

VARIÉTÉS HOLOMORPHIQUEMENT SYMPLECTIQUES
WORKSHOP ON HOLOMORPHICALLY SYMPLECTIC VARIETIES

March 8 to 10, 2017

Programme

Wednesday 8 March

14:30-15:30 Frédéric Campana
15:30-16:00 Coffee break
16:00-17:00 Katia Amerik

Thursday 9 March

9:30-10:30 Claire Voisin
10:30-11:00 Coffee break
11:00-12:00 Jørgen Rennemo
13:00-14:30 Lunch
14:30-15:30 Misha Verbitsky
15:30-16:00 Coffee break
16:00-17:00 Nikon Kurnosov
17:15-18:15 Eyal Markman

Friday 10 March

9:30-10:30 Valery Gritsenko
10:30-11:00 Coffee break
11:00-12:00 Laurent Manivel

ABSTRACTS

Katia Amerik (Université Paris-Sud, Orsay)

Title: Automorphisms of holomorphic symplectic manifolds via lattice embedding

Abstract: Let M be an irreducible holomorphic symplectic (hyperkähler) manifold. If $b_2(M) > 5$, we construct a deformation M' of M which admits a symplectic automorphism of infinite order. This automorphism is hyperbolic, that is, its action on the space of real $(1, 1)$ -classes is hyperbolic. If $b_2(M) > 14$, similarly, we construct a deformation which admits a parabolic automorphism.

Frédéric Campana (Université de Lorraine, Nancy)

Title: Specialness and isotriviality

Abstract: Let X be a connected complex quasi-projective manifold equipped with an everywhere regular foliation \mathcal{F} . Assume that the leaves of \mathcal{F} are all compact and canonically polarized. We show that the generic leaves are pairwise isomorphic if the ‘orbifold base’ of this family is ‘special’. This means that the p -th exterior power of the logarithmic conormal sheaf of \mathcal{F} does not contain any sub-line bundle of maximal Kodaira dimension p , for any $p > 0$. Motivating examples of this situation are given by ‘smoothly coisotropic’ submanifolds of projective hyperkähler manifolds. This is a joint work with E. Amerik.

Valery Gritsenko (Laboratoire Painlevé, Lille / Institut Universitaire de France / NRU HSE, Moscow)

Title: Moduli spaces of polarised $O'G_6$ and polarised generalised Kummer varieties

Abstract: This is a continuation of our joint project with Klaus Hulek. In our paper “Uniruledness of orthogonal modular varieties” (*J. Algebraic Geom.* **23** (2014)) we proved that the existence of an automorphic discriminant implies in some cases the uniruledness of moduli spaces. In this talk we apply our automorphic criterion in order to study some moduli spaces of polarised irreducible holomorphic symplectic varieties of two types: O’Grady varieties of dimension 6 and generalised Kummer varieties.

Nikon Kurnosov (NRU HSE, Moscow)

Title: Absolutely trianalytic tori in hyperkähler manifolds

Abstract: Let M be a simple hyperkähler manifold of known type. It is known that there are no absolutely trianalytic tori in $\text{Hilb}_n(K3)$ and O’Grady’s examples. I will explain the non-existence of absolutely trianalytic tori in a generalized Kummer variety $K_n(T)$.

Laurent Manivel (Institut de Mathématiques de Marseille)

Title: New constructions of varieties with trivial canonical bundle

Abstract: I will explain how to construct new interesting varieties, for example Fano or Calabi-Yau, as generalized degeneracy loci. Their universal models will be orbit closures of algebraic groups in prehomogeneous spaces.

Eyal Markman (University of Massachusetts, Amherst)

Title: Constructing algebraic cycles on products of K3 surfaces via hyperholomorphic bundles

Abstract: Let Z be a rational cohomology class of Hodge type $(2,2)$ on the product of two complex K3 surfaces. If Z induces an isometry of the second rational cohomologies of the two surfaces, then Z is algebraic, by Nikolay Buskin's thesis, extending a work of Mukai. Algebraicity of Z is not known, if Z induces a Hodge similarity. We will describe the relevance of hyperholomorphic vector bundles to this more general case.

Jørgen Rennemo (University of Oxford)

Title: A proof of the Torelli theorem for cubic 4-folds via derived categories

Abstract: I will explain a new proof of the Torelli theorem for cubic 4-folds which passes through derived categories of coherent sheaves. We start from Kuznetsov's observation that if X is a cubic 4-fold, then the derived category $D(X)$ contains a full subcategory A_X of K3 type. Results of Addington–Thomas and Huybrechts say that for a dense set of cubics, the category A_X is actually the derived category of a (twisted) K3 surface. Combining this with Orlov's derived Torelli theorem for K3's, we can upgrade a Hodge isometry $H^4(X)_{\text{pr}} = H^4(Y)_{\text{pr}}$ to a derived equivalence $A_X = A_Y$. Finally we show that this equivalence preserves an "extended Hochschild cohomology ring" of A_X and that this ring is a complete invariant of X . This is a joint work with Daniel Huybrechts.

Misha Verbitsky (NRU HSE, Moscow/ULB, Brussels)

Title: Kuga-Satake construction for higher cohomology.

Abstract: Let M be a hyperkahler manifold of complex dimension n . Kuga-Satake construction gives an embedding of $H^2(M)$ into $H^2(\text{torus})$ compatible with the Hodge structure. We construct a torus T of dimension $n + k$ and an embedding of cohomology space $H^*(M) \rightarrow H^{*+k}(T)$ which is compatible with the Hodge structures and the Poincare pairing. This is a joint work with Nikon Kurnosov and Andrei Soldatenkov.

Claire Voisin (Collège de France, Paris)

Title: Degenerations of hyper-Kähler manifolds and new models for O'Grady 10 dimensional HK manifolds

Abstract: This is a complement to our recent work with Laza and Saccà where we construct deformations of O'Grady 10 dimensional HK manifolds as compactified intermediate Jacobian fibrations. We will show a much easier argument to prove that the varieties we construct are deformations of O'G10. We will also show that the twisted family of intermediate Jacobians admits a HK compactification (which is only isogenous but not isomorphic to the untwisted family).