# Richard Ehrenborg (University of Kentucky)

# Lifting Inequalities for Polytopes

## Abstract for the Combinatorics and Number Theory Seminar 2002 October 9

The f-vector enumerates the number of faces of a convex polytope according to dimension. The flag f-vector is a refinement of the f-vector since it enumerates face incidences of the polytope. To classify the set of flag f-vectors of polytopes is an open problem in discrete geometry. This was settled for 3-dimensional polytopes by Steinitz a century ago. However, already in dimension 4 the problem is open.

I will discuss the known linear inequalities for the flag f-vector of polytopes. These inequalities include the non-negativity of the toric g-vector, that the simplex minimizes the cd-index, and the Kalai convolution of inequalities.

I will introduce a method of lifting inequalities from lower-dimensional polytopes to higher dimensions. As a result we obtain two new inequalities for 6-dimensional polytopes.

The talk will be accessible to a general audience.