
* Princeton Discrete Math Seminar *

Date: Wednesday, November 24, 2:30 in Fine Hall 224

Joshua Cooper
NYU

Erdos-Hajnal Sets and Semigroup Decompositions

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 2000 paper of Erdos, Hajnal, and Pach, is intimately related to the well-known Erdos-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.