometric property of moduli spaces parameterizing algebraic varieties with non-negative Kodaira dimension. In this talk, I will investigate the hyperbolicity properties of admissible strata—defined as loci over which the universal family remains equisingular in the birational sense—within the moduli stack of stable minimal models, a framework introduced by Professor Caucher Birkar that generalizes the moduli stack of KSBA pairs. Specifically, I will establish several hyperbolicity results for both the interior locus $M_{g,n}$ and the boundary strata supported on the divisor $\overline{\partial M}_{g,n}$.

Speaker: **Haesong Seo** (IBS-CCG/KAIST)

Title: Algebraic hyperbolicity of hypersurfaces in Grassmannians

Abstract: A complex projective manifold X is said to be hyperbolic if every holomorphic map $f : \mathbb{C} \rightarrow X$ is constant. On the one hand, Green–Griffiths–Lang conjecture predicts an algebraic characterization of hyperbolicity: X is hyperbolic if and only if it is algebraically hyperbolic in the sense of Lang, meaning that every subvariety of X is of general type. On the other hand, Demailly proved that hyperbolic manifolds are algebraically hyperbolic in the sense of Demailly, namely that the degrees of curves on X are bounded in terms of their genera. A central problem is to determine whether a very

general hypersurface in a given projective manifold is algebraically hyperbolic (in either sense). This has been extensively studied in various settings, including projective space. In this talk, we prove that very general hypersurfaces of certain degree in Grassmannians are algebraically hyperbolic in the sense of Lang or Demailly (under different numerical conditions). If time permits, we also discuss generalizations to hypersurfaces in rational homogeneous spaces. This is joint work in progress with Minseong Kwon.

Speaker: **Minzhe Zhu** (KIAS)

Title: Boundedness of polarized log Calabi-Yau fibrations with bounded bases

Abstract: A Calabi-Yau fibration is a fibration of projective varieties $X \rightarrow Z$ such that the canonical bundle K_X is numerically trivial over Z . The central question is: under what conditions does the total space of such a fibration belong to a bounded family? Motivated by this, we investigate fibrations whose bases and general fibers are themselves bounded. We show that, after fixing natural invariants, the total spaces are bounded in codimension one. Furthermore, when the general fibers have vanishing irregularity, the total spaces are in fact bounded. These results have further applications to the study of stable minimal models and fibered Calabi-Yau varieties. This is based on the joint work with Xiaowei Jiang and Junpeng Jiao.

Speaker: **Yen-An Chen** (KIAS)

Title: On Slope Unstable Fano varieties

Abstract: For Fano varieties, significant progress has been made recently in the study of K-stability, while the understanding of the weaker but more algebraic concept of $(-K)$ -slope stability remains intricate. In this talk, we present a method that aims to characterize the geometry associated with the maximal destabilizing sheaf of the tangent sheaf of a Fano variety. This approach utilizes modern advancements in the foliated minimal model program. In dimension two, our approach leads to a complete classification of $(-K)$ -slope unstable weak del Pezzo surfaces with canonical singularities. This is the joint work with Ching-Jui Lai.