Seminar Basel-Dijon
Algebraic Geometry

DIJON - June 6-7 2016

Programme

Automorphisms of affine del Pezzo threefolds, log Noether-Fano inequality and super-maximal singularity

Ivan CHELTSOV (University of Edinburgh)

Astract: We show how to study automorphisms of affine del Pezzo threefolds using new log version of the classical Noether-Fano inequality and Pukhlikov's super-maximal singularity.

Automorphisms of complements of smooth hypersurfaces: a landscape view

Adrien DUBOULOZ (Université Bourgogne-Franche Comté)

Abstract: After a brief presentation of classically known results concerning the structure of the automorphism groups of complements of smooth non degenerate hypersurfaces in projective spaces, I will mainly present general strategies and partial results towards the understanding of the automorphism group of the complement of a smooth cubic surface in $\mathbb{P}^3$, and more generally those of the complements of del Pezzo surfaces of degre 1 and 2 in suitable weighted projective spaces.
(This is intended to be an introduction to Ivan Cheltsov's Talk)

On the strong complement problem in dimension 2

Mattias HEMMIG (Universität Basel)

Abstract: Given two closed irreducible curves in the affine plane that have isomorphic complements, one can ask whether those curves are isomorphic. This question was posed by Hanspeter Kraft among his "Challenging problems in affine n-space" (1995). A stronger version asks whether the curves are equivalent by an automorphism of the plane. In this talk, which is based on work in progress with Jean-Philippe Furter, we address this second question, giving a negative answer by presenting a family of counterexamples. We also discuss some special cases where the answer is positive.

Covariants, derivation invariant subsets, and first integrals

Hanspeter KRAFT (Universität Basel)

Asbtract: Given an ordinary differential equation $\dot{x} = \xi(x)$ on a manifold M where ξ is a smooth vector field on M, a subset $Y \subset M$ is called *invariant* if, for every $y \in Y$, the integral curve through y defined by the flow of the ODE belongs to Y. Now assume that a group G is acting on M. A basic question is to describe the subsets $Y \subset M$ which are invariant with respect to all G-symmetric ODE's, i.e. those corresponding to G-symmetric vector fields ξ. Another important question concerns the first integrals, i.e. the solutions of $\xi f = 0$ for all G-symmetric vector fields ξ. Following Grosshans-Scheurle-Walcher [GSW12] we will consider the "algebraic" situation where $M = V$ is a complex vector space, the vector fields are polynomial, and $G \subset GL(V)$ is an algebraic group. Then one has the following proposition which implies several results from [GSW12].
Proposition: A closed subvariety $Y \subset V$ is invariant under all G-symmetric vector fields ξ if and only if it is stable under the action of the semigroup $End_G(V)$ of G-equivariant endomorphisms.
In order to study the first integrals, one can construct a "generic" quotient $X/End_G(V)$ such that the rational functions on $X/End_G(V)$ correspond to the first integrals on X where X is a G-stable and invariant closed subvariety X of V. As an application, the method above allows to give a complete description of the first integrals for the nullcone $N_d \subset V_d$ of the binary forms V_d of degree d, with respect to the group SL_2.
This is joint work with Frank D. Grosshans.
Reference: [GSW12] Grosshand, F., Scheurle, J., Walcher, S.: Invariant Sets Forced by Symmetry. J. Geometric Mechanics 4 (2012) 271-296

Birational maps of del Pezzo fibrations and alpha-invariants of del Pezzo surfaces

Jihun PARK (Pohang University)

Abstract: Using the alpha-invariants of del Pezzo surfaces, I explain why a del Pezzo fibration of degree at most 4 with nonsingular special fiber cannot be birationally transformed into another del Pezzo fibration with nonsingular special fiber.

Embeddings of horospherical homogeneous spaces into algebraic stacks
Ronan TERPEREAU (Max Planck Institute)

Abstract: The study of equivariant embeddings of tori into algebraic varieties, also known as toric varieties, is a well-known topic of algebraic geometry. In a recent work, Geraschenko and Satriano considered the equivariant embeddings of tori into algebraic stacks and proved that they are always quotient stacks of toric varieties. In this talk, I will explain the idea of their proof, give some examples, and also explain how their result might extend to the larger class of equivariant embeddings of horospherical homogenous spaces into algebraic stacks.

Categorification of the Weyl and Heisenberg algebras (after Khovanov)
Emmanuel WAGNER (Université Bourgogne-Franche Comté)

Abstract:

Schedule

Monday 6	Tuesday 7
	DUBOULOZ 9:30 - 10:00 Room 318
	CHELTSOV 10:30 - 11:30 Room 318
	Lunch Break
TERPEREAU 14:00 - 15:00 René Baire Room	PARK 13:30 - 14:30 Room 318
WAGNER 15:15 - 16:15 René Baire Room	HEMMIG 14:45 - 15:45 Room 318
KRAFT 16:45 - 17:45 René Baire Room	
Social Picnic 18:00 - ..	