WORKSHOP ON BIRATIONAL GEOMETRY
MOSCOW, 26–30 MARCH 2018
ABSTRACTS

Yifei Chen (Chinese Academy of Sciences)
Canonical bundle formula in a field of positive characteristic

Over the field of complex numbers, Kodaira formulates a canonical bundle formula for relatively minimal elliptic fibration in terms of j-function of the elliptic curves and singularities of fibers. Over the field of positive characteristic, Bombieri and Mumford give a canonical bundle formula in terms of Euler number of the surface. In the talk, we try to give a canonical bundle formula of Kodaira type over the field of positive characteristic. This is a joint work with Yi Gu.

Lars Halle (University of Copenhagen)
Degenerations of Hilbert schemes of points

I will present a "good" compactification of the relative Hilbert scheme of points associated to the smooth locus of a (simple) degeneration $X \to C$ of varieties. This compactification is obtained by GIT-methods, and yields a new, refined, approach to earlier stacky constructions of J. Li and B. Wu. In particular, I will discuss various aspects of the geometry of this degeneration (e.g. its birational geometry and dual complex), when $X \to C$ is a family of surfaces. This is joint work with M. Gulbrandsen, K. Hulek and Z. Zhang.

Andreas Höring (Université de Nice Sophia Antipolis)
Uniruled manifolds in projective and Kähler geometry

The goal of this lectures is to discuss some recent results on compact complex manifolds that are uniruled (i.e. covered by rational curves), but not rationally connected (i.e. two general points are not connected by a rational curve). In the first talk I will discuss a technique that aims at proving the existence of rational curves on compact Kähler manifolds, thereby generalising the work of Mori for projective manifolds. In the second talk I will explain how a manifold with nef anticanonical bundle (a generalisation of Fano manifolds) can be decomposed in its rationally connected part and a numerically trivial part. In the third talk I will discuss the technical background of both problems: the positivity of certain foliations.

I will explain all the terms appearing in this summary in the lectures. This is based on joint papers with Junyan Cao and Thomas Peternell.

Anne Lonjou (Universität Basel) & Christian Urech (Imperial College)
The Cremona group and its action on an infinite dimensional hyperboloid

The Cremona group is the group of birational transformations of the projective plane. One of the key techniques to understand its group structure is its isometric action on an infinite dimensional hyperboloid. We will explain this action and give some examples on how it can be used to prove some structure results about the Cremona group. In particular, we will show that the Cremona group is not simple and describe its simple subgroups.

Elisa Postinghel (Loughborough University)
Polynomial interpolation in algebraic geometry

I will give an introduction to polynomial interpolation problems in several variables and to their formulation in the algebraic as well as in the geometric setting. I will give an overview of conjectures and open problems arising from both settings and some ideas on how techniques from birational geometry are useful to approach these. I will discuss some results in this direction, obtained with C. Brambilla and O. Dumitrescu.

Andrey Trepalin (IITP and HSE)
Stable rationality of cubic surfaces

In the recent work of Yu. Tschinkel and K. Yang "Potentially stably rational del Pezzo surfaces over nonclosed fields" the authors proved that any minimal del Pezzo surface of degree 3 or 1 is not stably rational, and for del Pezzo surfaces of degree 2 there are four possibilities for the inage of the Galois group in the Weyl group $\mathrm{W}(\mathrm{E}_7)$ for which such a surface can be stably rational. The proof is based on well-organised analysis of all subgroups of the Weyl group $\mathrm{W}(\mathrm{E}_8)$ that is done by computations in `Magma` system.

In my talk for cubic surfaces I will show an alternative proof of the result of Tschinkel and Yang, based on G-equivariant MMP methods and not using computational methods. The method of this proof also works for del Pezzo surfaces of degree 2 and 1.

Misha Verbitsky (HSE)
Contraction loci in hyperkähler manifolds

An MBM curve on a hyperkähler manifold M is a rational curve with negative BBF square and minimal possible dimension of its Barlet deformation space. It is known that (up to a possible birational transform) MBM curves survive in all deformations of M which leave its homology class of type $(1,1)$. The MBM locus of an MBM curve is the union of all its deformations in the ambient manifold M. When M is projective, this is a birational contraction locus, and all birational contraction loci are obtained this way (when M is non-projective, a similar result is conjectured). I will prove that all MBM loci in a given deformation class are homeomorphic. This is a joint work with Ekaterina Amerik.