

Abstract

Oberwolfach Workshop:

Toric Geometry

Dates:

22 - 28 September 2019 (Code: 1939)

Organizers:

Jürgen Hausen, Tübingen
Diane Maclagan, Warwick
Hal Schenck, Ames

Toric geometry is a subfield of algebraic geometry with deep intersections with combinatorics. A toric variety X is a partial compactification of the algebraic torus T with an action of T that extends the action of T on itself. Behind this simple definition, however, is a striking combinatorial dictionary that relates algebro-geometric invariants of the variety X to geometric-combinatorial invariants of an associated lattice polytope or polyhedral fan. This bridge between the two fields has made toric geometry to an important source of examples and counterexamples in algebraic geometry.

A key property of toric geometry, which we will exploit in this workshop, is that it touches many subfields of algebraic geometry, and also has applications in other areas of mathematics, and outside mathematics. Inside algebraic geometry, the connection often comes by degenerating a variety to a toric variety. Another connection is through variants of toric varieties, such as T -varieties, toric vector bundles, spherical varieties, and Mori dream spaces. There are also connections to tropical geometry, combinatorics, commutative algebra, and algebraic topology. Finally, toric varieties also have applications outside mathematics, in areas as diverse as statistics, coding theory, computer modelling, and chemistry.

The goal of this workshop is to bring together mathematicians across this toric diaspora, together with toric specialists, to share problems and results, and to foster interactions between these groups.