Erdős-Ko-Rado theorems in finite classical polar spaces

Talk

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(joint work with V. Pepe and F. Vanhove)

In the original Erdős-Ko-Rado problem, the problem was to determine the largest sets of subsets of size k in a given set of size n, intersecting pairwise in at least one element.

This question was generalized to its q-analog: determine the largest sets of k-dimensional vector subspaces in the vector space $V(n, q)$ of dimension n over the finite field of order q pairwise intersecting in at least a one-dimensional vector space.

This q-analog can also be formulated in a projective geometry setting, where $V(n, q)$ corresponds to the projective space $\mathrm{PG}(n-1, q)$ of dimension $n-1$ over the finite field of order q, and where the k-dimensional vector subspaces correspond to the projective subspaces of dimension $k-1$. Here, the formulation is: determine the largest sets of $(k-1)$-dimensional projective subspaces of $\mathrm{PG}(n-1, q)$ intersecting pairwise in at least a projective point.

In finite projective spaces, there exist the finite classical polar spaces. The finite classical polar spaces are the non-singular quadrics, the non-singular Hermitian varieties, and the non-singular symplectic spaces. A *generator* of a finite classical polar space is a projective subspace of maximal dimension contained in this finite classical polar space.

Recently, the Erdős-Ko-Rado problem on the generators of the finite classical polar spaces was investigated. This talk presents the results of [1] on this new version of the Erdős-Ko-Rado problem.

References

[1] V. Pepe, L. Storme, and F. Vanhove, Theorems of Erdős-Ko-Rado-type in polar spaces. *J. Combin. Theory, Ser. A* **118** (2011), 1291-1312.

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