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Covectors of Phased Matroids

Abstract for the Combinatorics Seminar 2014 September 30 and October 7

Part 1 (Sept. 30)

The theory of phased matroids is still very much under construction. The goal is a combinatorial theory that models objects in $\mathbf{C}^n$ (vector arrangements, hyperplane arrangements, and linear subspaces) in the same way that oriented matroids model objects in $\mathbf{R}^n$.

Oriented matroid theory has proved powerful for two reasons: its rich library of equivalent axiomatizations, and the Topological Representation Theorem, which has led to fascinating interplay between combinatorics and topology. Phased matroids have their own library of axiomatizations, analogous to many of those for oriented matroids, but alas, to date, not the one that leads to a Topological Representation Theorem. In this talk I'll give some background on the problem and introduce a new approach which appears promising.

Part 2 (Oct. 7)

This is a continuation of last week's talk, in which I first raised doubts about the existence of a good notion of covectors for phased matroids, then claimed to define such a notion. Today I'll make the case that this definition is, in fact, really good: it has the matroidal properties one wants of covectors (deletion/contraction, duality), and it shows strong promise for a Topological Representation Theorem.
