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Title: k-sets of P$G(3,q)$ with two intersection numbers with respect to planes

Summary:

Let $\mathcal{K}$ be a set of points of $\mathbb{P} = \mathrm{P}G(d,q)$, $d \geq 2$, $\mathcal{P}_h$ be the family of all h-dimensional subspaces of $\mathbb{P}$ and let $0 \leq m_1 < \cdot < m_s$ be an increasing finite series of non negative integers. A k–subset $\mathcal{K}$ of $\mathbb{P}$ is of *type* $(m_1, \ldots, m_s)_h$ if:

(i) $|\mathcal{K} \cap \pi| \in \{m_1, \ldots, m_s\}$ *for every subspace* $\pi \in \mathcal{P}_h$,

(ii) *For every* m_j, $j = 1, \ldots, s$ *there is at least one subspace* $\pi \in \mathcal{P}_h$ *such that* $|\mathcal{K} \cap \pi| = m_j$.

In the talk, k-sets of P$G(3,q)$ with two intersection number, say m and n, with respect to planes will be considered.

A lower bound for the size of such sets for $m \leq q+1$ and some characterizations in the minimal size case will be showed. Also, sets of type $(3,n)_2$ will be studied. Finally a characterization of a non singular Hermitian variety of P$G(3,q^2)$ via its intersection numbers with respect to lines and planes will be presented.