

CONTRIBUTED TALKS,
RECENT ADVANCES IN CLASSICAL ALGEBRAIC GEOMETRY,
27 JUNE 2022 - 2 JULY 2022

Speaker: Fabio Bernasconi (École Polytechnique Fédérale de Lausanne)

Title: Title: Lifting globally F -split surfaces to characteristic 0.

Abstract: Given a projective variety X over an algebraically closed field k of characteristic $p > 0$, it is natural to understand the possible geometric and arithmetic obstructions to the existence of a lifting to characteristic zero. Motivated by the case of abelian varieties and K3 surfaces, a folklore conjecture asserts that ordinary Calabi-Yau manifolds lift over the ring of Witt vectors $W(k)$. I will report a joint work with I. Brivio, T. Kawakami and J. Witaszek where we prove that normal globally F -split surfaces (a generalisation of ordinary CYs) admit an equi-singular lifting over $W(k)$. From this we deduce several geometric consequences for F -split surfaces, as the Bogomolov bound on the singular points of klt del Pezzos.

Speaker: Stefano Filipazzi (École Polytechnique Fédérale de Lausanne)

Title: On the boundedness of elliptic Calabi-Yau threefolds.

Abstract: In this talk, we will discuss the boundedness of Calabi-Yau threefolds admitting an elliptic fibration. First, we will review the notion of boundedness in birational geometry and its weak forms. Then, we will switch focus to Calabi-Yau varieties and discuss how the Kawamata-Morrison cone conjecture comes in the picture when studying boundedness properties for this class of varieties. To conclude, we will see how this circle of ideas applies to the case of elliptic Calabi-Yau threefolds. This talk is based on work joint with C.D. Hacon and R. Svaldi.

Speaker: Sara Filippini (Jagiellonian University Kraków)

Title: Free resolutions from opposite Schubert varieties in minuscule homogeneous spaces.

Abstract: Free resolutions $F_\bullet$ of Cohen-Macaulay and Gorenstein ideals have been investigated for a long time. An important task is to determine generic resolutions for a given format rkF_i . Starting from the Kac-Moody Lie algebra associated to a T-shaped graph $T_{p,q,r}$, Weyman constructed generic rings for every format of resolutions of length 3. When the graph $T_{p,q,r}$ is Dynkin, these generic rings are Noetherian. Sam and Weyman showed that for all Dynkin types the ideals of the intersections of certain Schubert varieties of codimension 3 with the opposite big cell of the homogeneous spaces $G(T_{p,q,r})/P$, where P is a specified maximal parabolic subgroup, have resolutions of the given format. In joint work with J. Torres and J. Weyman we study the case of Schubert varieties in minuscule homogeneous spaces and find resolutions of some well-known Cohen-Macaulay and Gorenstein ideals of higher codimension.

Speaker: Marco Rampazzo (Università di Bologna)

Title: Hodge structures and derived categories of Fano varieties in Grassmannians.

Abstract: The flag variety $F(k, k+1, n)$ admits two projective bundle structures over the Grassmannians $G(k, n)$ and $G(k+1, n)$, given by projectivizations of vector bundles of ranks, respectively, $n-k$ and $k+1$. These projectivizations have the same Grothendieck line bundle $O(1, 1)$. Pushforwards of a general section with respect to such maps yield pairs of smooth varieties (X, Y) , where X is general type and Y is Fano. I will describe the implications of this construction at the level of Hodge structures and derived categories, including a conjectural homological projective duality statement. Joint work with Enrico Fatighenti, Michał Kapustka and Giovanni Mongardi.

Speaker: Arman Sarikyan (University of Edinburgh)

Title: On Rationality of Fano-Enriques with terminal cyclic quotient singularities.

Abstract: A three-dimensional non-Gorenstein Fano variety with at most canonical singularities is called a Fano-Enriques threefold if it contains an ample linear system, whose generic element is an Enriques surface with at most canonical singularities. Although there is no complete classification of Fano-Enriques threefolds yet, but there are some partial results. For instance, L. Bayle has classified Fano-Enriques threefolds with terminal cyclic quotient singularities in terms of their canonical covers, which are smooth Fano threefolds in this case. The rationality of Fano-Enriques threefolds is an open classical problem that goes back to the works of G. Fano and F. Enriques. In this talk we will discuss the rationality of Fano-Enriques threefolds with terminal cyclic quotient singularities.

Speaker: Isabel Vogt (Brown University)

Title: Brill–Noether theory over the Hurwitz space.

Abstract: Let C be a curve of genus g . A fundamental problem in the theory of algebraic curves is to understand maps of C to projective space of dimension r of degree d . When the curve C is general, the moduli space of such maps is well-understood by the main theorems of Brill–Noether theory. However, in nature, curves C are often encountered already equipped with a map to some projective space, which may force them to be special in moduli. The simplest case is when C is general among curves of fixed gonality. Despite much study over the past three decades, a similarly complete picture has proved elusive in this case. In this talk, I will discuss joint work with Eric Larson and Hannah Larson that completes such a picture, by proving analogs of all of the main theorems of Brill–Noether theory in this setting.