

Japanese-European Symposium on Symplectic Varieties and Moduli Spaces – Fourth Edition

- Date: 3rd (Mon.) – 7th (Fri.) June 2019.
- Venue: Lecture hall NO C 6 of the ETH (Sonneggstrasse 5, 8006 Zürich)
The NO-building can be accessed from both sides (i.e. from Sonneggstrasse and from Clausiusstrasse).
- Access: The lecture hall is in walking distance from the main station.

Schedule

	Monday	Tuesday	Wednesday	Thursday	Friday
9:00-9:30	Registration				
9:30-10:30	Short course	Short course	Short course	Short Course	Menet
10:30-11:00	Voisin I	Voisin II	Namikawa I	Namikawa II	Coffee
11:00-11:30	Coffee break				Ishi (1h)
11:30-12:30	Fu	Cattaneo	Abe	Discussion	Lunch
12:30-13:30 13:30-14:30	Lunch and free discussion time				
14:30-15:30	Ouchi	Ma	Free afternoon	Pertusi	Rapagnetta
15:30-16:00	Coffee break			Coffee break	
16:00-17:00	Saccà	Bakker		Nagai	Discussion
17:15-18:15	Poster session	Yoshioka		Discussion	
	with snacks	Social dinner			

Short courses

Yoshinori Namikawa (Kyoto University)

Title Symplectic singularities and nilpotent orbits

Abstract We characterize the finite covering of a nilpotent orbit closure among symplectic singularities. We also discuss the explicit form of crepant resolutions or \mathbb{Q} -factorial terminalizations of such symplectic singularities.

Claire Voisin (Collège de France)

Title The explicit geometry of hyper-Kähler manifolds

Abstract I will describe several explicit projective models of hyper-Kähler manifolds built from Fano geometry. I will explain how to compute their deformation type, and describe some divisors of HLS type in the moduli spaces.

If time permits, I will also discuss a conjectural picture concerning the Chow ring of hyper-Kähler manifolds, and the notions of surface decomposition and triangle variety.

Abstracts

Takeshi Abe (Kumamoto University)

Title A note on strange duality for holomorphic triples on a projective line

Abstract A holomorphic triple is a pair of vector bundles E_2, E_1 together with a morphism $\phi : E_2 \rightarrow E_1$. We propose a strange duality conjecture for holomorphic triples on a projective line. As an affirmative evidence, we prove the conjecture in the case $\text{rank } E_1 = 1$.

Benjamin Bakker (University of Georgia)

Title Global Torelli for symplectic varieties

Abstract By work of Namikawa and others, the local deformation theory of symplectic varieties in the sense of Beauville enjoys many of the same properties as the smooth case. In joint work with C. Lehn, we extend the local results in a number of ways, and prove generalizations of both Huybrecht's projectivity criterion and Verbitsky's global Torelli theorem. In particular, we give a new proof of Verbitsky's theorem in the smooth case (provided $b_2 > 4$) which avoids using the existence of a hyperkahler metric and twistor deformations.

Alberto Cattaneo (MPIM Bonn)

Title On involutions of high-dimensional IHS manifolds

Abstract I will report on recent progress in the classification of involutions of irreducible holomorphic symplectic manifolds deformation equivalent to Hilbert schemes of points on K3 surfaces. This classification is well-understood in the case of fourfolds, thanks to many contributions in recent years; however, the picture is far less clear for involutions of higher-dimensional manifolds of $K3^{[n]}$ -type, especially in the non-symplectic case. After describing the action of these automorphisms on the cohomology lattice, I will address two problems: determining the maximal deformation families of manifolds with a non-symplectic involution and producing examples. Part of the results which I will present have been obtained in collaboration with Chiara Camere and Andrea Cattaneo.

Lie Fu (Université Claude Bernard Lyon 1)

Title A motivic global Torelli theorem for isogenous K3 surfaces.

Abstract Two K3 surfaces are isogenous if there is a rational Hodge isometry between their second cohomology. Recently Hubrechts shows that two isogenous projective K3 surfaces can be linked by a chain of twisted derived equivalences and deduces that their rational Chow motives are isomorphic. We continue this line of consideration by giving a motivic characterization: two projective K3 surfaces are isogenous if and only if their rational Chow motives are isomorphic as algebra objects. I will discuss the possibility to have such a multiplicative isomorphism for higher dimensions varieties. This is a joint work with Charles Vial.

Akira Ishii (Nagoya University)

Title Dimer models with group actions

Abstract Dimer models are bipartite graphs on a real two-torus. To a dimer model, we can associate a 3-dimensional Gorenstein affine toric 3-fold and a quiver with relations. If the dimer model satisfies the so-called consistency condition, the quiver with relations gives a non-commutative crepant resolution. In this talk, we consider finite group actions on these things.

Wahei Hara (Waseda University)

Title Deformation of tilting-type derived equivalences for crepant resolutions

Abstract In this talk, we discuss the deformation theory of derived equivalences for crepant resolutions obtained from tilting bundles. As an application, we show that a derived equivalence for a stratified Mukai flop with certain conditions lifts to the one for a stratified Atiyah flop.

Shouhei Ma (Tokyo Institute of Technology)

Title Rational equivalence of cusps

Abstract We prove that two cusps of the same dimension in the Baily-Borel compactification generate the same line in the rational Chow group for orthogonal modular varieties, Siegel modular varieties and modular varieties of unitary type. This gives a higher dimensional analogue of the Manin-Drinfeld theorem.

Gregoire Menet (University of Grenoble)

Title On integral cohomology of quotients

Abstract In this talk, I will provide some new methods, based on toric blow-ups, to determine the integral cohomology of quotients. Indeed, quotient singularities can locally be interpreted as toric varieties, and the framework of toric geometry is well adapted to deal with integral cohomology. The original motivation to study this problem was the computation of Beauville–Bogomolov forms of holomorphically symplectic orbifolds. We will show some new examples at the end of the talk.

Yasunari Nagai (Waseda University)

Title Rational normal quintics on a cubic 4-fold and related coherent sheaves

Abstract Aiming at a generalization of the construction of [Lehn–Lehn–Sorger–van Straten], we study moduli properties of some coherent sheaves related with rational normal quintics on a cubic 4-fold. This is a joint work in progress with Manfred Lehn and Duco van Straten.

Genki Ouchi (iTHEMS Riken)

Title Derived categories of K3 surfaces, abelian surfaces and symplectic resolutions

Abstract In this talk, I would like to talk about some relations between derived categories of K3 surfaces and abelian surfaces via finite group actions. We use such relations to construct symplectic resolutions of certain quotients of moduli spaces of stable objects on K3 surfaces.

Laura Pertusi (University of Milan)

Title Elliptic quintics on cubic fourfolds and stability conditions

Abstract In 2008 Kuznetsov proved that the bounded derived category of a cubic fourfold Y has a semiorthogonal decomposition whose non-trivial component $Ku(Y)$ is a K3 subcategory. More recently, Bayer, Lahoz, Macrì and Stellari constructed Bridgeland stability conditions on $Ku(Y)$, making possible to study moduli spaces of semistable objects in this component.

The aim of this talk is to explain the modular interpretation of some hyperkähler manifolds, classically associated to Y . In particular, we show that elliptic quintic curves in a generic cubic fourfold give rise to a moduli space of semistable objects in $Ku(Y)$, whose resolution is a hyperkähler tenfold, equivalent by deformation to O'Grady's example. This is a joint work in progress with Chunyi Li and Xiaolei Zhao.

Antonio Rapagnetta (University of Tor Vergata)

Title The Hodge numbers of O'Grady's 10-dimensional irreducible symplectic manifold.

Abstract I report on a joint work with M.A. de Cataldo and G. Saccà where we determine the Hodge diamond of OG10.

Giulia Saccà (Columbia University)

Title Birational geometry of the intermediate Jacobian fibration

Abstract A few years ago with Laza and Voisin we constructed a hyperkahler compactification of the intermediate Jacobian fibration associated to a general cubic fourfold. In this talk I will first show how a HK compactification $J(X)$ with a Lagrangian fibration exists for any smooth cubic fourfold X and then discuss how the birational geometry of the fibration is governed by any extra algebraic cohomology classes on X .

Kota Yoshioka (Kobe University)

Title Weak Brill-Noether for the moduli of stable sheaves on a generic K3 surface.

Abstract Let $M_H(r, dH, a)$ be the moduli of stable sheaves E of rank r , $c_1(E) = dH$ and $\chi(E) = r + a$ on a K3 surface of Picard rank 1. Under the assumption $d > 0$ and $r + a > 0$, we shall discuss $h^1(E)$ for a general member of $E \in M_H(r, dH, a)$. In particular, we give a sufficient condition for the vanishing of $h^1(E)$. This is a joint work with Coskun and Nuer.