THE 19TH AFFINE ALGEBRAIC GEOMETRY MEETING

ABSTRACTS OF TALKS

⋆ 3th March (Wednesday)

● Sho Tanimoto (Kumamoto University):

Title: **Classifying rational curves on Fano threefolds**

Abstract: Mori proved that any smooth Fano variety is covered by rational curves using his famous Bend and Break technique, thus it is natural to study the space of rational curves on a smooth Fano variety. In particular one may ask its dimension and the number of components of the moduli space of rational curves of anticanonical degree less than or equal to d. We studied this problem in dimension 3 and established a technique called Movable Bend and Break claiming that a free rational curve of anticanonical degree greater than 5 degenerates into the union of two free rational curves of lower degree. As an application, we prove Batyrev's conjecture predicting a polynomial growth of the number of components of the moduli space. In this talk I will talk about these developments as well as its relation to Geometric Manin's conjecture. This is joint work with Roya Beheshti, Brian Lehmann, and Eric Riedl.

● Akihiro Kanemitsu (Kyoto University):

Title: **Fano manifolds and stability of tangent bundles**

Abstract: A Fano manifold X is, by definition, a smooth projective variety with ample anticanonical divisor. It was conjectured that, if the Picard rank of a Fano manifold X is one, then the tangent bundle of X is stable or, at least, semistable. In this talk, I will study this conjecture for a certain class of Fano manifolds, which are classified by Pasquier. As a consequence, we will provide counter-examples of the above conjecture. If time permits, I will address the existence of Kaehler-Einstein metrics on Pasquier's varieties.

● Hendrik Süß(University of Manchester):

Title: **On equivariant degenerations of G-varieties of complexity one**

Abstract: The complexity of an action of a reductive group on a variety is the codimension of a generic orbit of the corresponding Borel subgroup. Normal G-varieties of complexity 0 are called spherical. If $G = \mathbb{T}$ is a torus, then the variety is called toric. In my talk I will discuss conditions for an SL2-variety of complexity 1 to admit only one unique equivariant normal degeneration. I will then apply this to determine the K-stability of such a variety.

⋆ 4th March (Thursday)

● Masatomo Sawahara (Saitama University):

Title: **Cylinders in canonical del Pezzo fibrations**

Abstract: Cylinders in Mori fiber spaces begin recently to receive a lot of attentions from the viewpoint connecting birational geometry and unipotent group actions on affine cones over polarized varieties. It is known that by the work due to Dubouloz and Kishimoto a del Pezzo fibration $f : X \to Y$ of degree d admits a vertical cylinder if and only if $d \geq 5$ and the generic fiber X_η, which is a smooth del Pezzo surface of rank one defined over the field $\mathbb{C}(Y)$ of functions of the base variety Y, has a $\mathbb{C}(Y)$-rational point. Instead, we shall observe vertical cylinders found in del Pezzo fibrations with canonical singularities, where this observation is reduced to the existence of cylinder found on the generic fiber X_η, which is a normal del Pezzo surface of rank one having at most Du Val singularities defined over the field $\mathbb{C}(Y)$. In this talk, we will give a complete answer about the existence of vertical cylinder with respect to f depending on the degree d and type of singularities on X_η.

- Takuzo Okada (Saga University):

Title: **Birational geometry of Fano 3-fold weighted complete intersections**

Abstract: I will talk about systematic studies on birational geometry of Fano 3-fold weighted complete intersections of index 1 and codimension 2. After reviewing known results concerning their birational rigidity etc., I will especially explain recent progress on some of the remaining cases, that is, a proof of birational bi-rigidity for some Fano WCIs whose birational model admits a singular point of type cD.

- Pedro Montero (Universidad Tecnica Santa Maria):

Title: **On the liftability of the automorphism group of smooth hypersurfaces of the projective space**

Abstract: Smooth hypersurfaces are classical objects inalgebraic geometry since they are the simplest varieties one can define as they are given by only one equation. As such, they have been intensively studied and their geometry has shaped the development of classic and modern algebraic geometry. In this talk, I will first recall some fundamental results concerning the automorphism group of smooth hypersurfaces of the projective space and then I will present some new results obtained in a joint work with Victor Gonzalez-Aguiera and Alvaro Liendo, which are inspired by the classification groups which faithfully act on smooth cubic and quintic threefolds by Oguiso, Wei and Yu. If time allows us, I will discuss some open problems that arise from this.

⋆ 5th March (Friday)

- Kenta Hashizume (University of Tokyo):

Title: **On log MMP for log canonical pairs of log general type**

Abstract: Given a log canonical pair, the conjecture of the minimal model program predicts that we can construct a "good" birational model. The conjecture is known for log canonical pairs of dimension not greater than four, but still widely open for higher-dimensional case. In this talk, I will first introduce a result on the conjecture. More precisely, I will explain that the conjecture holds for projective log canonical pairs of log general type whose non-nef locus is disjoint from log canonical centers. I will also introduce variants of the result. After that, I will explain that these results can be used to recover some known results and to prove new special cases of the conjecture.

• Yusuke Suyama (Osaka University):

Title: **Classification of toric log del Pezzo surfaces with few singular points**

Abstract: It is known that there is a one-to-one correspondence between toric log del Pezzo surfaces and certain lattice polygons, called LDP-polygons. We give a classification of toric log del Pezzo surfaces with at most three singular points.

• Igor Krylov (KIAS):

Title: **Families of simple subgroups in the Cremona group arising from del Pezzo fibrations**

Abstract: Cremona group of rank n is the group of birational self-maps of the projective space of dimension n. For any subgroup G of Cremona group there is a rational variety on which G acts regularly. This allows to translate the study of subgroups of Cremona group into study of G-equivariant geometry of rational varieties. In this talk I will describe some continuous families of rational threefolds with an action of alternating group of rank 5. I will also explain why the corresponding subgroups of the Cremona group are not pair-wise conjugate.