Tuesday

Emelie Arvidsson - Kawamata-Viehweg vanishing theorem on log del Pezzo surfaces in positive characteristic greater than five.

I will discuss recent joint work with F. Bernasconi and J. Lacini where we prove the Kawamata-Viehweg vanishing theorem on log del Pezzo surfaces in positive characteristic greater than five. In this short video I explain what we have proved and why it is important. Along the way I discuss some aspects of birational geometry in positive characteristic which behaves as in characteristic zero, as well as some characteristic p pathologies.

Hanine Awada - Special cubic fourfolds

The rationality problem of smooth cubic hypersurfaces of dimension four is one of the most challenging open problems in algebraic geometry. It is expected that a very general cubic fourfold should be nonrational. Until now only examples of rational cubic fourfolds are known. They are "special", that is cubic fourfold containing a surface which is not homologous to a complete intersection. Special cubic fourfolds form a countable infinite union of irreducible divisors C_d (called Hassett divisors) in the moduli space of cubic fourfolds C. In this presentation, we will introduce some lattice and Hodge theory related to cubic fourfolds then we will be interested by the intersection of these Hassett divisors in C and will mention some of its applications.

Federico Barbacovi - Spherical functors and the flop-flop autoequivalence

A famous conjecture posed by Bondal and Orlov states that if two algebraic varieties are related by a flop, then they are derived equivalent. Often enough the derived equivalence is provided by the push-pull functors via the fibre product of the two maps. The resulting autoequivalence of either variety is called the flop-flop autoequivalence, and it has been extensively studied in various situations (3-fold flops, flops with fibres of relative dimension bounded by one). In this presentation, I will explain that the flop-flop autoequivalence can be realised as the inverse of the twist around a spherical functor whose source category arises naturally from the geometry, and I will provide some examples of how this can help us understand the structure of the flop-flop autoequivalence.

Tiago Guerreiro - Birational Geometry of Fano 3-folds

We start this story from one of the end points of the Minimal Model Program. Given a mildly singular Fano 3-fold, we investigate conditions determining whether there are other Mori Fibre Spaces birational to it.

Victor Do Valle Pretti – Zero rank Bridgeland stability at infinity

In this presentation I'll show the notion of Bridgeland Stability conditions and asymptotic stability over P^3, and its relation to sheaf stability conditions. This is done by a theorem which proves that an object in the derived category is asymptotically semistable if and only if it is Gieseker-semistable. The case where the object has ch0 not equal to zero was done by Jardim-Maciocia, my work was to study when the ch0=0.

Peter Spacek - Laurent polynomial Landau-Ginzburg models for cominuscule homogeneous spaces

In this mini-presentation I will highlight the main result from my paper arXiv:1912.09122. In 2008, Rietsch gave Landau-Ginzburg models for the small quantum cohomology of homogeneous spaces. My paper gives a type-independent construction of a Laurent polynomial expression for this potential when considering cominuscule homogeneous spaces. I will illustrate the concept of small quantum cohomology on CP^n and illustrate my expression on Gr(4,6).

Thursday

Arkadij Bojko - Orientations on the moduli stack of compactly supported perfect complexes over a non-compact Calabi-Yau 4-fold

We consider a Calabi--Yau 4-fold (X,w), where X is quasi-projective and w is a nowhere vanishing section of its canonical bundle K_X. The (derived) moduli stack of compactly supported perfect complexes M_X is (-2)-shifted symplectic and thus has an orientation bundle O^w -> M_X in the sense of Borisov-Joyce necessary for defining Donaldson-Thomas type invariants of X. We relate the orientation bundle $O^\omega\to \mathcal{M}_X$ to a gauge-theoretic orientation on the classifying space of compactly supported K-theory. Using orientability of the latter, we obtain orientability of M_X We also prove orientability of Hilbert schemes and moduli spaces of stable pairs. Finally, we consider the compatibility of orientations under direct sums.

Mandy Cheung - Compactification for cluster varieties and convexity

Cluster varieties are log Calabi-Yau varieties which are a union of algebraic tori glued by birational “mutation” maps. Partial compactifications of the varieties, studied by Gross, Hacking, Keel, and Kontsevich, generalize the polytope construction of toric varieties. However, it is not clear from the definitions how to characterize the polytopes giving compactifications of cluster varieties. We will show how to describe the compactifications easily by broken line convexity. As an application, we will see the non-integral vertex in the Newton Okounkov body of Gr(3,6) comes from broken line convexity. The talk will be based on a series of joint works with Bossinger, Magee, and Najera-Chavez.

Huy Dang - Galois theory for deformations of covers of curves

Classically, understanding a family of objects' deformations gives a lot of information about the moduli space that parameterizes them and how their invariants vary. In this presentation, we introduce the notion of deformations of covers (of curves), discuss the “Galois theory for deformations” question, and propose some tools to study them.

Geoffrey Mboya - Towards bigraded ring factory of projective fibrations

I will introduce a set-up of probing the geometry of certain projective fibrations polarized by a pair of divisors, one ample and one relatively ample; which together embed the fibration into a “relative key variety” over a base. I will end by briefly describing some problems I am pursuing using this set-up.

Papazachariou Theodoros - Computational GIT for complete intersections

Geometric Invariant Theory (GIT) seeks to find quotients of varieties with algebraic group actions. Although GIT has many merits, it remains hard to find and describe such quotients, and as such it is useful to consider whether computational methods could aid with doing so. In this presentation we discuss a computation approach in the analysis of GIT quotients of complete intersections of k hypersurfaces of the same degree, extending on some computational results by Gallardo - Martinez-Garcia on the Variational GIT of hypersurfaces with hyperplane sections.

Thomas Wennink - A reconstruction theorem for genus 2 Gromov-Witten invariants

We have proven a new reconstruction theorem for genus 2 Gromov-Witten invariants in the spirit of the genus 0 reconstruction theorem of Kontsevich-Manin and the genus 1 reconstruction theorem of Getzler. The theorem states that it is possible to recursively calculate all genus 2 Gromov-Witten invariants starting from a limited number of base cases. As an example application we have calculated some Grovov-Witten invariants of blowups of the projective plane.