

The geometry of double posets, Raman Sanyal, Cologne, 07/11/2016

In his 1984 paper, Stanley showed that partially ordered sets (posets, for short) can be studied from the perspective of geometry. His order- and chain polytopes express many well-known combinatorial properties of posets as geometric quantities. This connection between posets and polytopes furnished a number of deep results in combinatorics, geometry, and algebra.

In 2011, Malvenuto and Reutenauer introduced "double posets", that is, (finite) sets equipped with two partial order relations. The notion of a double poset underlies many constructions in algebraic combinatorics (such as P-partitions, Littlewood-Richardson rules, permutation statistics).

In this talk, I will explain how double posets can be studied from a geometric point of view. In particular, I will highlight connections to centrally-symmetric polytopes (weak Hanner polytopes), combinatorial optimization (anti-blocking polytopes), valuations on distributive lattices, and generalized Hibi (semigroup) rings. This is joint work with Tom Chappell and Tobias Friedl.