Sonja Riedel (Bremen)

Combinatorial Invariants of Toric Hyperplane Arrangements

Abstract for the Combinatorics Seminar 2014 June ?

A 'toric hyperplane arrangement' A is a finite family of 'toric hyperplanes', that is, hypersurfaces in the n-dimensional torus $(C^*)^n$ (complex, noncompact) or $(S^1)^n$ (real, compact) that are analogous to hyperplanes in real or complex linear space. Thus, toric hyperplane arrangements are analogues of ordinary hyperplane arrangements, which are finite sets of hyperplanes in a vector space.

Recent work of De Concini and Procesi generated new interest in combinatorial invariants of the topology of the complement of A. In the case of so-called 'complexified real' toric arrangements, the induced stratification of the compact torus $(S^1)^n$ (which is the decomposition of the torus into the faces of the arrangement) determines the homotopy type of the complement. To establish in greater generality the link between the combinatorics of these face structures and the topology of A I use the techniques of matroid theory. Starting from the theory of semimatroids and oriented matroids, I want to develop a 'toric oriented matroid' with the goal of characterizing the face structure of the stratification.

The talk will include an introduction to toric arrangements and the necessary background in matroid theory.
