

# Titles and Abstracts of the First Week

1. Jacopo Gandini, Scuola Normale Superiore di Pisa, Italy

**Title:** Embeddings of Spherical Homogeneous Spaces

**Abstract:** In this lectures, we will review the theory of equivariant embeddings of spherical homogeneous spaces for a reductive group  $G$ , due to Luna and Vust. Following this theory, equivariant embedding of spherical homogeneous spaces are classified by combinatorial objects called *colored fans*, which generalize the fans appearing in the classification of toric varieties. Several geometrical properties of a spherical embedding can be encoded in the associated colored fan, and we will explain how they reflect into combinatorial properties.

2. Yoshinori Gongyo, the University of Tokyo, Japan

**Title:** On Log CY Structure of Varieties Admitting Non-trivial Polarized Endomorphism

**Abstract:** We discuss the Calabi–Yau type structure of normal projective surfaces and Mori dream spaces admitting a non-trivial polarized endomorphism.

3. Jun-Muk Hwang, Korea Institute for Advanced Study, Korea

**Title:** Infinitesimal Automorphisms of Cubic Hypersurfaces

**Abstract:** We study infinitesimal automorphisms of singular cubic hypersurfaces. The goal is to characterize the homaloidal EKP-cubics in terms of the prolongations of the infinitesimal automorphisms. This study will be used to investigate the automorphism groups of projective Legendrian varieties.

4. Yujiro Kawamata, the University of Tokyo, Japan

**Title:** Derived Categories of Toric Varieties.

**Abstract:** I will explain how the derived categories of toric varieties change under the minimal model program.

5. Bernhard Kroetz, University of Paderborn, Germany

**Title:** The Tempered Sprectrum of a Real Spherical Space

**Abstract:** Let  $G/H$  be a unimodular real spherical space which is either absolutely spherical or wave-front. It is shown that every tempered representation of  $G/H$  embeds into a relative discrete series of a boundary degeneration of  $G/H$ . If in addition  $G/H$  is of wave-front type it follows that the tempered representation is parabolically induced from a discrete series representation of a lower dimensional real spherical space. (joint with Knop and Schlichtkrull).

6. Shinnosuke Okawa, Osaka University, Japan

**Title:** Derived Equivalence and Grothendieck Ring of Varieties.

**Abstract:** Let  $(X, Y)$  be a pair of derived equivalent smooth projective varieties. It is natural to ask what kind of (additive) invariants are the same for  $X$  and  $Y$ . One of the most naive expectations is that the difference  $[X] - [Y]$  in the Grothendieck ring of varieties is annihilated by some power of the class of the affine line. I would like to talk about a couple of (potential) examples of such pairs  $(X, Y)$ , which arise from geometry of homogeneous spaces and projective duality. I would also like to discuss related topics and problems. My talk will be based on joint works with Kenji Hashimoto, Atsushi Ito, Makoto Miura, and Kazushi Ueda.

7. Nicolas Perrin, Laboratoire de Mathématiques de Versailles, UVSQ, CNRS, Université Paris-Saclay, France

**Title:** Lectures on the Geometry of Spherical Varieties

**Abstract:** In these lectures we will describe some aspects of the geometry of spherical varieties. We shall especially consider

- (1) The geometry of  $B$ -orbits,
- (2) The local structure and the regularity of spherical varieties,
- (3) Divisors and line bundles on spherical varieties.

If time permits we will say few words on Mori theory for spherical varieties.