Name	Title	Abstract
Joaquin Moraga	Cluster type Fano varieties	A toric variety is a n-dimensional normal variety endowed with a n-dimensional toric action. Weakening the definition of toric variety leads to the concept of T-varieties. The notion of T-varieties, which was studied by Hausen and co-authors, had become a central one in algebraic geometry. In this talk, I will present a characterization of toric varieties from the birational point of view. A weakening of this new characterization will naturally lead to the concept of cluster type varieties. Finally, I will explain some recent developments in the study of cluster type Fano varieties.
Andriy Regeta	Group theoretical characterization of rationality and Borel subgroups	In this talk I will discuss two questions about the group of birational transformations, Bir(X), of an irreducible variety X: (1) If Bir(X) is isomorphic to Bir(P^n), does this imply that X is rational? (2) What are the Borel subgroups of Bir(X)? In 2014 Serge Cantat proved that the first question has an affirmative answer if the dimension of X is less than or equal to n. We show that (1) has a positive answer without this extra assumption (and we do not use the result of Serge Cantat). Regarding the second question: it is well-known that Borel subgroups of an algebraic group (over algebraically closed fields) are conjugate. This is not the case for Bir(P^2). Nevertheless, all Borel subgroups of Bir(P^2) were classified by Jean-Philippe Furter and Isac Heden. In this talk I will present a result concerning Borel subgroups of Bir(X) for arbitrary (irreducible) variety X: we prove that a Borel subgroup of Bir(X) has derived length at most twice the dimension of X, and if equality holds, then X is rational, and the Borel subgroup is conjugate to the standard Borel subgroup in Bir(P^n). Moreover, we provide examples of Borel subgroups in Bir(P^n) of derived length less than 2n for any n≥2. This answers affirmatively a conjecture of Vladimir Popov. This is joint work with Christian Urech and Immanuel van Santen.
Milena Hering	Equations of toric vector bundles	The projectivisation of a very ample toric vector bundle admits a natural embedding into projective space. We describe defining equations for this embedding in a larger projective space via a more natural embedding of the vector bundle in the Cox ring of a toric variety. This is joint work with Diane Maclagan and Greg Smith.
Kiumars Kaveh	Torus equivariant vector bundles on complexity-one T-varieties	
Antonio Laface	The Cox ring of an embedded variety	Let X be a subvariety of a smooth Mori dream space Z. The inclusion X ⊂ Z induces homomorphisms at the level of divisor class groups and Cox rings. A natural question in this setting is how to compute a presentation for the Cox ring of X in terms of the image R of the induced map from the Cox ring of Z to that of X. In this talk, I will show that if the induced map on the divisor class groups is an isomorphism, then the Cox ring of X can be expressed as the intersection of finitely many localizations of R. This generalizes results by Hausen (2008, "Cox Rings and Combinatorics. II"), Artebani and Laface (2012, "Hypersurfaces in Mori Dream Spaces"), and Ottem (2015, "Birational Geometry of Hypersurfaces in Products of Projective Spaces"). As an application, we compute the Cox ring of all smooth Calabi–Yau hypersurfaces X in a smooth toric Fano variety Z of Picard rank 2 and dimension at least 4, showing that the Cox ring of X is finitely generated and a complete intersection. This is joint work with Luca Ugaglia and Cristóbal Herrera.
Klaus Altmann	Universal extensions via Weil decorations	On a toric variety, the cohomology of the invertible sheaf O(P-Q) given by the formal difference of two polytopes can be understood via the set theoretic difference Q\P. In particular, the extensions Ext(Q,P) of O(Q) by O(P) are parametrised by the connected components of Q\P. If P is contained in Q, then the universal extension is a direct sum of invertible sheaves which one can directly visualise as polytopes. For the general case, we will use and explain so-called Weil decorations to visualise also non-split vector bundles. This is joint work with Andreas Hochenegger and Frederik Witt. A sequel of this talk dealing with the cohomology of Weil decorations will be given by Andreas Hochenegger later in this conference.
Andreas Hochenegger	Cohomology of toric vector bundles via Weil decorations	One can write divisors D as a difference of two nef divisors. In the toric context, this translates into the formal difference of two polytopes P-Q. Then it is possible to express the cohomology of O(D) via these two polytopes. In our talk we will show how this approach can be generalized to vector bundles E of higher rank. Using the language of Weil decorations introduced earlier in the talk of Klaus Altmann, the cohomology of E will be related to the cohomology of a constructible sheaf. This is joint work with Klaus Altmann and Frederik Witt.
Sam Payne	Counting curves over finite fields on two toric surfaces	I will present recent results on counting smooth curves in linear series over finite fields on the projective plane and the weight projective plane P(1,1,2). The heart of this research is computational and toric. It also has applications to the cohomology of moduli spaces of stable curves after dividing by the actions of the automorphism groups of these surfaces. Based on joint work with Jonas Bergström and Carel Faber.

Michel Brion	Local structure of T-varieties in positive characteristic	Let X be a normal variety over an algebraically closed field, equipped with an action of a torus T. In characteristic zero, it is known that every T-orbit in X has an open T-stable neighborhood of the form (T x Y)/D where D is a closed subgroup of T, and Y a normal affine D-variety with a fixed point. We will extend this local structure result to positive characteristic. Then Y need no longer be normal, but is D-normal in an appropriate sense. We will also explore the notion of D-normality for a diagonalizable group D.
Hamid Abban	A pointless approach to K-stability	K-stability is a notion initially introduced to detect existence of Kähler-Einstein metrics on Fano manifolds. However, the notion proved fruitful beyond this by providing the correct platform to construct compact moduli spaces for Fano varieties, amongst many other applications. In this talk I will uncover another facet of K-stability by exploring connections to existence of points over subfields of the complex numbers. This is based on a joint work with Ivan Cheltsov, Takashi Kishimoto, and Frederic Mangolte.
Christopher Manon	Cox rings of toric bundles	I'll give an overview of some recent work on the Cox rings of projectivized toric vector bundles. A toric vector bundle is a vector bundle over a toric variety equipped with an action by the defining torus of the base. Toric vector bundles and their projectivizations provide a rich class of spaces that still manage to admit a combinatorial characterization. I'll describe a classification result which shows that a toric vector bundle can be captured by an arrangement of points on the Bergman fan of a certain matroid and describe how this data can lead to a presentation of the Cox ring. Then I'll describe how these properties interact with natural operations on toric vector bundles like direct sum. This involves the geometry of the closely related class of toric flag bundles. This is joint work with Kiumars Kaveh and Courtney George.
Victor Batyrev	Variation of GIT quotients and MMP with scaling.	In my talk I will discuss an approach to the Minimal Model Program based on a natural action of 1-dimensional algebraic torus on the Cox-type bi-graded ring associated to two divisors on an arbitrary smooth projective algebraic variety X: the canonical divisor K and a big semiample divisor L. We give a combinatorial illustration of this approach in the Minimal Model Program for non-degenerate hypersurfaces in algebraic tori of arbitrary dimension.
Johannes Hofscheier	The generalised Mukai conjecture for spherical varieties	A classical question in algebraic geometry is how to characterise projective space P^n among smooth Fano varieties. In 1988 Mukai extended this question by suggesting a characterisation of powers of projective space (P^n)^r among smooth Fano varieties. Generalised by Bonavero, Casagrande, Debarre and Druel in 2002, the generalised Mukai conjecture suggests that for a smooth Fano manifold X the product \rho_X(i_X-1) is bounded by the dimension of X with equality exactly when X is isomorphic to (P^(i_X-1))^\rho_X. Here, \rho_X denotes the Picard number and i_X the pseudo-index of X. In this talk, I will outline some of the core ideas how to prove this conjecture for the case of spherical varieties. Our approach relies on a geometric characterisation of toric varieties conjectured by Shokurov and proven by Brown, McKernan, Svaldi, and Zong. This is joint work with Giuliano Gagliardi and Heath Pearson.
Jaroslaw Buczynski	Cactus scheme, catalecticant minors and singularities of secant varieties to high degree Veronese reembeddings	The r-th cactus variety of a subvariety X in a projective space generalises secant variety of X and it is defined using linear spans of finite schemes of degree r. It's original purpose was to study the vanishing sets of catalecticant minors. We propose adding a scheme structure to the cactus variety and we define it via relative linear spans of families of finite schemes over a potentially non-reduced base. In this way we are able to study the vanishing scheme of the catalecticant minors. For X which is a sufficiently large Veronese reembedding of projective variety, we show that r-th cactus scheme and the zero scheme of appropriate catalecticant minors agree on an open and dense subset which is the complement of the (r-1)-st cactus variety/scheme. As an application, we can describe the singular locus of some secant varieties to high degree Veronese varieties and other varieties. Based on a joint work with Hanieh Keneshlou.