
Algebraic, birational, arithmetic and Kahler geometry: Recent developments
Géométrie algébrique, birationnelle, arithmétique et kahlerienne : développements récents
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JASON BELL, University of Waterloo

NILS BRUIN, Simon Fraser University
(2,2,2) - Isogeny Descent on Jacobians of Plane Quartics

A classical method for exhibiting non-trivial elements in the Tate-Shafarevich group of Jacobians compares Selmer groups of various isogenies. In this presentation we consider Jacobians of plane quartics that have a $(2,2,2)$ -isogeny to another principally polarized abelian variety. An interesting complication is that such an abelian variety may not be a Jacobian: it may only be a quadratic twist of a Jacobian. We describe how, at least in the case of completely split 2-torsion, one can determine which quadratic twist and how one can still compute Selmer groups. This talk describes joint work with Damara Gagnier and with Emiel Haakma.

MICHAEL CHITAYAT, University of Padova

MICHAEL GROECHENIG, University of Toronto

KATRINA HONIGS, Simon Fraser University

JOEL KAMNITZER, McGill University

PETER MCDONALD, Simon Fraser University

NEGARIN MOHAMMADI, Simon Fraser University

DANNY OFEK, University of British Columbia
Recent progress toward computing the essential dimension of semisimple groups

Let G be an algebraic group over a field. The essential dimension of G , denoted $\text{ed}(G)$, measures how much can generically free G -representations be compressed using G -equivariant rational maps. Often G -torsors classify a class of algebraic objects,

in which case $\text{ed}(G)$ measures the complexity of a general member of that class. For example, $\text{ed}(\text{PGL}_n)$ is the number of algebraically independent parameters needed to define a generic division algebra of degree n . We will explain the historical development of the project of computing $\text{ed}(G)$ for all semisimple groups G and report on recent progress.

ZINOVY REICHSTEIN, University of British Columbia

On the Cremona dimension of a finite p -group

The Cremona dimension of a finite group G is the minimal dimension of a rationally connected variety which admits a faithful action of G . In this talk, based on joint work with Giulio Bresciani and Angelo Vistoli, I will discuss new lower bounds on the Cremona dimension of a finite p -group.

MATTHEW SATRIANO, University of Waterloo

Crepant resolutions of log-terminal singularities and non-negativity of stringy Hodge numbers

Crepant resolutions have inspired connections between birational geometry, derived categories, representation theory, and motivic integration. Stringy Hodge numbers are invariants of log-terminal varieties designed to capture the Hodge theoretic information of a crepant resolution, even when no crepant resolution exists. In this talk, we will characterize log-terminal singularities as those admitting a crepant resolution by a stack. We will use this characterization to obtain a cohomological interpretation of stringy Hodge numbers. We will also give a complete classification of when stringy Hodge numbers are non-negative, including counter-examples to Batyrev's non-negativity conjecture. This is based on joint work with Jiahui Huang and Jeremy Usatine.

AMAL VAYALINKAL, University of Toronto

XIA XIAO, University of Quebec at Montreal

YULUN XU, University of Toronto

Regularization and Hölder continuity for complex Hessian equations on Hermitian manifolds

Let (M, ω) be a compact Hermitian manifold, and let Γ be a symmetric convex cone. We develop a quantitative regularization method for Γ -admissible functions. As an application, we prove Hölder continuity for every bounded pluripotential solution of complex m -Hessian equations whose right-hand sides belong to L^p , for $p > \frac{n}{m}$. These results extend to a more general class of complex Hessian equations satisfying the structural condition used by Guo–Phong–Tong.

YUKAI ZHANG, University of Toronto

BORIS ZUPANCIC, McGill University

Reduction of Singularities in Poisson Geometry via Weighted Blowups

Hironaka's theorem on resolution of singularities via blowups fails in Poisson geometry, since blowups generally destroy Poisson structures. However, there exists a more general operation called a weighted blowup, which may provide a viable alternative. Weighted blowups have proven useful in the recent literature on resolution of singularities; for instance, in the non-Poisson setting, Abramovich–Temkin–Włodarczyk have shown that fast functorial resolution of singularities can always be achieved by

sequentially blowing up the worst singularities via a canonical choice of weighted blowup. We take a similar approach to show that appropriate choices of weighted blowups produce reduction of singularities in low dimensional Poisson geometry. In joint work with Simon Lapointe, Mykola Matviichuk and Brent Pym, we obtain: (1) a criterion for lifting a Poisson structure to a weighted blowup, (2) a classification of normal forms of Poisson varieties not admitting any weighted blowup, in low-dimension, and (3) a theorem on the extent to which weighted blowups can reduce the singularities of Poisson varieties, in low-dimension.