

MSRI–Evans Talk

Monday, 4:15–5:00pm, 60 Evans

Nov. 1 **Richard Stanley**, UC Berkeley and MSRI

The characteristic polynomial of a hyperplane arrangement

An arrangement A is (for this talk) a finite set of affine hyperplanes in a vector space over a field K . A fundamental combinatorial invariant of an arrangement is a polynomial $X(t)$ called the *characteristic polynomial* of A . We will discuss some applications of the characteristic polynomial, including the counting of regions of the complement L of the hyperplanes in A when $K=\mathbb{R}$ (the real numbers), the computation of the homology of the complement of the hyperplanes in A when $K=\mathbb{C}$ (the complex numbers), the partial computation of the Smith normal form of a “distance matrix” associated with A , the computation of the eigenvalues of a certain random walk on the regions of the complement L (when $K=\mathbb{R}$), and the counting of points lying on none of the hyperplanes when K is finite. Some examples of interesting characteristic polynomials will be given, including those that satisfy a “Riemann hypothesis.”