Milano, 27-28 October 2016

Topics on rationality and hyperkähler geometry

Schedule

Thursday 27-10-2016
Aula di Rappresentanza (ground floor)

15:00 - 16:00 : G. Farkas, "The Generic Mercat Conjecture"
16:15 - 17:15 : O. Debarre, "Unexpected isomorphisms between hyperkähler fourfolds"
17:30 - 18:30 : S. Verra, "The universal K3 surface of genus 14 via cubic fourfolds"

Friday 28-10-2016
Aula di Rappresentanza (ground floor)

10:00 - 11:00 : C. Lehn, "Birational contractions of hyperkähler varieties"
11:15 - 12:15 : M. Shen, "Hyperkähler geometry and the rationality problem of cubic fourfolds"
12:30 - 13:30 : C. Voisin, "Degenerations of hyper-Kähler manifolds and new models for O'Grady 10 dimensional HK manifolds"

For any further question, please contact the organizers:
Chiara Camere (chiara.camere@unimi.it)
Elisabetta Colombo (elisabetta.colombo@unimi.it)
Abstracts

OLIVIER DEBARRE
"UNEXPECTED ISOMORPHISMS BETWEEN HYPERKÄHLER FOURFOLDS"

Using Verbitsky's Torelli theorem, we show the existence of various isomorphisms between certain hyperkähler fourfolds.

GAVRIL FARKAS
"THE GENERIC MERCAT CONJECTURE"

It has been a long-standing problem to find an adequate definition of a Clifford index for higher rank vector bundles on curves, which should capture the complexity of the curve in its moduli space. An interesting proposal in rank 2 has been put forward by Mercat, who conjectured that the second Clifford index of a curve should be equal to its classical Clifford index, defined in terms of gonality. Using moduli of sheaves on generic K3 surfaces, we prove Mercat's conjecture for generic curves of every genus. Furthermore, for odd g, we identify an effective divisor in the moduli space $M_g$ along which the Mercat Conjecture fails and compute its slope, which is shown to be equal to $6 + 12/(g + 1)$. This is joint work with Ben Bakker.

CHRISTIAN LEHN
"BIRATIONAL CONTRACTIONS OF HYPERKÄHLER VARIETIES"

We study birational contractions of hyperkähler varieties and their deformations. The theory Bayer-Macrì then allows us to disprove the existence of certain contractions for $K3^{[n]}$-type varieties that exist in local examples of symplectic varieties. We also investigate some questions related to the global Torelli theorem. This is joint work with Gianluca Pacienza and Ben Bakker.

MINGMIN SHEN
"HYPERKÄHLER GEOMETRY AND THE RATIONALITY PROBLEM OF CUBIC FOURFOLDS"

It is known that the variety $F$ of lines on a smooth cubic fourfold $X$ is a hyperkähler manifold which is deformation equivalent to the Hilbert scheme of two points on a K3 surface. In this talk I will discuss (potential) relations between the rationality of $X$ and the geometry of $F$. Typically, if $X$ is rational then certain structures on $F$ should be integral.

SANDRO VERRA
"THE UNIVERSAL K3 SURFACE OF GENUS 14 VIA CUBIC FOURFOLDS"

In complex projective geometry the interplay of $K3$ surfaces and cubic fourfolds is a well known topic, possibly related to the rationality problem for a cubic
fourfold. This was recently attracting the attention of many authors. In the talk a survey on the more recent results is given and a special case of interest is considered. This is the family of (conjecturally rational) cubic fourfolds $X$ containing a 3-nodal scroll $R$ of degree 7. Such a family is associated to the moduli space $F_{14}$ of $K3$ surfaces polarized in genus 14. The new result presented in the talk is that the moduli space of pairs $(X,R)$ is rational and birational to the universal $K3$ surface over $F_{14}$. (Joint work with G. Farkas).

CLAIRE VOISIN
"DEGENERATIONS OF HYPER-KÄHLER MANIFOLDS AND NEW MODELS FOR O'GRADY 10 DIMENSIONAL HK MANIFOLDS"

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 jacobians 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).