GAeL XXVII

Schedule

	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
09:00 - 09:30	Registration				
09:30 - 10:30	C. Casagrande	C. Casagrande	C. Casagrande	C. Casagrande	S. Cantat
10:30 - 11:00	Coffee break				
11:00 - 11:30	F. Anella	M. Fortuna	GAeL XXVIII	I. Spelta	F. Rezaee
11:30 - 11:45	Coffee break				
11:45 - 12:45	S. Cantat	S. Cantat	S. Cantat	E. Markman	E. Markman
12:45 - 15:30	Lunch and free discussion time				
15:30 - 16:00	E. Markman	E. Markman	I. Gheorghita	IMAR AG seminar	F. Rota
16:00 - 16:30	E. Markman	E. Markman	E. Paemurru	IMAR AG seminar	P. Spacek
16:30 - 17:00	Coffee break	Coffee break	Coffee break	Free afternoon	Coffee break
17:00 - 17:30	L. De Biase	S. Gaulhiac	M. Paulsen	Free afternoon	T. Wennink
Evening	Poster Session		Conference dinner		

Senior Talks

Serge Cantat
Title : The Geometric Bogomolov Conjecture
Abstract : I shall describe the content of the Bogomolov conjecture in Diophantine geometry (now a theorem of Ullmo and Zhang), and its geometric version over function fields. Then, I shall explain the main ideas to solve the geometric conjecture in characteristic zero. Keywords are: abelian varieties, canonical heights, small points, but also foliations, holonomy, and equidistribution of orbits in dynamical systems. I shall explain the meaning of all these notions, and how they interact in the context of the Bogomolov conjecture.

Cinzia Casagrande
Title : Fano Manifolds and Birational Geometry
Abstract : We will illustrate some of the techniques in birational geometry and the Minimal Model Program in the framework of Mori dream spaces, and their applications to the study of (smooth, complex) Fano manifolds, with a particular focus to dimension 4. A tentative schedule:

- 1st Lecture: Mori dream spaces and birational geometry; examples

- 2nd Lecture: Overview on Fano varieties and their properties as Mori dream spaces

- 3rd Lecture: The Lefschetz defect of Fano varieties, properties and study via birational geometry

- 4th Lecture: Geometry of Fano 4-folds with large second Betti number.

Eyal Markman
Title : The Monodromy of Projective Holomorphic Symplectic Varieties and its Significance
Abstract : We will review the role the monodromy group plays in the Torelli theorem, the structure of the ample and movable cones, and the study of algebraic cycles on projective holomorphic symplectic varieties.

Junior Talks

Fabrizio Anella

Title : The Twisted Cotangent Bundle of a Hyperkähler Manifold

Abstract : Let X be a complex projective Hyperkähler manifold. By a recent result of Höring and Peternell, the cotangent bundle of X is not pseudoeffective. One way to measure this negativity more precisely is to give sufficient conditions on an ample line bundle A such that the twist $\Omega_X \otimes A$ is pseudoeffective. I will give a sufficient condition that depends only on the deformation's type of X. Then I will discuss when this sufficent condition is also necessary. This is a joint work with Andreas Höring.

Lorenzo De Biase

Title : Generalized Braid Actions

Absract : In this talk, after giving some background on autoequivalences of derived categories of smooth projective varieties, I will define the generalised braid category and describe its action on the derived categories of (the cotangent bundles of) full and partial flag varieties. Generalised braids are the braids whose strands are allowed to touch in a certain way. The basic building blocks of their action on flag varieties are spherical and non-split P-functors together with the twist equivalences they induce. I will describe our present progress and future expectations. This is a joint project with Rina Anno and Timothy Logvinenko.

Mauro Fortuna

Title : Cohomology of the Moduli Space of Non-Hyperelliptic Genus Four Curves

Abstract : In this talk, I will present the intersection Betti numbers of the moduli space of non-hyperelliptic Petri-general genus four curves. This space has a canonical compactification as GIT quotient, which was proved to be the final step in the Hassett-Keel log MMP for stable genus four curves. The strategy of the cohomological computation relies on a general method developed by F. Kirwan to calculate the cohomology of GIT quotients of projective varieties, based on stratifications, a partial desingularisation and the decomposition theorem.

Sylvain Gaulhiac

Title : Anabelian geometry for Berkovich Curves

Abstract : The question that anabelian geometry asks is : What can one recover about an object from its fundamental group ? In the case of Berkovich spaces the fundamental group which seems interesting to look at is the "tempered fundamental group", introduced by Yves André. Our goal is to inspire from some works of Shinichi Mochizuki and its langage of anabelioïds and temperoïds to show that under some conditions it is possible to recover the skeletton of an analytic curve from its tempered fundamental group.

Iulia Gheorghita

Title : Effective Divisors in the Projectivized Hodge Bundle

Abstract : In this talk, I will first give some background information and history on effective divisors on moduli spaces and the effective cone of divisors. I will then discuss how to compute the class of the closure of the locus of canonical divisors in the projectivization of the Hodge bundle over $\bar{M}_g$ which have a zero at a Weierstrass point. Given sufficient time, I will also discuss the extremality of the strata of canonical divisors with a double zero.

Erik Paemurru

Title : Birational Models of Terminal Sextic Double Solids

Abstract : A sextic double solid is a double cover of $\mathbb{P}^3$ branched along a sextic surface. Terminal threefold hypersurface singularities are compound du Val singularities cA_n, cD_n and cE_n, that is, where the general hyperplane section is an A_n, D_n or E_n singularity. My aim is to construct birational models for sextic double solids with a cA_n singularity for $n \geq 4$. I will introduce birational rigidity, analytic singularities, and discuss progress so far.

Matthias Paulsen

Title : Rationality of Quadric Surface Bundles and Density of Noether-Lefschetz Loci

Abstract : I will explain how the rationality of quadric surface bundles is related to Hodge theory. The behaviour of rationality in certain families can thus be studied using variations of Hodge structure and leads to questions about Noether-Lefschetz loci. I will explain how to apply an infinitesimal density criterion due to Green and Voisin in order to prove that the locus of rational members is analytically dense in the moduli space for many natural families of quadric surface bundles over $\mathbb{P}^2$. At the same time, it is known for these families that the very general member is not rational. This phenomenon is analogous to the Noether-Lefschetz theorem on the Picard group of surfaces in $\mathbb{P}^3$.

Irene Spelta

Title : Totally Geodesic Subvarieties via Galois Coverings of Elliptic Curves

Abstract : We will study totally geodesic subvarieties of A_g obtained as families of Galois coverings $f : C \to C'$, where C' is a smooth curve of genus $g' \geq 0$. All examples known so far satisfy a sufficient condition, denoting it with (*) we will briefly explain why it works. Supposing $g' \geq 1$, we will show that condition (*) gives us a bound on the genus g'. Computer calculations allow us to say that, under these hypotheses, we can find only 6 families: all of them describe Galois coverings of elliptic curves. We will quickly illustrate them. At the end, we will explicitly construct and study an example.

Fatemeh Rezaee

Title : Geometry of Complete Intersections via Wall-Crossing

Abstract : In this talk, after introducing wall-crossing with respect to Bridgeland stability conditions and explaining how it can be used to understand the geometry of moduli spaces on surfaces, we will explain some new wall-crossing phenomenon on $\mathbb{P}^3$ with an unexpected birational behaviour.

Franco Rota

Title : Bridgeland Stability and Mirror Symmetry for Orbifold Elliptic Quotients

Abstract : Mirror symmetry predicts a relation between the stability manifold of an object X and the moduli space of its mirror. We focus on the case where X is a certain orbifold quotient of an elliptic curve. In this case, the stability manifold is related to the universal unfolding of a mirror singularity, and its geometry is regulated by an extended affine root system. This possibly represents an example of a stability manifold admitting a Frobenius manifold structure.

Peter Spacek

Title : Constructing a Mirror for the Cayley Plane

Abstract : We will walk through the construction of a mirror for the Cayley plane. This mirror consists of a pair of a variety and a function such that the coordinate ring modulo the first derivatives of the function is isomorphic to the small quantum cohomology of the Cayley plane (after inverting the quantum parameter). We will introduce the small quantum cohomology and afterwards use some Lie theoretic properties to construct the mirror pair.

Tom Wennink

Title : Counting the Number of Trigonal Curves of Genus Five over Finite Fields.

Abstract : I am trying to count the number of points over finite fields of M_5, the moduli space of smooth genus five curves. If we have this number of points then it will give us the Hodge Euler characteristic of M_5, which is part of the puzzle of finding the cohomology of $\overline{M}_5$, the compactification by stable curves . Inside M_5 there is the locus of trigonal curves. Such trigonal curves correspond to projective plane quintics that have precisely one singularity, which is of delta-invariant one. I have counted these projective plane quintics over finite fields using a partial sieve method.