

Polarities of projective planes and related (hyper)graphs

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This is joint work with Francesco Pavese and Leo Storme

Polarity graphs were first introduced by Erdős and Rényi [1] to solve a problem in extremal graph theory. Ever since, they have appeared in several contexts, most often in extremal (hyper)graph theory. While their applications are very fruitful, this interesting class of graphs merits an investigation of its own. As a motivating example, a natural question that any mathematician can understand is the following.

Question. Consider the finite vector space $V(3, q)$. What is the largest set of vectors A such that no two distinct vectors in A are orthogonal?

This particular question is related to the independence number of certain polarity graphs. The techniques that have been employed to investigate this problem range from algebraic graph theory and coherent configurations [2], to purely geometrical constructions. In this talk, I will give an overview of the current best known lower and upper bounds on the independence numbers of certain polarity (hyper)graphs, including some new results, which are joint work with Francesco Pavese and Leo Storme [3, 4].

References

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- [3] S. Mattheus, F. Pavese, L. Storme, On the independence number of graphs related to a polarity, submitted (2017).
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