

Rationality of algebraic varieties

Schiermonnikoog, 15 – 19 April, 2019

Title and abstracts

Monday, 15 April

9:00 – 9:50

Jean-Louis Colliot-Thélène

Title : Rationality problems, mostly over nonclosed fields

Abstract :

I shall survey various techniques used to detect the lack of stable rationality. Special attention will be given to cubic hypersurfaces.

10:10 – 11:00

Johannes Nicaise

Title : Motivic volume and specialization of stable rationality

11:20 – 12:10

Francesco Russo

Title : Explicit rationality of some cubic fourfolds

16:30 – 17:20

Ekaterina Amerik

Title : Contraction loci on hyperkaehler manifolds in families

Abstract :

This is a joint work with Misha Verbitsky. Let X be an irreducible holomorphic symplectic manifold and z a Beauville-Bogomolov negative $(1,1)$ -class. Using the ergodicity of the monodromy action and a recent result on contractibility by Bakker and Lehn, we prove some deformation-invariance statements for the locus covered by rational curves of class proportional to z in X . An explicit description of contraction loci on low-dimensional manifolds of $K3$ type comes as an application.

17:30 – 18:20

Daniel Huybrechts

Title : Motivic and derived invariants of cubic fourfolds

Tuesday, 16 April

9:00 – 9:50

Alexander Kuznetsov

Title : Intermediate Jacobian of Gushel–Mukai 3-folds

10:10 – 11:00

Daniele Agostini

Title : Measures of irrationality and syzygies

11:20 – 12:10

Nicolas Addington

Title : Rational points and derived categories

Abstract :

For smooth projective varieties over \mathbb{Q} , is the existence of a rational point preserved under derived equivalence? First I'll discuss why this question is interesting, and what is known. Then I'll show that the answer is no, giving two counterexamples: an abelian variety and a torsor over it, and a pair of moduli spaces of sheaves on a K3 surface. Joint with Ben Antieau and Sarah Frei.

16:30 – 17:20

Martijn Kool

Title : Moduli spaces of sheaves on general type surfaces and virtual invariants

Abstract :

In this talk I discuss (virtual) Euler characteristics of moduli spaces of stable sheaves on general type surfaces. These are part of so-called Vafa-Witten invariants, which were discovered in the context of supersymmetric Yang-Mills theory by Vafa-Witten in 1994 and mathematically defined by Tanaka-Thomas in 2017. The generating functions of these invariants have interesting modularity properties predicted by physics. Using virtual intersection theory, we can verify Vafa-Witten's original predictions in examples and generalize in several new directions. Joint work with Göttsche.

17:30 – 18:20

Yuri Tschinkel

Title : Equivariant birational geometry

Wednesday, 17 April

9:00 – 9:50

Olivier Wittenberg

Title : The Clemens–Griffiths method over non-closed fields

10:10 – 11:00

Andrey Soldatenkov

Title : Kuga–Satake construction for varieties of generalized Kummer type

11:20 – 12:10

Ivan Cheltsov

Title : Rational and non-rational 3-folds

Thursday, 18 April

9:00 – 9:50

Mingmin Shen

Title : Some new counterexamples to the integral Hodge conjecture

Abstract :

I will explain a topological degeneration argument which produces some new counterexamples to the integral Hodge conjecture. This generalises the recent construction of Benoist–Ottem.

10:10 – 11:00

Sandro Verra

Title : On \mathcal{C}_{26} and \mathcal{C}_{42}

11:20 – 12:10

Alexander Kuznetsov

Title : Rationality of Fano 3-folds over nonclosed fields

16:00 – 16:50

Arnaud Beauville

Title : Vector bundles on Fano 3-folds and $K3$ surfaces

17:00 – 17:50

Emma Brakkee

Title : Two (twisted) $K3$ surfaces associated to the same cubic 4-fold

18:00 – 18:50

Brendan Hassett

Title : Complete intersections of quadrics and rationality

Abstract :

Let X be a smooth complete intersection of r quadrics in projective space. If X contains a linear subspace of dimension $r - 1$ then it is rational. We explore situations where the converse may hold, focusing on complete intersection of two quadrics in \mathbb{P}^5 . (joint with Pirutka and Tschinkel)

Friday, 19 April

9:00 – 9:50

Stefan Schreieder

Title : The rationality problem of hypersurfaces

10:10 – 11:00

Renjie Lyu

Title : A result on algebraic cycles on cubic hypersurfaces

11:05 – 11:55

Burt Totaro

Title : Bott vanishing for algebraic surfaces

Abstract :

Bott proved a strong vanishing theorem for sheaf cohomology on projective space. The statement does not hold for most varieties, and we survey what is known. We find new varieties that satisfy Bott vanishing, building on our knowledge of moduli spaces of K3 surfaces.