ABSTRACT

Cocliques in the Kneser graph on the point-hyperplane flags of a projective space

The point-hyperplane Kneser graph is defined on the point-hyperplane flags (P, H) where the point P is in the hyperplane H of n-dimensional vector space V over $F(q)$. Two flags (P, H), and (P', H') are adjacent if P is not in H' and P' is not in H. The problem is to find the maximal cocliques in this graph, so it is analogous to the Erdös-Ko-Rado theorem describing the maximal cocliques in the classical Kneser graph $K(n, k)$.

This problem is solved in a recent paper with Aart Blokhuis and Andries E. Brouwer. The size of maximal colciques is proved to be $1+2q+3q^2+...+(n-1)q^{(n-2)}$. The maximal number of points involved in a maximal coclique is proved to be $1 + q + q^2 + ... + q^{(n-2)}$, which is the number of points in a hyperplane in an n-dimensional vector space. Since the problem is self dual, this is also the number of hyperplanes invloved in a maximal coclique. For the number of points involved, the characterization of the maximal cocliques where this bound is attained is also done. In this talk, I will describe the proof of the results of this work.