Geometry Seminar
November 02, 2004, Tuesday, 6:00 p.m.
Room 613, Courant Institute
251 Mercer Street, New York

# Erdős-Hajnal Sets and Semigroup Decompositions

Joshua Cooper
Courant Institute, NYU

**Abstract**

Define a set of lines in $R^3$ to be "stacked" with respect to $v \in R^3$ if, from a vantage point far away in the direction of $v$, the lines are linearly ordered by the "crossing over" relation. Given a collection of skew lines and a point $v$, we ask, what is the largest stacked subset that must be present among the lines? This question, which appears in a a 2000 paper of Erdős, Hajnal, and Pach, is intimately related to the well-known Erdős-Hajnal conjecture via the Milnor-Thom theorem. It was recently resolved by a powerful and very general theorem of Alon, Pach, Pinchasi, Radoicic, and Sharir. We describe these results and discuss several related issues, including a generalization to "Erdos-Hajnal sets" and an intriguing problem concerning the decomposability of semi-algebraic sets: Do all semi-algebraic sets belong to the set algebra generated by semigroups in $R^d$? Our main result is a resolution of this question in dimensions 1 and 2.

For further information contact {pach,pollack}@cims.nyu.edu, or visit our website: http://www.math.nyu.edu/seminars/geometry_seminar.html