

# Reading Seminar on Toric Varieties

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## Abstract:

Toric varieties form an important and rich class of examples in algebraic geometry, which often provide a testing ground for theorems. The geometry of a toric variety is fully determined by the combinatorics of its associated fan, which often makes computations far more tractable. For a quite general class of toric varieties, this information is also encoded in a polytope, which creates a powerful connection of the subject with convex geometry.

The reading seminar will follow the book “Toric Varieties” of Fulton. We will cover a choice of topics from the following list, mostly from the first 3 chapters of the book:

- Convex polyhedral cones and affine toric varieties;
- Fans and toric varieties
- Toric varieties from polytopes
- Local properties of toric varieties
- Surfaces; quotient singularities
- One-parameter subgroups; limit points
- Compactness and properness
- Nonsingular surfaces
- Resolution of singularities
- Orbits under the torus action
- Fundamental groups and Euler characteristics
- Divisors and line bundles

## References:

Fulton, *Toric Varieties*, Princeton University Press, 1993.

Cox, Little, Schenck, *Toric Varieties*, Graduate Studies in Mathematics, 124. AMS, 2011.