

Geometry Seminar  
Tuesday, April 14, 2009  
Room 317 WWH at 6:00 P.M.

# Discrete Morse Theory for Arrangements of Hyperplanes

Emanuele Delucchi  
Binghamton University, SUNY.

The central question about complements of hyperplane arrangements in complex space is to study to what extent the geometry and topology of the complement is determined by the combinatorics of the pattern of intersections of the hyperplanes. If the defining equations of the planes have real coefficients, then the homotopy type of the complement is determined by the oriented matroid associated to its real part.

The goal of the talk is to introduce some basics of the theory of hyperplane arrangements and, using discrete Morse theory, to show how the combinatorial data of the oriented matroid can be used to give a new, constructive proof (at least in the complexified case) that every such space is minimal - in the sense that it has the homotopy type of a CW complex with as many cells in every dimension as there are generators of the corresponding homology group.

For more information please visit the seminar website at:  
[http://www.math.nyu.edu/seminars/geometry\\_seminar.html](http://www.math.nyu.edu/seminars/geometry_seminar.html).